TM 11-4019

WAR DEPARTMENT TECHNICAL MANUAL

RADIO RECEIVER AND TRANSMITTERS

BC-611-A,-B,-C,-D,-E, and-F

REPAIR INSTRUCTIONS

RESTRICTED. DISSEMINATION OF RESTRICTED MATTER. No person is entitled solely by virtue of his grade or position to knowledge or possession of classified matter. Such matter is entrusted only to those individuals whose official duties require such knowledge or possession. (See also paragraph 23b, AR 380–5, 15 March 1944.)

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TM 11–4019, Radio Receiver and Transmitter BC–611–A, –B, –C, –D, –E, and –F, Repair Instructions is published for the information and guidance of all concerned.

[AG 300.7 (2 Jul 45)]

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

CONTENTS

SECTION I

DESCRIPTION OF RADIO RECEIVER AND TRANSMITTERS BC–611–A, –B, –C, –D, –E, AND –F'

1. General

a. USE. Radio Receiver and Transmitter BC–611–(*) is designed for short-range two-way voice communication. It is a press-to-talk portable radiotelephone, receiving and transmitting on the same frequency.

b. RANGE. The set is designed to operate over distances from 100 feet to 1 mile. The maximum range may be considerably greater when operating over water or from a plane.

c. FREQUENCY COVERAGE. The unit is crystal-controlled on both reception and transmission, and will operate over the frequency range of 3,500 to 6,000 kilocycles (kc). However, each unit is adjusted to operate at only one frequency in this band. The set can be made to operate at any frequency in the band by proper choice of crystals and coils. For correct performance, each set must be adjusted to the crystals used. The set transmits and receives amplitude modulated voice signals only.

d. SOURCE OF POWER. Radio Receiver and Transmitter BC–611–(*) is battery-powered. Power requirements are as shown in table I.

Table I

Battery	Drain receiving	Drain transmitting
A Battery BA–37 1.5 volts	0.25 amperes	0.30 amperes
B Battery BA–38 103.5 volts	11 milliamperes	35 milliamperes

[1] See TM 11–235 for installation, operation, and other maintenance data on this equipment.

e. NOMENCLATURE SYMBOL. Official nomenclature followed by the symbol (*) indicates all models of the item of equipment included in this Technical Manual. Thus Radio Receiver and Transmitter BC–611–(*) is used throughout this manual to represent Radio Receiver and Transmitters BC–611–A, –B, –C, –D, –E, and –F.

2. Over-all System Function

a. GENERAL OPERATION. Radio Receiver and Transmitter BC–611–(*) is a transceiver with

Figure 1. Radio Receiver and Transmitter BC–611–A, –B, –C, –D, –E.

interrelated components. Five tubes are used in a superheterodyne receiver circuit and four of the same tubes are used in a grid-modulated transmitter circuit. A block diagram of the set is shown in figure 2. Rapid change-over from receive to transmit is accomplished through a manually operated press-to-talk switch.

rectified signal developed across the diode resistor of the Tube JAN–1S5 (VT–172) is fed back as bias for the previous stages to automatically maintain volume at a constant level. The output of the audio amplifier stage is then coupled to Tube JAN–3S4 (VT–174) of the power amplifier stage. The amplified signal is

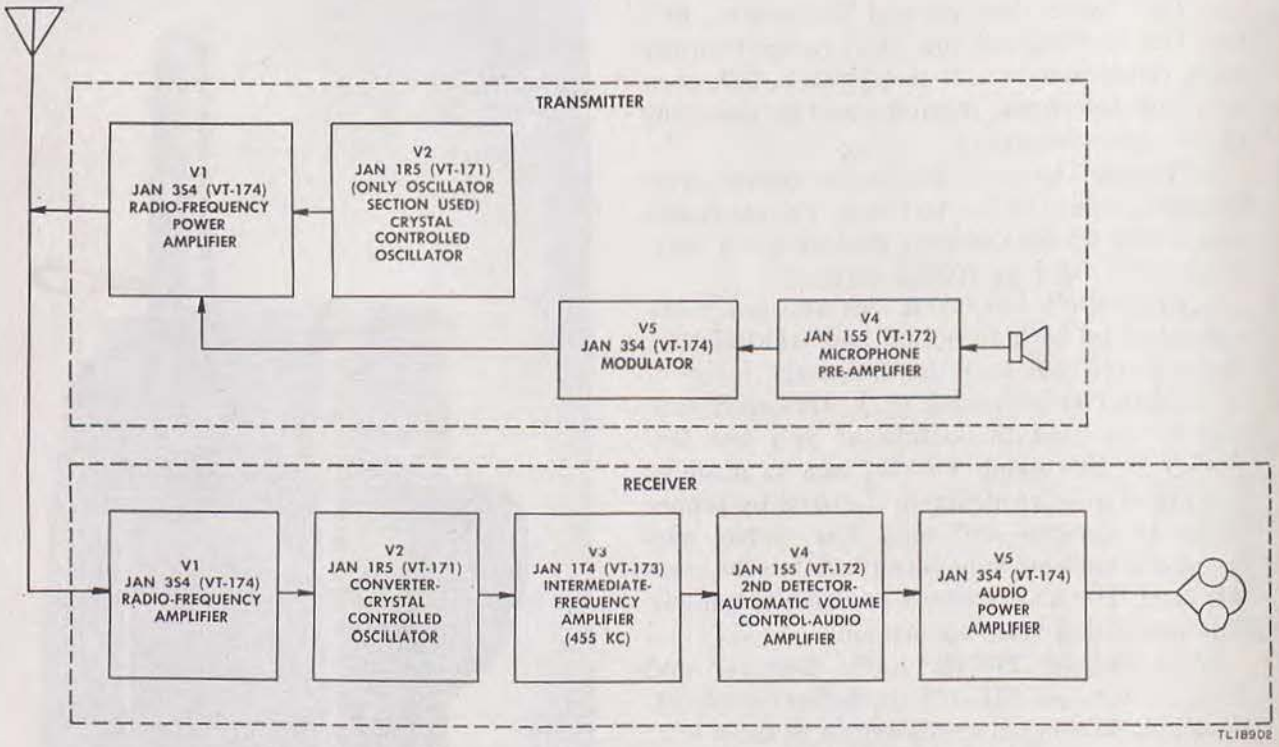


Figure 2. Block diagram, Radio Receiver and Transmitter BC–611–(*).

b. RECEIVER. During reception the incoming signal is impressed on the grid of first radio-frequency (r-f) amplifier Tube JAN–3S4 (VT–174). The output of this stage is coupled to the grid of the Tube JAN–1R5 (VT–171) in the mixer-oscillator stage. At this point the signal is mixed with the signal generated by the oscillator section of the tube to produce an output frequency of 455 kc. This output is fed into the Tube JAN–1T4 (VT–173) of the intermediate-frequency (i-f) amplifier stage. This amplifier output is then coupled to the Tube JAN–1S5 (VT–172) of the second detector, automatic-volume-control and first audio-amplifier stage. In this stage the signal is demodulated and a rectified signal is impressed on the pentode section of the tube of this stage. A portion of the then fed to the receiver (earphone) unit through the audio-output transformer.

c. TRANSMITTER. In the transmit position, the r-f voltage generated by the oscillator stage comprising Tube JAN–1R5 (VT–171) in a Pierce circuit is coupled to the grid of Tube JAN–3S4 (VT–174) utilized in an r-f power-amplifier stage. The microphone output is impressed on Tube JAN–1T4 (VT–173) used in the speech amplifier stage and the output from the stage is then impressed on the grid of modulator Tube JAN–3S4 (VT–174). The output from the modulator stage is then fed into the r-f power amplifier to modulate the r-f voltage present. The modulated r-f output of the stage is then fed to the antenna.

SECTION II

DIFFERENCES BETWEEN MODELS

3. Operational Differences

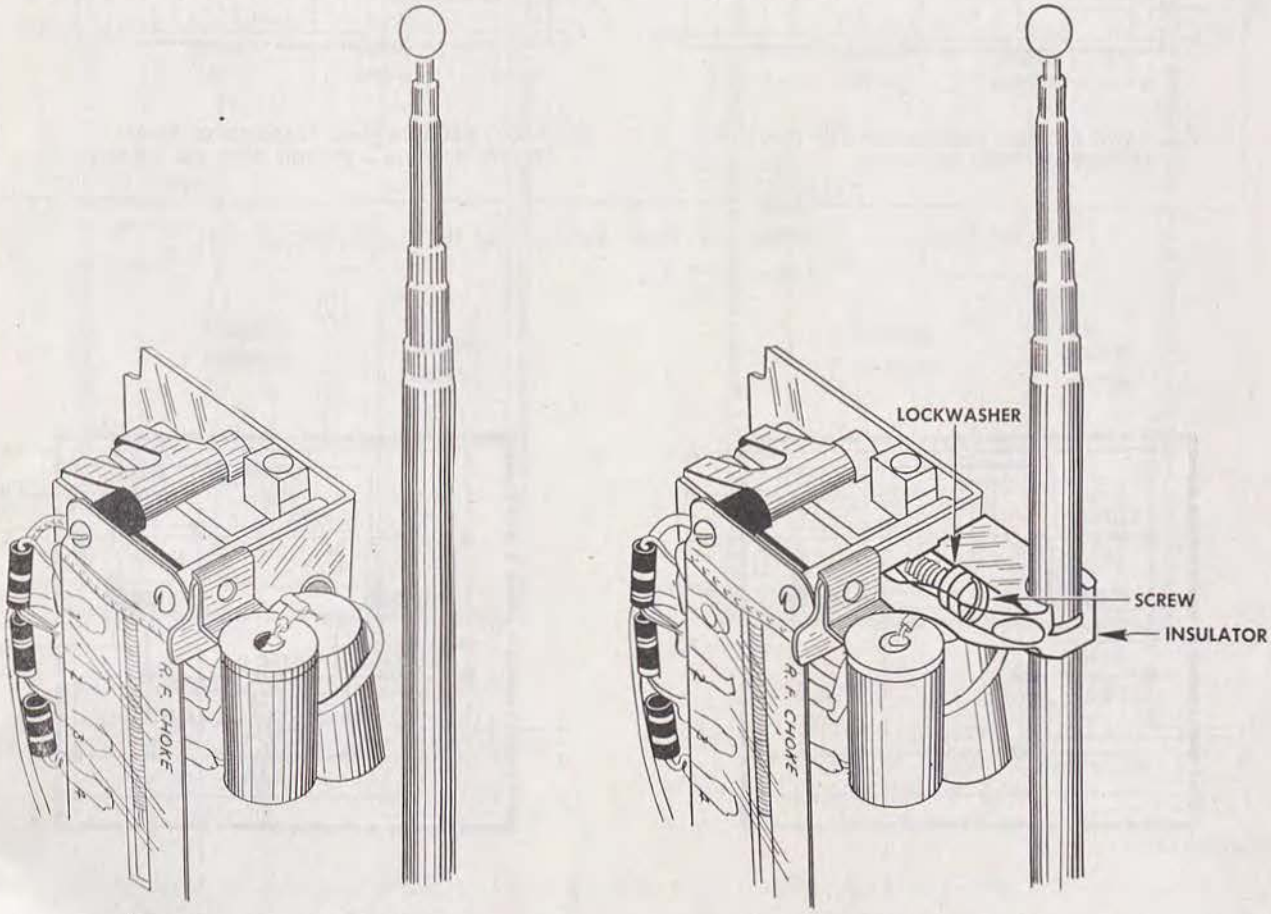
All models of Radio Receiver and Transmitter BC–611–(*) are operated in the same manner.

4. Design Differences

a. IDENTIFICATION OF MODEL. Since the chassis for any BC–611–(*) will fit any housing for BC–611–(*) and the chassis itself bears no serial number, reference to the nameplate on the housing for the serial number and specific model of BC–611–(*) may not give the correct information. Because of this, the repairman must carefully inspect the chassis and housing of the particular set on which he is working to determine the exact model of the equipment to be repaired. Changes made in the different models are listed in the paragraphs below.

b. PARTS DESIGNATIONS. Designations stamped on parts vary in some models. In the BC–611–A and –B the reference number on the first i-f transformer is marked L4, the second i-f transformer L5, and the audio-output coil L6. However, in the BC–611–C, –D, –E, and –F, the first i-f transformer is marked T1, the second i-f transformer T2 and the audio-output coil L4. (See fig. 60.)

c. ANTENNA INSULATOR SUPPORT ASSEMBLY. BC–611–A, –B, and the first production models of BC–611–C were not equipped with the antenna insulator support assembly. The chassis of BC–611–A, –B, and –C without the insulator is shown in figure 3A and the chassis of the late production models of BC–611–C, –D, –E, and –F showing the insulator installed, is shown in figure 3B. In accordance with MWO SIG 11–235–2 this insulator must be installed on all repaired sets.



A— CHASSIS WITHOUT INSULATOR

B— CHASSIS WITH INSULATOR

TL18903

Figure 3. Chassis, top section, Radio Receiver and Transmitter BC–611–(*).

d. ADDITION OF RESISTORS. Resistor R26 is not included in BC–611–A. Figure 4A shows this portion of the circuit in the BC–611–A while figure 4B shows the portion of the circuit for subsequent models. On late BC–611–C sets and on all BC–611–D, –E, and –F sets, a dummy lug was added to section 0 of the change-over switch to accommodate the addition of resistor R28. The change is shown in figure 5A for BC–611–A, –B, and early production models of BC–611–C. Figure 5B shows the change in late production models of BC–611–C and all models of BC–611–D, –E, and –F.

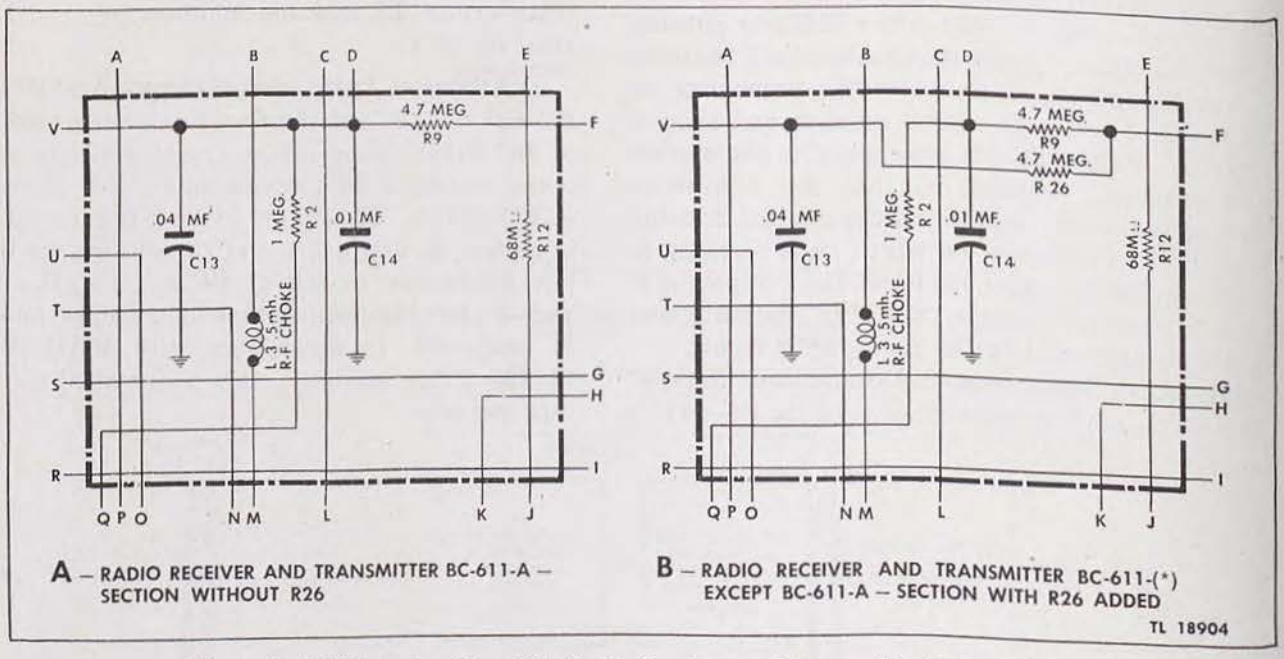


Figure 4. Addition of resistor R26, Radio Receiver and Transmitter BC–611–(*).

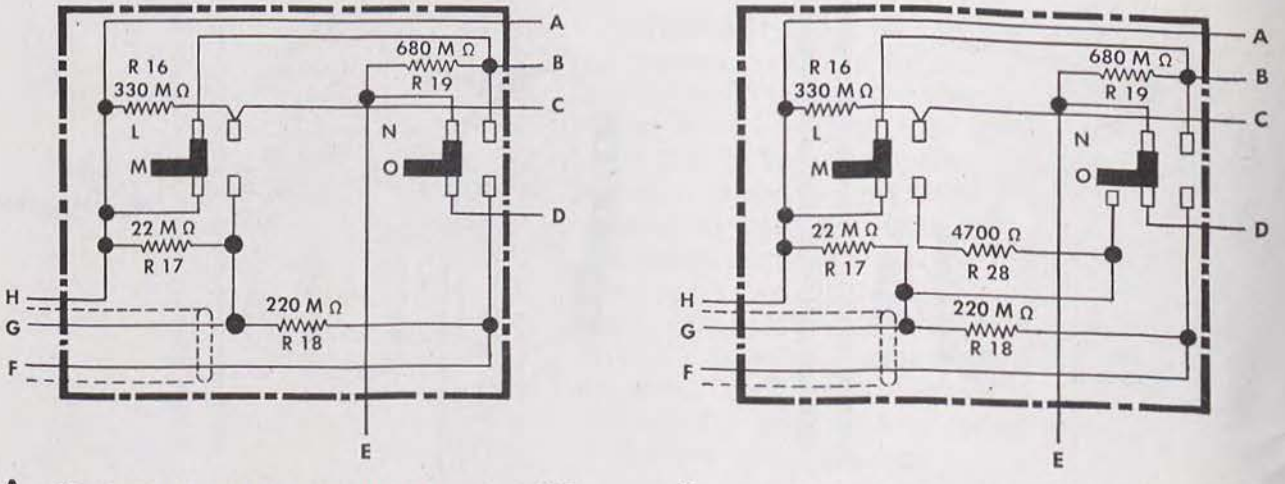


Figure 5. Addition of resistor R28, Radio Receiver and Transmitter BC–611–(*).

e. TRANSPOSITION OF SECTIONS E AND F OF CHANGE-OVER SWITCH. On models BC–611–C manufactured by Electrical Research Laboratories and coded CZE, sections E and F of the change-over switch were transposed to make shorter connections. The portion of the circuit showing all models except BC–611–C, coded CZE, is shown in figure 6A. The portion of the circuit showing the transposition is shown in figure 6B. The legend on the change-over switch insulator was changed to match the transposition as shown in figure 7.

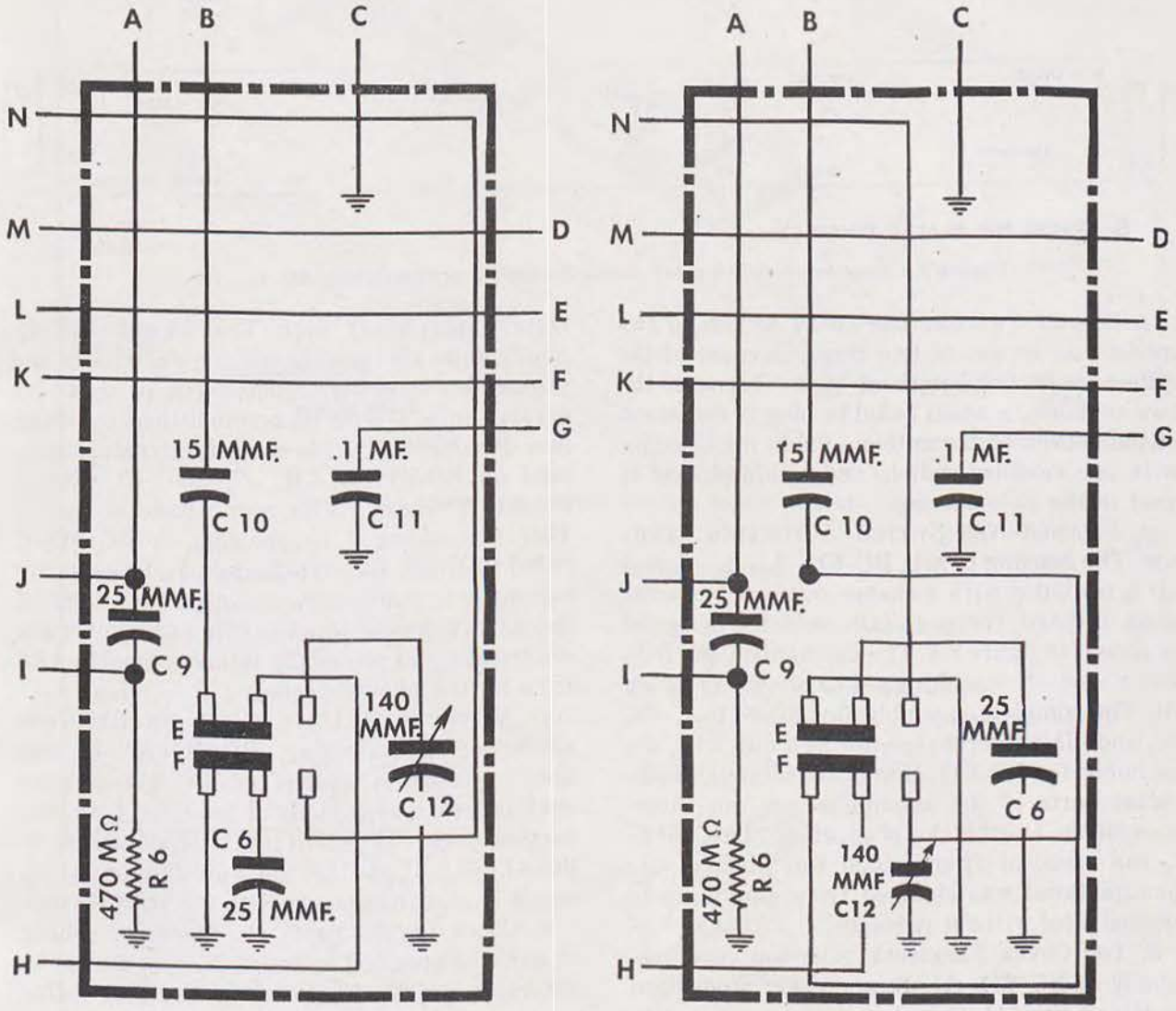


Figure 6. Transposition of switch sections E and F, Radio Receiver and Transmitter BC–611–(*).

A– LEGEND FOR BC-611-(*) EXCEPT BC-611-C CODED CZE

B– LEGEND FOR BC-611-C CODED CZE

Figure 7. Change-over switch cover, Radio Receiver and Transmitter BC–611–(*).

f. ON-OFF SWITCH. The on-off switch in any model may be one of two types. Because of the difference in the length of throw between the two switches, a small bakelite plug is cemented at the bottom of the antenna guide for use only with one modified switch, and a thinner pad is used in the antenna cap.

g. CHANGE-OVER SWITCH ACTUATING LINKAGE. The housing of sets BC–611–A, –B, –C, and –D is equipped with a change-over switch actuating linkage (press-to-talk switch) designed as shown in figure 8A. The mechanism for BC–611–E and –F was designed as shown in figure 8B. The complete assembly for BC–611–A, –B, –C, and –D is interchangeable as a unit with the assembly for BC–611–E and –F, although individual parts of the assemblies are not interchangeable. During the production of BC–611–C, the material from which the linkage was manufactured was changed from aluminum to pressed steel without redesign.

h. TOP COVER ASSEMBLY. The top cover assembly of BC–611–A, –B, and early production models of BC–611–C uses a ceramic antenna insulator and a removable moisture seal as shown in figure 9B; late production models of BC–611–C and all models of BC–611–D, –E, and –F have a polystyrene insulator and include a moisture seal rolled over a bead on the insulator as shown in figure 9A.

i. MICROPHONE UNIT AND RECEIVER (EARPHONE) UNIT. The early production models of BC–611–A have a crystal microphone unit and a crystal receiver (earphone) unit. Later production models of BC–611–A and all subsequent models have a dynamic microphone unit and receiver (earphone) unit. The crystal and dynamic units are interchangeable electrically and physically; however, replacement of defective crystal units should be accomplished by using new dynamic units. The cones for dynamic units used on BC–611–A, –B, –C, and –D (except BC–611–C coded CZE) were made of paper. This was changed to phenolic in BC–611–C coded CZE and BC–611–E and –F. This change was made to improve the moisture resistance of the item; however, units having paper cones are electrically and physically interchangeable with units having phenolic cones.

j. MICROPHONE UNIT CAP AND RECEIVER (EARPHONE) UNIT CAP. BC–611–A, –B, and early production models of BC–611–C were equipped with caps made of bakelite. Late production models of BC–611–C, and all models of BC–611–D, –E and –F have an aluminum cap which is interchangeable with the bakelite cap.

k. COLOR CODING OF WIRE. The color coding of wires as specified in figure 61 may change in different models; however, in the descriptive portions of these instructions, the wires will be referred to by the color coding specified in the figure noted above. The repairman must check each wire with the circuit involved before proceeding with the work.

l. EXTERNAL HEADSET AND MICROPHONE. Later models of Radio Set SCR–536–F are equipped with a new type bottom cover which provides jacks for use of an external headset and microphone when desirable. The MIKE AND PHONE CHANGE-OVER SWITCH located inside the bottom cover and marked EXTERNAL-INTERNAL cuts the jacks in or out

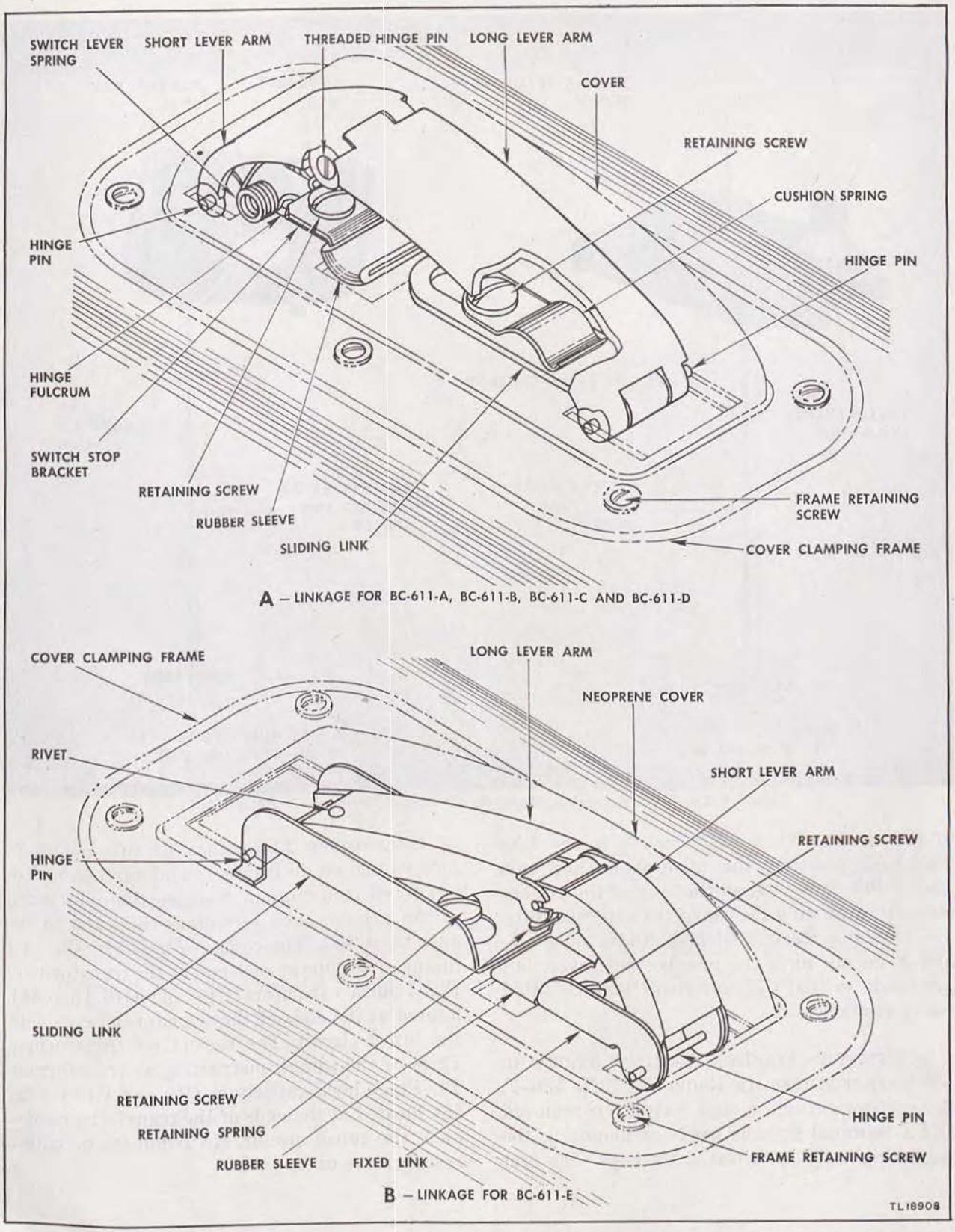


Figure 8. Change-over switch actuating linkage, Radio Receiver and Transmitter BC–611–(*).

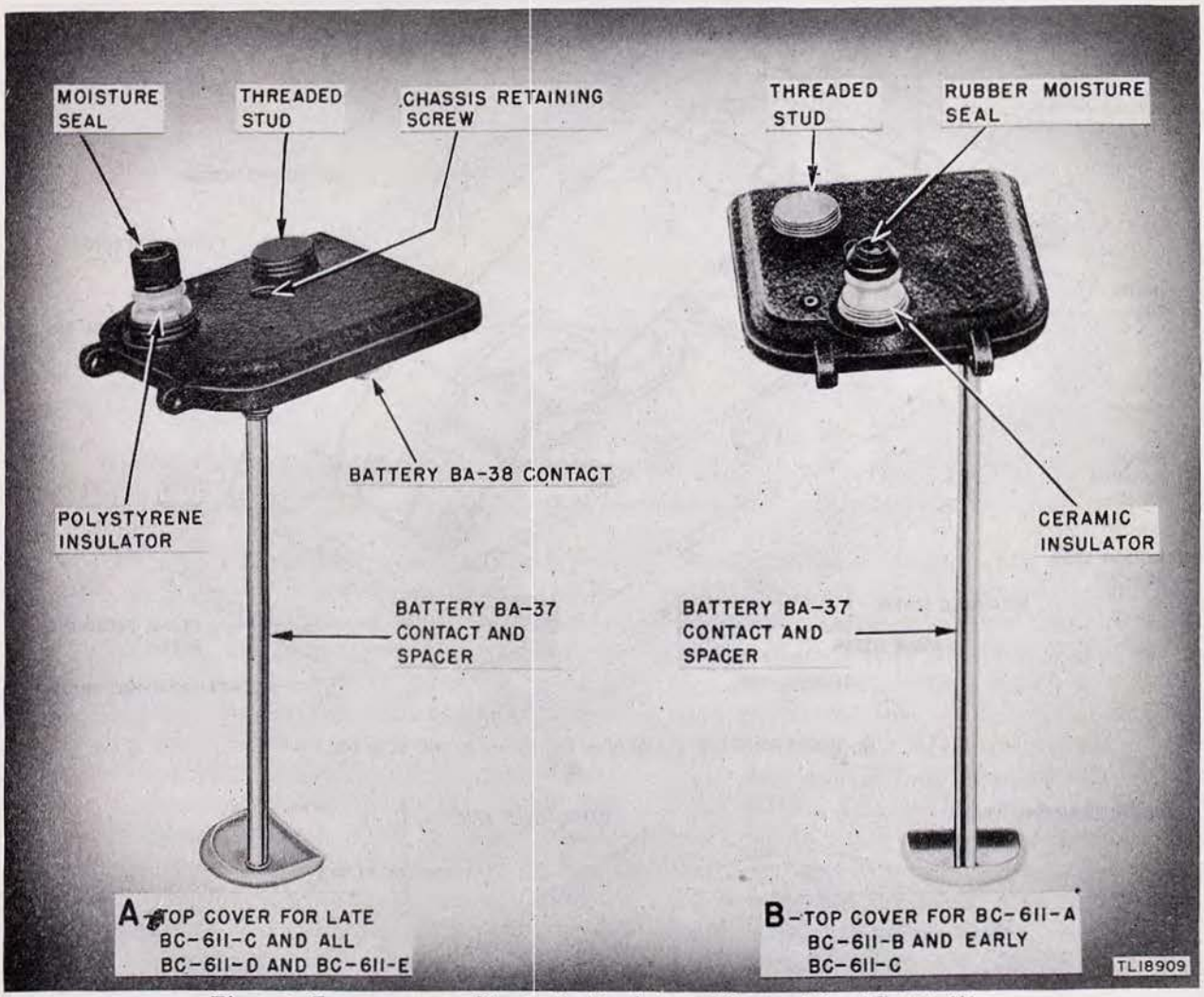


Figure 9. Top cover assembly, Radio Receiver and Transmitter BC–611–(*).

of the circuit. When the switch is in the EXTERNAL position, the microphone and earphone units mounted on the side of the set are cut out, permitting the use of the external units. (See fig. 10.) Early models of Radio Set SCR–536–F do not have the new bottom cover, but are made so that the new cover may be fitted when available.

m. RESISTOR-CAPACITOR TERMINAL STRIP AND I-F TRANSFORMERS. In Radio Set SCR–536–F, the resistor-capacitor cups have been removed and a terminal strip is used for mounting the parts originally contained in the cups. The first i-f transformer T1 consists of two windings each wound on an iron core and surrounded by powdered iron cups to increase the inductance of the primary and secondary coils and to reduce their size. The coils are tuned by the two tuning slugs, one at each end of the transformer. Fixed mica capacitors C15 and C16 (fig. 58) located at the ends of the transformer complete the tuned circuit. The second r-f transformer T2 is of the same construction as transformer T1. Fixed mica capacitors C19 and C19.1 (fig. 58) located at the ends of the transformer complete the tuned circuit. No trimmers or shunt resistors are used.

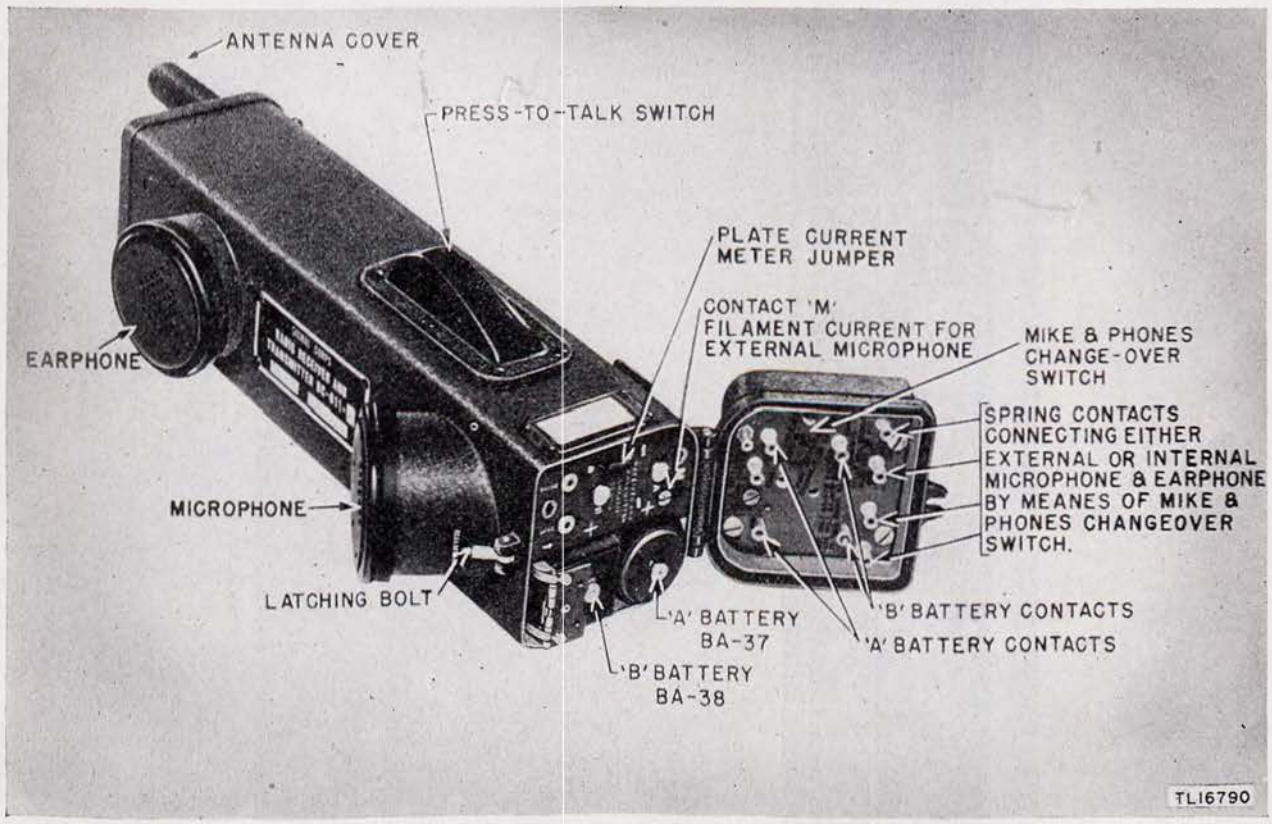


Figure 10. Radio Set SCR–536–F Showing Battery Compartment and New Type Bottom Cover.

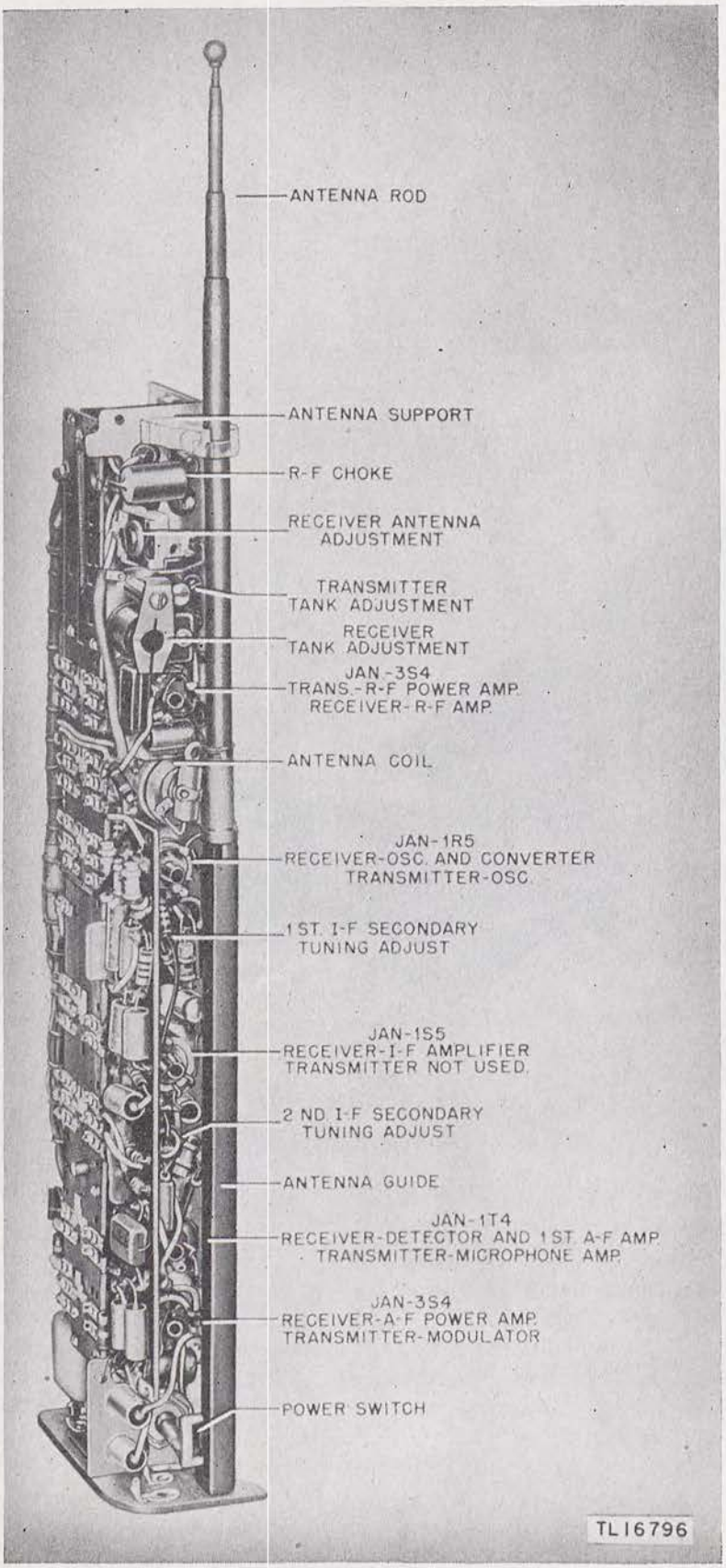


Figure 11. Radio Receiver and Transmitter BC–611–F, side view of chassis.

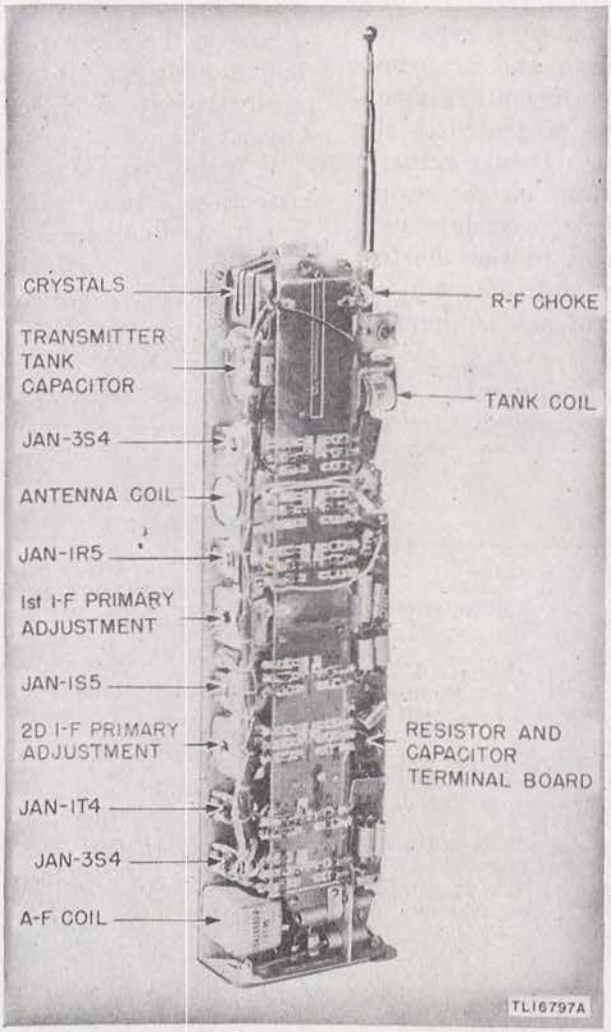


Figure 12. Radio Receiver and Transmitter BC–611–F, front view of chassis.

SECTION III

INITIAL REPAIR PROCEDURES

5. General

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

Maintenance personnel should follow the procedure outlined in this manual when repairing and overhauling Radio Receiver and Transmitter BC–611–(*). 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, and results 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 II

Item	Description
Assorted hand tools.	Pliers, screw drivers, etc.
Insulated alignment tool.	
Soldering iron and solder.	
Signal generator radio frequency.	Covering the ranges 455 kc to 6,000 kc. Modulated 30% at 400 cps or 1,000 cps.
Signal generator audio frequency.	Providing 1,000 cps output, with an output of at least 5 v across high impedance load.
Test Set IE–17–(*).	Comprised of: Test Unit I–135–(*), Test Stand FT–252–(*), Test Case CS–81–(*), and Antenna A–82–(*).
Dry-cleaning solvent (SD).	
Assorted brushes.	
Pipe cleaners.	
Clean cloths.	Lint-free.
Sandpaper.	#0000.
Crocus cloth.	

7. Disassembly for Inspecting and Cleaning

a. BATTERY. Open bottom cover of set by unscrewing the knurled nut of the spade bolt and cover nut assembly. Remove both batteries. (If batteries do not come out easily, they may be pushed out of housing after removal of chassis and top cover.) (See fig. 13.)

b. CHASSIS. Disconnect microphone unit lead and receiver (earphone) unit lead from chassis end plate jacks. Remove data plate, and data plate cover from housing by sliding out toward the bottom of housing when bottom cover is open. (See fig. 13.) Unscrew chassis retaining screw on top cover of housing and slide chassis out of housing. (If chassis does not come out easily, it may be pushed out after removing top cover.)

c. TOP COVER ASSEMBLY. Remove top cover assembly by unscrewing the top hinge pin with a narrow bladed screw driver. The top cover will be free of the housing when this pin is removed. Remove antenna cap and chain assembly from top cover assembly by unscrewing the retaining screw.

d. BOTTOM COVER AND STRAP. Remove bottom cover assembly by unscrewing the bottom hinge pin with a narrow bladed screw driver. This will also free strap.

e. MICROPHONE AND RECEIVER. Insert screw driver between filler and clip assembly and housing, and twist as shown in figure 14A. Unscrew microphone unit cap and receiver (earphone) unit cap, and lift microphone unit out of well, and unscrew housing grounding screw as shown in figure 14B. Lift receiver (earphone) unit out of well and unscrew housing grounding screw.

f. TUBE REMOVAL. Open tube retainer catches. Carefully insert a one-eighth-inch diameter wooden dowel rod or a small screw driver through center hole in tube socket and gently push each tube out of socket. (See fig. 15.)

g. CRYSTAL REMOVAL. Remove both crystals from chassis by lifting crystal retaining spring. (See fig. 16A.) Insert a small screw driver between one of the crystals and the crystal socket, as shown in figure 16B, and pry gently. After removal has been started, the crystals may be withdrawn by hand.

h. ANTENNA COIL REMOVAL. Remove antenna coil from chassis by inserting a thin screw driver between antenna coil and antenna coil socket, and prying gently as shown in figure 17. When loose, the coil may be removed by lifting it up by hand.

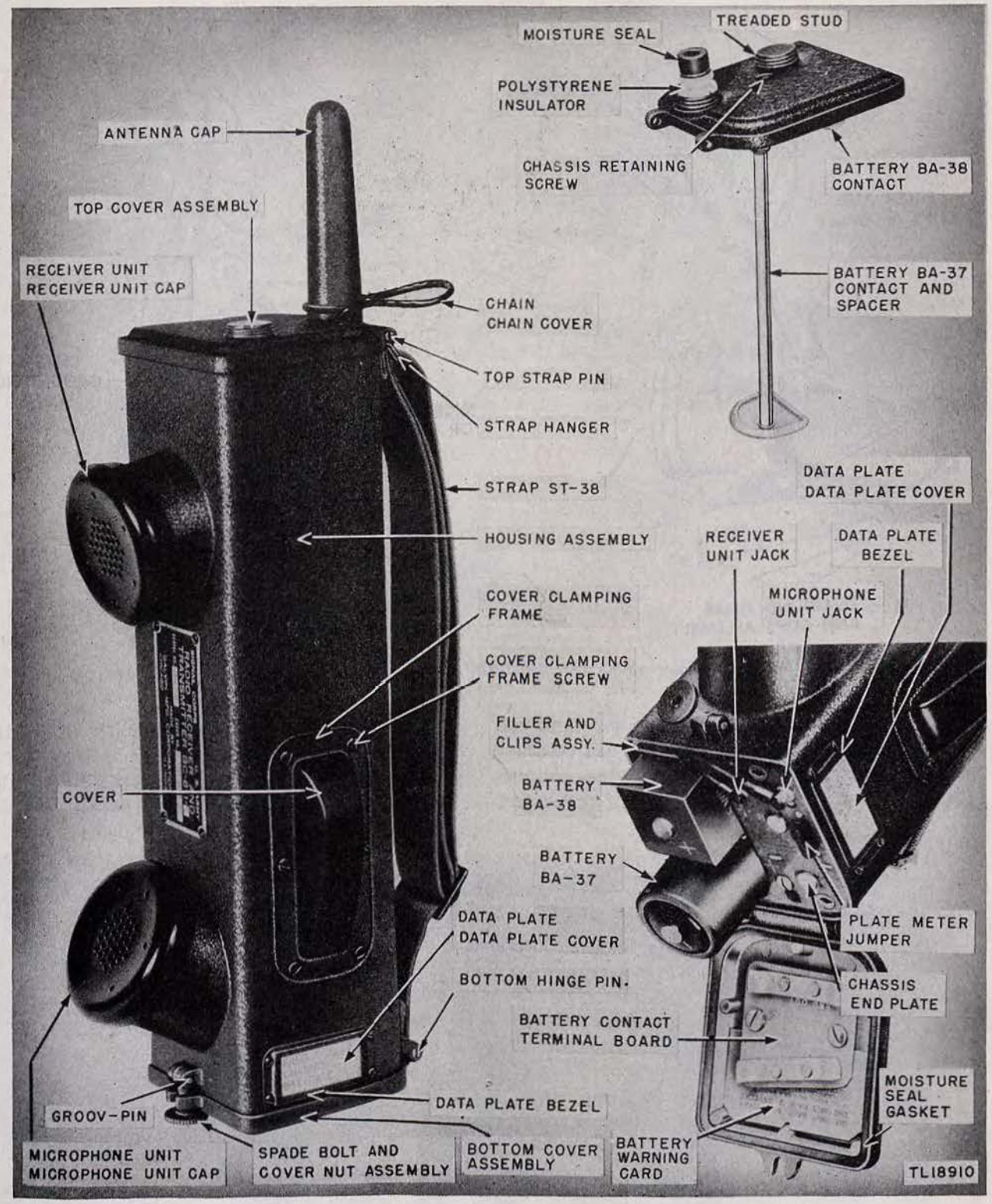


Figure 13. Location of parts, Radio Receiver and Transmitter BC–611–(*).

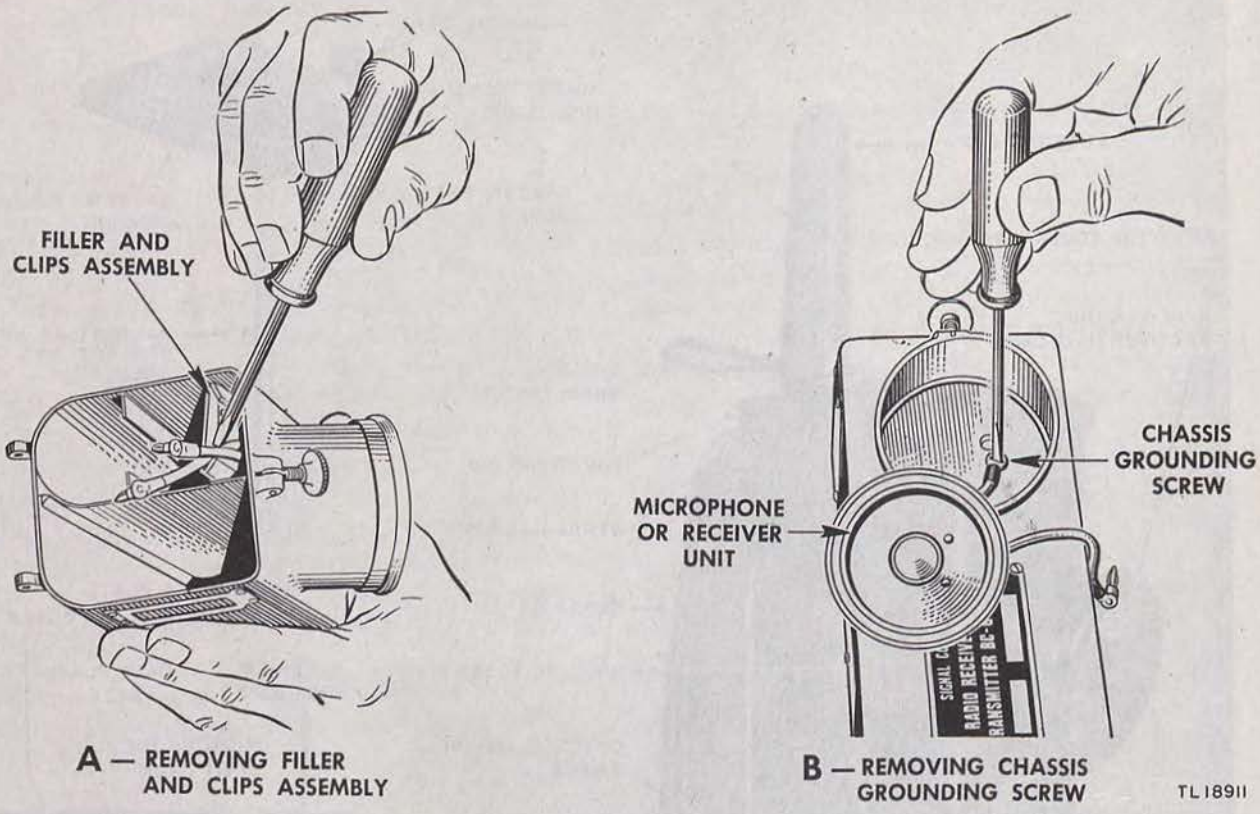


Figure 14. Removal of microphone or receiver unit, Radio Receiver and Transmitter BC–611–(*).

i. R-F COIL REMOVAL. Remove r-f tank coil from chassis by first loosening the coil retainer spring screw, and then rotating the coil retainer spring. Gently pry coil out of the socket as shown in figure 18 and then lift out with fingers.

j. CHANGE-OVER SWITCH LINKAGE REMOVAL. Remove assembly as directed in paragraph 52.

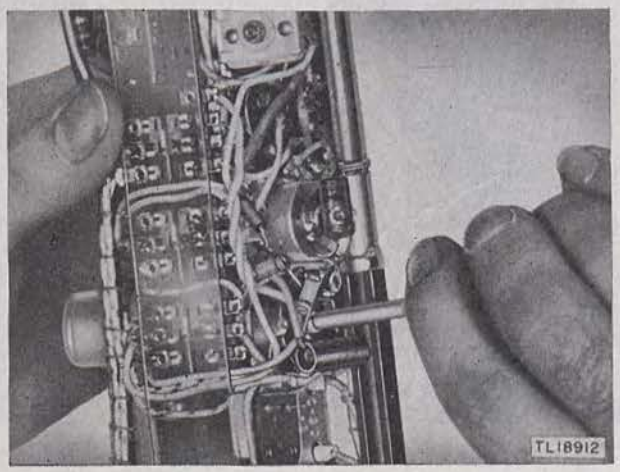


Figure 15. Removal of tubes, Radio Receiver and Transmitter BC–611–(*).

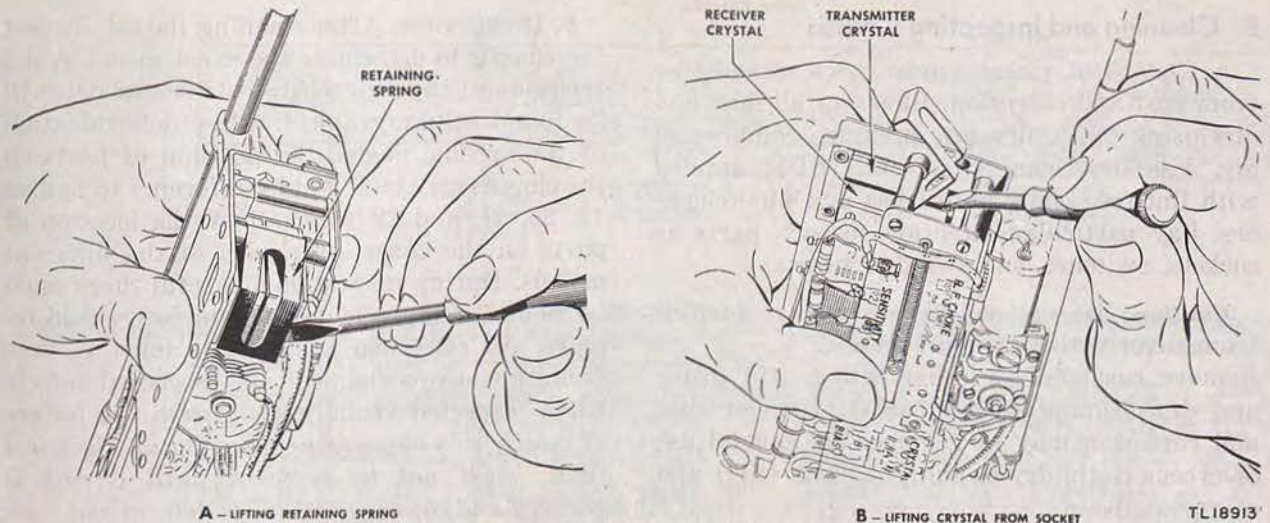


Figure 16. Removal of crystals, Radio Receiver and Transmitter BC–611–(*).

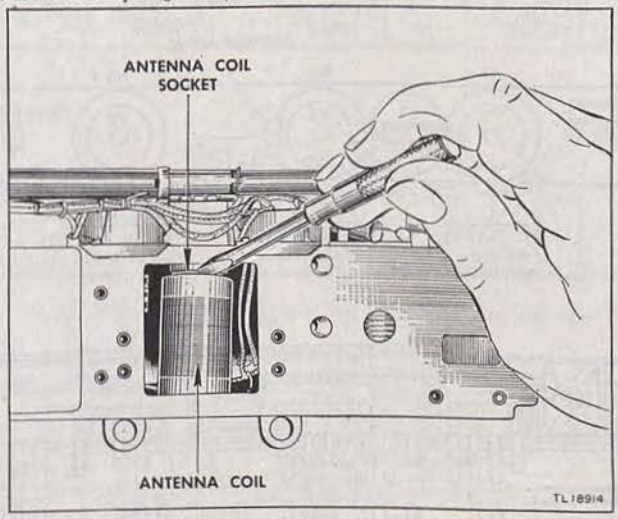


Figure 17. Removal of antenna coil from socket, Radio Receiver and Transmitter BC–611–(*).

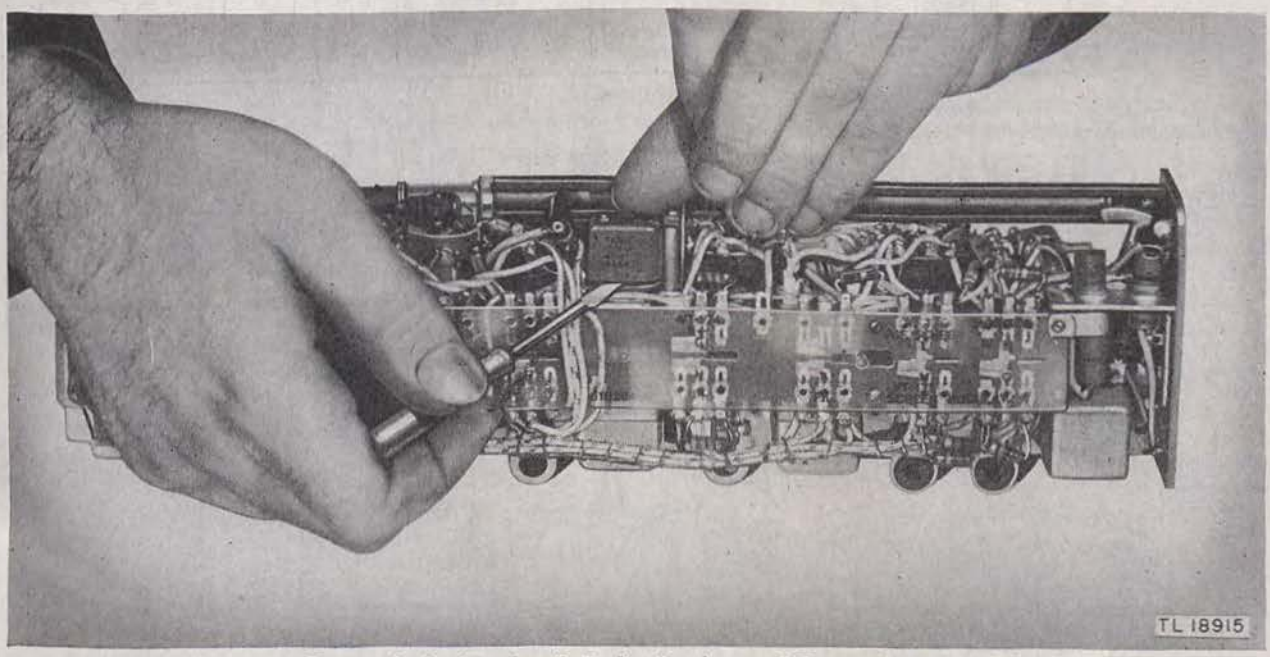


Figure 18. Removal of r-f tank coil, Radio Receiver and Transmitter BC–611–(*).

8. Cleaning and Inspecting Chassis

a. CLEANING. Chassis must be clean and free from rust and corrosion. Blow out all dust and dirt using clean, dry low pressure compressed air. Use dry-cleaning solvent (SD), applied with lint-free cloth or brushes and pipe cleaners. Pay particular attention to such parts as sockets, switches, and switch contacts.

Caution: Do not attempt to remove tarnish from silver-plated switch contacts.
Remove rust and corrosion with a stiff brush and dry-cleaning solvent (SD). Heavier rust and corrosion may be removed by careful use of crocus cloth, dry-cleaning solvent (SD) and compressed air.

b. INSPECTION. After cleaning the set, inspect the chassis to determine the exact model. A description of the differences between models will be found in paragraph 4. After determination of the specific model, the position of parts on the chassis may be found by reference to figures 19, 20, 21, and 22 which show the location of parts on the chassis for each of the different models. During inspection a careful check must be made 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.*

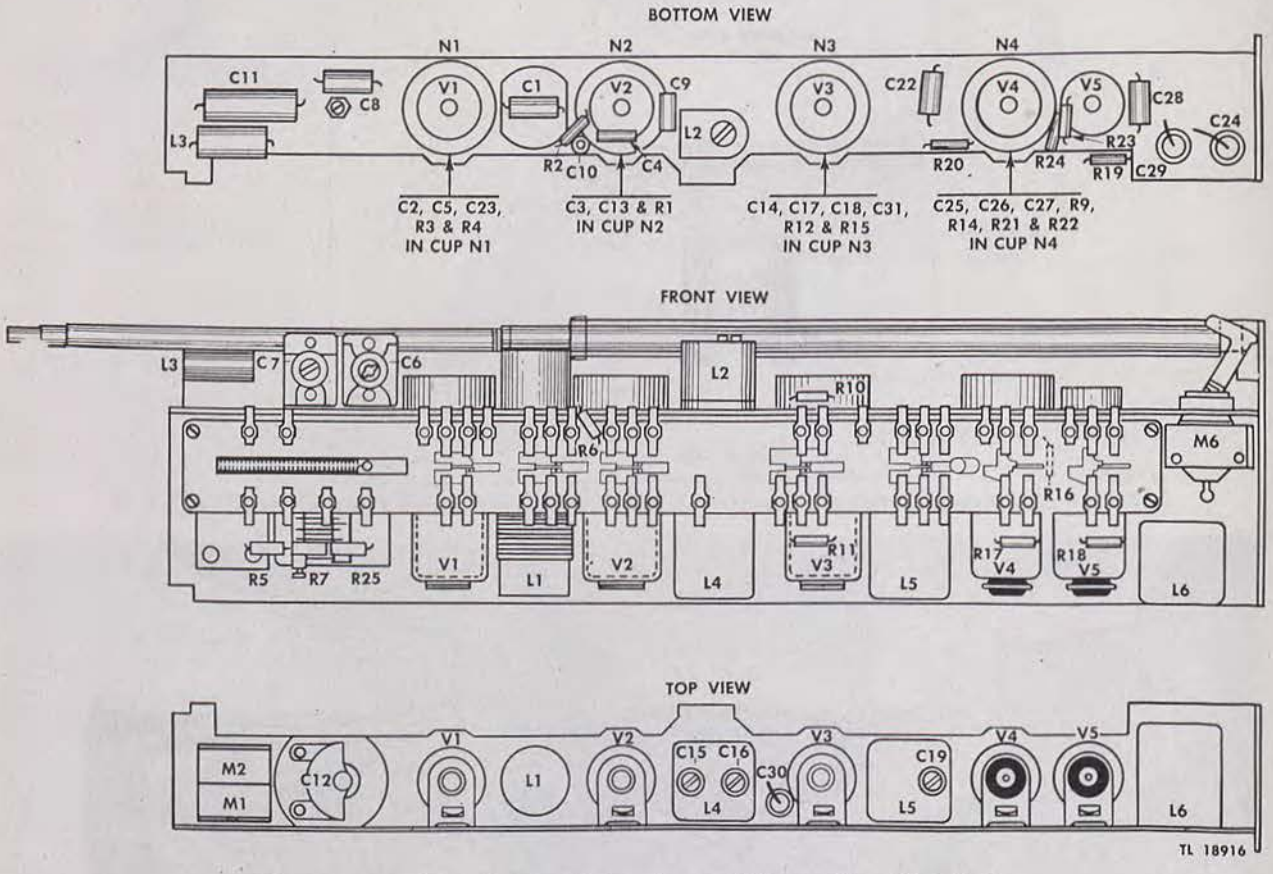


Figure 19. Parts location, Radio Receiver and Transmitter BC–611–A.

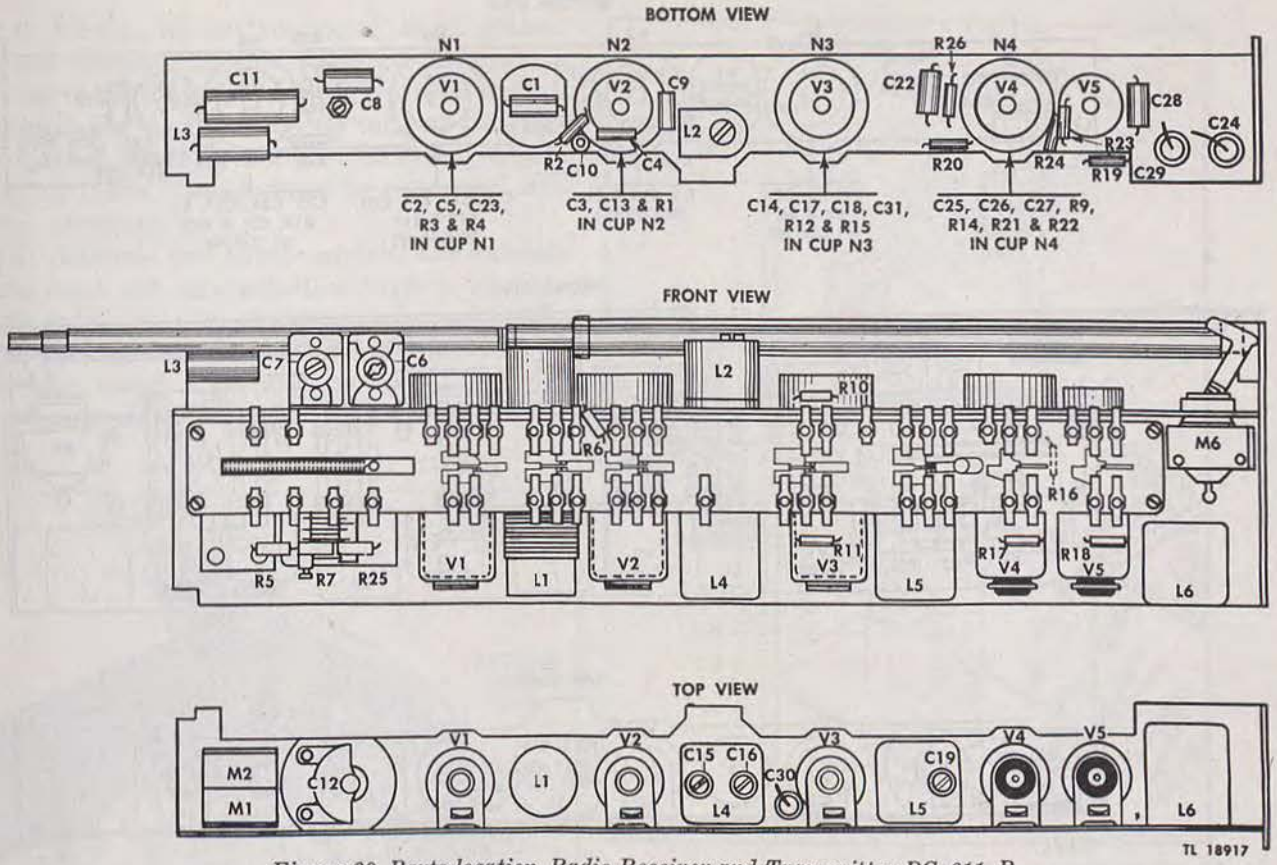


Figure 20. Parts location, Radio Receiver and Transmitter BC–611–B.

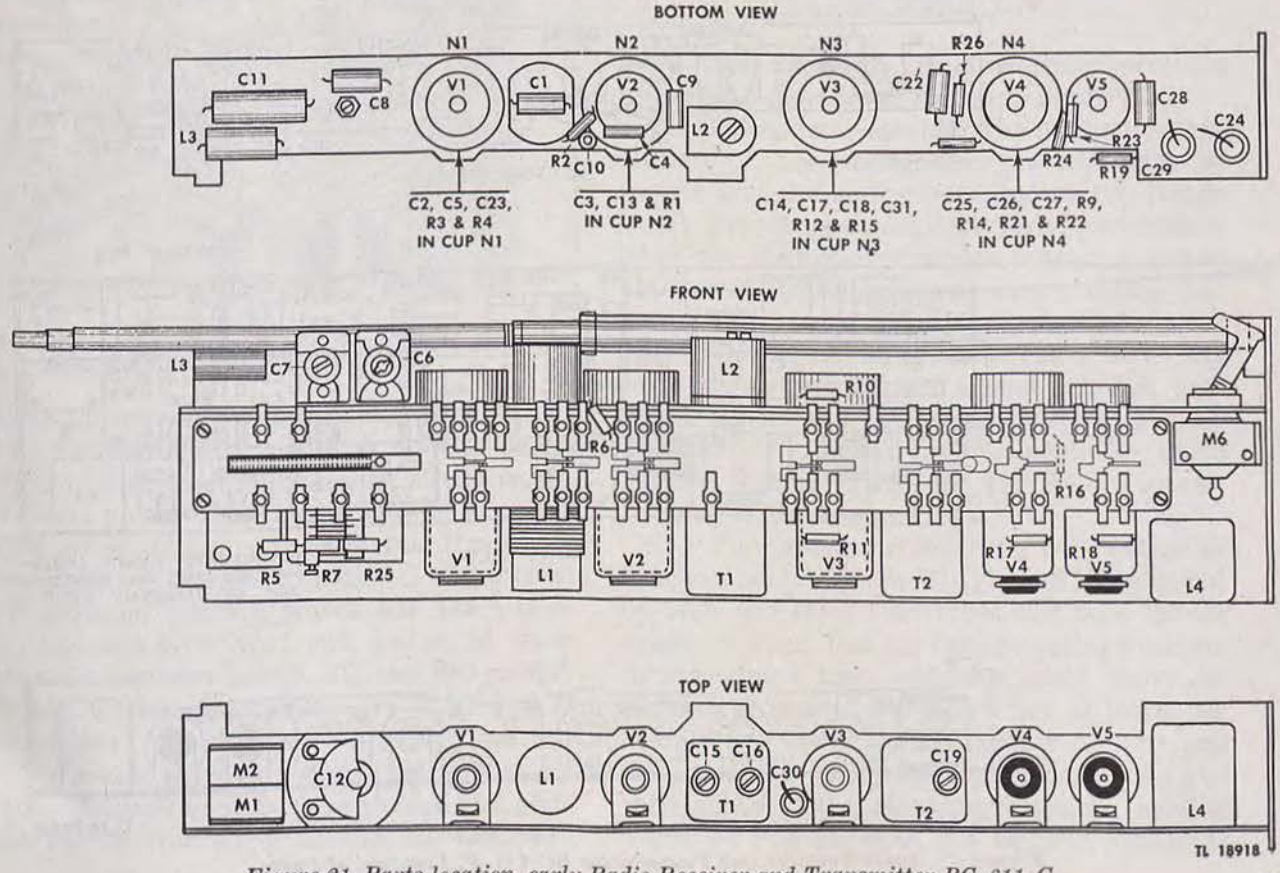


Figure 21. Parts location, early Radio Receiver and Transmitter BC–611–C.

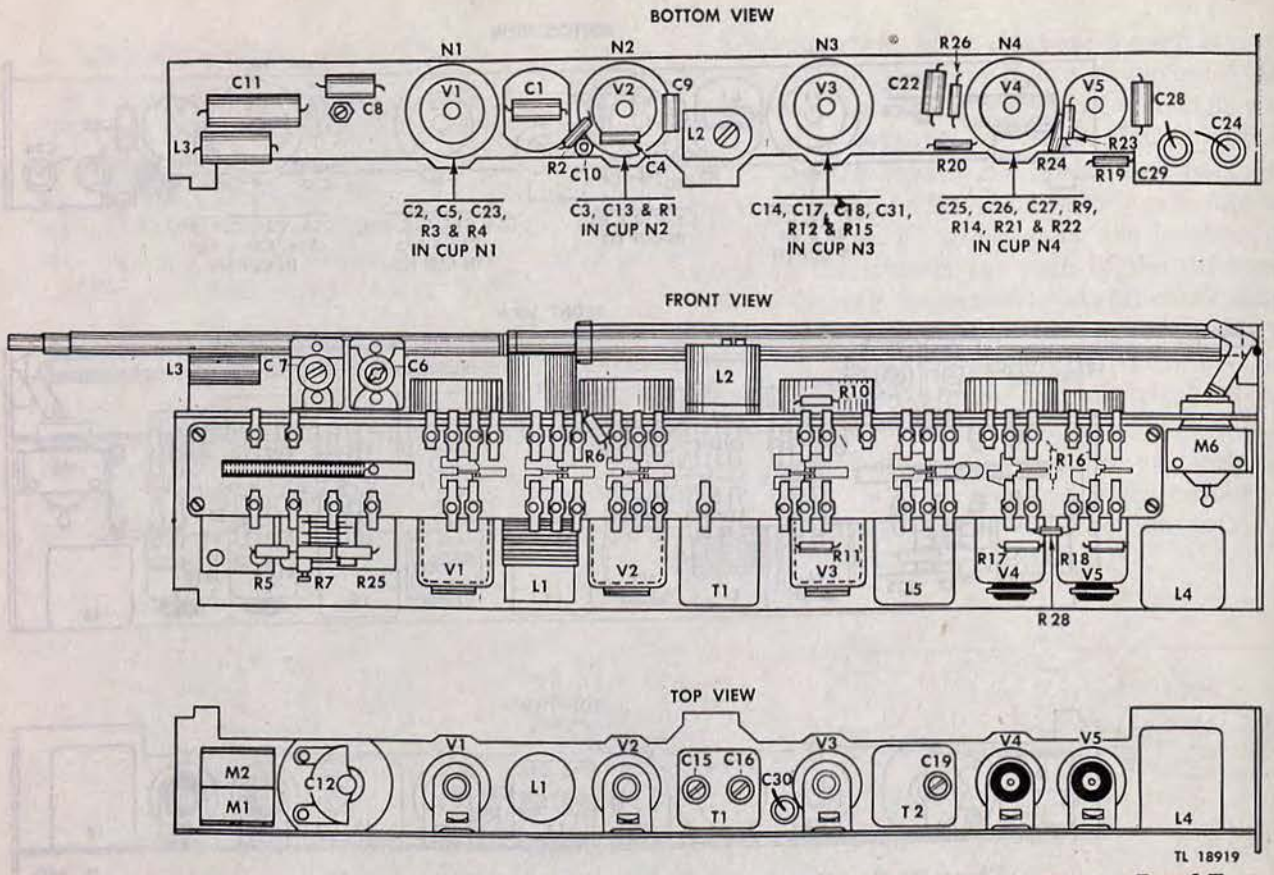


Figure 22. Parts location, late Radio Receiver and Transmitter BC–611–C, and all models of BC–611–D and E.

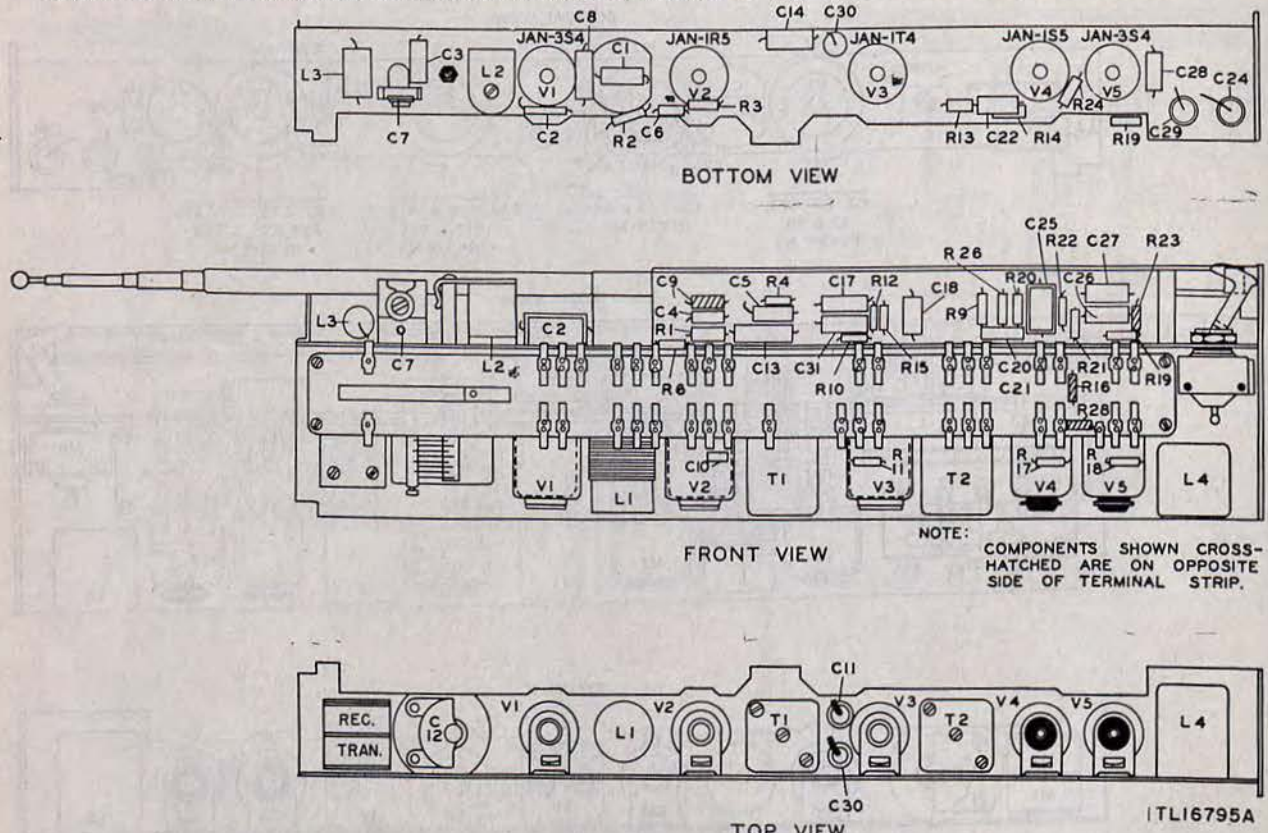


Figure 23. Radio Receiver and Transmitter BC–611–F. Location of Parts.

(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 torn or missing, and bare wires must not be shorted to chassis or other parts. Chassis must be clean and free from corrosion.

(2) *Antenna and power switch.* The antenna guide must not be cracked or broken. The antenna guide installed on a chassis using a switch with a short throw, must have a bakelite plug securely cemented in place as shown in figure 24. Do not use a plug with a long throw switch.

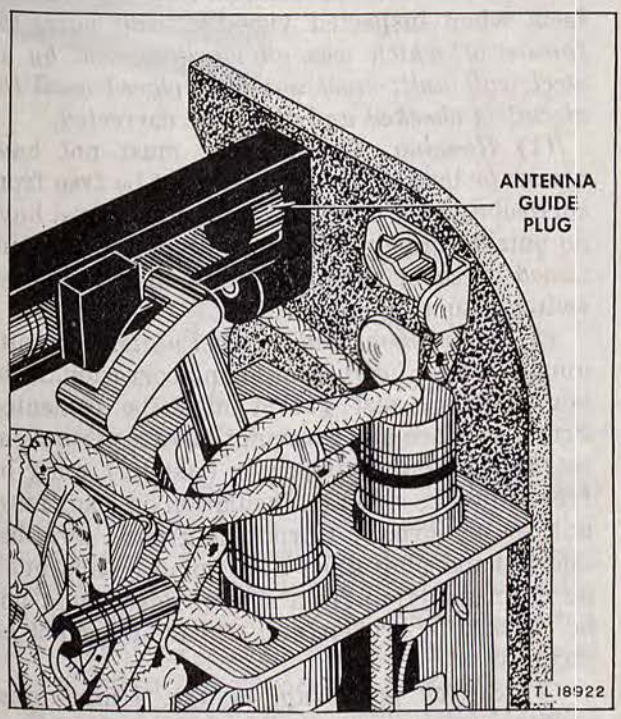


Figure 24. Use of antenna guide plug, Radio Receiver and Transmitter BC–611–(*).

Antenna must slide easily in antenna guide and lower section of antenna must actuate on-off switch without binding. The on-off switch toggle arm must not be broken, and must be actuated by the lower section of the antenna. It must be open circuited between points AC and BD in OFF position, between points AB and CD in both ON and OFF positions, and must show continuity between points AC and BD in ON position. *Terminal notations A, B, C and D listed above do not appear on switch but are only reference notations as shown in figure 25.*

(3) *Chassis end plate.* The chassis end plate must not be cracked or broken. Contacts and

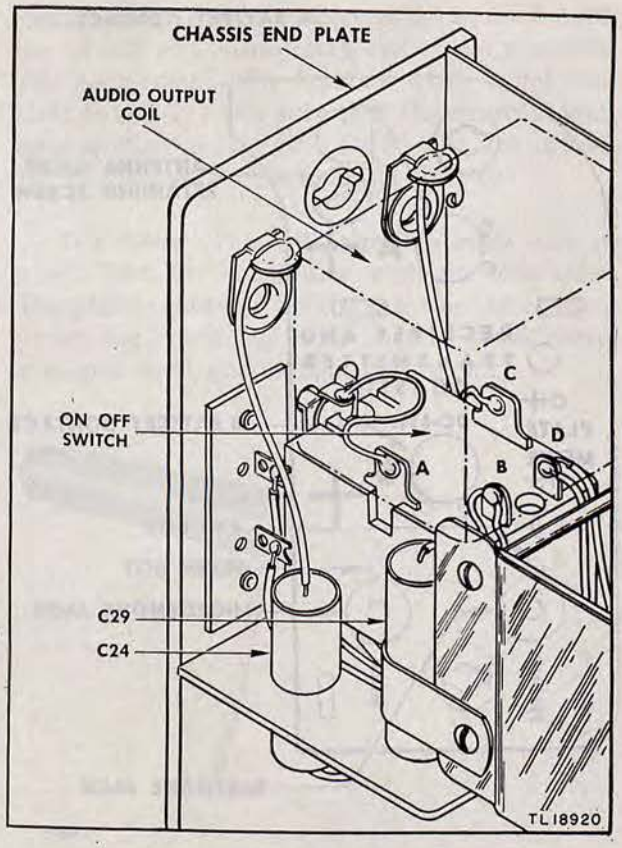


Figure 25. On-off switch, Radio Receiver and Transmitter BC–611–(*).

jacks must be clean and free from corrosion and legend must be as shown in figure 26.

(4) *Change-over switch.* The mechanical operation of the change-over switch must be smooth and the spring must return the switch to its proper position. The force required to move the change-over switch must not exceed 5½ pounds when measured with a spring balance. The plastic change-over switch cover must be clean and must not be cut or torn. The cover must have correct legend for that particular model and the legend must be in place and securely attached. Refer to applicable parts location figures 19, 20, 21, and 22 for correct position of contacts and lugs.

(5) *Tube retaining brackets.* Tube retaining brackets holding tubes V1, V2, and V3 must not be bent and must hold tubes and tube shields firmly in place. Test the tube retaining brackets by inserting a tube, and tube shield where applicable, in socket. With retainer in place, jar chassis and check for movement of tube and tube retainer. After testing, remove tube and tube shield. Tube retaining brackets, holding tubes V4 and V5 must not be bent, and must

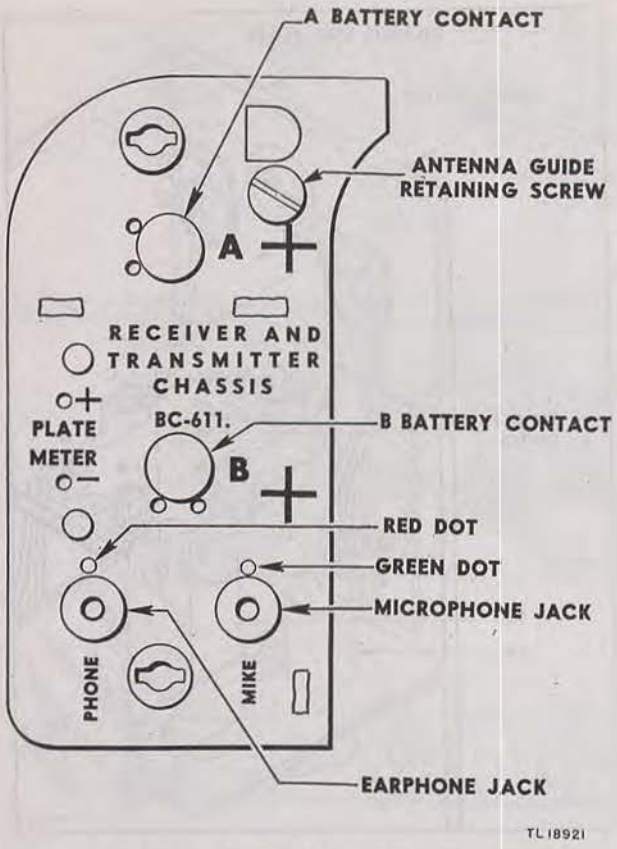


Figure 26. Chassis end plate legend, Radio Receiver and Transmitter BC–611–(*).

hold tubes firmly in place. Rubber grommets must not be torn or broken and must not have a permanent set. The antenna coil socket and the r-f tank coil socket must be clean and unbroken.

(6) *Antenna Support Assembly.* The antenna insulator support assembly must be in place on the chassis of all models. The assembly must be clean, and securely attached to chassis. Clearance space between support and antenna in particular must be free from dirt and grease. The threads of the antenna insulator retaining screw and nut must not be stripped. The antenna assembly must not be bent. It must be capable of full extension without binding and must be free from corrosion and large worn areas in the plating. Extend the antenna to its full length and retract noting the operation. The antenna tip must be securely in place. The antenna wiper support must be clean, free from grease, unbroken, and held securely in place by retaining rivet. The antenna guide ferrule must not be bent or broken and must be securely soldered to wiper assembly.

(7) *Capacitor.* Capacitor C6 and C7 assemblies must be clean and held securely in place. Capacitor C12 must be held securely in place and plastic cover must not be broken, cracked, or loose. Resistor-capacitor cups must not be broken, solder terminals must not be broken, and cups must be securely cemented in place.

9. Inspecting and Cleaning Removed Parts

a. CLEANING. Remove all dust, dirt, and corrosion from removed parts, following the procedure as outlined in paragraph 8*a*.

b. INSPECTING. All removed parts 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 the circuit is checked and the fault corrected.*

(1) *Housing.* The housing must not have cracks or breaks in castings, must be free from corrosion, must not be scratched, and must have no outside unpainted areas except the area inclosed by cover clamping frame of change-over switch actuating linkage.

(2) *Microphone and receiver units.* The units must be free of dirt, grease and corrosion. Rubber moisture seal gasket must be cemented firmly in place and must not have a permanent set. Cones (either paper or bakelite) must be free of breaks or tears. Insulation on leads must not be cut, torn, or worn. The ground terminal and banana plug must be in place. Caps must be clean and free from sharp edges, must not be cracked or broken, and threads must not be stripped.

(3) *Switch actuating linkage.* Hinge pins, switch lever springs, cushion spring, and stop switch bracket must not be stripped, bent, or broken.

(4) *Top cover assembly.* The assembly must be free from cracks in the casting and strap supports. Strap hanger must not be broken or threads stripped. The assembly must be free from scratches and unpainted areas. Battery contacts and chassis grounding contact must not be broken or corroded. The antenna cap threads must not be stripped, and the chain must not be broken. The chain cover must not be torn, and the chain must be riveted to the retainer on the cap. The insulator must be in place inside the antenna cap. The antenna cap must be equipped with a pad three-eighths inch thick when used with the chassis having a long

throw switch. When a short throw switch is used, the pad must be one-eighth inch thick. (See fig. 27.)

(5) *Bottom cover assembly.* Bottom cover assembly must be free from cracks or breaks in the casting; hinge pin supports must not be broken; assembly must be free from scratches, unpainted areas, and corrosion.

(6) *Press-to-talk switch cover.* The press-to-talk switch cover is made of rubber and must not be cut or torn. The clamping frame must not be bent.

clean and free from corrosion. A required reading of 0.3 to 0.8 milliamperes is the specification requirement for crystals when using Test Unit I–135–(*). Be sure that the external voltages applied to Test Unit I–135–(*) are at least 1.5 and 90 volts when making this test.

(10) *Coils.* The coil circuits must not be open. Test for continuity with an ohmmeter. The plastic cover of the coil must not be cracked or broken. Contacts must be free from corrosion and must not be bent or broken.

Figure 27. Checking size of antenna cap pad, Radio Receiver and Transmitter BC–611–(*).

(7) *Tubes.* Check prongs for looseness and check envelope for cracks. See that tube prongs are not dirty or corroded and check for loose elements by shaking tubes. Inspect tubes for low emission, leakage, or short circuits with a tube tester, or place doubtful tubes in a receiver known to be operating normally.

(8) *Tube shields.* Tube shields must conform with dimensions shown in figure 28 and must be clean and not dented.

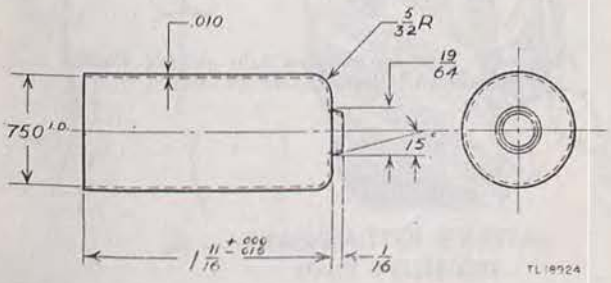


Figure 28. Tube shield dimensions, Radio Receiver and Transmitter BC–611–(*).

(9) *Crystals.* The crystal holder must be free from cracks or breaks and must be properly sealed. Crystal holder contacts must be

10. Procedure for Repair and Replacement of Defective Parts

a. GENERAL. In removing and replacing parts, certain items necessitate the removal of another part. After inspection and cleaning, the order of replacement must be correctly planned and all defective parts must be replaced accordingly or in reverse of the disassembly procedure.

b. PAINTING. The housing assembly, the top cover assembly, and the bottom cover assembly must be touched up using olive drab paint applied with a small camel's-hair brush. If scratches are deep or unpainted areas are large, the entire assembly should be repainted with olive-drab wrinkle finish. When refinishing the top cover assembly, do not paint the antenna insulator, the under surface, or the battery and chassis grounding contacts. When refinishing the bottom cover assembly do not paint the under surface or the terminal board assembly. When refinishing the antenna cap and chain assembly, be sure that the threads are free from paint.

c. NUT FOR ANTENNA INSULATOR RETAINING

SCREW. On a chassis which is factory equipped with the antenna insulator support, the nut retaining screw is rolled into the chassis. If this nut is defective, drill it out wth a No. 38 drill (0.1015 inch) and reassemble insulator to chassis using a nut and lockwasher.

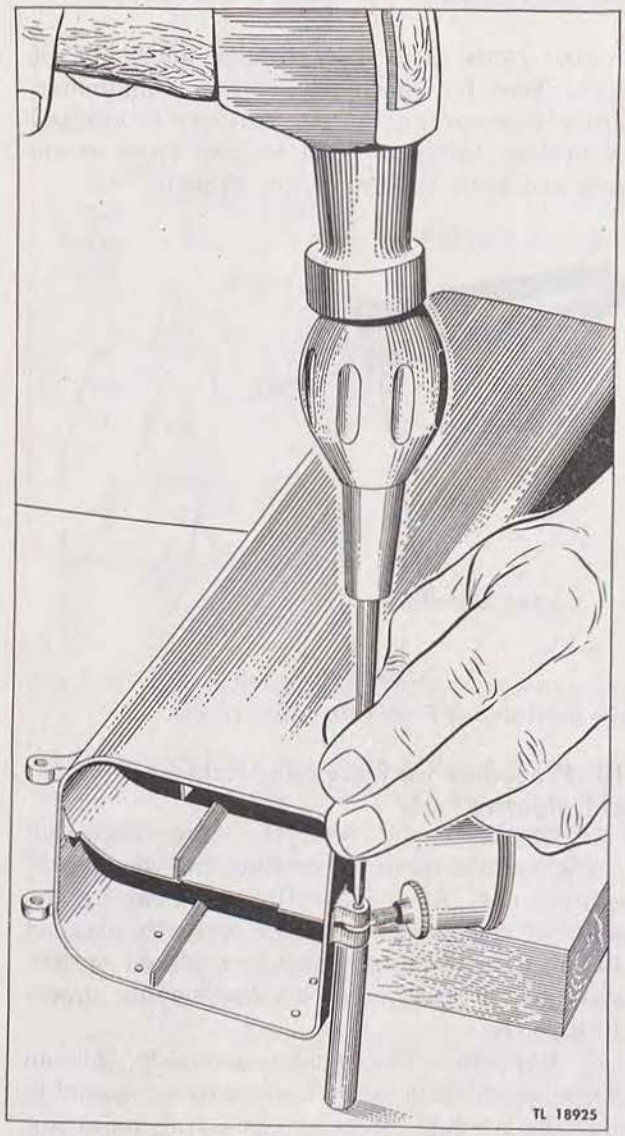


Figure 29. Removal of hinge pin, Radio Receiver and Transmitter BC–611–(*).

d. ANTENNA TIP. Only the top section may be held in a vise or with pliers when replacing a defective antenna tip. Protect the antenna rod during this operation by using lead or a thin piece of brass.

e. RESISTOR-CAPACITOR CUPS. A loose resistor-capacitor cup which fulfills electrical resistance measurement requirements for the particular stage should be cemented in place with clear plastic cement.

f. HOUSING ASSEMBLY. A stripped thread on the hinge pin support may be repaired by drilling and reaming the support and inserting a threaded bushing. The hinge pin is tapered and must be driven out in direction as shown in figure 29. The lug on the housing must be properly supported both during removal and replacement of hinge pin.

g. MICROPHONE AND RECEIVER CAP. After removing sharp edges on the bakelite caps, polish them using either black buffing compound or a loose muslin buffing wheel.

h. TOP AND BOTTOM COVER GASKET. When the top or bottom cover gasket is loose it must be cemented in place with a strong cement.

i. TUBE SHIELDS. Small dents in tube shields may be removed by forcing shield over a steel rod of the shape shown in figure 30 and tapping shield lightly with a hammer.

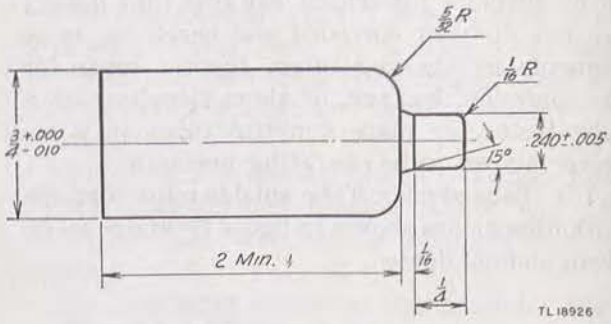


Figure 30. Tool for shaping tube shields, Radio Receiver and Transmitter BC–611–(*).

PRELIMINARY TROUBLE-SHOOTING PROCEDURES

11. Replacement of Removed Parts in Chassis

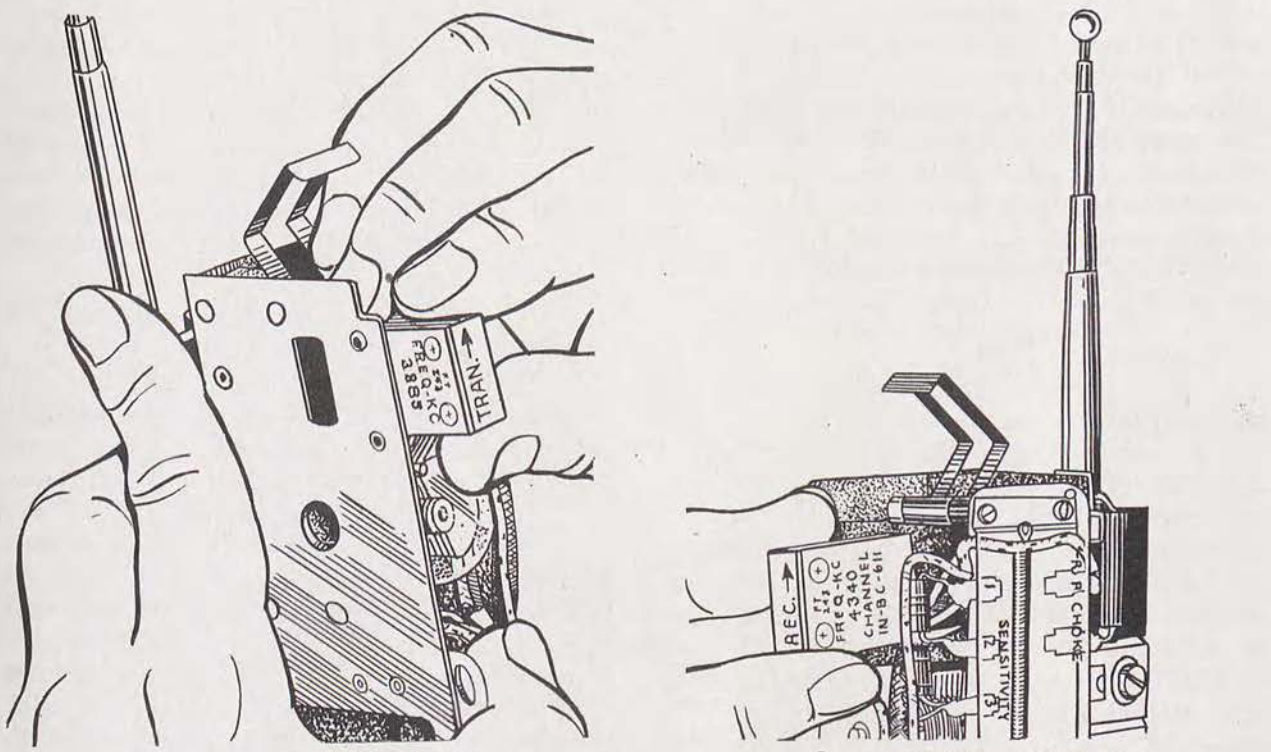
a. GENERAL. See table XXIII and choose the proper combination of coils and crystals for the desired operating frequency. Choose three tube shields and one set of tubes as listed in table III below.

Table III

Tube	Quantity
JAN 3S4 (VT–174)	2
JAN 1R5 (VT–171)	1
JAN 1S5 (VT–172)	1
JAN 1T4 (VT–173)	1

b. COILS AND TUBES. Insert antenna coil into three hole socket marked L1 on chassis. Carefully insert r-f coil over the two pins projecting up from the socket, fitting the pins into the holes in the coil form, and the coil adjustment shaft into the hole in the socket. Gently press the coil into the socket. Replace the coil retainer spring on top of the coil, and tighten the screw holding the spring. Insert tubes and shields into proper sockets and close tube retainer catches.

c. CRYSTAL UNITS. Care must be taken to insure the proper placement of the two crystal units. The transmitter crystal unit must be inserted into the jacks marked TRAN as shown in figure 31A, and the receiver crystal unit inserted into the jacks marked REC. as shown in figure 31B. When crystal units are in place, close the retaining spring.



A — TRANSMITTER CRYSTAL UNIT POSITION

B — RECEIVER CRYSTAL UNIT POSITION

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Figure 31. Position of crystal units, Radio Receiver and Transmitter BC–611–(*).

12. Replacement of Parts on Housing

Assemble the change-over switch actuating linkage to the housing as directed in section VIII. Insert microphone unit and receiver (earphone) unit into proper well, fasten grounding screws in place (fig. 14B), place microphone and receiver unit caps in position, and insert filler and clips assembly into housing.

13. Final Assembly

Replace top cover and bottom cover on the housing assembly with the proper hinge pins. Insert chassis into the compartment and fasten with retaining screw. Chassis should slide into housing easily. If difficulty is encountered, check for bent chassis, bent chassis guides or defective housing guides. Attach antenna cap and chain assembly to top cover with retaining screw. *Take care to insure proper mating of cap with on-off switch on chassis.* See paragraph 9B(4) and figure 27. Insert data plate and data plate cover, properly marked with the operating frequency.

14. Operational Test

Turn set on by extending the bottom section of the antenna and check operation by conversing with another radio receiver and transmitter operating on the *same* frequency.

SECTION V

ALIGNMENT PROCEDURE

15. Preparation

a. COILS, CRYSTALS AND TUBES. See table XXIII, and choose the proper combination of coils and crystals for the desired operating frequency.

b. REPLACING COILS AND TUBES IN CHASSIS. Insert antenna coil into three-hole socket marked L1 on chassis. Carefully insert the r-f coil over the two pins projecting up from the socket so the pins fit into the holes in the coil form, and the coil adjustment shaft fits into the hole in the socket. Gently press the coil into the socket, replace the coil retainer spring on top of the coil, and tighten the screw holding the spring.

c. REPLACING CRYSTAL UNITS IN CHASSIS. Insert the receiver crystal unit in the crystal socket marked REC. The frequency number painted on the metal side faces out and the arrow on the holder points in the same direction as the arrow on the socket. (See fig. 31B.) Replace the metal clamp on the receiver crystal holder on the chassis. *Do not insert the transmitter crystal in the radio set at this time.* Insert tubes and shields in their proper sockets and close the tube retainer catches.

16. Setting up Test Equipment IE–17–(*)

a. Place the chassis into Test Case CS–81–(*) housing. (In Radio Set SCR–536–F the changed location of the receiver tank adjustment, and the change in i-f transformers require that new holes be drilled in Test Case CS–81–(*). (See figs. 33, 34, and 35.) The chassis must be inserted into the test case through the bottom as is done when inserting the chassis into its own housing. Take care that the chassis fits between the guides provided for it in the case. It should not be necessary to force the chassis. If force is necessary, withdraw the chassis and check to see that no parts are catching on the test case or that the chassis has not jumped the guides. Slip the top cover over the antenna rod and fasten the chassis to it with the knurled mounting screw. Remove the plate current meter jumper from the terminal board at the bottom end of the chassis.

Caution: Do not misplace this jumper since it must be replaced after alignment tests.

b. Attach the terminal board of the Test Unit I–135–(*) harness to the terminal board of the chassis so that the two small pins on the harness terminal board fit into the plate current meter jacks, and that the two large locking pins, one on each end of the terminal board, fit into the holes provided for them. Lock the two terminal boards together by a sideward movement of the levers attached to the locking pins. Next, clamp Test Case CS–81–(*) into Test Stand FT–252–(*) with the antenna end up, and the housing in such position that the change-over switch is opposite the left side of the operator as he faces the stand. (See fig. 32.)

c. Make certain that the master switch of Test Unit I–135–(*) is in the OFF position. Place the transmitter crystal holder of the desired frequency in the crystal socket in the front panel compartment of Test Unit I–135–(*). Be sure the crystal is of the same frequency as the coils in the radio set and that its frequency is 455 kc less than the receiver crystal. Connect external 1.5-volt and 90-volt heavy duty batteries marked EXTERNAL 1.5 VOLTS and EXTERNAL 105 VOLTS on the front of Test Unit I–135–(*).

17. Crystal Activity Test

Be sure that the transmitter crystal has been properly placed in the crystal socket of the test unit. Place the MODULATE TESTER switch in the OFF position. Then turn the master switch to the crystal activity position. The meter should read between 0.3 and 0.8 milliampere, If it reads less than 0.3 milliampere the crystal is defective and must be replaced. Before replacing a crystal for poor activity, be sure that the external battery voltages applied to Test Unit I–135–(*) are 1.5 and 90 volts. The foregoing tests apply equally well to receiver crystals. Turn in defective crystals for salvage. Leave a good transmitter crystal of the proper frequency in place in Test Unit I–135–(*) for receiver frequency presetting adjustments.

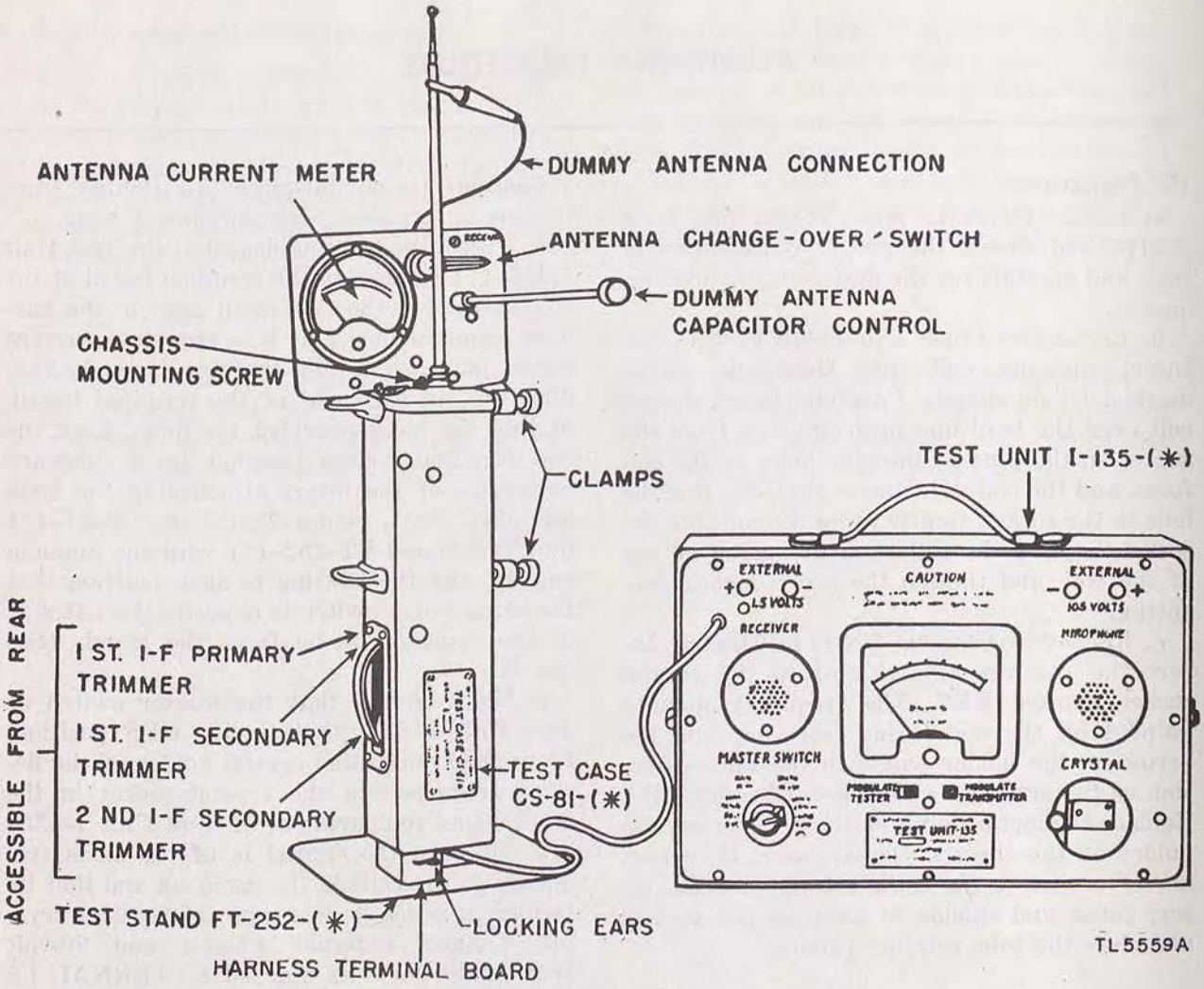


Figure 32. Test Equipment IE–17–(*)—Set-up.

18. Presetting Receiver

a. Extend the radio set antenna rod to its full length, 39 inches above the top cover of Test Case CS–81–(*). This will turn on the radio set. *Do not press the press-to-talk switch of the test case during the receiver presetting adjustments.*

b. Before proceeding with the necessary set adjustments, check operating voltages and currents, using the multirange meter of Test Unit I–135–(*). The following voltage and current readings are normal, as in table IV. Replace batteries if voltage is less than minimum figure.

Table IV

Master switch set at	BA–37 0–3 V.D.C.	BA–37 0–600 MA. D.C.	BA–38 0–150 V.D.C.	BA–38 0–60 MA. D.C.
Meter should read	1.35 to 1.5 v	250 ma	85 v.	5–11 ma

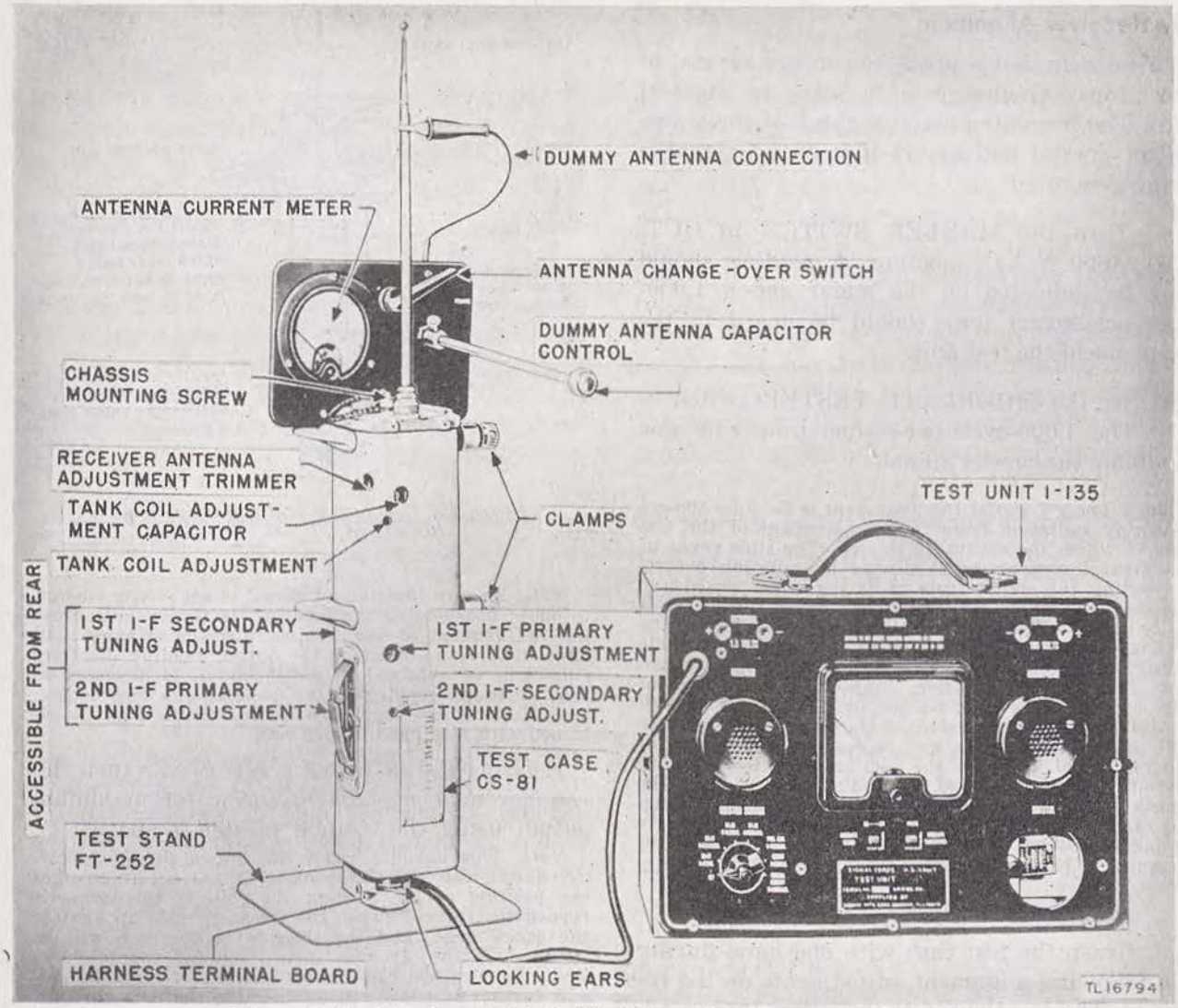


Figure 33. Test Equipment IE–17–(*). Set-up with Radio Set SCR–536–F.

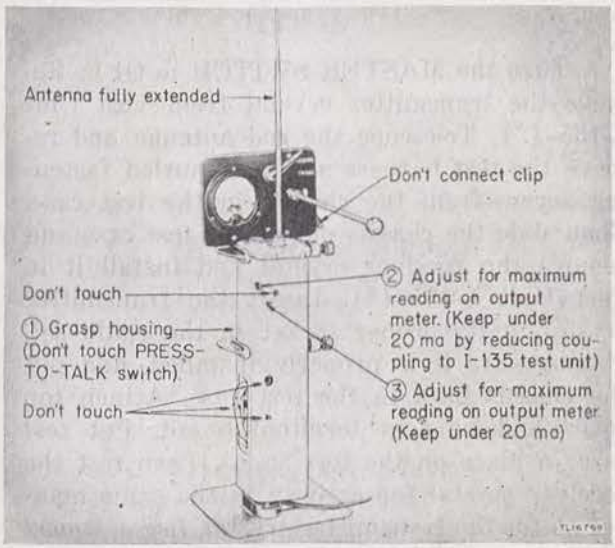


Figure 34. Radio Set SCR–536–F. Receiver presetting adjustments.

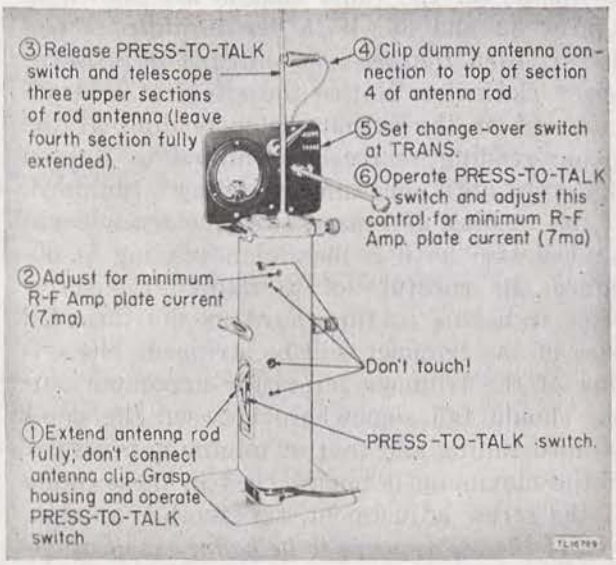


Figure 35. Radio Set SCR–536–F. Transmitter presetting adjustments.

19. Receiver Alignment

a. Be sure that a good transmitter crystal of the proper frequency is in place in the test unit. The preceding activity check of the transmitter crystal will assure that an r-f signal is being generated.

b. Turn the MASTER SWITCH to OUTPUT, 0-60 V.A.C. position. A reading should now be indicated on the meter and a 1,000-cycle-per-second tone should be heard in the earphone of the test unit.

c. Set the MODULATE TESTER switch to ON. The 1,000-cycle-per-second tone will now modulate the carrier signal.

Note. The r-f signal for alignment is fed into the receiver by radiation from the compartment of the test unit in which the crystal is located. The slide cover of the crystal compartment acts as a radiation control preventing the signal from radiating when closed and allowing maximum radiation when open. If the set is badly out of alignment, the r-f signal picked up by the receiver may not be sufficient to give a reliable audio voltage reading on the meter, output 0–60 V.A.C. position. For such a condition, connect a short piece of wire to the clip marked r-f output. This clip is located in the crystal compartment of the test unit. The wire will act as an antenna and increase the radiation of the r-f signal. Varying the position of this wire with respect to the antenna of the radio set or varying the length of the wire will control the strength of the signal radiated. In extreme cases of misalignment the wire connected to the r-f output terminal may have to be wrapped a couple of turns around the radio set antenna.

d. Grasp the test case with one hand during the following alignment adjustments on the receiver. The location of the receiver tuning adjustments on the radio chassis are shown in figures 32 and 36. *With the insulated screw driver,* turn the *receiver antenna adjustment* screw clockwise. Notice the effect of this adjustment on the output meter reading. If the meter reading *increases,* continue to tighten the screw until a maximum reading is obtained. If the reading *decreases,* turn the screw counterclockwise until a maximum reading is obtained. Be careful not to tighten the screw after it begins to turn hard as the threaded base of the trimmer will be stripped. The setting of the trimmer screw for maximum output should fall somewhere between the point of hard tuning and that of minimum pressure. If the maximum is not reached in these limits of the screw adjustment, try another antenna coil. *If the set appears to be badly out of alignment, proceed as outlined in paragraph 22.*

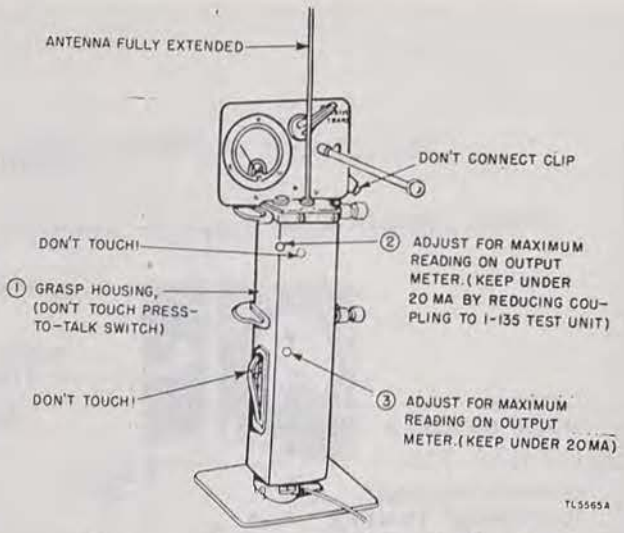


Figure 36. Receiver presetting adjustments, BC–611–A, –B, –C, –D, –E.

Note. Be sure that the r-f signal is not strong enough to cause overloading the receiver. If this condition exists, adjustment of the receiver antenna trimmer will have little or no effect on the output reading. Best results will be obtained if the r-f input is adjusted so that the meter reading on the 60-volt scale does not exceed 10 volts, although satisfactory results may be obtained with readings up to 20 volts.

e. Using the *insulated screw driver* turn the *receiver tank adjustment* screw for maximum output using the method in step *d* above.

Note. This bakelite screw fits into a threaded powdered iron core. The movement of the screw changes the position of the core in the coil. If the screw is turned too far clockwise, the core will ride up against the screw head, and the threads in the core will be stripped. If the screw is turned too far counterclockwise, the core will come in contact with the coil socket, and further turning will again strip the core threads. The screw setting for maximum output should fall somewhere between these two limits of adjustment. If it does not, check to see that proper tank coil has been used.

f. Turn the MASTER SWITCH to OFF. Remove the transmitter crystal from Test Unit I–135–(*). Telescope the rod antenna and remove the test harness and the knurled fastening screw from the chassis in the test case. Then slide the chassis out of the test case and remove the receiver crystal and install it in Test Unit I–135–(*). Insert the transmitter crystal in its proper socket in the radio set, making sure it is properly installed, and put the chassis back in the test case. Attach top cover and harness terminal board. Put test case in place on the test stand. Then test the receiver crystal for activity in the same manner as for the transmitter crystal. *Leave a good receiver crystal in place in the test unit for use*

while presetting the transmitter portion of the radio set.

20. Presetting Transmitter

Grasp the test case and depress the press-to-talk switch with one hand during all following presetting adjustments of the transmitter. The MODULATE TESTER switch should be OFF unless otherwise specified. Extend the antenna of the radio set to its full length. This will operate the power switch in the radio set chassis. Before proceeding with the necessary set adjustments, check operating voltages and currents, using the multirange meter of Test Unit I–135–(*). The following voltage and current readings should be obtained with press-to-talk switch on the radio set depressed:

Table V

Master switch set at	BA–37	BA–37	BA–38	BA–38
	0–3 V.D.C.	0–600 MA. D.C.	0–150–V. D.C.	0–60 MA. D.C.
Meter should read	1.35 (min)* to 1.5 v	275–300 ma	75 v. (min)*	26–30 ma

*Replace batteries if voltage is less than the minimum figure.

21. Transmitter Alignment

a. Turn the MASTER SWITCH on test unit to PWR. AMP. position. Adjust the *transmitter tank adjustment* screw for *minimum* current reading on the meter in the test unit. The normal reading in this position is approximately 7 milliamperes. See figures 32 and 37 for location of *transmitter tank adjustment.* *Be sure to depress the press-to-talk switch with one hand during this operation.*

b. Telescope the upper three sections of the antenna rod, leaving only the bottom or fourth section fully extended from the housing. Clip the *dummy antenna connection* to the upper part of the antenna rod. (See fig. 37.) Set the *antenna change-over switch* on the panel of Test Stand FT–252–(*) to TRANS. position, and then, still grasping the test case and press-to-talk switch, use the insulated shaft extension to adjust the *dummy antenna capacitor control* for *minimum* current reading on the meter in Test Unit I–135–(*) (approximately 7½ ma in PWR. AMP. position). This adjustment of the dummy antenna capacitance for minimum power-amplifier plate current is necessary to compensate for the change in antenna capacitance due to telescoping the upper three sections of the antenna rod. Observe the reading of the *antenna current meter* on Test Stand FT–252–(*). This should be from 15 to 24 milliamperes and represents the unmodulated antenna current.

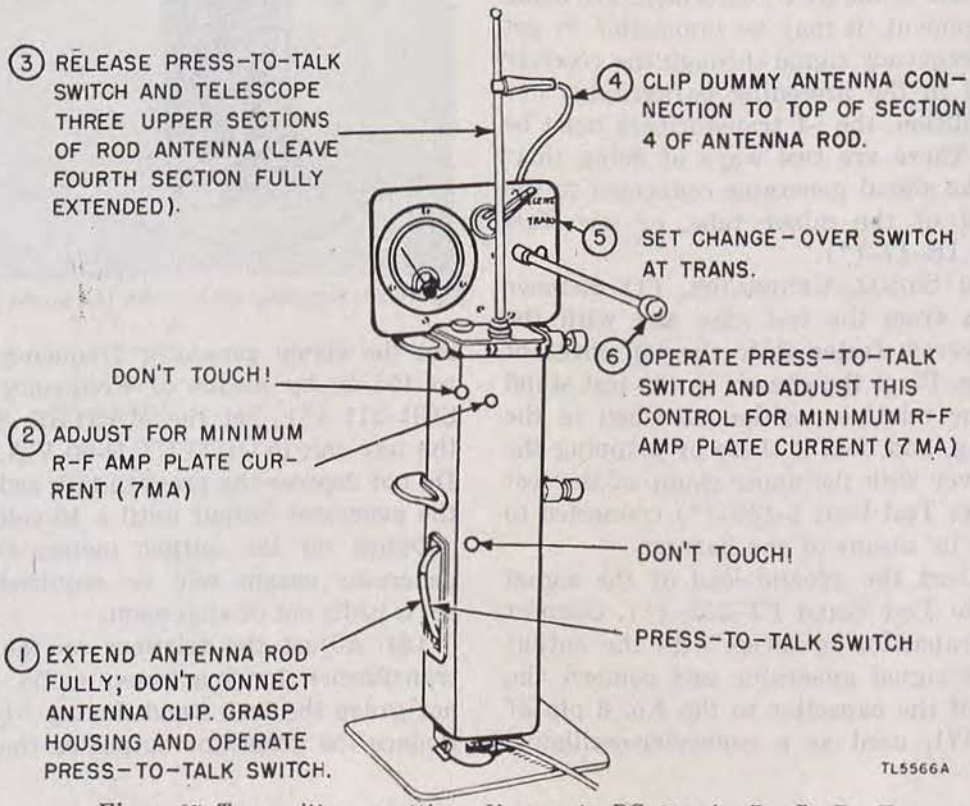


Figure 37. Transmitter presetting adjustments, BC–611–A, –B, –C, –D, –E.

c. Place the MODULATE TESTER switch to ON position and press the MODULATE TRANSMITTER button on the test unit. This modulates the transmitter by applying a 0.2-volt, 1,000-cycle-per-second audio signal across the microphone terminals. Note the rise in the *antenna current meter* reading when the modulated signal is applied. This rise should be at least 6 percent over the unmodulated current reading. A 6 percent increase in antenna current indicates 50 percent modulation.

d. Further checks on modulation may be made by whistling into the microphone or holding a sustained note. The modulation rise should be substantially greater. MODULATE TRANSMITTER button must not be pressed when using the microphone method. This completes normal frequency presetting adjustments. Remove the chassis from the test case, replace in the radio set housing and reconnect microphone and earphone. *Be sure to replace the plate current meter jumper.* Reinstall the A and B batteries, making certain that the positive (+) ends face outward. Close the cover, move the latching bolt into place, and tighten the knurled nut. The set is now ready for operation.

22. Procedure for Correcting Poor Alignment

a. GENERAL. If the i-f transformers are badly out of alignment, it may be impossible to get a carrier-frequency signal through the receiver as outlined in the preceding paragraphs. For such a condition, the i-f transformers must be realigned. There are two ways of doing this: use a 455-kc signal generator connected to the signal grid of the mixer tube, or use Test Equipment IE–17–(*).

b. USING SIGNAL GENERATOR. (1) Remove the chassis from the test case and with the mounting screw fasten it to the top cover of the housing. Place the chassis in the test stand in the same relative position as when in the test housing, and hold it there by gripping the housing cover with the upper clamp of the test stand. Leave Test Unit I–135–(*) connected to the chassis by means of the harness.

(2) Connect the ground lead of the signal generator to Test Stand FT–252–(*). Connect a 0.05-mf capacitor in series with the output lead of the signal generator and connect the other end of the capacitor to the No. 6 pin of Tube VT–171, used as a converter-oscillator.

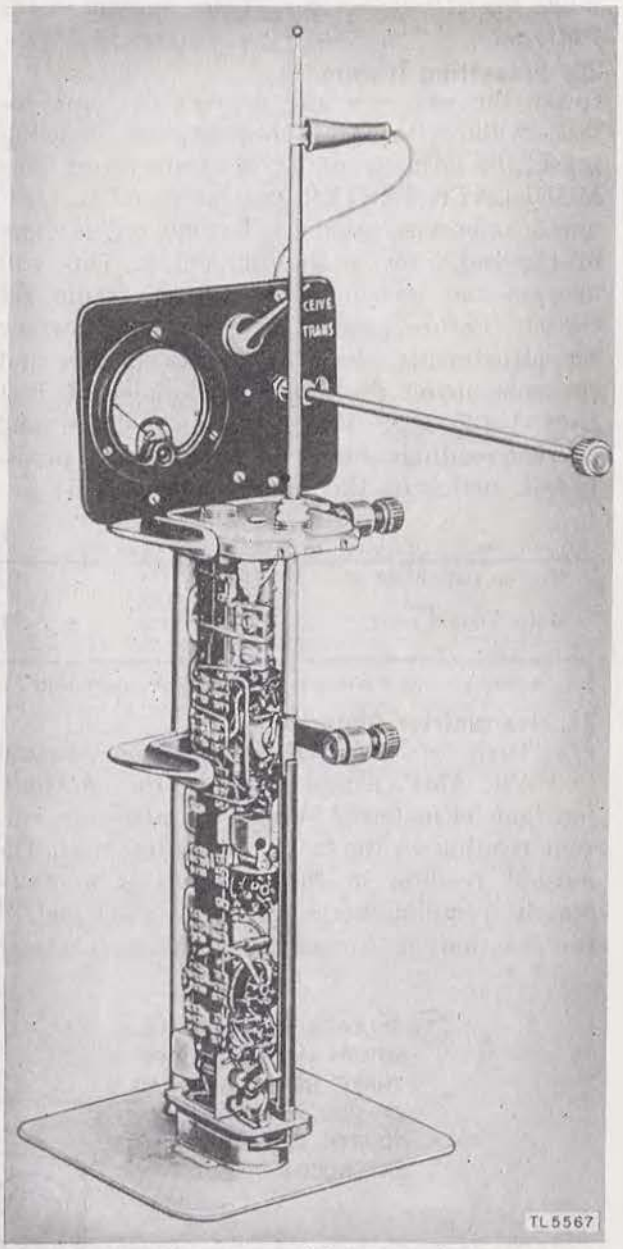


Figure 38. Servicing set up with test stand FT–252–(*).

Set the signal generator frequency accurately to 455 kc by means of Frequency Meter Set SCR–211–(*). Set the MASTER SWITCH of the test unit to OUTPUT 0-60 V.A.C. position. Do not depress the press-to-talk switch. Adjust the generator output until a 10-volt reading is obtained on the output meter. Considerable generator output will be required when the set is badly out of alignment.

(3) Adjust the trimmer on the second i-f transformer for maximum audio output. Do not grasp the test stand during i-f alignment. Reduce the generator output as the audio out-

put increases above 10 volts. Next, peak the secondary on the first i-f transformer, and then peak the primary trimmer. After these adjustments have been made, put the chassis back into Test Case CS–81–(*), and align the set as described in presetting receiver procedure.

c. USING TEST EQUIPMENT IE–17–(*). (1) Be sure that the frequency of the REC. (receiver) crystal is 455 kc higher than that of the TRANS. (transmitter) crystal. The chassis may be left in the test case when using this method. The receiver crystal must be installed in the chassis and the transmitter crystal in Test Unit I–135–(*).

(2) If the presetting receiver procedure has been followed, and no readable audio voltage has been obtained on the OUTPUT 0-60 V.A.C. position of the test unit meter, first make sure that a maximum r-f signal is being radiated. This can be assured by connecting a short length of wire to r-f output terminal of the test unit and placing this wire close to the receiver antenna.

(3) With the MASTER SWITCH of the test unit on OUTPUT 60 V.A.C. (MODULATE TESTER switch ON), adjust the second i-f secondary trimmer for maximum output, next the first i-f secondary trimmer, and then the first i-f primary trimmer. (See fig. 32.) All i-f trimmers are adjusted for peak output meter reading. As the i-f trimmers are aligned, loosen the signal coupling to the receiver antenna so the maximum audio output reading of the meter is not over 10 volts. This is necessary to prevent overloading the receiver and consequent poor alignment of the i-f circuits. The above alignment adjustments must be performed very carefully for good results. Go over the alignment a second time.

(4) After the i-f alignment adjustments have been made, complete the procedure by adjusting the receiver antenna adjustment screw and the receiver tank adjustment as described in paragraphs 19*d* and 19*e*.

23. Signal Substitution

a. GENERAL. If the set is inoperative or has weak output 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 1,000 cycles per second (cps)) and an r-f signal generator covering at least 400 to 6,000 kc, modulated 30 percent at 400 or 1,000 cps.

c. PROCEDURE. With the aid of figure 39 and table VI inject the signal at the given points in the set until the trouble is isolated within a particular stage. Apply the *hot* lead of the signal generator to the lug of the tube socket or switch in accordance with figure 39. A signal should be heard or read on the output meter. See table VII for type of signal generator, frequency, and input voltage. After the trouble has been localized to a particular portion of a stage, make a resistance and voltage check of individual components using table VIII to locate the faulty part.

Table VI

Set	Mounted on Test Stand FT–252–(*). Case removed
Power	On antenna extended
A-f signal generator	Outside shield or cable marked ground of outside cable connected to set chassis. Capacitor of 0.1 mf used in series with signal generator lead.
R-f signal generator	Connected same as above.
Test Unit I–135–(*)	Test unit connected by harness. Master switch turned to read output 0–50 VAC.

24. Stage Gain

The voltages as measured in the previous signal substitution tests are average. However, any small deviation from the given values should not be construed as indication of trouble. The sets have been found to differ in stage gain. The over-all sensitivity should be as indicated on table VII, step 5. It will be found that certain stages in a set will be more sensitive than the table indicates and others might be

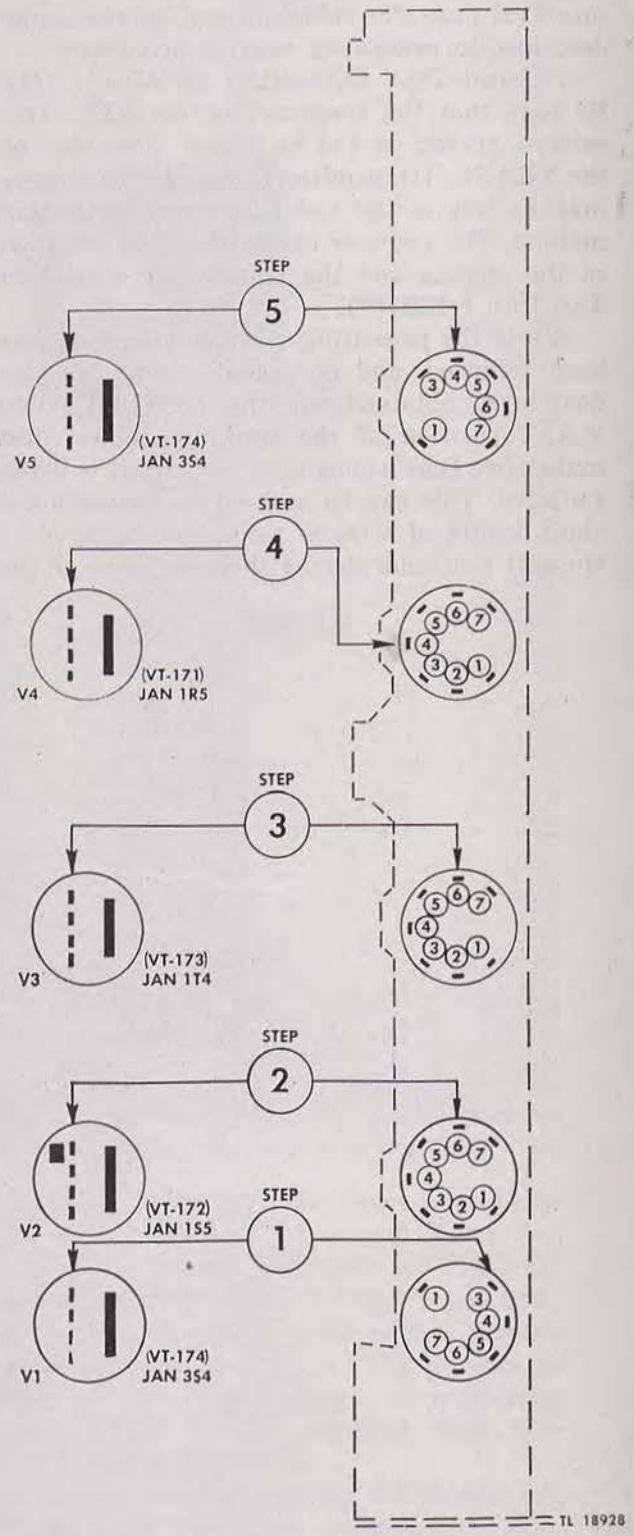


Figure 39. Stage-by-stage trouble location, Radio Receiver and Transmitter BC–611–(*).

less sensitive. The over-all result should be the same.

25. Crystal Activity Test

The crystals are properly placed in the crystal socket of the test unit. Place the MODULATE TESTER switch in the OFF position. Then turn the MASTER SWITCH to the crystal ACTIVITY position. The meter should be between 0.3 and 0.8 milliampere. If it reads less than 0.3 milliampere the crystal is defective and must be replaced. Before replacing a crystal which indicates poor activity be sure that the external battery voltages applied to the Test Unit I–135–(*) are 1.5 and 90 volts.

Table VII. Signal substitution steps, signal input for fixed output

Steps	Signal generator connected to	Signal generator frequency setting (1)	Dummy	Signal in to produce 20 v out V.T.V.M. (2)	Signal in to produce 15 v out on S.C.V. (3)
1	2d audio control grid	1,000 cps	0.1 mf	1.1 v	1.3 v
2	1st audio control grid	1,000 cps	0.1 mf	0.25 v	0.275 v
3	I-f control grid	455 kc	0.1 mf	2,400 μv	2,400 μv
4	Converter grid	455 kc	0.1 mf	180 μv	180 μv
5	Antenna	5,205 kc	Thru FT–252–(*)	2.5 μv	3 μv

(1) Signal generator modulation 400 cps.
(2) Values listed in this column are for 20-volt output reading on a vacuum tube voltmeter (General Radio type 726–A).
(3) Values listed in this column are for 15-volt output reading on 50-volt a-c range of selective analyzer of Test Set I–56–(*).
The test conditions are as follows:
All values taken with chassis out of Test Case CS–81–(*).
A Battery BA–37 voltage 1.45 volts.
B Battery BA–38 voltage 100 volts.
Receiver earphone, or equivalent, connected across receiver output.

Table VIII. Voltage and resistance measurements

Tube	Pin	Element	Voltage xmtr	Voltage rec	Resistance xmtr	Resistance rec
V1	1	Fil	1.4	0	1.75	2
	3	Grid	—5.0	0	Infinity	Infinity
	4	Screen grid	73	17	Infinity	Infinity
	5	Fil	0	0	0	0
	6	Plate	70	42	Infinity	Infinity
	7	Fil	1.4	1.4	2	4.6
V2	1	Fil	0	0	0	0
	2	Plate	0	90	Infinity	Infinity
	3	Screen grid	87	45	Infinity	Infinity
	4	Osc grid	—8.0	—3.5	100k	80k
	5	Suppressor	0	0		
	6	Grid	0	0	Infinity	Infinity
	7	Fil	1.4	1.4	1.1	1
V3	1	Fil	0	0	0	0
	2	Plate	0	76	Infinity	Infinity
	3	Screen grid	0	48	Infinity	Infinity
	4	None	0			
	5	Suppressor	0	0		
	6	Grid	0	0	Infinity	Infinity
	7	Fil	0	1.4	8	2
V4	1	Fil	0	0	0	0
	2					
	3	Diode	0	0	2 meg	2 meg
	4	Screen	1	1	Infinity	Infinity
	5	Plate	2.5	2.5	Infinity	Infinity
	6	Grid	0	0	10 meg	10 meg
	7	Fil	1.4	1.4	2	1.8
V5	1	Fil	1.4	0	1.75	2
	3	Grid	0	0	Infinity	Infinity
	4	Screen grid	76	18	Infinity	Infinity
	5	Fil	0	0	0	0
	6	Plate	72	45	Infinity	Infinity
	7	Fil	1.4	1.4	2.0	4.6

All measurements made from pin terminal to chassis using a 1000 ohms/volt meter.

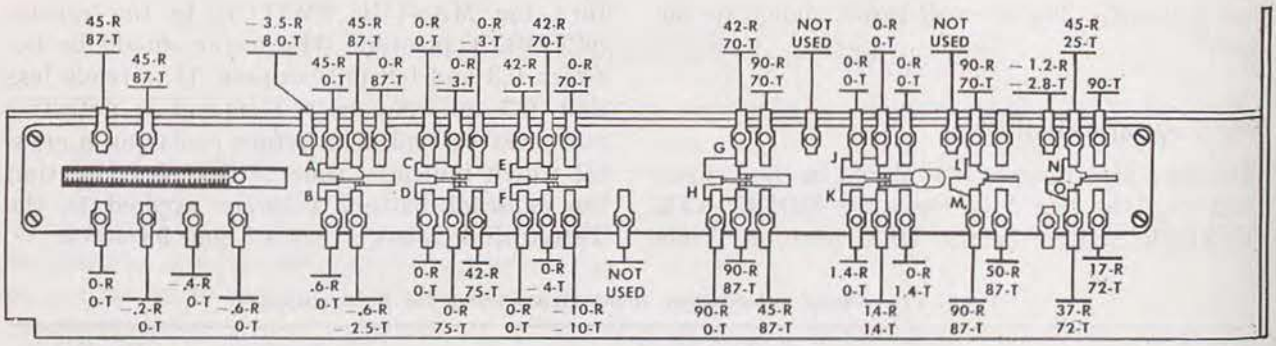


Figure 40. Change-over switch voltage measurements, Radio Receiver and Transmitter BC–611–(*).

Table IX. Point-to-point direct-current voltage measurements

Component	Receiver	Transmitter	Voltmeter range	Component	Receiver	Transmitter	Voltmeter range
R1	0	0	3	C10	NM	NM	
R2	0	0	3	C11	50	90	300
R3	0.2	0.5	3	C12	0	75	300
R4	0.2	0.7	3	C13	0	0	3
R5	0.1	0	3	C14	0	0	3
R6	15	90	300	C15	0	0	3
R7	0.2	0	3	C16	0	0	3
R8	0	0	3	C17	27	0	30
R9	0	0	3	C18	80	0	300
R10	18	0	30	C19	0	0	3
R11	18	0	30	C20	0	0	3
R12	28	0	30	C21	0	0	3
R13	0	0	3	C22	NM	NM	
R14	0	0	3	*C23	0.2	0	3
R15	10	0	30	C24	NM	NM	
R16	65	0	300	C25	0.2	0.2	3
R17	45 ***	0	300	C26	0.1	0.1	3
R18	15	15	30	C27	NM	NM	
R19	18	0	30	R25	0.1	0	3
R20	0	0	3	R26	0	0	3
R21	65	60	300	R27	0	0	3
R22	5	5	30	C1	0	0	3
R23	0	0	3	C2	5	80	300
R24	0	1	3	C3	24	80	300
C4	NM	NM		C28	85	80	300
C5	0.2	0.2	3	C29	40	85	300
C6	0	2	3	C30	80	90	300
C7	0	0	3	C31	95	0	300
C8	0	1.3	3	**L6 (L4)	0	10	30
C9	NM	NM					

*C23 voltage will depend on bias connection.
**L6 refers to BC–611–A and BC–611–B. This component is marked L4 in BC–611–C, BC–611–D, BC–611–E, and –F.
***Late models of BC–611–C, BC–611–D, BC–611–E, and –F.

All readings taken across component using the voltchmmeter of test set I–56–(*). Readings shown were taken using a 1,000-ohm per-volt meter. No direct-current voltmeter readings should be taken where the letters NM appear in any column because of likely damage to the circuit. This is particularly true of DC voltages reading across grid coupling capacitors.

26. Moistureproofing, Fungiproofing, and Refinishing

After the set has been repaired and is functioning correctly make a check of the date of the last moistureproofing and fungiproofing. If new treatment is required see TB SIG 13 and TM 11–235 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.

SECTION VII

FINAL TESTING

27. 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. Check alignment as shown in paragraphs 16 to 21. After the alignment has been checked, make over-all performance tests as outlined in the following paragraphs.

28. Over-all Sensitivity Test

a. PREPARATION. (1) Set up the receiver in Test Case CS–81–(*).

(2) Set r-f signal generator to the correct operating frequency of the particular set and connect hot lead to the end of the first section of the antenna through a 0.1-microfarad (mf) capacitor. Connect ground clip to set chassis.

(3) Test Set I–56–(*) is connected by use of the harness as in the previous tests. The meter is set for 0-60 V.A.C.

b. TEST. (1) The signal generator modulated at 400 cps is tuned to the set r-f frequency.

(2) The results of the sensitivity check should be checked against table X.

29. Transmitter Power Test

a. PREPARATION. (1) Set up set in Test Case CS–81–(*) harness connection.

(2) The antenna is extended to the full length of the first section; other sections remain collapsed.

(3) The wire from the antenna load is attached to the antenna by the clip provided. Change-over switch at TRANS.

b. TEST. (1) Press the push-to-talk switch and adjust control on antenna load (Test Stand FT–252–(*)) to minimum plate current as read on Test Unit I–135–(*) (approximately 7½ ma in PWR. AMP. position).

(2) Observe reading on antenna current meter. It should be between 15 and 24 milliamperes.

(3) Place modulator tester switch to ON position and press Modulate Transmitter Button on the test unit.

(4) Antenna current indication should be at least 6 percent above previous reading.

(5) See table XI for maximum and minimum readings.

30. Image Frequency

a. GENERAL. When setting the generator frequency, be sure that the frequency is that of the signal to be received and not the image frequency, which is exactly 910 kc higher than the carrier frequency. For example, a unit aligned for proper operation at 4,000 kc will have an image response at 4,910 kc, while one which operates on 5,000 kc will have an image response at 5,910 kc.

b. TEST. In checking for proper operation (in regard to image reception) take the following steps:

(1) Completely align receiver to the carrier frequency. Note the signal generator dial reading.

(2) See the calibration charts of the signal generator (or to its dial if it is directly calibrated) and estimate the dial reading for a frequency of 910 kc above that in the step (1) above.

(3) Increase signal generator output to 1,000 times its output necessary to produce 10 volts across the earphone and the output meter.

(4) Rotate the signal generator dial to the dial reading ascertained in step (2) above. A signal should now be heard. Rotate the dial for a maximum signal as indicated on the output meter. Adjust the generator output by means of the attenuator so that the output meter across the earphone indicates exactly 10 volts. Note the reading necessary to produce 10 volts. If this image frequency sensitivity is divided by the carrier frequency sensitivity, the resulting number should never be less than 200. If no signal is heard at 910 kc above the carrier frequency, it is a certainty that the receiver is not correctly aligned, and the unit should be realigned as outlined in paragraph 19.

31. Operational Test

Install the set in its housing with fresh batteries in place and make a check with another unit operating on the same frequency for intelligibility and proper over-all operation.

Table X. Average receiver performance characteristics

Test	Average		Minimum	
	Using vacuum tube voltmeter	Using I–56–(*)	Using vacuum tube voltmeter	Using I–56–(*)
Sensitivity	3 μv * & ***	4 μv ** & ****	6 μv * & **	7 μv ** & ****
Image ratio	800	800	200	200
Direct transmission ratio	10,000	10,000	4,000	4,000
Maximum audio output	50 volts*	22 volts**	40 volts*	18 volts**
A Battery BA–37:				
Voltage	1.4 volts	1.4 volts		
Current	235 ma	235 ma	250 ma (max)	250 ma (max)
B Battery BA–38:				
Voltage	103 volts	103 volts		
Current	11 ma	11 ma	14 ma (max)	14 ma (max)

Note. All values taken with chassis in Test Case CS–81–(*).

*Readings made on a General Radio type 726–A vacuum tube voltmeter.
**Readings made on selective analyzer of Test Set I–56–(*).
***20-volt output meter reading. Signal generator modulation 400 cps 30%.
****15-volt output meter reading. Signal generator modulation 400 cps 30%.

Table XI. Average transmitter performance characteristics

Test	Average	Minimum
R-f current:		
Unmodulated	18 ma (r-f power: 181 mw)	15 ma (r-f power: 126 mw)
Modulated	20.5 ma (r-f power: 255.3 mw)	17.5 ma (r-f power: 170 mw)
Modulation capability	Over 50 percent	Over 50 percent
A Battery BA–37:		
Voltage	1.4 volts	
Current	280 ma	
B Battery BA–38:		
Voltage	95 volts	
Current	30 ma	

Note. All values taken with chassis in Test Case CS–81–(*).

SECTION VIII

INDIVIDUAL STAGE AND CIRCUIT REPAIR DATA

32. Receiver R-F Amplifier

a. ANTENNA CIRCUIT. There is an open circuit between the antenna and grid No. 3 of VI. This should be checked with an ohmmeter. This same check can be applied to coil L, to test for continuity of coil, and switch sections D and G. There should be a high resistance reading between the control grid pin No. 3 of VI and the chassis.

b. OSCILLATION. Oscillation may be caused by a break-down of C8, filament bypass C3, plate tank decoupling capacitors, and screen bypass capacitor C2.

c. TUBE VOLTAGE. The tube voltage should be checked against values given on table VIII. The cause of erroneous readings are indicated by the component causing the trouble. Check the component for proper value and for open or short circuits. (See table XII.)

Table XII. Voltage and resistance measurements

Pin	Element	Voltage rcvr	Voltage xmtr	Low volts	No volts	Resistance rcvr	Resistance xmtr
1	Fil	0	1.4	Batt		2	1.75
3	Control grid	0	—5	R1 xmtr	R2	infinity	infinity
4	Screen	17	73	C2	C2, R18	infinity	infinity
5	Ground	0	0			0	0
6	Plate	42	70	C3	R10, C3	infinity	infinity
7	Fil	1.4	1.4	Batt		4.6	2.0

33. R-f Power Amplifier

a. GENERAL. Troubles in the r-f power amplifier for the most part will arise in the signal tracing of the r-f receiver stage. The greatest trouble to be encountered will be excessive r-f amplifier plate current.

b. TRANSMITTER R-F AMPLIFIER PLATE CURRENT. If the r-f amplifier grid excitation, that is the r-f voltage applied to the amplifier grid, is low, insufficient bias voltage will be developed across grid resistor R6, and the plate current will be excessive. Low grid excitation may be caused by a poor crystal or a weak or burned-out oscillator tube. Also no excitation would occur if coupling capacitor C9 were open or the oscillator were not functioning. The r-f grid drive should be about 15 to 18 volts as measured with a vacuum-tube voltmeter. High plate current might be caused by an improper r-f amplifier tank coil. An incorrect coil will show up in the inability to get a dip in the plate current reading of the r-f amplifier tube when tuning this stage. High plate current could also be caused by short-circuited turns in the r-f amplifier coil. The effect would be the same as when using an incorrect coil. A leaky or short-circuited coupling capacitor C9 would also cause excessive plate current.

34. Removal and Replacement of Adjustable Tuning Capacitor and Cover Assembly

a. REMOVAL. (1) Remove antenna and antenna guide as indicated in paragraph 36*a*.

(2) Unsolder blue-white tracer of capacitor C12.

(3) Remove retaining nut using a 7/16 inch open-end wrench. (See fig. 41.)

(4) Remove capacitor and plastic cover from chassis.

(5) Separate capacitor and plastic cover using a knife to break the seal.

b. REPLACEMENT. (1) With cover on capacitor in position, cement in place to capacitor base.

(2) Place capacitor and cover in correct position in chassis.

(3) Fasten to chassis with lockwasher and retaining nut and tighten with 7/16 inch open-end wrench.

(4) Solder blue-white tracer to correct terminal.

(5) Place capacitor C8 in proper position and fasten in place using a hold-down lug.

(6) Replace antenna and antenna guide as indicated in paragraph 36*b*.

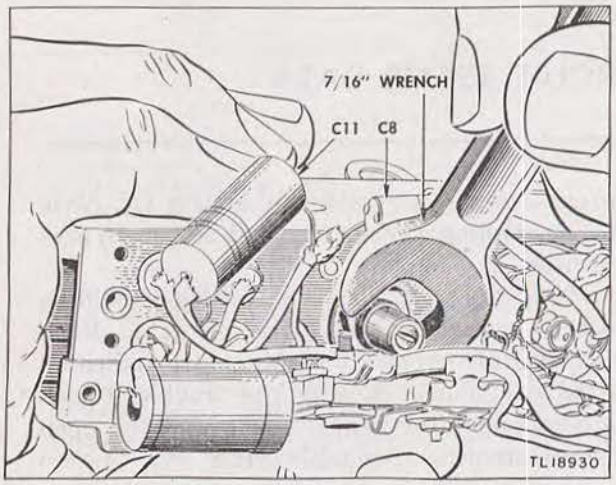


Figure 41. Removing capacitor retaining nut, Radio Receiver and Transmitter BC–611–(*).

35. Removal and Replacement of Antenna Support Insulator

a. REMOVAL. (1) Remove antenna support insulator retaining screw and lockwasher.

(2) The insulator is located on the chassis by the use of lugs on the insulator and location of holes in chassis. Separate insulator from chassis and slide over the antenna. (See fig. 42.)

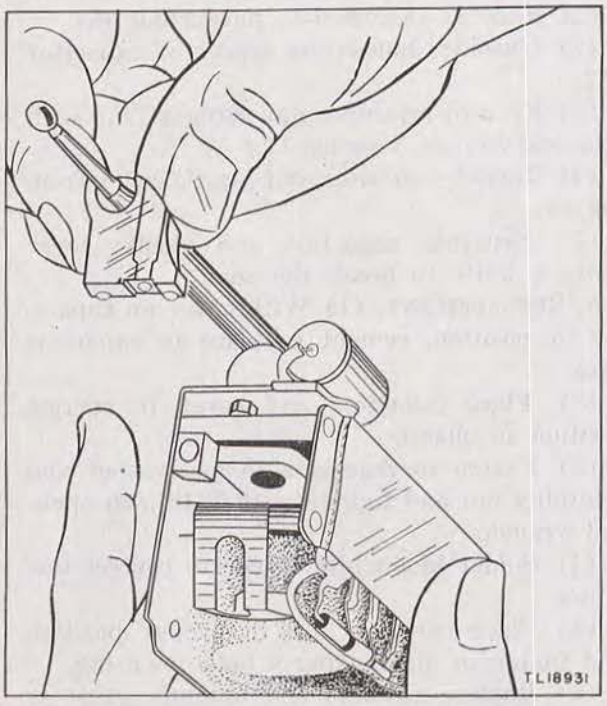


Figure 42. Removal of antenna insulator, Radio Receiver and Transmitter BC–611–(*).

b. REPLACEMENT ON PRODUCTION EQUIPPED CHASSIS. (1) With insulator in correct position, as shown in figure 42, slide over the antenna.

(2) Slide screw and lockwasher into proper place in insulator.

(3) Align the positioning lugs of the insulator with the holes in the chassis and tighten the retaining screw.

c. REPLACEMENT ON CHASSIS NOT PRODUCTION EQUIPPED. (1) Remove antenna and antenna guide as directed in paragraph 36*a*.

(2) Lay-out the holes in the chassis and drill in accordance with the information contained in paragraph 36.

(3) Replace antenna and antenna guide as indicated in paragraph 36*b*.

(4) With insulator in the correct position, as shown in figure 43, slide over antenna, and align positioning lugs of the insulators with the holes in chassis.

(5) Fasten in place with nut, screw, and lockwasher.

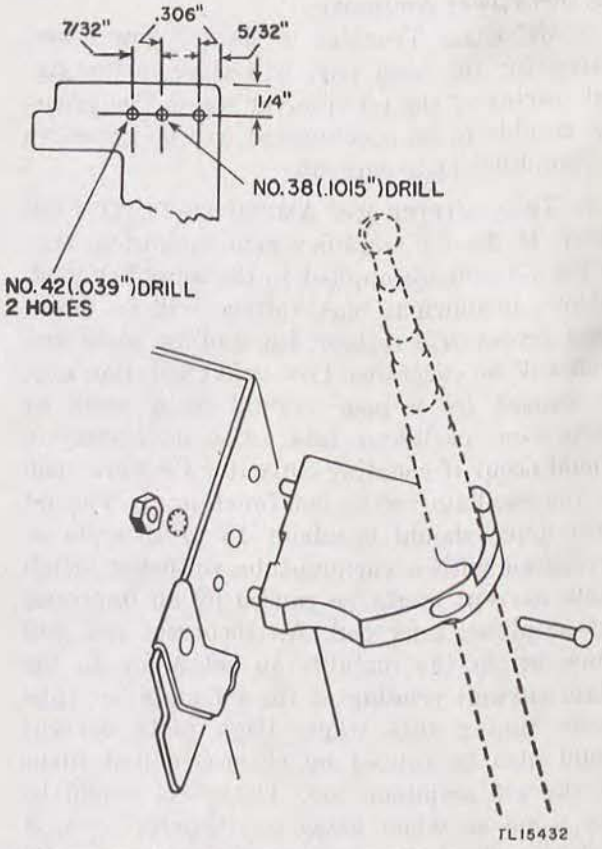


Figure 43. Chassis drill layout, Radio Receiver and Transmitter BC–611–(*).

36. Removal and Replacement of Antenna and Antenna Guide

a. REMOVAL. (1) Remove antenna insulator support assembly as indicated in paragraph 36*a*.

(2) Remove antenna guide retaining screw, as indicated in figure 44A.

(3) Place knife blade or a thin screw driver between the antenna guide and chassis end plate, and separate the guide locating plug from the end plate locating hole. (See fig. 44B.)

Caution: Exercise the greatest care in this operation as it is possible to tear the chassis end plate loose from its fastenings and break the plate.

(4) Swing antenna and antenna guide clear of the chassis end plate and remove the antenna and guide together by sliding them through the wiper and support assembly toward the chassis end plate. (See fig. 45.)

(5) Separate antenna and antenna guide carefully.

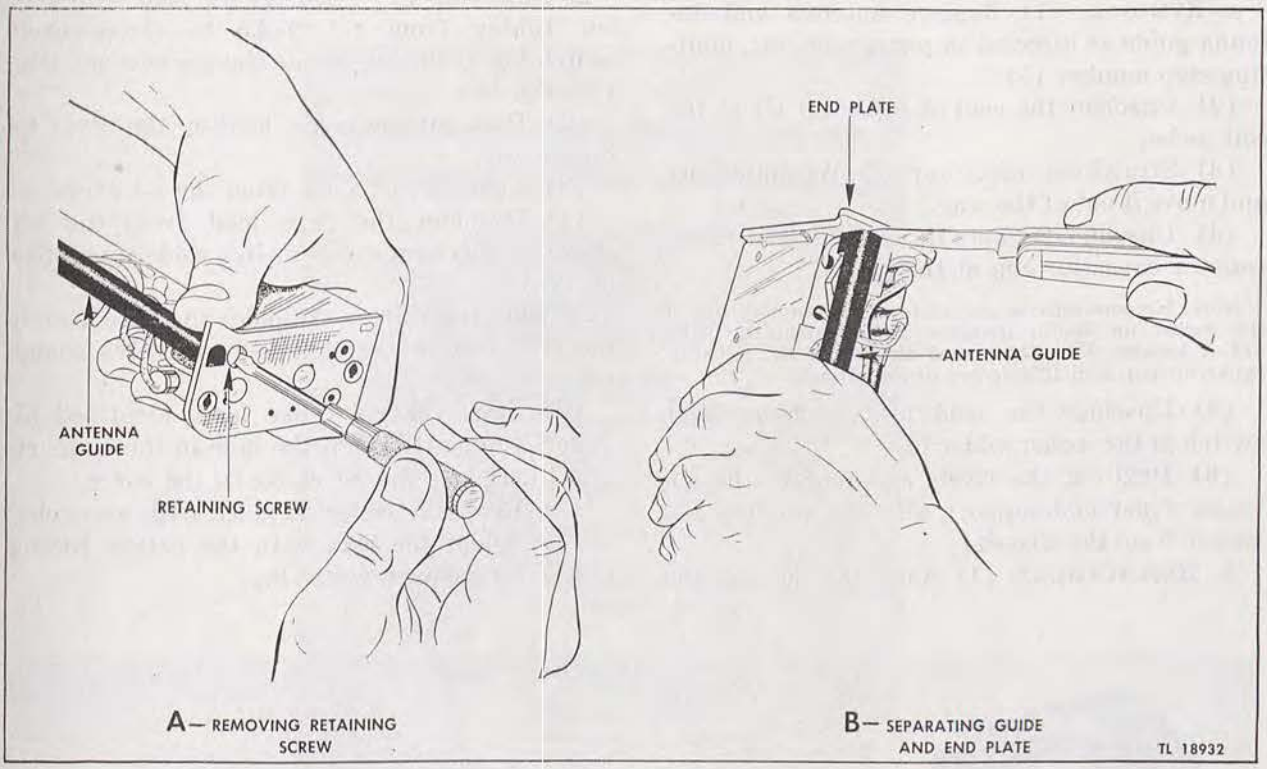


Figure 44. Antenna removal, Radio Receiver and Transmitter BC–611–(*).

b. REPLACEMENT. (1) Assemble antenna and antenna guide.

Caution: Before assembly inspect the on-off switch on the chassis and check with paragraph 8B(2) to determine whether the guide will properly operate the on-off switch.

(2) Slide antenna and guide through the wiper and support assembly, and engage the positioning slots on the antenna guide with the slots on the wiper and support assembly.

(3) Position the antenna guide, locating the plug in the locating hole of the chassis and end plate.

(4) Replace and tighten the antenna guide retainer screw.

(5) Replace the antenna insulator support assembly as directed in paragraph 35*b*.

37. Removal and Replacement of Capacitor and Bracket Assembly

a. REMOVAL. (1) Unsolder the lead of the capacitor C8 and capacitor C11 at bracket solder lugs.

(2) Remove capacitor and cover assembly as directed in paragraph 34*a*, however omit steps (2) and (5).

(3) Unsolder the leads of each capacitor and bracket assembly.

(4) Drill out the eyelets and remove the assembly from the chassis.

b. REPLACEMENT. (1) Place the capacitor and bracket assembly in their correct positions and rivet in place.

(2) Solder the proper leads to the capacitor and bracket assembly.

(3) Replace the capacitor and cover assembly as directed in paragraph 34*b*.

(4) Resolder the leads of capacitors C8 and C11 to the bracket solder lugs.

38. Removal and Replacement of Antenna Coil Socket and Antenna Wiper Support

a. REMOVAL. (1) Remove antenna and antenna guide as directed in paragraph 36*a*, omitting step number (5).

(2) Unsolder the lead of capacitor C1 at the coil socket.

(3) Straighten capacitor C1 retaining lug and move it out of the way.

(4) Unsolder resistor R2 and the lead to the resistor capacitor cup at the socket.

Note. No connections are made to the dummy lug of the socket on Radio Receiver and Transmitter BC–611–A because R2 is connected directly to the resistor-capacitor cup and R26 is not in the circuit.

(5) Unsolder the lead to the change-over switch at the socket solder lug.

(6) Drill out the rivets and remove the antenna wiper and support, also the antenna coil socket from the chassis.

b. REPLACEMENT. (1) Assemble the antenna coil socket, wiper support, wiper assembly, and solder lug to the chassis in their correct position and rivet in place.

(2) Resolder all connections when the slot in the antenna support aligns with the key on the chassis.

(3) Replace the antenna and the antenna guide as directed in paragraph 36*b*.

39. Removal and Replacement of R-F Choke Cover and R-F Choke

a. REMOVAL. (1) Unsolder the lead with yellow tubing from r-f choke to change-over switch lug at the lug on the change-over switch. (See fig. 46.)

(2) Drill out the eyelet holding the cover to the chassis.

(3) Remove the cover from the r-f choke.

(4) Unsolder the bare lead from the r-f choke at the change-over switch solder lug. (See fig. 46.)

b. REPLACEMENT. (1) Solder the bare lead of the r-f choke to the change-over switch solder lug.

(2) Start the r-f choke lead, identified by yellow tubing, through the hole in the support, and then place the r-f choke in the cover.

(3) Rivet the cover in place with an eyelet.

(4) Solder the lead with the yellow tubing to the change-over switch lug.

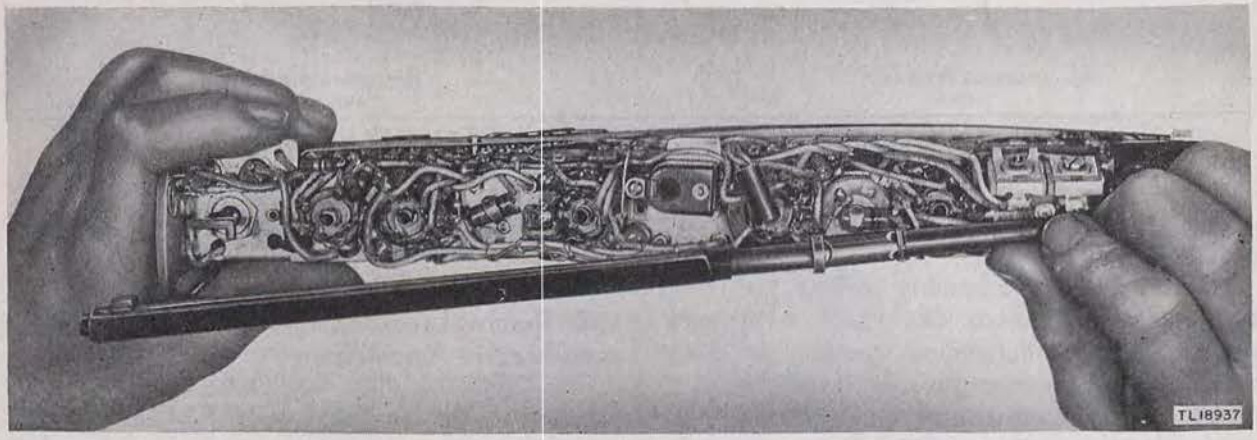


Figure 45. Antenna and antenna guide removal, Radio Receiver and Transmitter BC–611–(*).

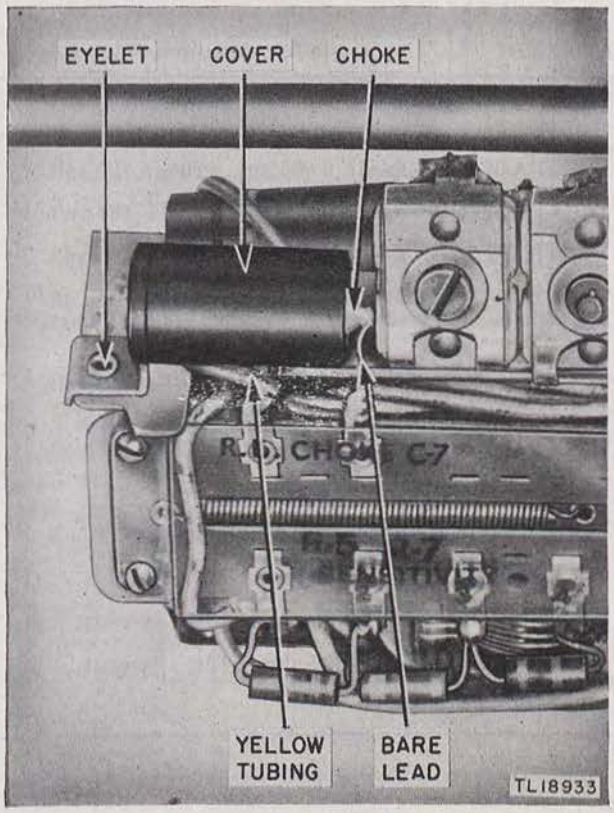
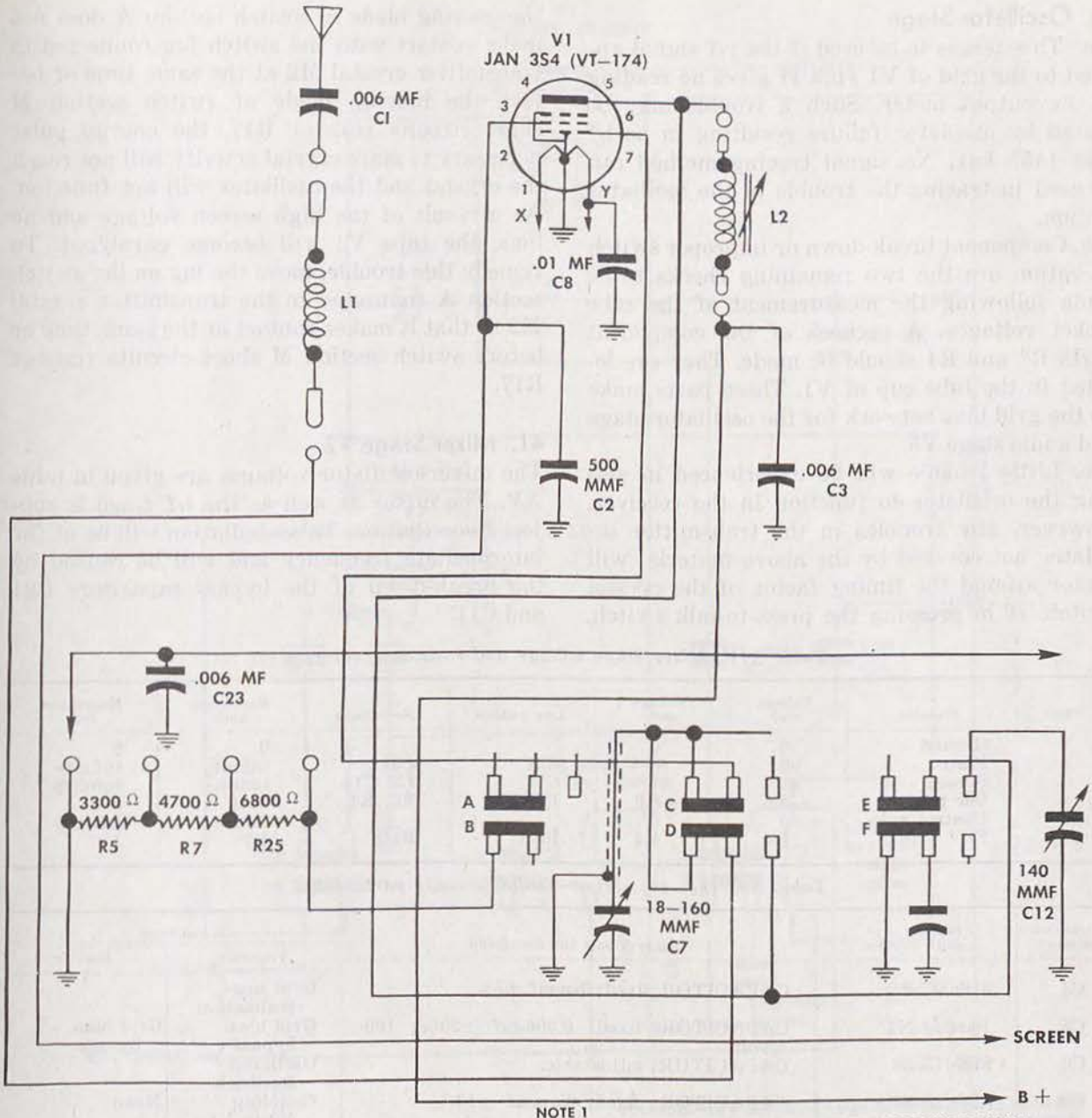
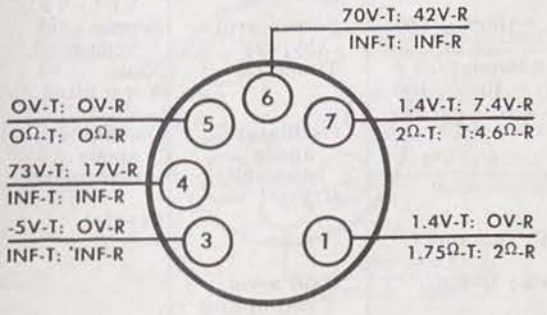


Figure 46. Removal of the r-f choke, Radio Receiver and Transmitter BC–611–(*).

Table XIII (fig. 47). Radio-frequency amplifier stage

Reference number	Signal Corps stock number	Name of part and description	Function	
			Transmit	Receive
C1	3DA6–41	CAPACITOR: fixed; 0.006 mf ±20%; 100-volt.	Voltage blocking	
C2	Part of N1	CAPACITOR: fixed; 500 mmf ±20%; 100-volt.	Screen bypass	Screen bypass
C3	Part of N2	CAPACITOR: fixed; 0.006 mf ±20%; 100-volt.		Plate bypass
C6	3D9025–36	CAPACITOR AND BRACKET ASSEMBLY: in-	Oscillator feedback	
C7	3D9025–36	cludes C6, fixed section, 25-mmf; and C7, variable section, 18 to 160-mmf.		Antenna tuning
C8	3DA10–102	CAPACITOR: fixed; 0.01 mf ±20%; 100-volt.	Filament bypass	Filament bypass
C12	3D9007V–1	CAPACITOR: variable; 7 to 140 mmf.	Tuning	
C23	3DA6–42	CAPACITOR: fixed; 0.006-mf ±20%; 100-volt.	Grid bias bypass	Grid bias bypass
L1	See table XXIII	ANTENNA COIL.		
L2	See table XXIII	R-F TANK COIL.		
N1	2C5351A/C4	RESISTOR-CAPACITOR CUP: includes C2, C5, C23, R3 and R4.		
R5	3Z6630–4	RESISTOR: fixed; 3,300-ohm ±10%; ⅓-watt.		Sensitivity control
R7	3Z4670–9	RESISTOR: fixed; 4,700-ohm ±10%; ⅓-watt.		Sensitivity control
R25	3Z6568–9	RESISTOR: fixed; 6,800-ohm ±10%; ⅓-watt.		Sensitivity control
V1		TUBE: JAN–3S4.		





NOTE 1

VOLTAGES WITH SUFFIX "R" MEASURED IN RECEIVE POSITION.
VOLTAGES WITH SUFFIX "T" MEASURED IN TRANSMIT POSITION.
FILAMENT AND BIAS VOLTAGES MEASURED ON 30 VOLT RANGE OF VOLT-OHMMETER UNIT OF SIGNAL CORPS TEST SET I-56-(*).
ALL OTHER VOLTAGES MEASURED ON 300 VOLT RANGE.
"A" BATTERY VOLTAGE 1.4 V. "B" BATTERY VOLTAGE 90 V.

NOTE 2

RESISTANCES WITH THE SUFFIX "R" MEASURED IN RECEIVE POSITION.
RESISTANCES WITH THE SUFFIX "T" MEASURED IN RECEIVE TRANSMIT POSITION.
NC – NO CONNECTION.
INF – NO READING.
NM – NOT MEASURED.
ALL MEASUREMENTS MADE WITH TUBES IN PLACE AND POWER SWITCH OFF.
ALL MEASUREMENTS OBTAINED WITH SIGNAL CORPS METER I-56-(*).
ALL MEASUREMENTS BETWEEN CHASSIS AND POINTS INDICATED.

TL 18938

Figure 47. R-f stage schematic diagram, Radio Receiver and Transmitter BC–611–(*).

40. Oscillator Stage

a. This test is to be used if the r-f signal applied to the grid of V1 (pin 4) gives no reading in the output meter. Such a trouble may be caused by oscillator failure resulting in no i-f beat (455 kc). No signal tracing method can be used in tracing the trouble in the oscillator section.

b. Component break-down or improper switch operation are the two remaining checks to be made following the measurement of the tube socket voltages. A recheck of the component parts R3 and R4 should be made. They are located in the tube cup of V1. These parts make up the grid bias network for the oscillator stage and audio stage V5.

c. Little trouble will be experienced in getting the oscillator to function in the receiver. However, any troubles in the transmitter oscillator not covered by the above material will center around the timing factor of the crystal switch. If in pressing the press-to-talk switch, the moving blade of switch section A does not make contact with the switch lug connected to transmitter crystal M2 at the same time or before the moving blade of switch section M short circuits resistor R17, the energy pulse necessary to start crystal activity will not reach the crystal and the oscillator will not function. As a result of the high screen voltage and no bias, the tube V2 will become paralyzed. To remedy this trouble, move the lug on the switch section A connected to the transmitter crystal M2 so that it makes contact at the same time or before switch section M short circuits resistor R17.

41. Mixer Stage V2

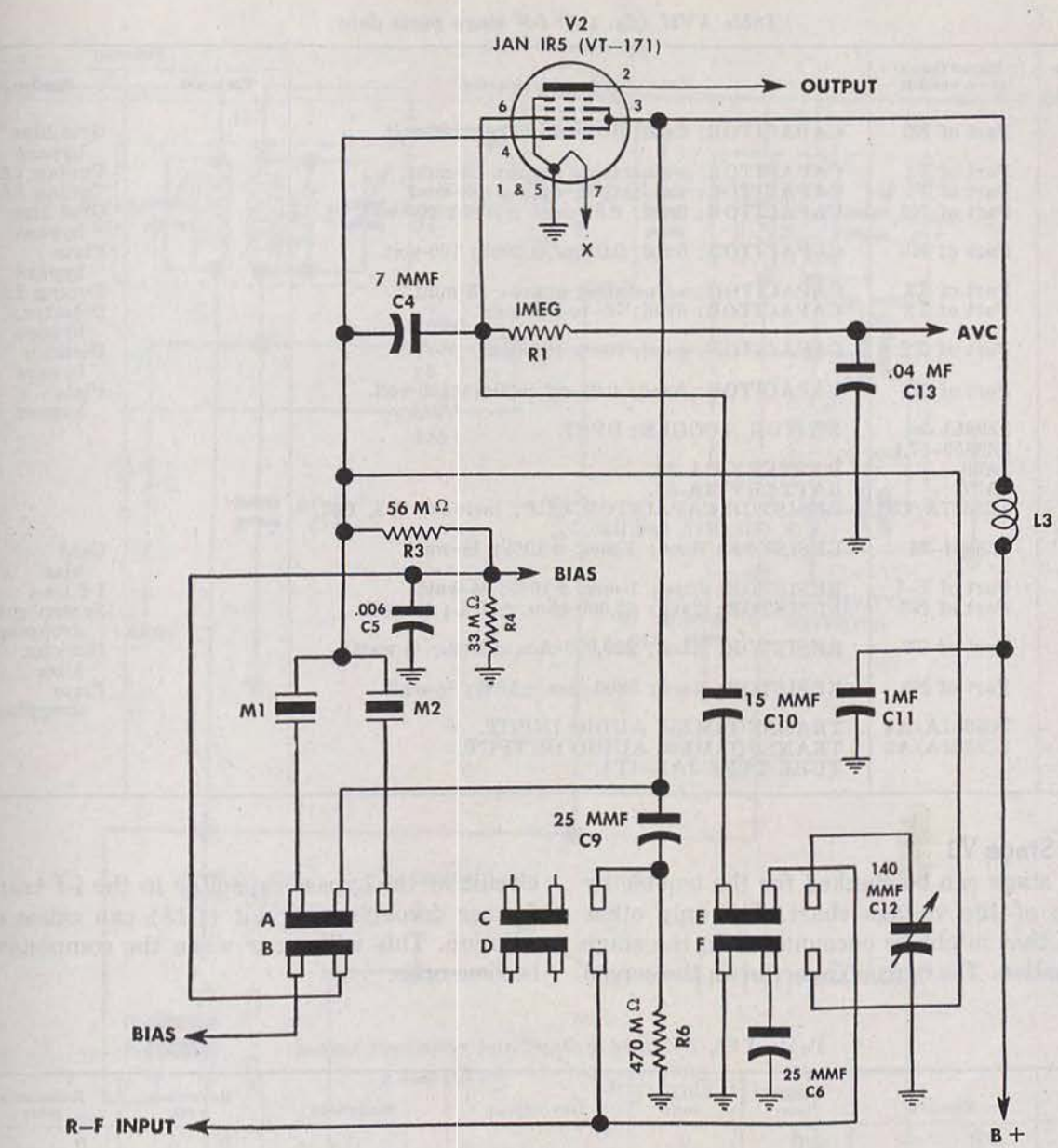
The mixer-oscillator voltages are given in table XV. The mixer as well as the i-f stage is subject to oscillation. This oscillation will be at the intermediate frequency and will be caused by the break-down of the bypass capacitors C31 and C11.

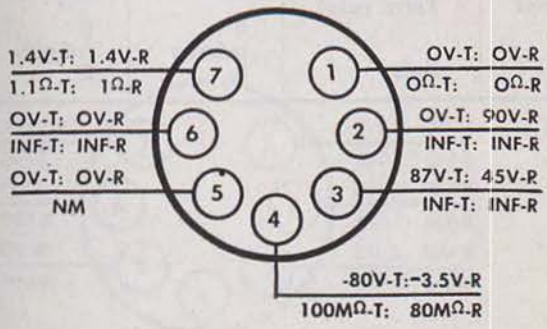
Table XIV. Mixer stage voltage and resistance valves

Pin	Element	Voltage rcvr	Voltage xmtr	Low voltage	No voltage	Resistance xmtr	Resistance rcvr
1	Ground	0	0			0	0
2	Plate	90	0	C31	C31	infinity	infinity
3	Screen	45	87	C11	L3, C11	infinity	infinity
4	Osc grid	—3.5	—8.0	R3, R1	R3, R4	100k	80k
6	Control grid	0	0			infinity	infinity
7	Fil	1.4	1.4	Batt	Batt	1.1	1

Table XV (fig. 48). Mixer-oscillator stage parts data

Reference number	Signal Corps stock number	Name of part and description	Function	
			Transmit	Receive
C4	3D9007–2	CAPACITOR, fixed; 7-mmf ±5%.	Grid neutralization	
C5	Part of N1	CAPACITOR, fixed; 0.006-mf ±20%; 100-volt.	Grid bias bypass	Grid bias bypass
C6	3D9025–36	CAPACITOR; adjustable.	Oscillator feedback	
C9	3D9025–35	CAPACITOR; fixed; 25-mmf ±10%.	Coupling V2 to V1	None
C10	3D9015–18	CAPACITOR; fixed; 15-mmf ±10%.	None	Coupling V1 to V2
C11	3DA100–120	CAPACITOR; fixed; 0.1-mf ±100%; 100-volt.	Screen grid bypass	Screen grid bypass
C12	3D9007V–1	CAPACITOR; variable; 7- to 140-mmf.	Tunes L2	None
C13	3DA40–6	CAPACITOR; fixed; 0.04-mf ±10%; 100-volt.		A-v-c filter
L3	3C362–17	R-F CHOKE; 0.5-mh.	Oscillator anode decoupling	Oscillator anode decoupling
M1	See table XXIII	RECEIVER CRYSTAL.	Crystal	
M2	See table XXIII	TRANSMITTER CRYSTAL.		Crystal
N2	2C5351A/C5	RESISTOR-CAPACITOR CUP; contains C3, C13, and R1.		
R1	Part of N2	RESISTOR; fixed; 1-meg ±10%; ⅕-watt.	Grid a-v-c decoupling mixer	
R3	Part of N1	RESISTOR; fixed; 56,000-ohm ±10%; ⅕-watt.	Oscillator grid bias	Oscillator grid bias
R4	Part of N1	RESISTOR; fixed; 33,000-ohm ±10%; ⅕-watt.		
R6	3Z6747–6	RESISTOR; fixed; 470,000-ohm ±10%; ⅓-watt.		Grid bias power amplr





NOTE 1

VOLTAGES WITH SUFFIX "R" MEASURED IN RECEIVE POSITION.
VOLTAGES WITH SUFFIX "T" MEASURED IN TRANSMIT POSITION.
FILAMENT AND BIAS VOLTAGES MEASURED ON 30 VOLT RANGE OF VOLT-OHMMETER UNIT OF SIGNAL CORPS TEST SET I-56-(*).
ALL OTHER VOLTAGES MEASURED ON 300 VOLT RANGE.
"A" BATTERY VOLTAGE 1.4 V "B" BATTERY VOLTAGE 90 V

NOTE 2

RESISTANCES WITH THE SUFFIX "R" MEASURED IN RECEIVE POSITION.
RESISTANCES WITH THE SUFFIX "T" MEASURED IN RECEIVE TRANSMIT POSITION.
NC – NO CONNECTION.
INF – NO READING.
NM – NOT MEASURED.
ALL MEASUREMENTS MADE WITH TUBES IN PLACE AND POWER SWITCH OFF.
ALL MEASUREMENTS OBTAINED WITH SIGNAL CORPS METER I-56-(*).
ALL MEASUREMENTS BETWEEN CHASSIS AND POINTS INDICATED.

TL 18939

Figure 48. Mixer-oscillator stage schematic diagram, Radio Receiver and Transmitter BC–611–(*).

Table XVII (fig. 49). I-F stage parts data

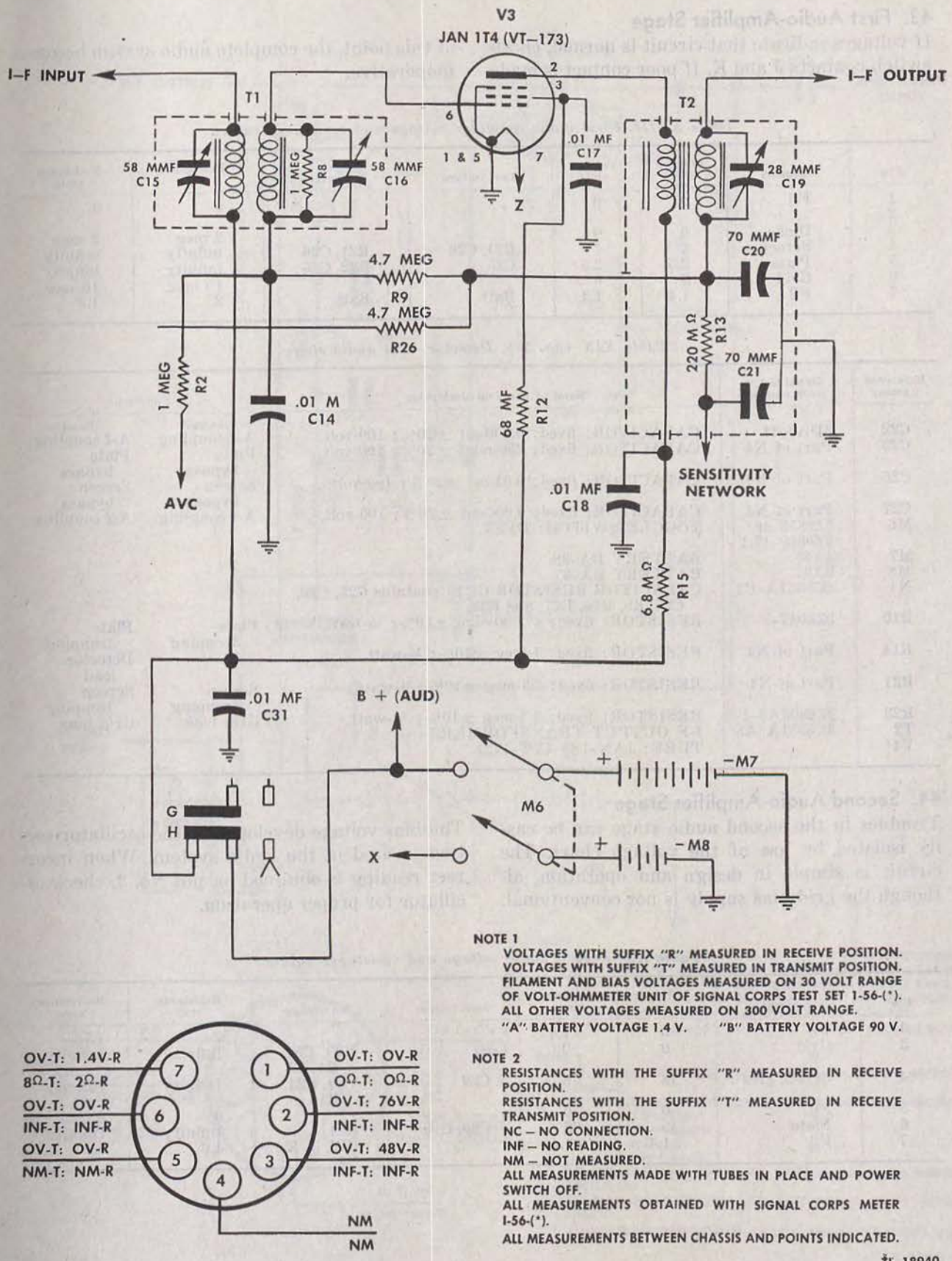
Reference number	Signal Corps stock number	Name of part and description	Function	
			Transmit	Receive
C14	Part of N3	CAPACITOR; fixed; 0.01-mf ±20%; 100-volt.		Grid bias bypass
C15	Part of T1	CAPACITOR; adjustable; approx 58-mmf.		Tuning i.f.
C16	Part of T1	CAPACITOR; adjustable; approx 58-mmf.		Tuning i.f.
C17	Part of N3	CAPACITOR; fixed; 0.01-mmf ±20%; 100-volt.		Grid bias bypass
C18	Part of N3	CAPACITOR; fixed; 0.01-mf ±20%; 100-volt.		Plate bypass
C19	Part of T2	CAPACITOR; adjustable; approx 28-mmf.		Tuning i.f.
C20	Part of T2	CAPACITOR; fixed; 70- to 100-mmf.		Detector bypass
C21	Part of T2	CAPACITOR; fixed; 70- to 100-mmf.		Detector bypass
C31	Part of N3	CAPACITOR; fixed; 0.01-mf ±20%; 100-volt.		Plate bypass
M6	3Z9853 or 3Z9859–17.1	SWITCH, TOGGLE; DPST.		
M7	3A38	BATTERY BA–38.		
M8	3A37	BATTERY BA–37.		
N3	2C5357A/C3	RESISTOR-CAPACITOR CUP; includes C14, C17, C18, C31, R12, and R15.		
R2	3Z6801–24	RESISTOR; fixed; 1-meg ±10%; ⅛-watt.		Grid bias
R8	Part of T–1	RESISTOR; fixed; 1-meg ±10%; ⅛-watt.		I-f load
R12	Part of N3	RESISTOR; fixed; 68,000-ohm ±10%; ⅛-watt.		Screen grid dropping
R13	Part of T2	RESISTOR; fixed; 220,000-ohm ±10%; ⅛-watt.		Detector filter
R15	Part of N3	RESISTOR; fixed; 6800-ohm ±10%; ⅛-watt.		Plate dropping
T1	2C5351A/A4	TRANSFORMER, AUDIO INPUT.		
T2	2C5351A/A5	TRANSFORMER, AUDIO OUTPUT.		
V3		TUBE TYPE JAN–1T4.		

42. I-F Stage V3

The i-f stage can be checked for the trouble by the use of the voltage chart. The only other trouble that might be encountered in the stage is oscillation. The bypass capacitor in the screen circuit or the bypass capacitor in the i-f transformer decoupling circuit (C18) can cause oscillation. This will occur when the components become open.

Table XVI. I-F tube voltage and resistance values

Pin	Element	Voltage rcvr	Voltage xmtr	Low voltage	No voltage	Resistance rcvr	Resistance xmtr
1	Fil	0	0			0	0
2	Plate	76	0	C18, R15	C18, R15, C31, L5	infinity	infinity
3	Screen grid	0	0	C17, R12	R12	infinity	infinity
4	None	48	0	Term. point	Term. point		
5	Suppressor	0	0			0	0
6	Grid	0	0			infinity	infinity
7	Fil	1.4	0	Batt	Batt	2	8



NOTE 1

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VOLTAGES WITH SUFFIX "T" MEASURED IN TRANSMIT POSITION.
FILAMENT AND BIAS VOLTAGES MEASURED ON 30 VOLT RANGE OF VOLT-OHMMETER UNIT OF SIGNAL CORPS TEST SET I-56-(*).
ALL OTHER VOLTAGES MEASURED ON 300 VOLT RANGE.
"A" BATTERY VOLTAGE 1.4 V. "B" BATTERY VOLTAGE 90 V.

NOTE 2

RESISTANCES WITH THE SUFFIX "R" MEASURED IN RECEIVE POSITION.
RESISTANCES WITH THE SUFFIX "T" MEASURED IN RECEIVE TRANSMIT POSITION.
NC – NO CONNECTION.
INF – NO READING.
NM – NOT MEASURED.
ALL MEASUREMENTS MADE WITH TUBES IN PLACE AND POWER SWITCH OFF.
ALL MEASUREMENTS OBTAINED WITH SIGNAL CORPS METER I-56-(*).
ALL MEASUREMENTS BETWEEN CHASSIS AND POINTS INDICATED.

TL 18940

Figure 49. I-f stage schematic diagram, Radio Receiver and Transmitter BC–611–(*).

43. First Audio-Amplifier Stage

If voltages indicate that circuit is normal, check switch contacts J and K. If poor contact is made at this point, the complete audio system becomes inoperative.

Table XVIII. First audio amplifier voltage and resistance values

Pin	Element	Voltage rcvr	Voltage xmtr	Low voltage	No voltage	Resistance rcvr	Resistance xmtr
1	Fil	0	0			0	0
2							
3	Diode	0	0			2 meg	2 meg
4	Screen	1	1	R21, C26	R21, C26	infinity	infinity
5	Plate	2.5	2.5	C25	R22, C25	infinity	infinity
6	Grid	0	0			10 meg	10 meg
7	Fil	1.4	1.4	Batt	Batt	2	1.8

Table XIX (fig. 50). Detector, first audio stage

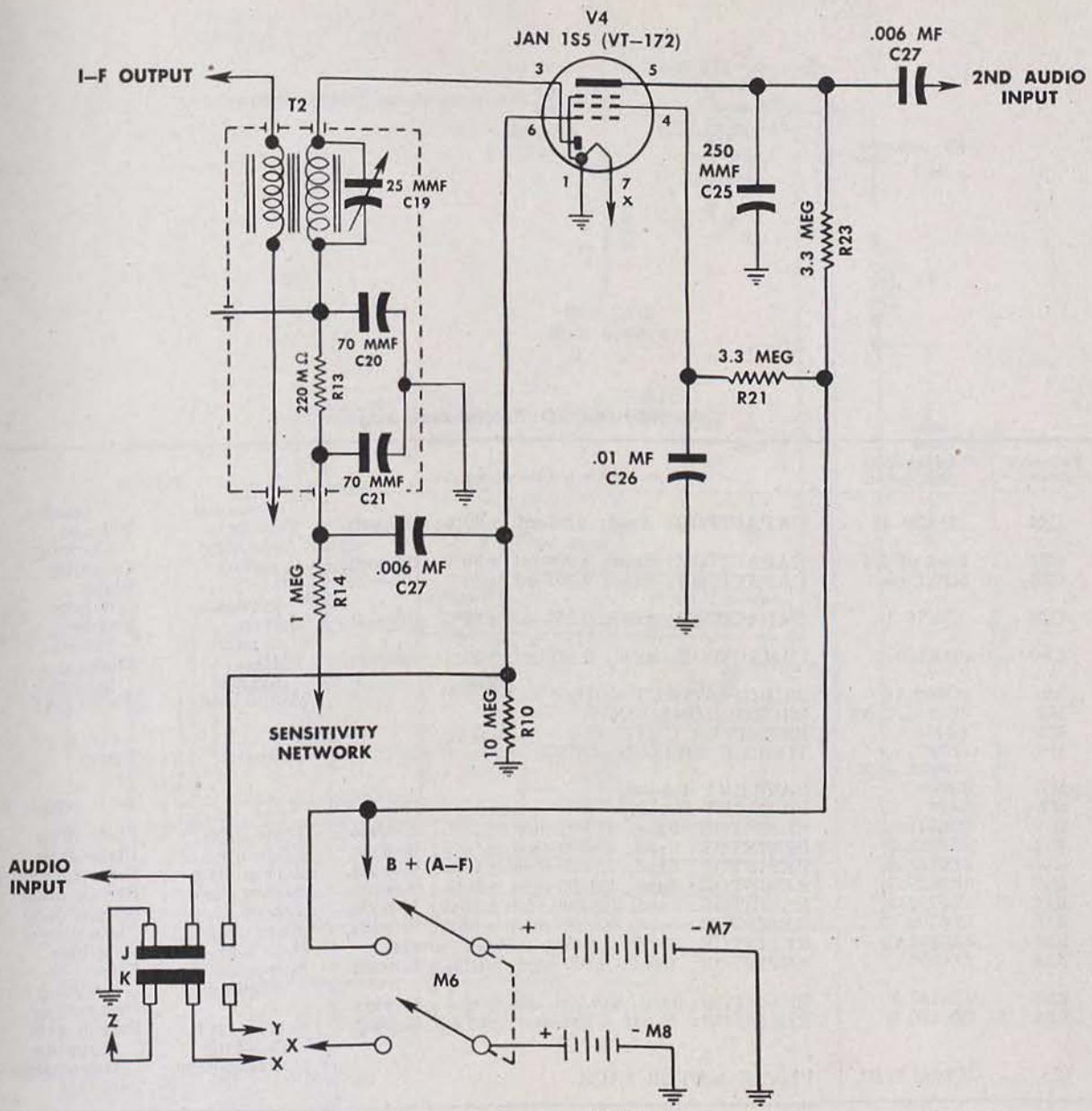
Reference number	Signal Corps stock number	Name of part and description	Function	
			Transmit	Receive
C22	3DA6–41	CAPACITOR: fixed; 0.006-mf ±20%; 100-volt.	A-f coupling	A-f coupling
C25	Part of N4	CAPACITOR: fixed; 250-mmf ±20%; 100-volt.	Plate bypass	Plate bypass
C26	Part of N4	CAPACITOR: fixed; 0.01-mf ±20%; 100-volt.	Screen bypass	Screen bypass
C27	Part of N4	CAPACITOR: fixed; 0.006-mf ±20%; 100-volt.	A-f coupling	A-f coupling
M6	3Z9853 or 3Z9859–17.1	TOGGLE SWITCH: DPST.		
M7	3A38	BATTERY BA–38.		
M8	3A37	BATTERY BA–37.		
N4	2C5357A/C2	CAPACITOR RESISTOR CUP: contains C25, C26, C27, R9, R14, R27, and R22.		
R10	3Z6047–5	RESISTOR: fixed; 47,000-ohm ±10%; ⅓-watt.	Plate dropping	Plate dropping
R14	Part of N4	RESISTOR: fixed; 1-meg ±10%; ⅓-watt.		Detector load
R21	Part of N4	RESISTOR: fixed; 3.3-meg ±10%; ⅓-watt.	Screen dropping	Screen dropping
R23	3Z6803A3–1	RESISTOR: fixed; 3.3-meg ±10%; ⅓-watt.	Grid bias	Grid bias
T2	2C5351A/A5	I-F OUTPUT TRANSFORMER.		
V4		TUBE: JAN–1S5 (VT–172).		

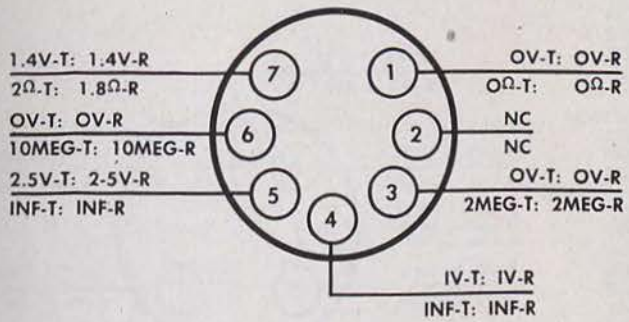
44. Second Audio-Amplifier Stage

Troubles in the second audio stage can be easily isolated by use of the voltage chart. The circuit is simple in design and operation, although the grid bias supply is not conventional. The bias voltage developed in the oscillator section is used in the audio system. When incorrect reading is obtained on pin No. 3, check oscillator for proper operation.

Table XX. Second audio voltage and resistance values

Pin	Element	Voltage rcvr	Voltage xmtr	Low voltage	No voltage	Resistance rcvr	Resistance xmtr
1	Fil	0	1.4			2	1.75
3	Grid	0	0		R23, C5, R4, R3	Infinity	Infinity
4	Screen grid	18	76	C29	C29, R24, R16	Infinity	Infinity
5	Fil	0	0			0	0
6	Plate	45	72	C28, C10	R11	Infinity	Infinity
7	Fil	1.4	1.4		SW, J, K	4.6	2.0





NOTE 1

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VOLTAGES WITH SUFFIX "T" MEASURED IN TRANSMIT POSITION.
FILAMENT AND BIAS VOLTAGES MEASURED ON 30 VOLT RANGE OF VOLT-OHMMETER UNIT OF SIGNAL CORPS TEST SET I-56-(*).
ALL OTHER VOLTAGES MEASURED ON 300 VOLT RANGE.
"A" BATTERY VOLTAGE 1.4 V. "B" BATTERY VOLTAGE 90 V.

NOTE 2

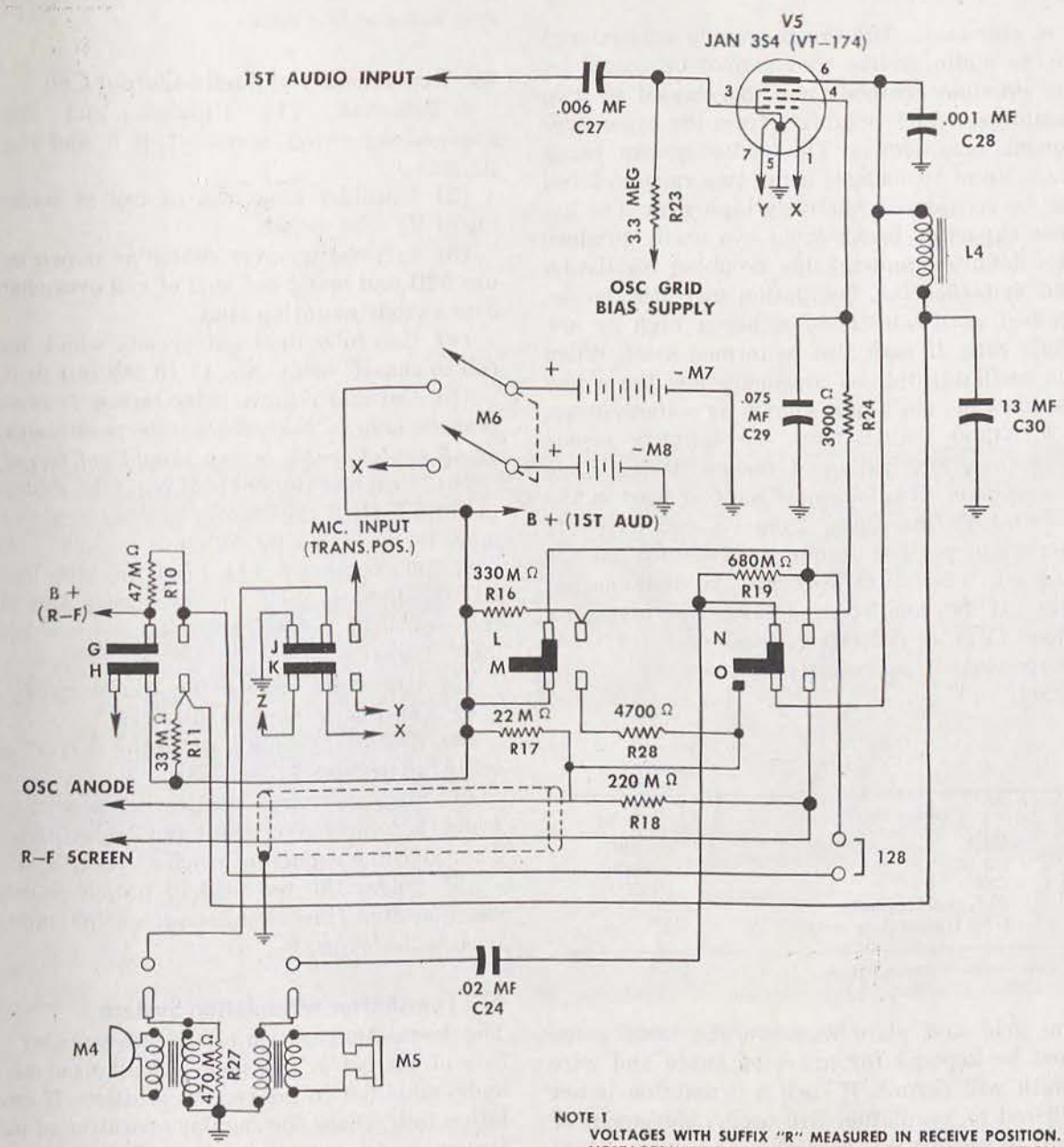
RESISTANCES WITH THE SUFFIX "R" MEASURED IN RECEIVE POSITION.
RESISTANCES WITH THE SUFFIX "T" MEASURED IN RECEIVE TRANSMIT POSITION.
NC – NO CONNECTION.
INF – NO READING.
NM – NOT MEASURED.
ALL MEASUREMENTS MADE WITH TUBES IN PLACE AND POWER SWITCH OFF.
ALL MEASUREMENTS OBTAINED WITH SIGNAL CORPS METER I-56-(*).
ALL MEASUREMENTS BETWEEN CHASSIS AND POINTS INDICATED.

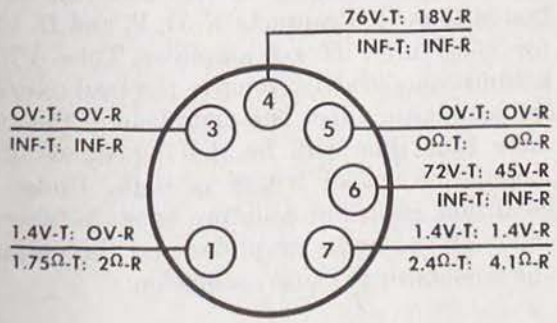
TL 18941

Figure 50. Detector first audio schematic diagram, Radio Receiver and Transmitter BC–611–(*).

Table XXI (fig. 51). Second audio stage

Reference number	Signal Corps stock number	Name of part and description	Function	
			Transmit	Receive
C24	3DA20–43	CAPACITOR; fixed; 0.02-mf ±20%; 100-volt.	Voltage blocking	Voltage blocking
C27	Part of N4	CAPACITOR; fixed; 0.006-mf ±20%; 100-volt.	Coupling	Coupling
C28	3OA1–85	CAPACITOR; fixed; 0.001-mf ±20%; 100-volt.	Plate bypass	Plate bypass
C29	3DA75–1	CAPACITOR; fixed; 0.075-mf ±20%; 100-volt.	Screen bypass	Screen bypass
C30	3DA150–2	CAPACITOR; fixed; 0.130-mf ±20%; 100-volt.	Plate bypass	Plate bypass
L4	3C362–16	AUDIO OUTPUT COIL.	Audio load	Audio load
M4	2C5357A/A3	MICROPHONE UNIT.		
M5	2B475	RECEIVER UNIT.		
M6	3Z9853 or 3Z9859–17.1	TOGGLE SWITCH; DPST.	Power	Power
M7	3A38	BATTERY BA–38.		
M8	3A37	BATTERY BA–37.		
R10	3Z6647–5	RESISTOR; fixed; 47,000-ohm ±10%; ⅓-watt.	Plate drop	Plate drop
R11	3Z6633–3	RESISTOR; fixed; 33,000-ohm ±10%; ⅓-watt.	Plate drop	Plate drop
R16	3Z6733–2	RESISTOR; fixed; 33,000-ohm ±10%; ⅓-watt.	Screen drop	Screen drop
R17	3Z6627–7	RESISTOR; fixed; 22,000-ohm ±10%; ⅓-watt.	Screen drop	Screen drop
R18	3Z6722–9	RESISTOR; fixed; 220,000-ohm ±10%; ⅓-watt.	Screen drop	Screen drop
R19	3Z6768–3	RESISTOR; fixed; 680,000-ohm ±10%; ⅓-watt.	Plate drop	Plate drop
R23	3Z6803A3–1	RESISTOR; fixed; 3.3-meg ±10%; ⅓-watt.	Grid bias	Grid bias
R24	3Z6390	RESISTOR; fixed; 3,900-ohm ±10%; ⅓-watt.	Screen decoupling	Screen decoupling
R27	3Z6747–6	RESISTOR; fixed; 470,000-ohm ±10%; ⅓-watt.		Dampening
R28	3Z6470–9	RESISTOR; fixed; 4,700-ohm ±10%; ⅓-watt.	Screen grid dropping transmitter	Screen grid dropping transmitter
128	2C5351A/S1	PLATE METER JACK.		





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NOTE 2

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NC – NO CONNECTION.
INF – NO READING.
NM – NOT MEASURED.
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ALL MEASUREMENTS OBTAINED WITH SIGNAL CORPS METER I-56-(*).
ALL MEASUREMENTS BETWEEN CHASSIS AND POINTS INDICATED.

TL 18942

Figure 51. Second audio stage schematic diagram, Radio Receiver and Transmitter BC–611–(*).

45. Service Notes

a. GENERAL. Additional trouble encountered in the audio system that cannot be traced by the previous methods may be classed by two symptoms which originate from the same component break-down. The audio system being made up of two stages using two vacuum tubes can be considered relatively high gain. The bypass capacitor break-down can easily produce two definite unmistakable troubles, oscillation and *motorboating*. Oscillation may best be described as a whistle of either a high or low audio rate. It may also be termed *howl*. When the oscillator rate is unusually low the sound assumes the noise best known as *motorboating*.

b. AUDIO OSCILLATION. To simplify repair procedure, localization of the oscillating stage is necessary. The simplest method used is the removal of first audio Tube VT–172 (V4). If oscillation persists it may be assumed the oscillation is a function of V5, the audio-output tube. If no oscillation occurs, the preceding stage (V4) is defective. Break-down of those components listed below will cause audio oscillation.

Table XXII

Stage V4	Stage V5
C25*	C29
C2	C30
C26	C2
C31, receiver only	
C30, transmitter only	

*High-frequency whistle only.

The grid and plate wires in the same stage must be kept as far apart as space and wire length will permit. If such a precaution is not adhered to, oscillation will occur. Movement of leads to remove this oscillation is known as *lead dress*. Low-frequency oscillations which might well be described as audio *howl* can be brought about by open control grid circuits. This trouble is not likely to exist in first audio stage V4 because of the minute voltage impressed across R20. However, mechanical break-down must be considered. Second audio stage V5, because of its more complex biasing arrangement, can develop open grid-circuited condition more easily. The tube cup of V1 should be given a thorough check or replaced, because the biasing circuit originates at this point.

46. Replacement of Audio-Output Coil

a. REMOVAL. (1) Unscrew and remove change-over switch screws 1, 2, 3, and 4. (See fig. 52A.)

(2) Unsolder blue lead of coil at soldering lug of V5 tube socket.

(3) Lift change-over switch as shown in figure 52B and bring red lead of coil over change-over switch mounting stud.

(4) Carefully drill out eyelets which fasten coil to chassis using No. 43 (0.089 in.) drill.

(5) Cut and remove cable lacing. *If removal is made only in connection with replacement of on-off switch, cable lacing should not be cut.*

(6) Unsolder the red lead from the solder lug in section H of the change-over switch and remove the coil. (See fig. 52A.)

b. REPLACEMENT. (1) Feed the blue lead of coil through the hole in the chassis and place the red lead behind the change-over switch mounting stud.

(2) Rivet the coil to the chassis with two eyelets (0.125 by 0.089 in. diam.).

(3) Solder the blue lead to the correct soldering lug of the V5 tube socket.

(4) Replace change-over switch screws 3 and 4 and then replace screws 1 and 2, placing screw 2 through the capacitor bracket. (See fig. 52A.)

(5) Solder the red lead to proper soldering lug of section H of change-over switch and then recable the wires.

47. Transmitter Modulation System

The modulation system for the transmitter portion of the set is the same circuit used as the audio amplifier in the receive position. If modulation fails, check for regular operation of audio system under proper heading. The modulation troubles not localized in this test can well be traced to switch contacts N, O, B, and H. Check for continuity. If r-f amplifier Tube VT–174 becomes inoperative, remove the load offered to the modulator tube. The plate load of the modulator tube then will be the impedance of the modulation choke which is high. Under this condition, sufficient coupling exists between the input of the audio amplifier and the output of the modulator to cause oscillation.

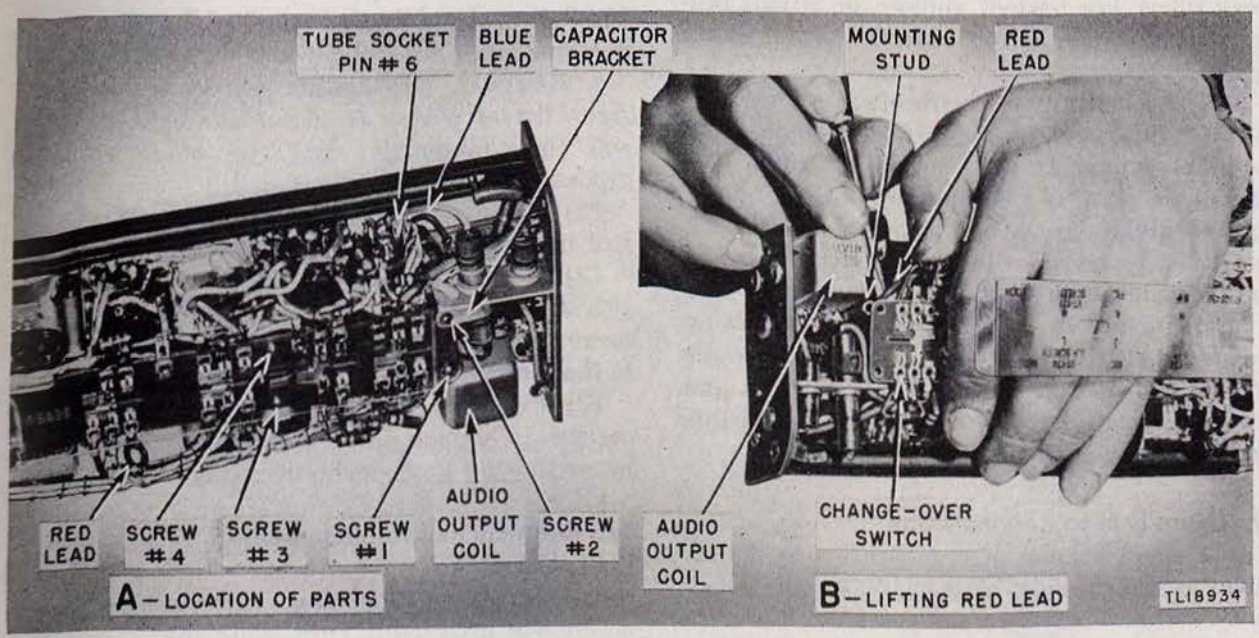

Figure 52. Removal of audio output coil, Radio Receiver and Transmitter BC–611–(*).

SECTION IX

SUPPLEMENTARY DATA

48. Sensitivity

a. If after the proper alignment of a receiver it is found that the sensitivity is greater than 7 microvolts for a 15-volt output reading on the 50-volt a-c scale of the output meter, or 6 microvolts for a 20-volt reading on a vacuum-tube voltmeter output meter, adjust the sensitivity control. This adjustment, however, should be made only after checking the receiver to see that the lack of sensitivity does not result from weak tubes, low battery voltage, or circuit failures. (See table X for receiver performance figs.)

b. The sensitivity of the receiver is controlled by an adjustment of the grid bias on the r-f amplifier, mixer, and i-f amplifier tubes. The adjustable bias is obtained by means of the voltage divider made up of resistors R5, R7, and R25. To increase the sensitivity of the receiver, reduce the bias. The reduction in bias is accomplished by moving the wire connecting resistor R14 to the voltage divider closer to the ground end of the divider. Minimum bias and greatest sensitivity will be obtained when this lead is connected to ground.

49. Noise Due to Regeneration

a. A small amount of regeneration in the receiver is permissible, as it increases the selectivity and sensitivity of the receiver; however, because tubes of the same type vary somewhat in their gain characteristics, excessive regeneration may occur when tubes are changed in the receiver. Excessive regeneration results in a high circuit noise level, and in extreme cases causes oscillation. Regeneration is caused by coupling between circuit elements due to close spacing of parts on the chassis.

b. The solution to this problem is to reduce the sensitivity of the receiver to a value which permits an allowable noise level. Provision for reducing the sensitivity of Radio Receiver and Transmitter BC–611–(*) for cases of excessive regeneration is provided for by an adjustable bias arrangement. Resistors R25, R7, and R5 connected across oscillator grid leak resistor R4 provide this adjustable bias arrangement. The lead connecting detector load resistor R14 to the bias point should be moved one step up on the voltage divider to decrease the sensitivity. This adjustment will increase the bias on tubes V1, V2, and V3. Normally, this lead is grounded, but for sets of abnormal sensitivity will be found connected to one of the taps on the divider. The lead should be connected to the lowest point on this divider which provides a satisfactory noise level.

50. Removal and Replacement of Top or Bottom Cover Assembly Moisture Seal Gasket

a. REMOVAL. (1) Loosen seal by inserting a screw driver with a ⅛-inch blade between seal and cover assembly, and run blade around groove.

(2) Clean old cement from groove using a stiff brush dipped in petroleum spirits.

(3) Wipe groove dry with clean cloth.

b. REPLACEMENT. (1) Apply thin coat of cement to the groove in the cover assembly and to the moisture seal, and allow to dry.

(2) Correctly position the gasket, place all corners in proper place, then stamp into place by setting on housing or by using a flat stick.

51. Removal and Replacement of On-Off Switch

a. REMOVAL. (1) Remove antenna guide and antenna as directed in paragraph 36*a*.

(2) Remove audio-output coil as directed in paragraph 46*a*, except do not cut cable lacing (step 5) or unsolder red lead from change-over switch soldering lug No. 17 (step 6).

(3) Unsolder leads to switch at switch soldering lugs.

(4) Bend B— solder lug flat.

(5) Unscrew on-off switch retainer nut with 9/16-inch twelve-point box wrench.

Note. See information contained in paragraph 4*f* with reference to differences between switches.

b. REPLACEMENT. (1) Place switch in chassis in proper position as shown in figure 25, and fasten in place with switch retainer nut. (See fig. 53.)

(2) Bend B— solder lug into proper position.

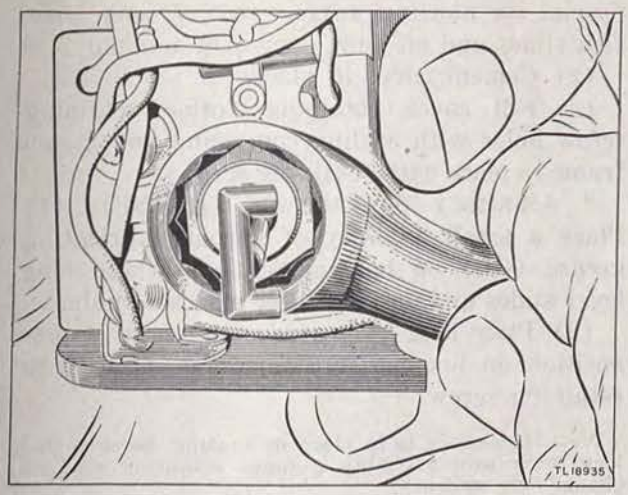

Figure 53. Removal of on-off switch retainer nut, Radio Receiver and Transmitter BC–611–(*).

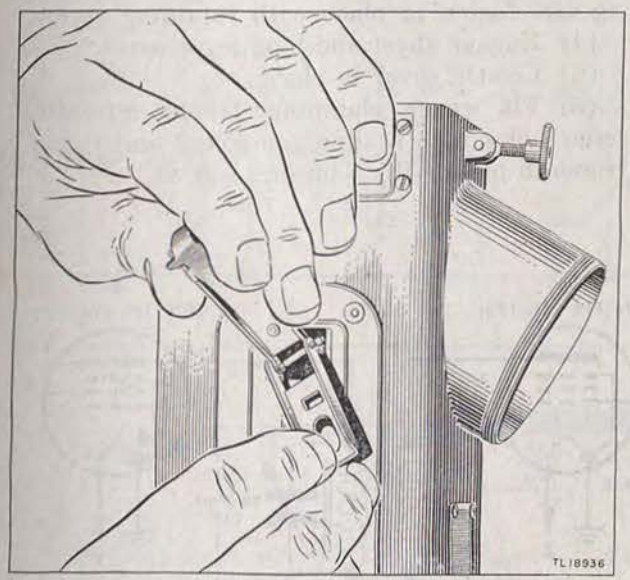

Figure 54. Removal of long lever arm assembly, Radio Receiver and Transmitter BC–611–(*).

(3) Resolder leads to switch.

(4) Replace audio output coil as indicated in paragraph 46*b*.

(5) Replace antenna and antenna guide as indicated in paragraph 36*b*. Do not fully retract antenna.

(6) Place on-off switch in ON position, then fully retract antenna.

52. Removal and Replacement of Change-over Switch Actuating Linkage Assembly

a. REMOVAL AND DISASSEMBLY OF EARLY DESIGN LINKAGE. (1) Unscrew cover clamping frame retaining screws.

(2) Carefully insert a small thin screw driver between cover and housing and move around contour of frame to separate cover and housing.

(3) Lift cover and frame from housing and separate.

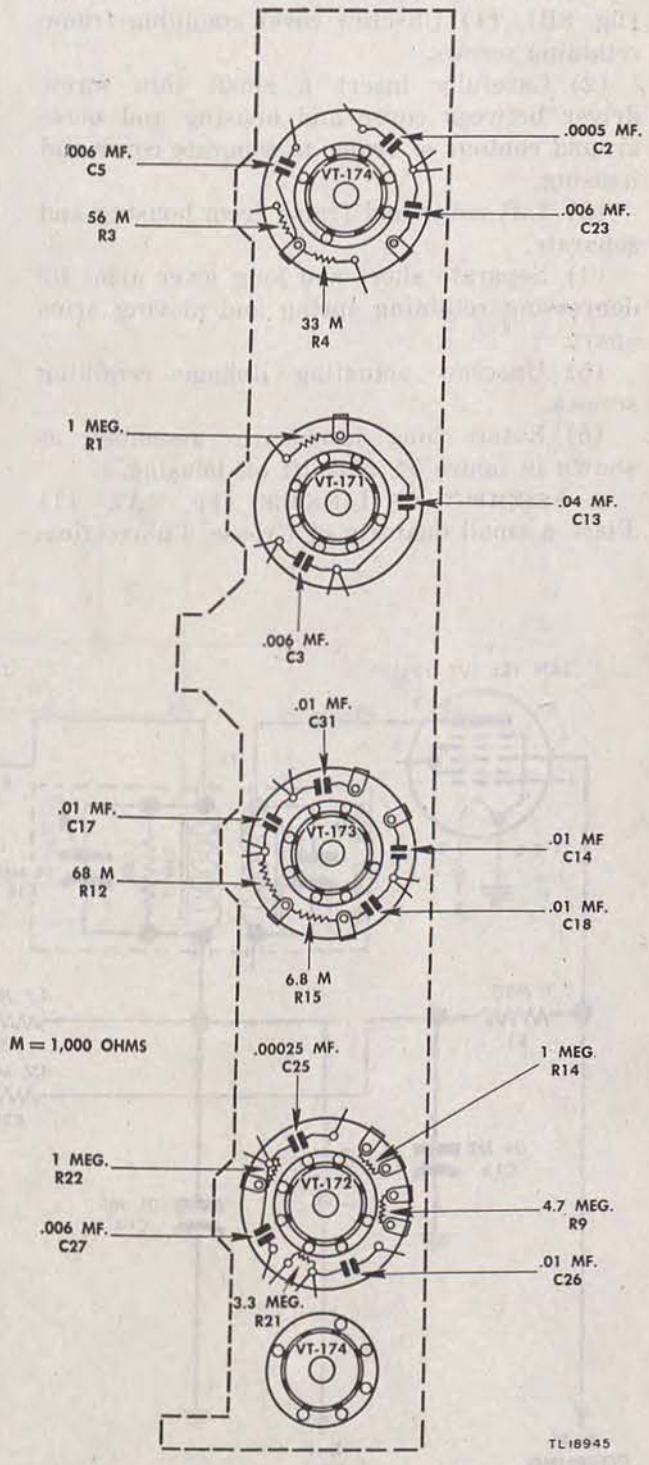

Figure 55. Resistor capacitor cup detail, Radio Receiver and Transmitter BC–611–(*).

(4) Unscrew threaded hinge pin and separate long and short lever arms.

(5) Unscrew actuating linkage retaining screws and lift off housing.

Note. The linkage assembly varies depending on the model of the set. (See fig. 8.)

b. REMOVAL AND DISASSEMBLY OF LINKAGE (fig. 8B). (1) Unscrew cover clamping frame retaining screws.

(2) Carefully insert a small thin screw driver between cover and housing and move around contour of frame to separate cover and housing.

(3) Lift cover and frame from housing and separate.

(4) Separate short and long lever arms by depressing retaining spring and moving arms apart.

(5) Unscrew actuating linkage retaining screws.

(6) Rotate long lever arm assembly, as shown in figure 54, and lift off housing.

c. ASSEMBLY OF LINKAGE (fig. 8A). (1) Place a small quantity of Grease, Lubricating, Special on housing surface where long lever arm slides and on long lever arm assembly.

(2) Cement cover in place.

(3) Fill cover clamping frame retaining screw holes with sealing compound and fasten frame in place with retaining screws.

d. ASSEMBLY OF LINKAGE (fig. 8B). (1) Place a small quantity of special lubricating grease (GL) on housing surface where long lever slides and on long lever arm assembly.

(2) Place long lever arm assembly in proper position on housing and fasten in place with retaining screw.

Note. If chassis is in place in housing, be sure that long lever arm assembly engages actuating stud on change-over switch.

(3) Place short lever arm assembly on housing and fasten in place with retaining screw.

(4) Engage short and long lever arms.

(5) Cement cover in place.

(6) Fill cover clamping frame retaining screw holes with sealing compound and fasten frame in place with retaining screws.

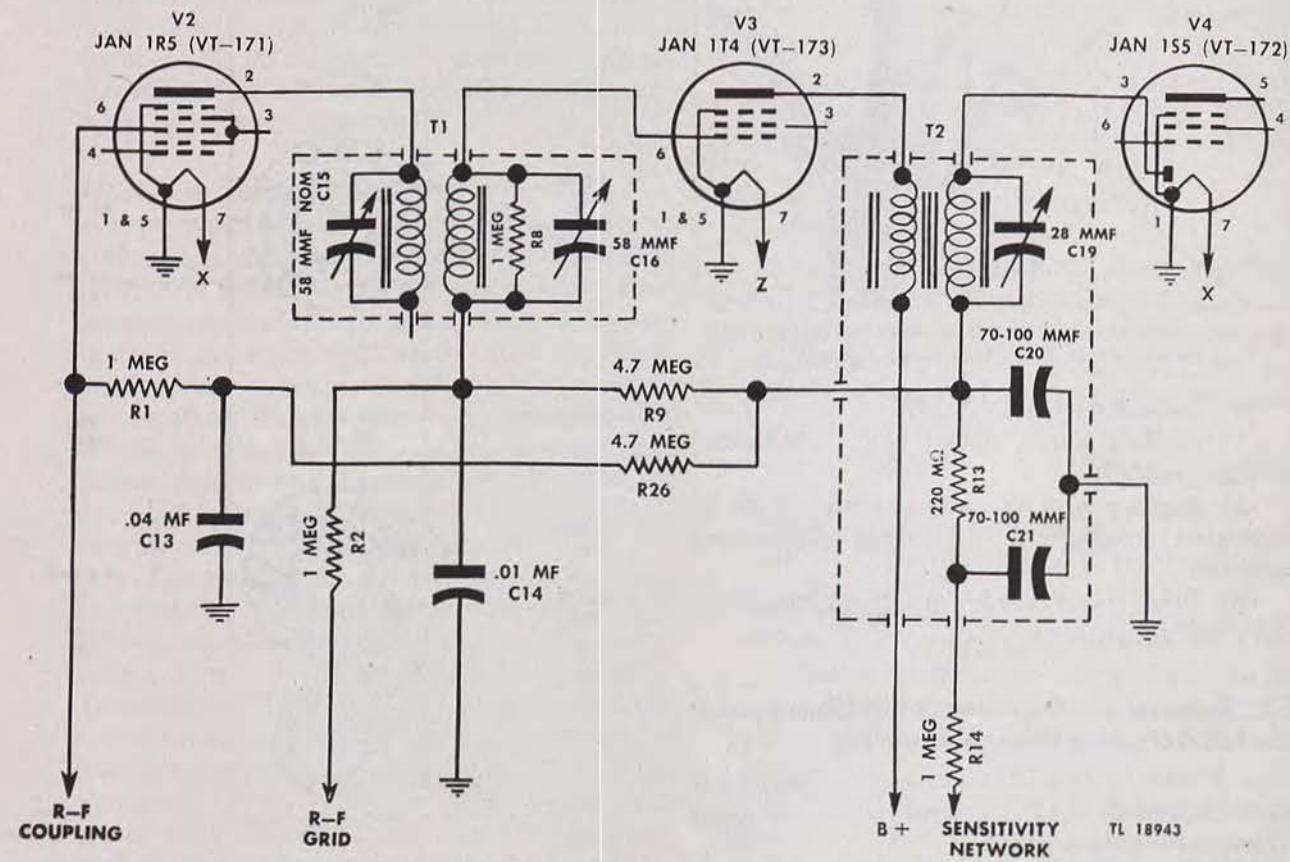

Figure 56. A-v-c schematic diagram, Radio Receiver and Transmitter BC-611-(*).

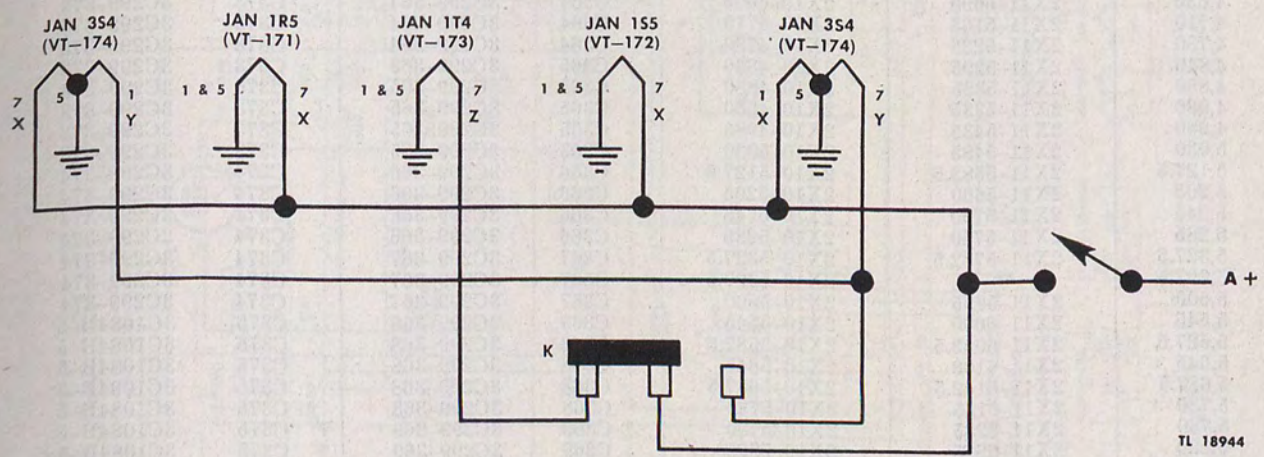

Figure 57. Filament schematic diagram, Radio Receiver and Transmitter BC–611–(*).

Table XXIII. Frequency channel table for radio receiver and transmitter BC–611–(*)

Frequency (kc)	Receiver crystal unit Signal Corps stock No.	Transmitter crystal unit Signal Corps stock No.	Antenna coil Signal Corps type No.	Antenna coil Signal Corps stock No.	R-F tank coil Signal Corps type No.	R-F tank coil Signal Corps stock No.
2,670	†	†	*24K47956	†	*24K47959	†
3,500	2X10–3500	2X10–3500	C358	3C299–358	C370	3C299–370
3,540	2X10–3995	2X10–3540	C358	3C299–358	C370	3C299–370
3,590	2X11–4045	2X10–3590	C358	3C299–358	C370	3C299–370
3,640	2X11–4095	2X10–3640	C358	3C299–358	C370	3C299–370
3,680	2X11–4135	2X10–3680	C358	3C299–359	C370	3C299–370
3,720	2X11–4175	2X10–3720	C359	3C299–359	C370	3C299–370
3,760	2X11–4215	2X10–3760	C359	3C299–359	C370	3C299–370
3,800	2X11–4255	2X10–3800	C359	3C299–359	C370	3C299–370
3,840	2X11–4295	2X10–3840	C360	3C299–360	C371	3C299–371
3,885	2X11–4340	2X10–3885	C360	3C299–360	C371	3C299–371
3,940	2X11–4395	2X10–3940	C360	3C299–360	C371	3C299–371
3,990	2X11–4445	2X10–3990	C360	3C299–360	C371	3C299–371
4,035	‡	2X10–4035	C361	3C299–361	C371	3C299–371
4,080	2X11–4535	2X10–4080	C361	3C299–361	C371	3C299–371
4,165	2X11–4620	2X10–4165	C361	3C299–361	C371	3C299–371
4,240	2X11–4695	2X10–4240	C362	3C299–362	C372	3C299–372
4,280	2X11–4735	2X10–4280	C362	3C299–362	C372	3C299–372
4,330	2X11–4785	2X10–4330	C362	3C299–362	C372	3C299–372
4,397.5	2X11–4852.5	2X10–4397.5	C362	3C299–362	C372	3C299–372
4,445	2X11–4900	2X10–4445	C363	3C299–363	C372	3C299–372
4,495	2X11–4950	2X10–4495	C363	3C299–363	C372	3C299–372
4,540	2X11–4995	2X10–4540	C363	3C299–363	C372	3C299–372
4,580	2X11–5035	2X10–4580	C363	3C299–363	C372	3C299–372
4,635	2X11–5090	2X10–4635	C364	3C299–364	C373	3C299–373
4,710	2X11–5165	2X10–4710	C364	3C299–364	C373	3C299–373
4,780	2X11–5235	2X10–4780	C364	3C299–364	C373	3C299–373
4,840	2X11–5295	2X10–4840	C365	3C299–365	C373	3C299–373
4,880	2X11–5335	2X10–4880	C365	3C299–365	C373	3C299–373
4,930	2X11–5385	2X10–4930	C365	3C299–365	C373	3C299–373
4,980	2X11–5435	2X10–4980	C365	3C299–365	C373	3C299–373
5,030	2X11–5485	2X10–5030	C365	3C299–365	C373	3C299–373
5,127.5	2X11–5582.5	2X10–5127.5	C366	3C299–366	C374	3C299–374
5,205	2X11–5660	2X10–5205	C366	3C299–366	C374	3C299–374
5,245	2X11–5700	2X10–5245	C366	3C299–366	C374	3C299–374
5,285	2X11–5740	2X10–5285	C366	3C299–366	C374	3C299–374
5,327.5	2X11–5782.5	2X10–5327.5	C367	3C299–367	C374	3C299–374
5,397.5	**	2X10–5397.5	C367	3C299–367	C374	3C299–374
5,500	2X11–5955	2X10–5500	C367	3C299–367	C374	3C299–374
5,545	2X11–6000	2X10–5545	C368	3C299–368	C375	3C1084B–5
5,587.5	2X11–6042.5	2X10–5587.5	C368	3C299–368	C375	3C1084B–5
5,645	2X11–6100	2X10–5645	C368	3C299–368	C375	3C1084B–5
5,687.5	2X11–6142.5	2X10–5687.5	C368	3C299–368	C375	3C1084B–5
5,730	2X11–6185	2X10–5730	C368	3C299–368	C375	3C1084B–5
5,780	2X11–6235	2X10–5780	C369	3C299–369	C375	3C1084B–5
5,820	2X11–6275	2X10–5820	C369	3C299–369	C375	3C1084B–5
5,860	2X11–6315	2X10–5860	C369	3C299–369	C375	3C1084B–5
5,907.5	2X11–6362.5	2X10–5907.5	C369	3C299–369	C375	3C1084B–5
5,950	2X11–6405	2X10–5950	C369	3C299–369	C375	3C1084B–5
5,995	2X11–6450	2X10–5995	C369	3C299–369	C375	3C1084B–5

*Number listed is Galvin Mfg. Co. part number.
**Stock number not available for this crystal unit; must be crystal for 5,852.5-kc in Crystal Holder FT–243–(*).
†Stock numbers not available for these parts. Receiver crystal unit must be crystal for 3,125-kc in Crystal Holder FT–243–(*). Transmitter crystal unit must be crystal for 2,670-kc in Crystal Holder FT–243–(*).
‡Stock number not available for this crystal unit; must be crystal for 4,480-kc in Crystal Holder FT–243–(*).

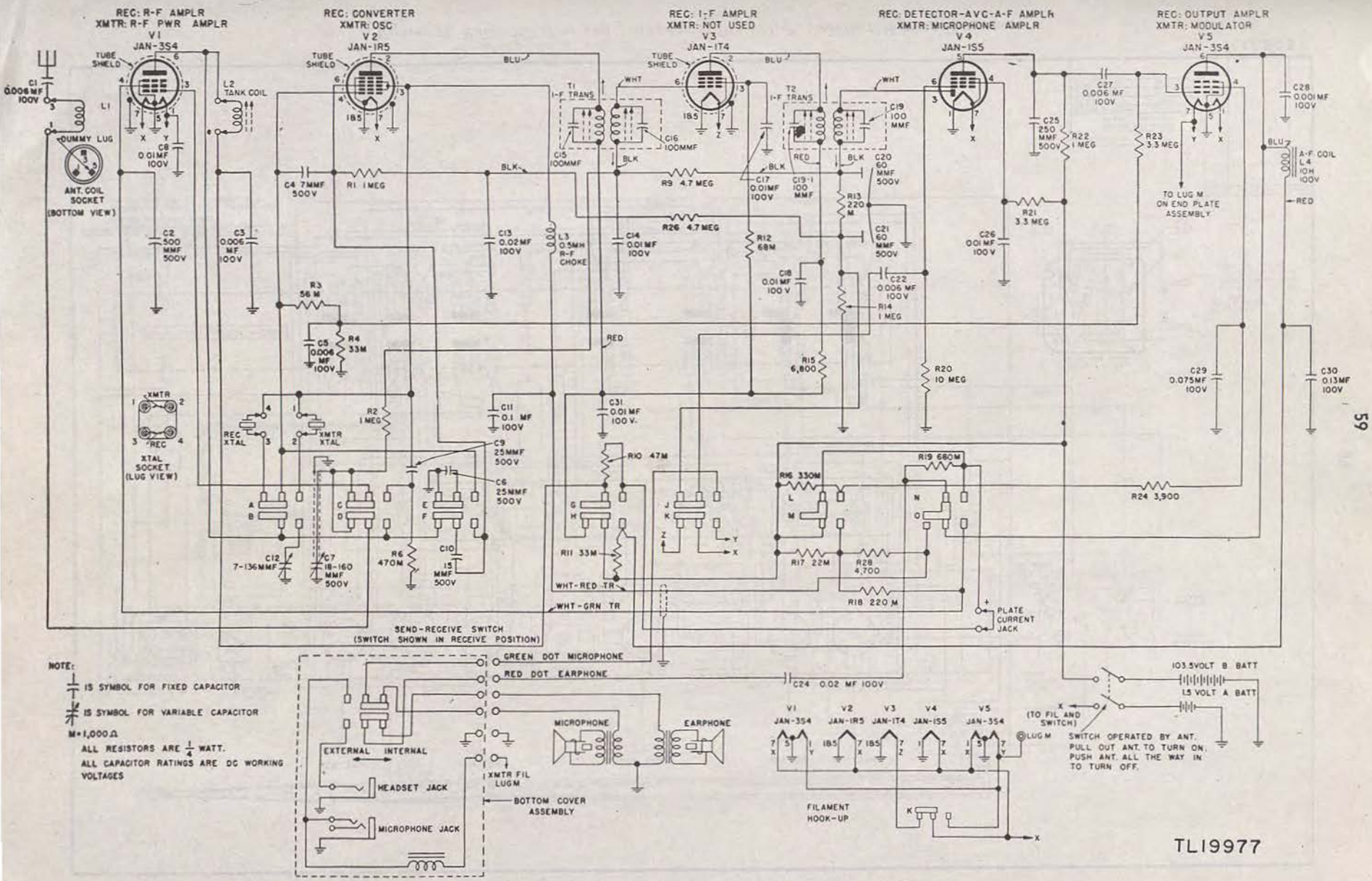

Figure 58. Radio Receiver and Transmitter BC–611–F. Schematic Diagram.

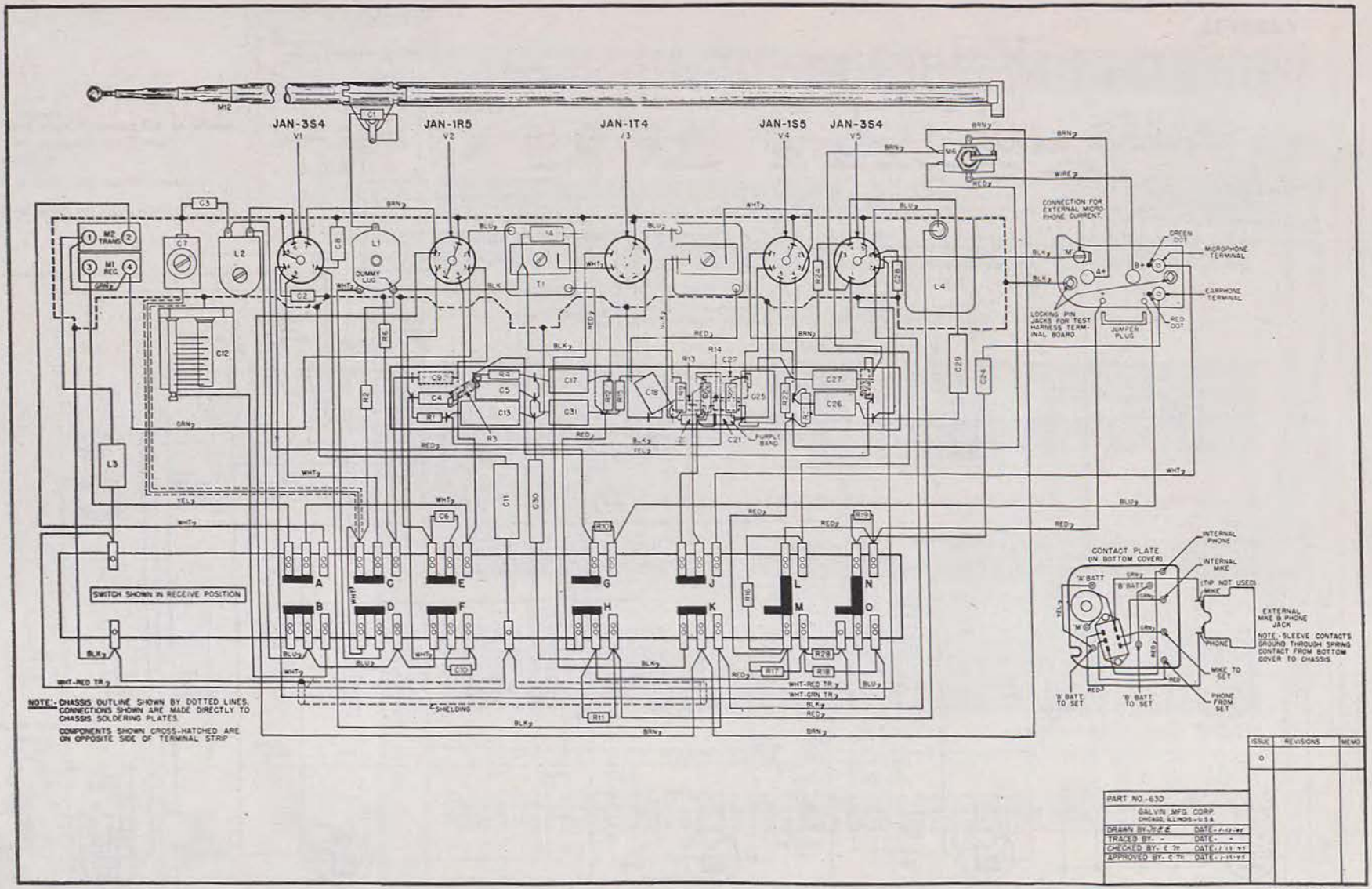

Figure 59. Radio Receiver and Transmitter BC–611–F. Practical Wiring Diagram.

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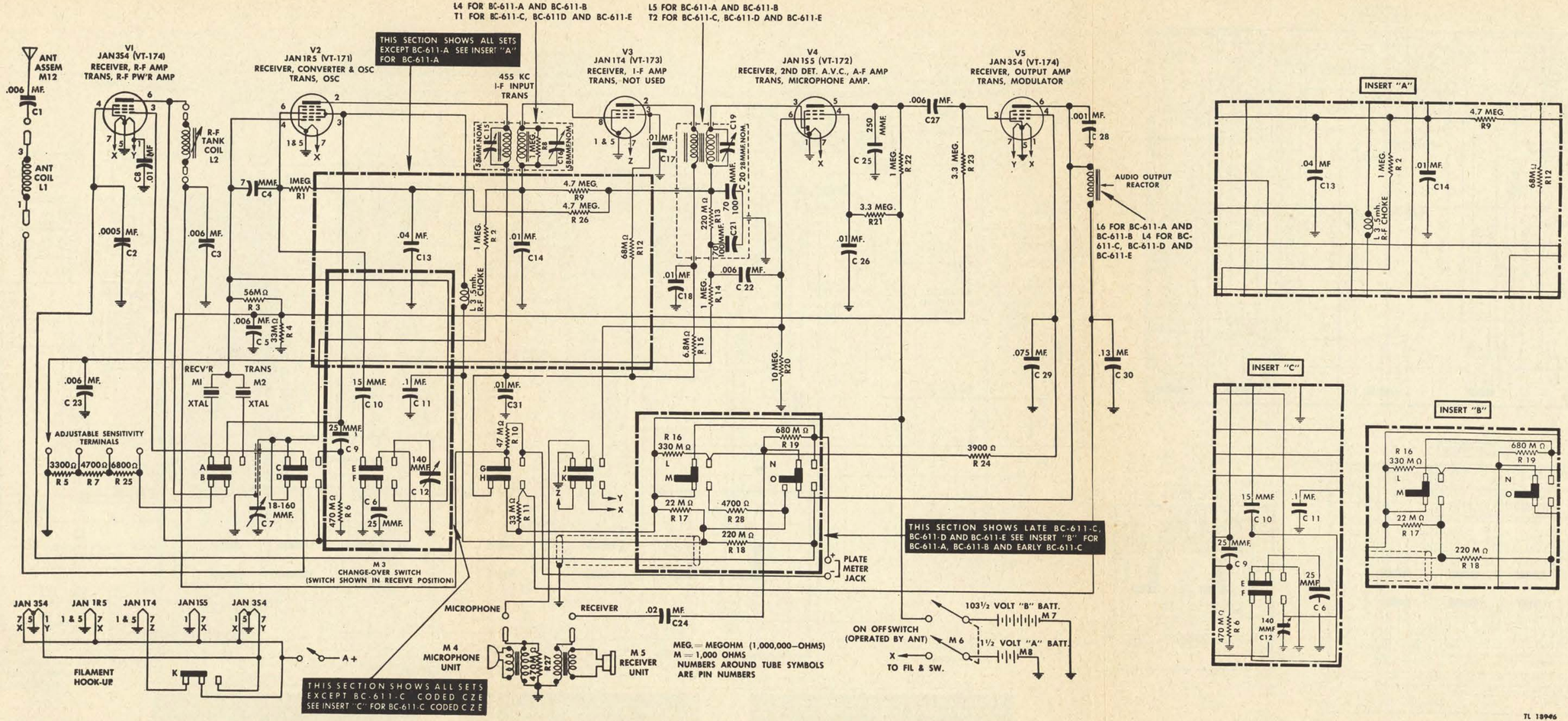

Figure 60. Schematic diagram, Radio Receiver and Transmitter BC–611–A, –B, –C, –D, –E.

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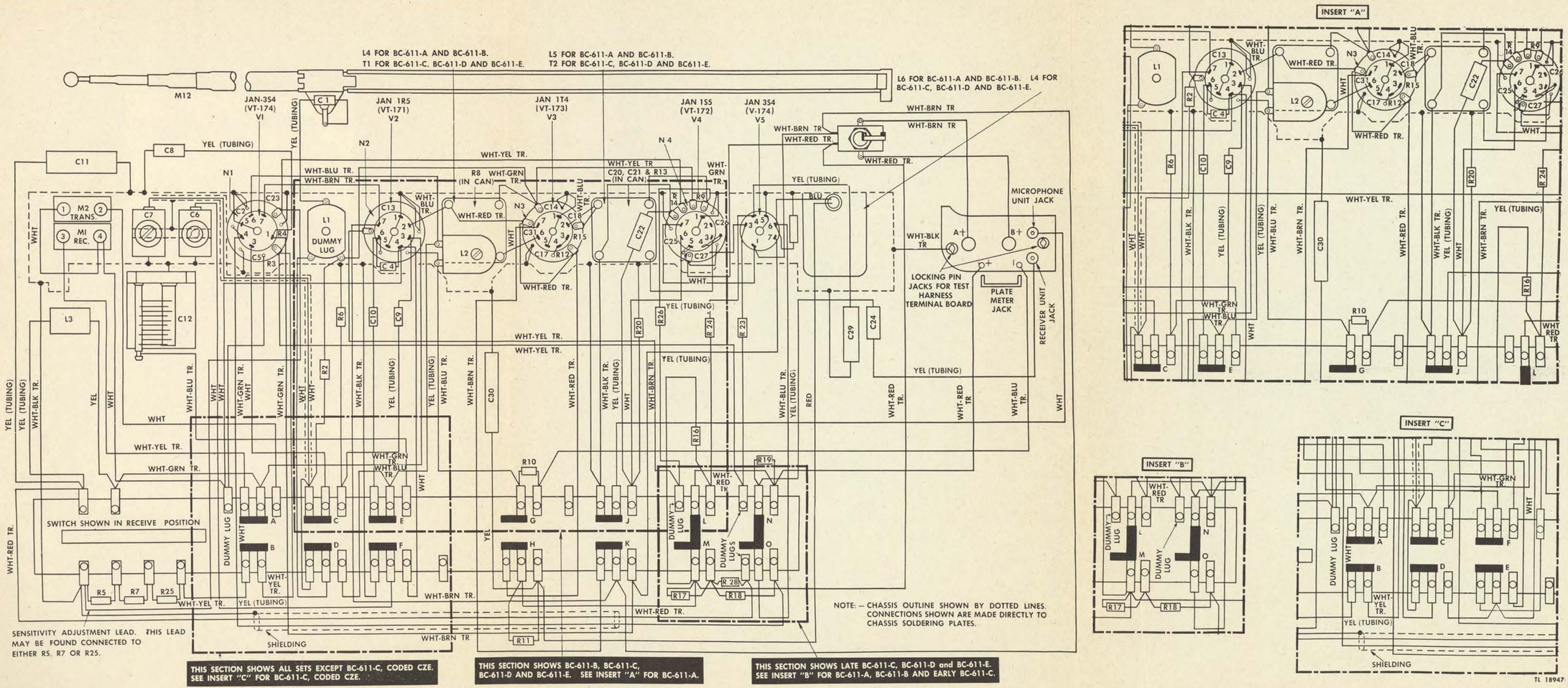

Figure 61. Pictorial diagram, Radio Receiver and Transmitter BC–611–A, –B, –C, –D, –E.