TM 11-4060

WAR DEPARTMENT TECHNICAL MANUAL

RADIO RECEIVER BC-792-A

REPAIR INSTRUCTIONS

WAR DEPARTMENT • OCTOBER 1945

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TM 11–4060, Radio Receiver BC–792–A, Repair Instructions, is published for the information and guidance of all concerned.

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

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WARNING

HIGH VOLTAGE

is used in the operation of
this equipment

DEATH ON CONTACT

may result if operating personnel
fail to observe safety precautions.

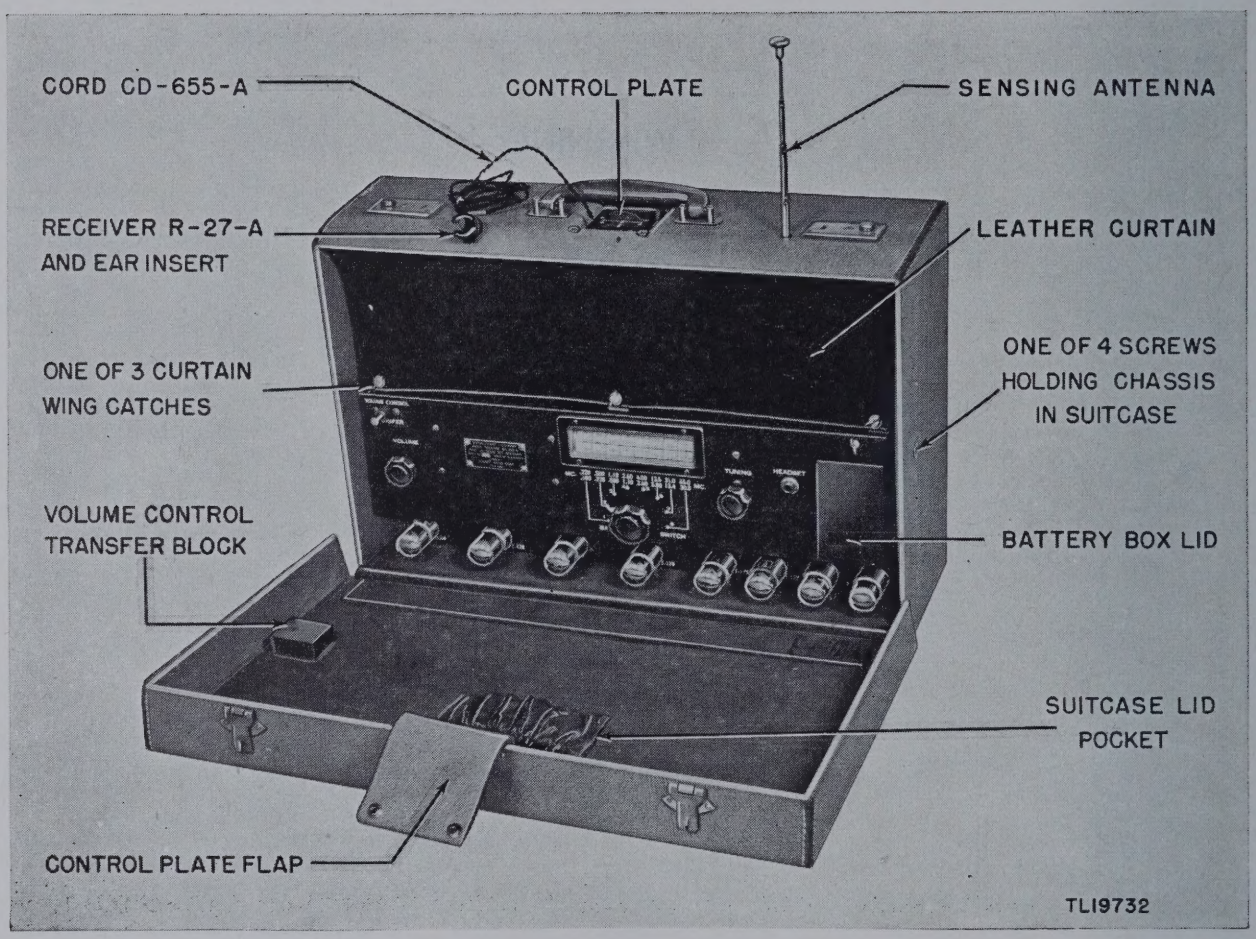


Figure 1. Radio Receiver BC-792-A.

SECTION I
DESCRIPTION OF RADIO RECEIVER BC–792–A*

1. General (fig. 1)

Radio Receiver BC–792–A is a portable, 8-tube superheterodyne direction finder housed in a russet pigskin suitcase. It is designed to receive either continuous-wave (c-w) or amplitube-modulated (a-m) signals. It is used to locate the position of a transmitter. Radio Receiver BC–792–A covers a frequency range from 100 kilocycles (kc) to 65 megacycles (mc) in eight bands. The antenna stage of the receiver uses a single turn loop as a directional pick-up, and a collapsible rod antenna as a nondirectional pick-up. The power supply consists of one Battery BB–51, supplying 6 volts at 0.1 ampere and one Battery BB–52 supplying 72 volts at 0.017 ampere.

2. Over-All System Function

a. TUBES USED. The over-all system of Radio Receiver BC–792–A, as demonstrated in the block diagram (fig. 2) uses the following tubes:

(1) Receiver amplifier tube JAN–1LNS (VT–179).

(2) Oscillator tube JAN–1LB4.

(3) Modulator (mixer) tube JAN–1LC6 (VT–178).

(4) Two intermediate-frequency amplifier tubes JAN–1LN5 (VT–179).

(5) Detector tube JAN–1LH4 (VT–177).

(6) Output tube JAN–1LN5 (VT–179).

(7) Beat-frequency oscillator tube JAN–1LN5 (VT–179).

b. STAGE FUNCTIONS DURING M-C-W OPERATION (fig. 24). The antenna stage of Radio Receiver BC–792–A uses a single turn loop as a directional pick-up and a collapsible rod antenna as a nondirectional pick-up. When the rod antenna and the loop antenna are connected, they form the "sensing" device which determines the direction of the transmitter. The loop picks up the signal and feeds it to the grid of the radio-frequency (r-f) tube (118–1) through an antenna transformer for bands 1 to 7, depending on position of band switch. In the case of band 8, the signal is fed directly to the modulator tube (115). The output of the r-f tube is coupled to the grid of the modulator tube, through an r-f transformer for bands 1 to 7 only, since band 8 uses no r-f amplification. The oscillator tube (116) generates an r-f signal whose frequency depends upon the position of the band switch, and which is fed from the plate of the oscillator tube to the modulator injection grid. The modulator tube combines

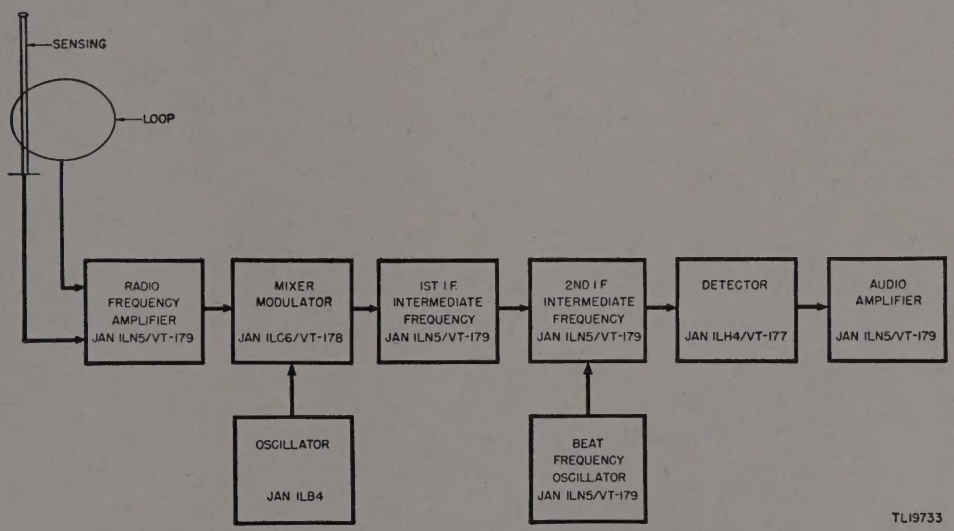


Figure 2. Radio Receiver BC–792–A—block diagram.

* See TM 11–862 for installation, operation, and other maintenance data on this equipment.

the incoming signal with the signal from the oscillator tube to form a new signal retaining the modulation of the incoming signal. The frequency of the new signal is either the sum (910 kc) or difference (455 kc) of the frequencies of the incoming signal and the signal generated in the oscillator tube, depending upon the position of the band switch. This signal is fed from the modulator tube to the first intermediate-frequency (i-f) tube (118–2) through an i-f transformer. The amplified signal from this stage is fed to the second i-f transformer for further amplification. The output from the second i-f tube goes to the detector section of tube 117 which changes the modulated r-f signal to an audio-frequency (a-f) signal. The a-f signal is amplified in the triode section (117) and then fed to the output tube (118-4) for further audio amplification. The output tube is coupled to the headset through an audio output transformer.

c. STAGE FUNCTIONS DURING C-W OPERATION (fig. 24). If an unmodulated r-f signal is being received, an audible indication is obtained through the use of the beat-frequency oscillator (118–5) which generates an r-f signal of 454 kc. This signal is coupled to the intermediate-frequency (i-f) channel through the common supply circuits and by virtue of the strong fields the oscillator produces. The 454-kc signal produced by the beat-frequency oscillator (bfo) combines with the 455-kc i-f signal to produce a 1,000-cycle beat note which will be audible in the headset. The second harmonic produced by the bfo is used to combine with the 910-kc i-f, also to give an audible signal in the headset.

SECTION II
DIFFERENCES BETWEEN MODELS

(Not applicable)

SECTION III
INITIAL REPAIR PROCEDURES

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

3. General

Maintenance personnel should follow the procedure outlined in this manual when repairing and overhauling Radio Receiver BC–792–A. The repair information in this and the following sections is presented in the order in which the repairman should actually perform the various operations on the equipment in the repair shop. This procedure permits repair of the equipment in the shortest time possible, resulting in performance comparable to that of new equipment.

4. Test, Tool, and Cleaning Equipment

The items listed below are required for repairing and overhauling Radio Receiver BC–792–A.

a. INSTRUMENTS.

Item	*Description*
Signal generators	To cover frequency ranges from 100 kc to 65 mc. It should be well-shielded and provided with an attenuator for reducing the signal to at least 10 microvolts.
Resistors	250-ohms, ½-watt, carbon. 150-ohm, ¼-watt, carbon.
Radiating loop	See paragraph 36 and figure 23.
Coupling capacitor	Paper capacitor with capacitance of 0-05 mf equipped with alligator clips.
Vacuum-tube voltmeter (VTVM), a-c.	
Voltmeter, d-c	1,000 ohms per volt; 12-volt range and 300-volt range. Part of I-56-(*).
Voltmeter, d-c	20,000 ohms per volt; 12-volt range and 300-volt range.
Field strength meter	Frequency range; 100 kc to 65 mc. Capable of reading 40 to 500 microvolts per meter.
Flashlight	Small.
Battery charger	Battery Charger PE-128-A, or equal.
Ohmmeter	Such as part of I-56-(*).

b. TOOLS.

Item	*Description*
Probe, insulated.	
Screw drivers, insulated	Length: 6 inches; blade widths: 1/8"; 3/16"; ¼".
Small brush	½-inch; medium hard bristles.
Hypodermic syringe.	

c. MATERIALS AND AGENTS.

Item	*Description*
Crocus cloth.	
Sandpaper	#0000.
Rags	Lintless.
Solvent, Dry-cleaning	Cleaning fluid.
Sulphuric acid	Specific gravity: 1,280.
Blotting paper.	

5. Removal of Plug-in Parts

a. REMOVAL OF TUBES. The tubes consist of one JAN–1LH4 (VT–177), one JAN–ILC6 (VT–178) and five JAN–1LN5 (VT–179). They are located in sockets directly below the control panel. (See fig. 8.) Be careful not to exert too much pressure when removing the tubes. Do not use screw driver to pry tubes out of socket. Key at bottom of tube is easily broken. Grasp tube, rock slightly, and pull upward to remove.

b. REMOVAL OF BATTERIES. There are three batteries to be removed: one Battery BB–51, and two Batteries BB–52. These are miniature two-prong storage batteries. They are located in a vertical row at the right side of unit, to the right of the headset jack. In removing the batteries, grip firmly and pull straight out. Care should be exercised in avoiding contact of corrosive acid with clothing or other parts of unit.

c. REMOVAL OF PLUGS AND CONNECTORS. Disconnect the following plugs by pulling on the plug, not on the wire or cable:

(1) A four-prong connector at the end of a cable which is inserted in a four-hole receptacle. It is located on the vertical control plates, back of the leather curtains over the panel.

(2) A five-prong connector at the end of a cable which is inserted in a five-prong receptacle. It is located on a vertical plate, back of the leather curtain over the panel.

(3) Single-prong plugs which are attached to the insulated wire. They are located on top of the receiver, one in the socket near the base of the sensing antenna, and one in the socket between the terminals of the loop.

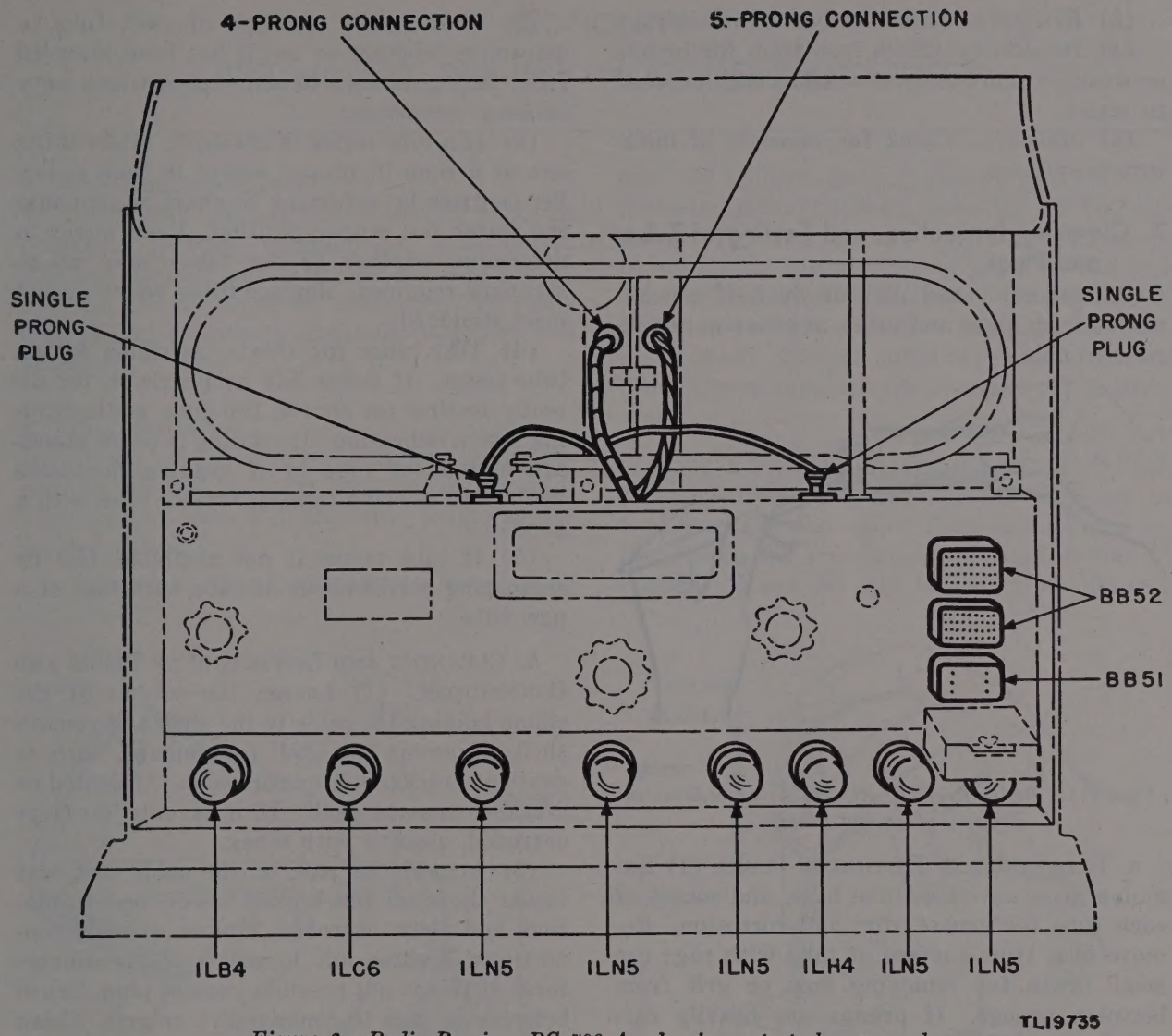


Figure 3. Radio Receiver BC–792–A, plug-in parts to be removed.

6. Chassis Cleaning, Inspecting, and Lubricating

a. GENERAL. It is important that the equipment be clean in order to function properly. Dust in equipment may be removed with low pressure from air hose. Antenna inductance may be cleaned with a dry rag, or a rag moistened with dry-cleaning solvent (SD). Electrical connections may be cleaned with a brush or clean rag. Relay contacts should be examined for accumulation of dirt or pitting. The contacts may be cleaned with a rag and dry-cleaning solvent (SD). Aluminum cans, housings, etc., can be cleaned and given a satin finish by placing them in dry-cleaning solvent (SD) for ½ hour or less. If more than one piece is treated in the same bath, each piece should be separated from the others in order to expose all surfaces to the solution. Overlapping may result in spots or stains. Regardless of recent servicing or apparent good condition, Radio Receiver BC–792–A requires careful inspection to insure efficient functioning.

b. SPECIAL INSPECTION POINTS. The following list comprises a few of the checks which should be made in disassembling Radio Receiver BC–792–A for servicing. Necessary alertness will reveal many others.

(1) *Tight connections.* Check to see that all wiring terminals and connections are securely fastened.

(2) *Dials.* Check dials for backlash.

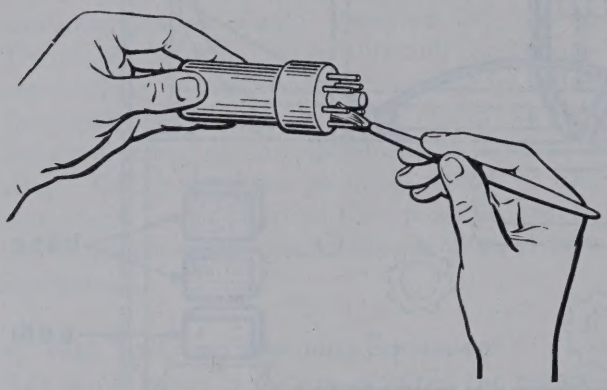
(3) *Resistors.* Check for burned resistors.

(4) *Insulation.* Check insulation for breaks or wear, or shorts where wire has been exposed to water.

(5) *Moisture.* Check for presence of moisture in suitcase.

7. Cleaning, Inspecting, and Testing of Tubes and Plugs

Grit, corrosion, and dirt or dust, if not removed from plugs and tubes, are sources of possible trouble.



TL19736

Figure 4. Radio Receiver BC-792-A, procedures in cleaning plugs and prongs.

a. CLEANING AND TESTING OF TUBES. (1) Examine glass envelope, tube base, and socket of each tube for grease, dirt and corrosion. Remove dust from surface of tube with rag; use small brush for removing dust or grit from between prongs. If prongs are heavily corroded, use #0000 sandpaper or crocus cloth, rubbing corroded surface gently.

(2) Check glass envelope of each tube to determine whether or not it has been loosened from the tube base. Replace tubes which have loosened envelopes.

(3) If a tube tester is available, insert tubes one at a time in proper socket in tube tester. Set controls by referring to chart accompanying tester for proper position. Read meter to determine whether or not tube comes up to standard required. Replace tubes which do not meet standard.

(4) Test tubes for shorts, as called for on tube tester. If tester has no provision for directly testing for shorts, tap tube while reading meter indication. If reading is below standard stated for tube or if reading fluctuates while tube is being tapped, replace tube with a good one.

(5) If tube tester is not available, test by comparing performance of tube with that of a new tube.

b. CLEANING AND INSPECTING OF PLUGS AND CONNECTORS. (1) Loosen the screws of the clamp holding the cable to the shell and remove shell. Examine the shell for damage, such as dents or cracks, dirt or corrosion. If dented or cracked, replace shell. If it is only dirty or corroded, clean it with a rag.

(2) Inspect the part of the cable that was inside the shell for broken wires, bad insulation, and dirty, corroded, broken, or loose connections. Tighten any looseness of the connectors. If this is not possible, replace plug. Brush between prongs to remove dirt or grit. Clean prongs with a lintless rag. Use crocus cloth to remove corrosion.

8. Input Resistance Test

With all tubes and batteries removed, measure resistance between terminal No. 2 of socket 125 and ground, and terminal No. 3 of socket 125 and ground, using an ohmmeter. The readings should be infinity and 6.61 megohms, respectively.

9. Filling Batteries

Before the receiver can be operated, it is necessary to fill the batteries with sulphuric acid. This is done with a hypodermic needle as described below.

a. GENERAL. A set of batteries consists of one "A" battery, Battery BB–51, and two "B" batteries, Battery BB–52. (See fig. 8.) The difference between the two may be readily seen by observing the number of holes in the top. The "A" batteries have exactly six pinholes in their top surface, while the "B" batteries have many more. The cell holes are sealed. Before filling the syringe, use the needle to pierce these seals.

b. TO FILL HYPODERMIC SYRINGE. Push plunger all the way into barrel. Pull out to 5-cc mark on the scale. Hold the syringe by the barrel and push needle through center of rubber stopper of acid bottle. Push plunger

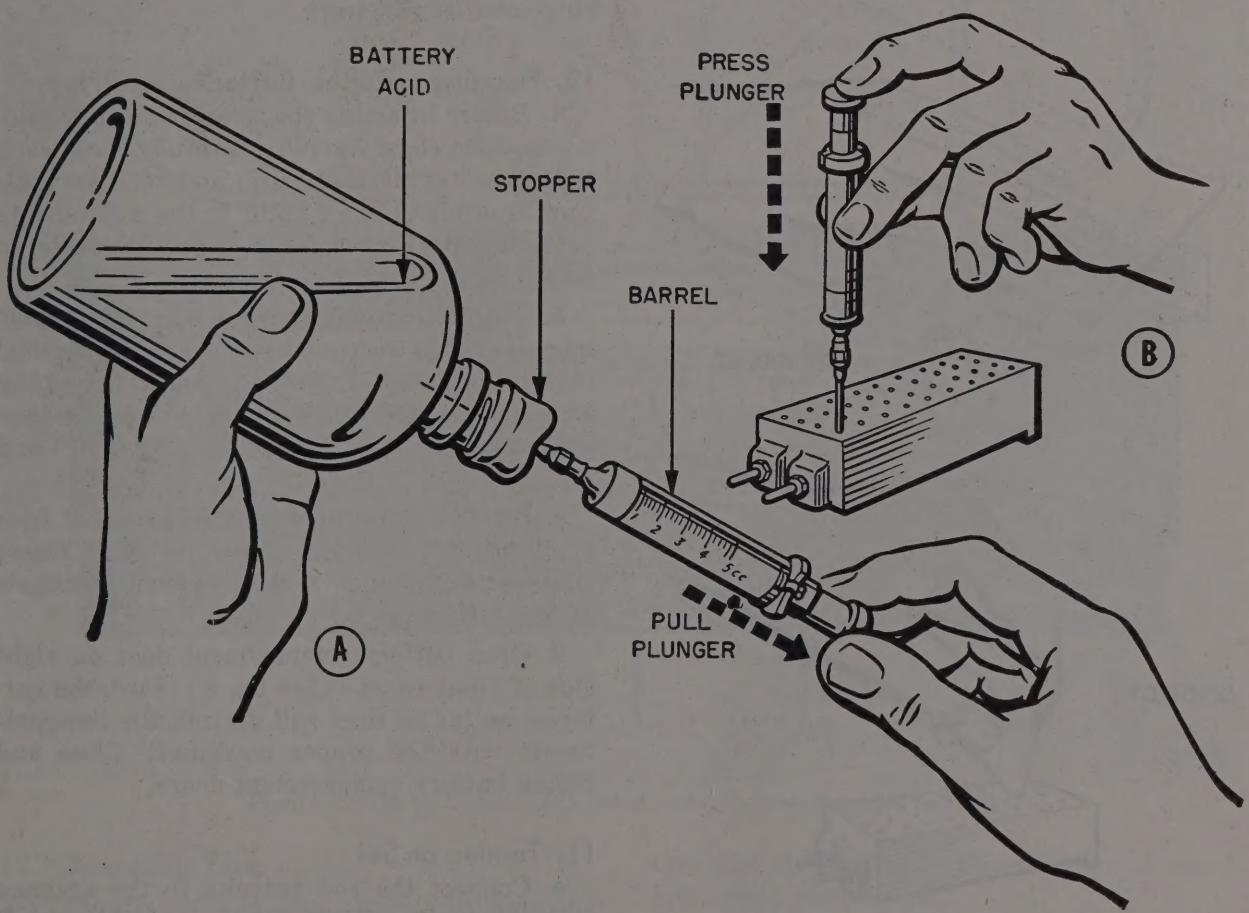


Figure 5. Radio Receiver BC–792–A, filling syringe and batteries.

of syringe all the way down. Tip the bottle, and pull out plunger slowly, drawing acid into barrel through needle until acid reaches 5-cc level. Withdraw needle.

Note. Sulphuric acid is corrosive and will damage fabric. Care should be taken to avoid contacts with the acid which would prove destructive.

c. To Fill Battery BB–51. (1) Insert needle into either of the holes numbered 1 (on cell No. 1). Push plunger slowly with thumb, forcing acid out of syringe. Each Battery BB–51 requires approximately 6-cc of acid per cell. Watch for formation of a small pool of acid around hole being filled. If this occurs, stop until the surplus acid is absorbed.

Caution: If acid is permitted to cover the top of battery from one hole to next, cells may be shorted, current wasted, and batteries damaged.

(2) Time and patience are required for filling this battery. The acid will settle more quickly if the battery is tapped *gently* with finger. Feed acid in small shots until hole is filled. Use a blotter to absorb any overflow of acid. In blotting acid after filling, use the *edge* of the blotter at one hole at a time. Acid-soaked blotters are excellent conductors, and if applied to two holes at once will short-circuit the cells.

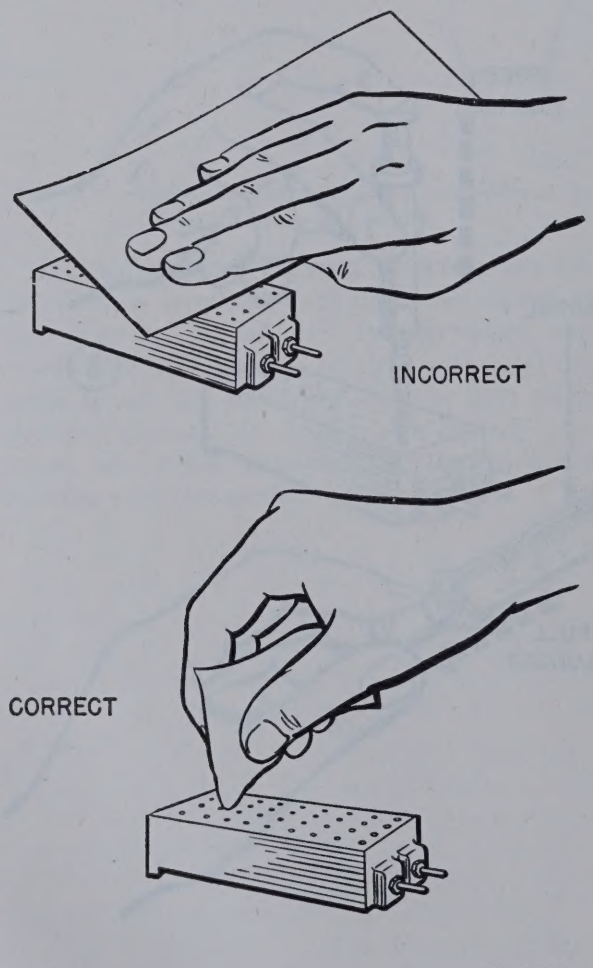


Figure 6. Radio Receiver BC 792-A—right and wrong way to blot batteries.

d. To Fill Batteries BB–52. Note that the cells nearest the edge of the battery are the ones to be filled with sulphuric acid. The inside rows of holes are vent holes. Start with cell No. 1 and fill all odd numbers. Then fill even numbered holes. Each cell requires about 1-cc of acid. The batteries are now ready for use.

e. To Clean Syringe. Upon completing the operation, cleanse syringe and needle thoroughly by filling syringe several times with clean water, and squirting the water out through the needle. Remove needle from syringe and let parts dry.

10. Plugging in Tubes, Batteries, and Plugs

a. Before inserting the tubes in their respective sockets (figs. 7 and 8), carefully check each tube base for number, size, and relative position in order to place them in the appropriate tube stocket. Do not force or rock the tube to insert it.

b. Push four-prong connector at end of cable into four-hole receptacle attached to vertical plate. (See figs. 7 and 8.) Push five-prong connector at end of cable into five-hole receptacle attached to vertical plate. (See figs. 7 and 8.)

c. Insert single-prong plug in socket at base of "sensing" antenna. (See fig. 4.) Insert single-prong plug in socket between terminals of loop. (See fig. 3.)

d. Open battery compartment door on right side of front panel. (See fig. 8.) Push the batteries as far as they will go into the compartments with the proper markings. Close and fasten battery compartment doors.

11. Turning on Set

a. Connect the rod antenna to the antenna stage by pushing SENSE button on the control plate. The collapsible rod antenna should be extended as far as possible. This is accomplished by pulling the small brass button on

top of the suitcase, near the right-hand latch. Make sure that five sections are visible.

b. Either of two types of listening apparatus may be used in testing Radio Receiver BC–792–A. Headset HS–34–A connects with the HEADSET jack on the control plate. (See fig. 1.) A conventional headset may be connected to the panel HEADSET jack, by means of Plug PL–55. Plug in preferred headset. The receiver is now ready for operation. TURN IT ON.

There will be no attempt here to list all possible defects that may be detected. The following examples will serve to illustrate.

a. WATCH. Tubes may turn too red, or fail to light. This may indicate a faulty tube or a current overload, or it may denote a faulty output or a failure to insert tube securely in socket.

b. SMELL. Odors of melting wax, heated insulation, etc., may be traced to burned resis-

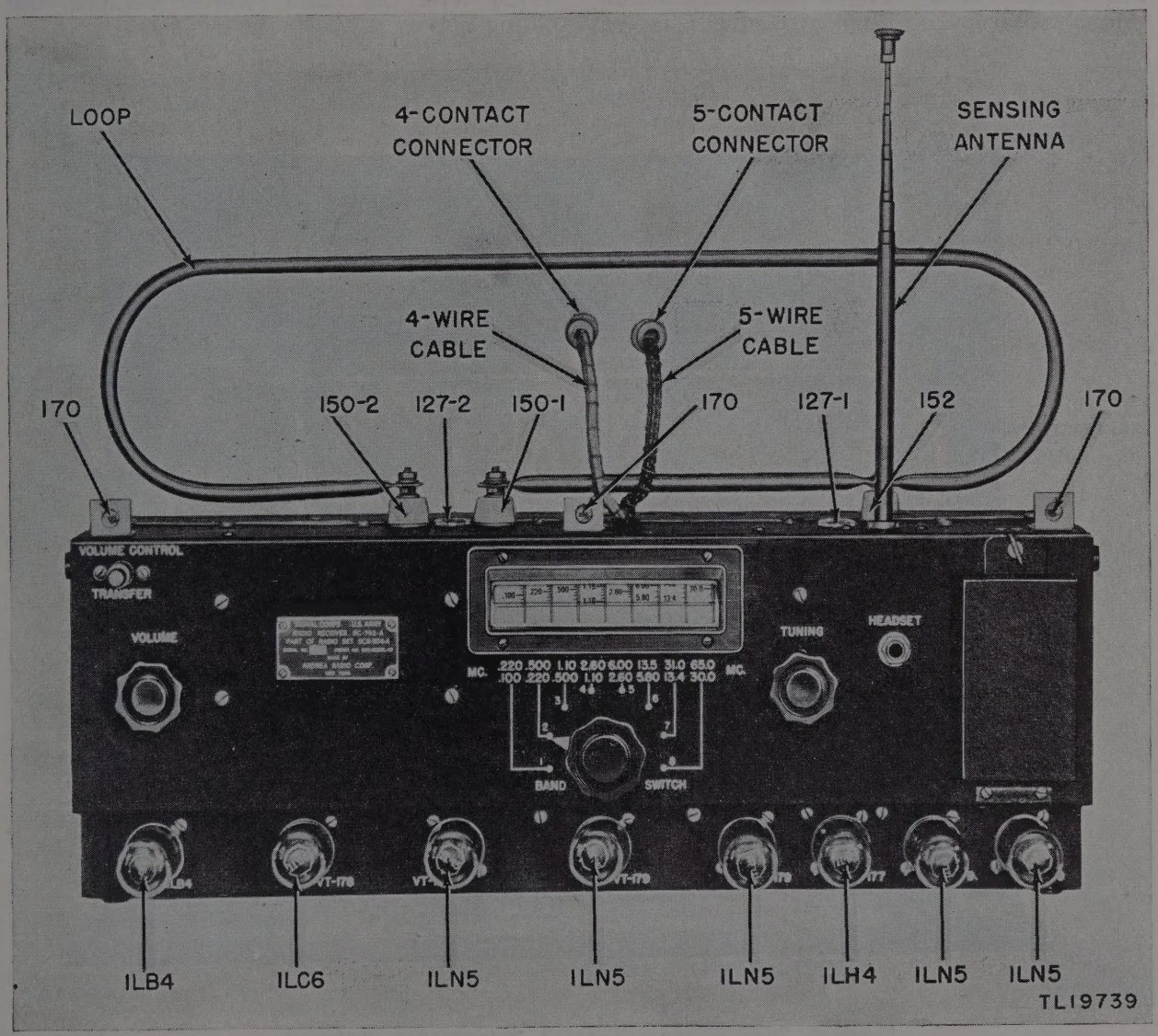


Figure 7. Radio Receiver BC–792–A—chassis removed from suitcase.

12. Operating Test

Be immediately alert for trouble by applying four senses to detecting any possible flaws in operation. The repairmen must smell, listen, watch, and feel the equipment during the test.

tors, dielectric leakage or break-down of capacitors, short circuits, etc.

Note. If moistureproofing or fungiproofing varnish has been recently applied to the set, the varnish will smoke slightly, due to normal warmth of part. Do not confuse this odor with those denoting defects.

c. TOUCH. Touch, except in the instances of noting overheating, may be effectively used in ombination with listening and watching. For instance, loose connections, faulty contacts, etc., may be detected by placing one hand behind the back and proceeding to touch the insulated parts of the set with an insulated probe in the other hand. Through listening, the fault will be detected and by watching with the help of a small probing light, the cause of the defect will become evident. A hand placed on a power transformer, audio transformer, choke or vibrator will discover possible vibration.

d. LISTEN. A dead set, weak or fading signals, or superfluous noise may be detected by listening. In combination with other senses, listening may also aid in disclosing faulty earphones or headsets, possible shorted or broken wiring or parts, and loose chassis connectors. (If the latter condition is suspected, tap around chassis until trouble is located through examination.) In addition, the checks listed below should prove helpful in testing the set during operation.

(1) There should be NO NOISE heard in headset caused by band switch operation.

(2) With the radio receiver detuned, tap each tube gently. There should be no noise or lingering microphonics caused by vibration of elements within tubes.

(3) Couple signal generator to the receiver (fig. 23) and set signal generator to give modu-

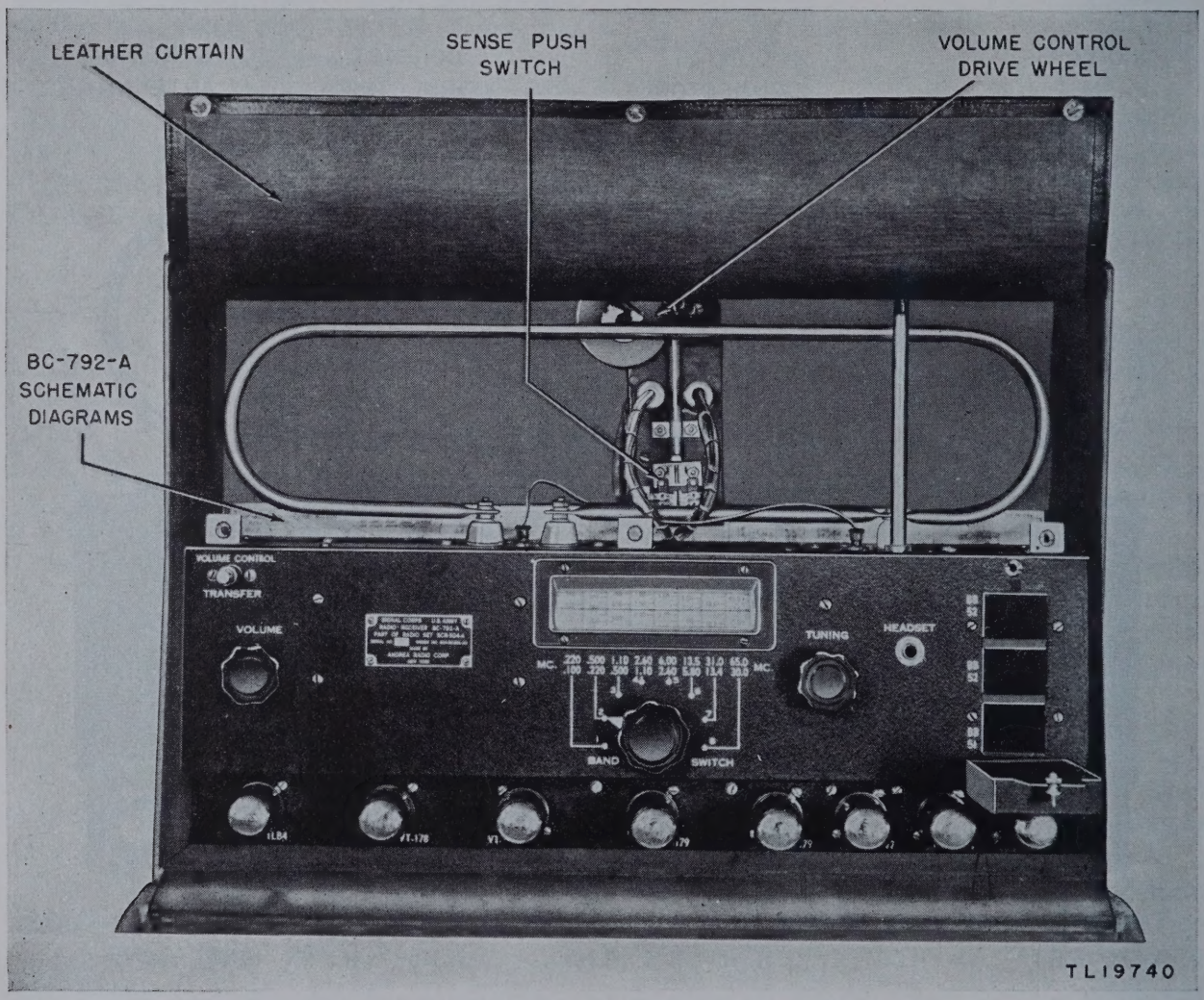


Figure 8. Radio Receiver BC-792-A, suitcase open, curtain up.

lated signal. Turn push control plate BFO switch ON. An audible signal must be obtained when the receiver is tuned to approximate signal frequency. A zero beat must be obtained when receiver is tuned to exact signal frequency.

(4) Press down on BFO switch and shake button gently. The switch must remain in the ON position. There must be no audible change in the signal received.

(5) Press down on POWER switch button and shake gently. The switch must remain in ON position. The receiver must continue to operate.

13. Output Voltage of Batteries

Test output voltage of batteries when the receiver is in operation. If voltage is below 6 volts for Battery BB–51 or 72 volts (total) for Battery BB–52, recharge using Battery Charger PE–128–A in accordance with data given in TM 11–862. If this procedure does not restore the batteries to within 15 percent of original charged value, they must be replaced with new ones.

SECTION V
ALIGNMENT PROCEDURE

14. Procedure for Removing Receiver From Suitcase

a. Remove four flathead screws from suitcase. These screws are located on bottom of suitcase, one on each side in a position usually concealed by suitcase lid.

b. Unfasten leather flap by means of three wing catches over front panel of receiver.

c. Disconnect the four-prong and five-prong connectors from control plate. (See fig. 3.)

d. Remove single-prong plugs from top of receiver. (See fig. 3.)

e. Unscrew brass button at top of sensing antenna. Make sure sensing antenna is completely collapsed.

f. Grasp receiver with two hands and pull out of suitcase, tilting bottom slightly so that loop clears switches and control head.

g. Remove four screws holding control head to top of suitcase. Remove two wood screws holding control head to block inside suitcase. Remove control head and reconnect it to receiver by using the plugs and connectors.

h. Remove ten screws securing metal cover to main chassis. There are three each of these on top and bottom of receiver, and two at each end. Cover may then be pulled straight off chassis.

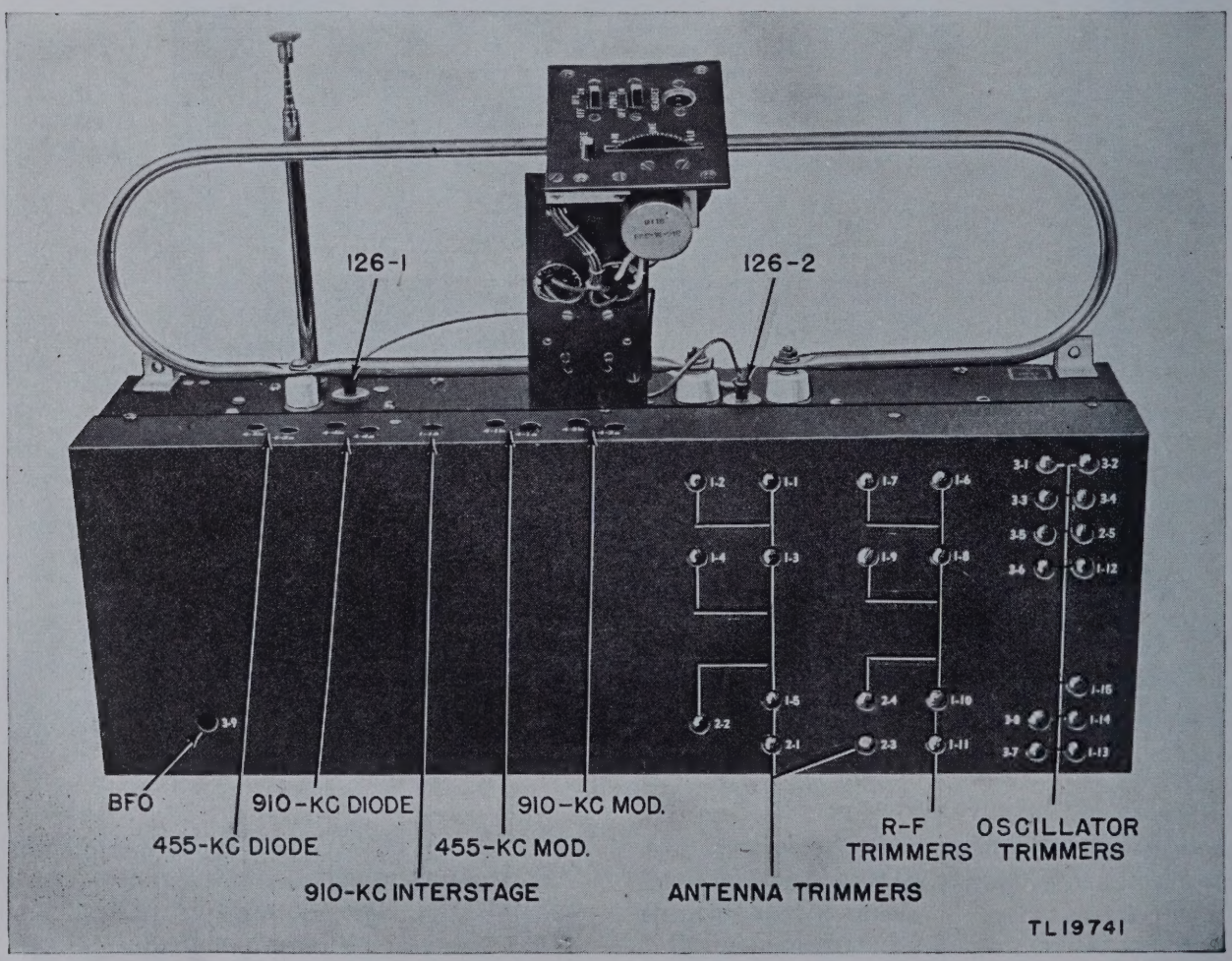


Figure 9. Radio Receiver BC-792-A—rear view.

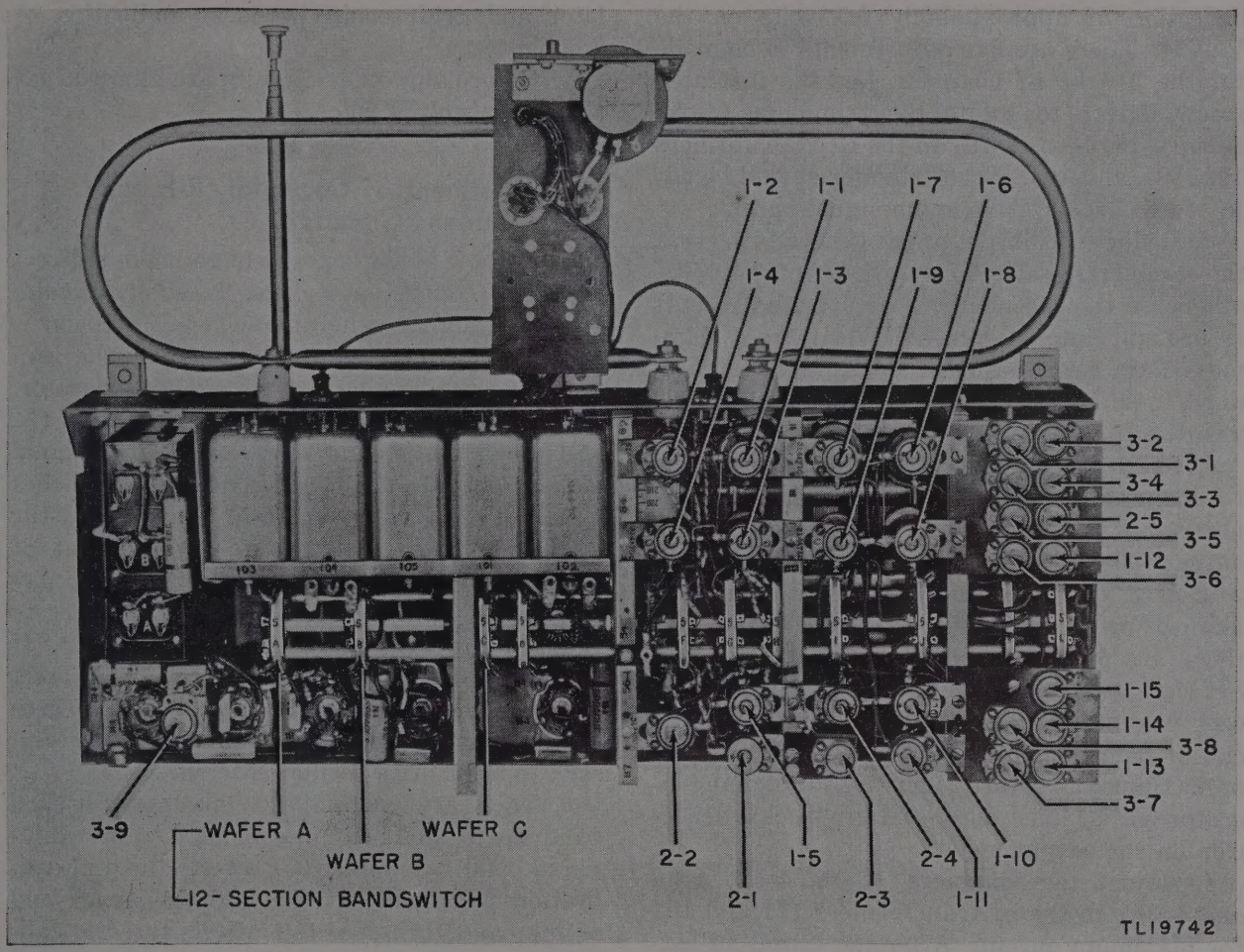


Figure 10. Radio Receiver BC–792–A—rear view, cover removed.

15. I-F Alignment

Caution: Before attempting to make any adjustments, study the circuit diagram carefully (fig. 24) and illustration showing chassis layout (fig. 10.) The receiver can be made completely inoperative by inaccurate readjustment of circuit trimmers.

a. Connect the ground side of the signal generator to any convenient point of the chassis. Connect the signal generator "hot" lead to the signal grid of the modulator tube (pin No. 6 of 115), through the 0.05 mf coupling capacitor.

Caution: In connecting the clip lead to the tube socket, care should be taken to avoid short circuiting or touching any other circuits. It is best to make this connection before inserting the batteries. Thoroughly check the connection and position of the alligator clip. Then insert Batteries BB–51 and BB–52.

b. Connect the test leads of a-c vacuum-tube voltmeter (VTVM) across the terminals of Headphone Plug PL–55. Insert the cord tips of Radio Receiver R–27–A into the HEADSET terminals on the control plate under the suitcase handle. Engage Headphone Plug PL–55 in HEADSET jack on the front of receiver panel. Throw the power switch to ON position and tune the receiver to the lower end of band 2. Advance the VOLUME control to maximum. An alternate means for connecting the VTVM is to use Cord CD–665–A plugged into the HEADSET terminals on the control plate of radio set. Disconnect Cord CD–665–A from Radio Receiver R–27–A and connect a 250-ohm, ½-watt resistor in its place. Connect the test leads of VTVM across the terminals of 250-ohm resistor. Radio Receiver R–27–A or the 250-ohm resistor, as used in either method of test, provides the necessary matched load.

c. Set the signal generator to 910 kc with 30 percent modulation at 400 or 1,000 cycles. Increase the output until the signal produces a

deflection of approximately 0.5 volts on the VTVM. There are five adjustments to be made for the 910 kc i-f channel. Use the insulated screw driver to rotate the trimmers (4–2a, 4–2b, 1–16, 4–4a, 4–4b) in the i-f transformers 102, 104, and 105. Each trimmer should be adjusted to produce maximum signal output.

d. Reduce the output of the generator so that the receiver remains in the region of 0.5 volts, otherwise the receiver will be overloaded as it is brought into alignment. When these trimmers have been adjusted once, repeat procedure to make certain each set is at its best position.

e. Check the peak-response frequency of the i-f channel by tuning the signal generator and observing the frequency giving the maximum output. The frequency observed should be within 2 or 3 kc of 910 kc. The 455-kc channel is aligned by a similar procedure, except that there are only four adjustments to be made. Set the signal generator to 455 kc with 30 percent modulation. Tune the receiver to the low end of band 1. Advance the VOLUME control to maximum as before. Increase the signal generator output until the signal produces a deflection on the output meter.

f. Adjust the trimmers (4–1a, 4–1b, 4–3a and 4–3b) in the i-f transformers 101 and 103 for maximum output. After the initial adjustment, repeat the procedure to insure optimum adjustment of each.

g. Check the peak response frequency by tuning the signal generator for maximum output. The frequency observed on the generator should be within one or two kc of 455 kc. The sensitivity at the modulator grid at 910 kc and 455 kc for 0.5 volts output should be approximately 15 microvolts and 30 microvolts, respectively. These figures are based on normal battery voltage and tubes that are in good condition. Any considerable departure in modulator and grid sensitivity is an indication of trouble.

h. Before any other circuits are aligned, *put the cover back in place.*

Table I. Table of I-F Alignment

Band	Sig gen frequency kc	Adjust trimmers
2	910	4–2a
2	910	4–2b
2	910	1–16
2	910	4–4a
2	910	4–4b
1	455	4–1a
1	455	4–1b
1	455	4–3a
1	455	4–3b

16. Adjustment of Oscillator, R-F and Antenna Circuits

a. Since it is not convenient to make a direct electrical connection to the receiver circuits from the signal generator when the cover is in place, it is necessary to use a radiating loop to couple the receiver to the signal generator. For the construction of this loop, see section IX, and figure 23. Connect the loop to the signal generator and place it approximately 20 inches from the receiver as shown in figure 23. If the circuits of the receiver are seriously out of alignment, the signal generator output may have to be increased considerably, in order to produce a deflection on the output meter. If the dial calibration departs from the correct frequencies produced by a reliable signal generator or frequency standard, it will be necessary to adjust the oscillator trimmers.

b. There are two oscillator trimmers for each band up to and including band 6. For example in band 1, trimmer 3–2 affects the dial calibration principally at the high-frequency end of the band. Trimmer 3–1 affects the dial calibration principally at the low-frequency end of the band. There is, however, a certain amount of interdependence between the two adjustments. It will therefore be necessary to readjust each more than once, until satisfactory results are obtained.

c. In the higher frequency bands, care should be taken not to confuse the signal with the image when adjusting oscillator trimmers. Remember that in bands 1 to 7 the oscillator is always above the signal frequency. Of the two possible responses that can be obtained when tuning the signal generator, the lower frequency is the one to use. The adjustment of band 7 oscillator circuit is made solely by trimmer 1–15 at the high-frequency end of the band. Since band 8 uses the same oscillator circuit as described previously, no further adjustment is required. The low-frequency end of band 7 and 8 oscillator circuit is not adjustable.

d. After the oscillator circuits have been adjusted so that the dial calibration reads correctly, adjust the r-f circuits at the high-fre-

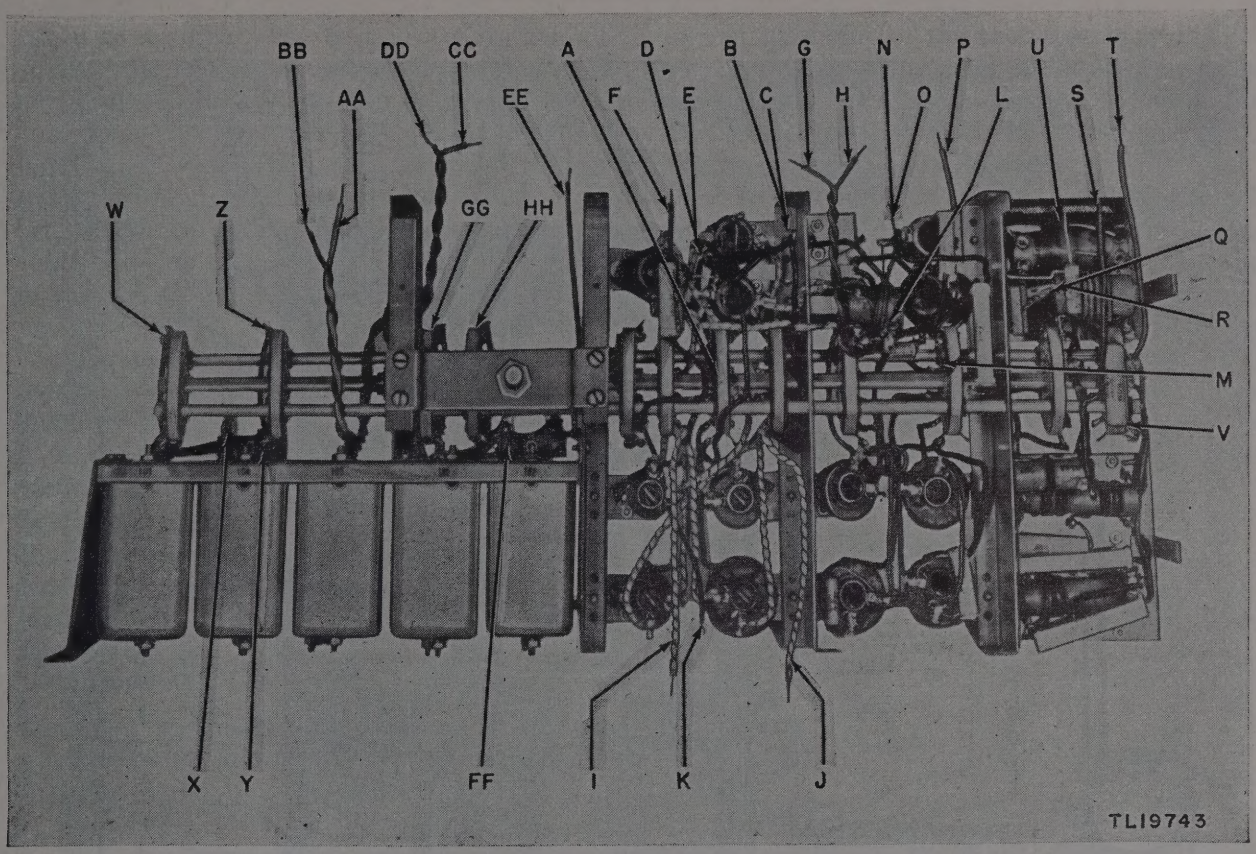


Figure 11. Radio Receiver BC-792-A—underside view of band switch assembly.

quency end of the bands so that maximum response is obtained from the VTVM. This is done by adjusting the r-f trimmers at the frequencies given in the table of oscillator, r-f, and antenna alignment, table II.

e. For example, in band 1, trimmer 1–6 is adjusted at 205 kc until maximum output is obtained. Since there is no r-f stage for band 8, only 7 r-f trimmers require adjusting. The antenna circuits for bands 1 to 8 inclusive are also adjusted at the high-frequency end of the bands.

f. For example, trimmer 1–1 is used to adjust for maximum output at 205 kc in band 1. In general, it is preferable to adjust both antenna and r-f circuit for one band before proceeding to the next. Each adjustment should be repeated several times to insure best results.

g. At the higher frequencies, make sure that the oscillator frequency is accurately tuned with respect to the signal when the alignment adjustments are being made.

Table II. Table of Oscillator, R-F and Antenna Alignment

Band	Dial and signal generator frequency mc	Osc*	Adjust trimmers	Ant.
1	0.100	3–1		
	0.205	3–2	1–6	1–1
2	0.240	3–3		
	0.470	3–4	1–7	1–2
3	0.540	3–5		
	1.100	2–5	1–8	1–3
4	1.20	3–6		
	2.40	1–12	1–9	1–4
5	2.70	3–7		
	5.60	1–13	1–10	1–5
6	6.0	3–8		
	13.0	1–14	1–11	2–1
7	14.0			
	29.0	1–15	2–4	2–2
8	29.0			
	60.0			2–3

* Adjust these only if dial calibration is off by more than one division.

17. Adjustment of Beat-Frequency Oscillator

a. The necessity for readjusting the beat-frequency oscillator (BFO) is evident if an audible beat is no longer produced when the BFO switch is thrown to ON, after the receiver is

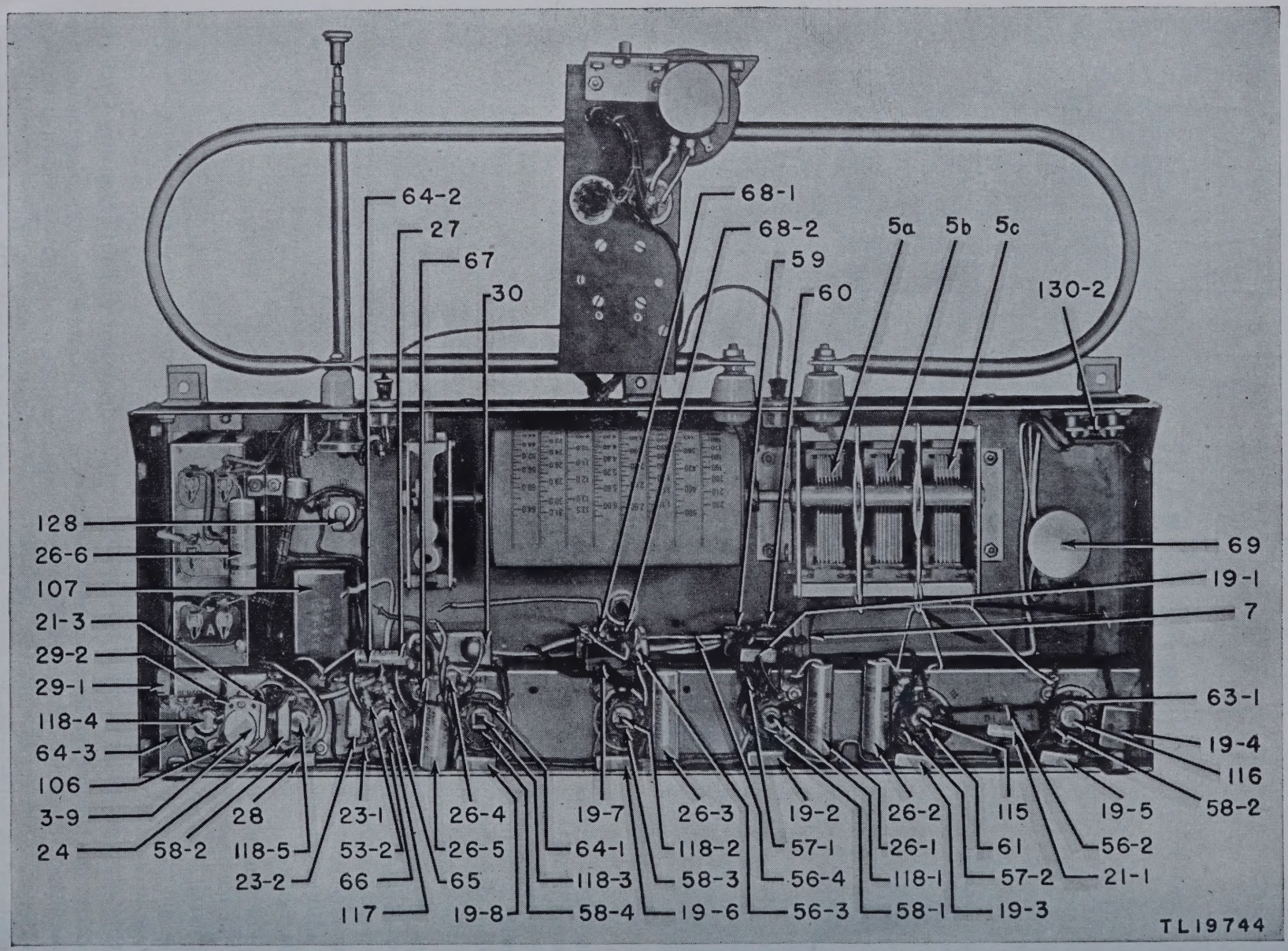


Figure 12. Radio Receiver BC-792-A—rear view with band switch assembly removed.

tuned to a signal. The best procedure for adjusting the BFO is to radiate from the loop a signal of 455 kc modulated with 400 cycles.

b. Tune the receiver near the low end of band 3. Increase the signal generator output until the signal is clearly audible in the headset. Make sure that the signal generator is tuned exactly to the peak response frequency of the 455-kc channel. Switch off the 400-cycle modulation.

c. Throw BFO switch to ON. Adjust trimmer 3–9 so that the audible beat is approximately 1,000 cycles. Since there are two positions of 3–9 which will give the 1,000-cycle beat, the method of trial and error should be used to determine which of these positions represents the frequency of the BFO below 455 kc. This is best done by observing in which direction the signal generator must be tuned in order to produce zero beat.

d. Since the 910-kc i-f channel utilizes the second harmonic of the beat-frequency oscillator, no further adjustment of 3–9 need be made for bands using 910-kc channel. To check the BFO in conjunction with the 910-kc intermediate frequency, proceed as follows:

e. Tune the receiver to high end of band 2. Tune the signal generator to produce peak output when radiating at or near 910 kc with the modulation turned on. Then remove modulation and throw BFO switch to ON. The beat produced should be within the audible range. If the ratio of the i-f channel peak frequencies is exactly 2:1, the beat frequencies also will be in the ratio 2:1. Realign i-f amplifier if necessary.

Table III. Table of BFO Adjustment

Signal generator frequency	Dial frequency kc	Adjust trimmer
455	600	3–9

SECTION VI
DETAILED TROUBLE-SHOOTING PROCEDURES

18. Voltage Measurements

A useful means of finding the source of trouble in the receiver is to check the d-c voltage at the tube sockets. To make test points accessible, it is necessary to remove the cover from the receiver.

a. CONDITIONS FOR MEASUREMENT. (1) Before proceeding with the actual measurement, make sure that the "A" and "B" batteries are fully charged by testing them with a charger.

(2) Connect the control plate to the receiver with the connectors (123 and 125.)

(3) Throw POWER switch ON.

(4) Tune receiver to 100 kc (no signal input).

(5) Adjust volume control to medium.

(6) Turn BFO switch OFF. Turn it on when measuring voltages marked "*".

(7) Use a 1,000-ohms-per-volt meter in measuring all voltages which are shown on figure 13 with the exception of those which are inclosed in a circle. These voltages are in high resistance circuit, and in these instances the voltmeter used should have a resistance of 20,000 ohms per volt, in order not to reduce excessively the voltage at the points measured. If only 1,000-ohms-per-volt meter is available, the voltages observed will be considerably lower at these points.

(8) The voltages that should be measured on a normal receiver are shown in figure 13. Because of the tolerances allowed on the values of various circuit elements, deviations of ± 10 percent from the normal are permissible.

(9) To make the voltage measurements, connect one side of the voltmeter to the terminals of each of the sockets in turn. Be careful not to short-circuit any adjacent terminals on the tube sockets with the test prod. Usually it is more convenient to measure all the positive voltages with respect to chassis and then, by connecting the positive side of the voltmeter to the chassis, measure all the negative voltages. Generally, voltages are measured with a 1,000-ohms-per-volt meter. The exceptions are indicated in figure 13 by the circles.

b. INTERPRETATION OF VOLTAGE READINGS. If any of the voltages measured are abnormally low, this information can be used to diagnose the source of the trouble. For example, if the plate voltage measured at any of the tube sockets is zero, the coil or resistor in that plate circuit should be investigated for an open circuit, or if the filament voltage is absent at one or more of the tubes, it is a positive indication that a tube is burned out. Always keep in mind that if one tube in a filament string burns out, the other tubes of that string are deprived of filament current. Another example of using the information given by measuring tube socket voltages is the case in which both the screen voltage and plate voltage are zero. A likely cause for this condition is a damaged screen by-pass capacitor or an open-circuited isolation resistor.

19. Resistance Measurements

If all the voltages are normal or the interpretation of any abnormalities does not lead to the trouble, further investigation should be carried on by measuring the continuity between the various points and the resistance to ground. Resistances are measured to chassis with an ohmmeter.

Caution: Before making resistance measurements, remove the tubes and batteries from the receiver, otherwise incorrect readings will be obtained and the ohmmeter will be damaged.

20. Signal Substitution

Note. If neither the voltage and resistance measurements nor the continuity measurements lead to the source of trouble in a completely inoperative receiver, the following procedure is recommended.

a. Prepare the receiver as for normal operation, insert batteries, turn on POWER switch, plug in headset, and connect VTVM to output.

b. Advance the VOLUME control to maximum and connect a signal generator through a 0.05-mf coupling capacitor successively to the signal grids of the tubes.

c. The order of doing this should start with

the output tube, in which case an audio frequency (400 cycles) is supplied by the signal generator to pin No. 6 of the tube. If no output is heard in the headset, the trouble is then known to be in the output tube or its associated circuit.

r-f tube in order to complete the step-by-step search for the source of trouble.

21. Moistureproofing and Fungiproofing

When repairing equipment which has been treated with moistureproofing and fungiproof-

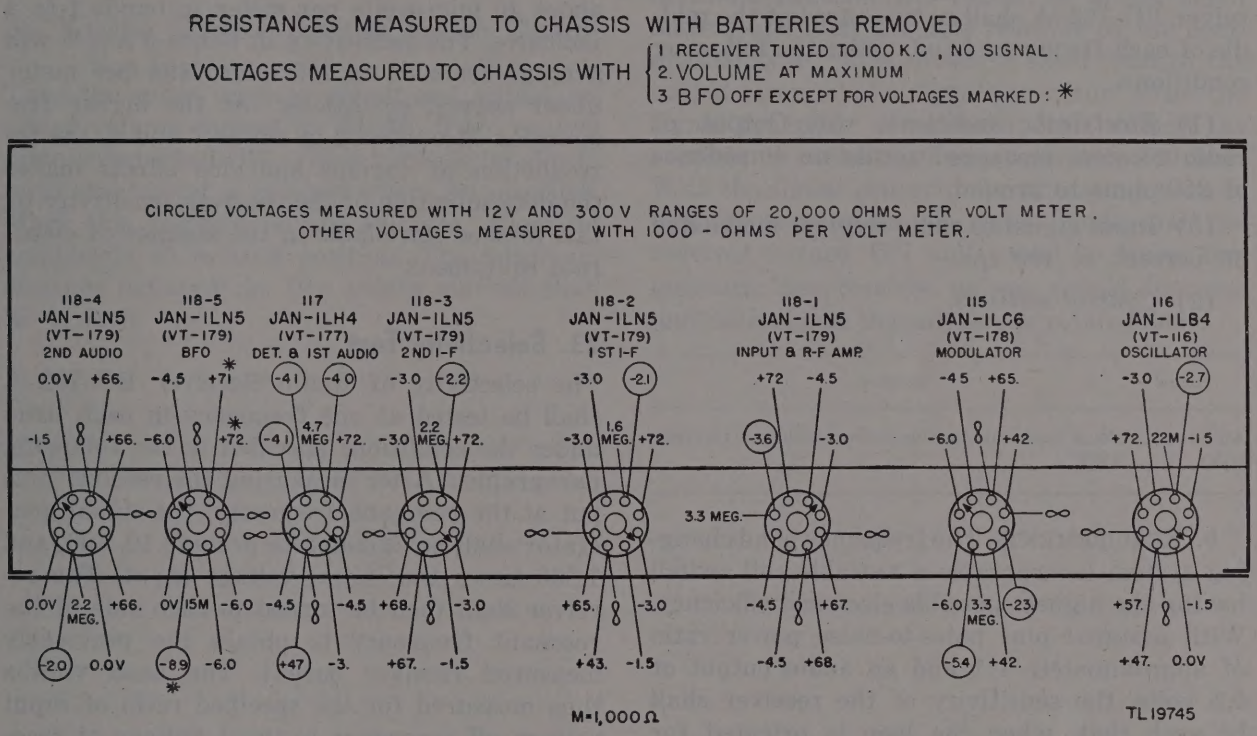


Figure 13. Radio Receiver BC–792–A—diagram of tube sockets.

d. If the output stage passes the signal, then proceed to the previous tube connecting the audio-frequency generator to the signal grid (pin No. 4) of the detector.

e. In like fashion, a signal generator supplying the correct intermediate frequency to the signal grids of tubes 118–3, (pin No. 6), 118–2 (pin No. 6) and 115 (pin No. 6) successively, will reveal in which stage the receiver trouble exists.

f. If the sensitivity at the modulator signal grid (pin No. 6) is normal (approximately 20 microvolts), then the sensitivity at the same grid should be checked, using the r-f signal to which the receiver is tuned.

g. The signal generator should finally be coupled to the signal grid (pin No. 6) of the

ing varnish, it is necessary to clean the varnish from all connections which are to be soldered. After completing the repairs, apply the moistureproof varnish with a brush to the repaired connections and to all other parts from which the coating was removed. Avoid applying the varnish to any points where electrical contacts must be made and broken, such as switches, jacks, binding posts, tube caps, socket connections, etc., by masking these points. If the date of moistureproofing and fungiproofing marked on the equipment shows that it has been more than six months since the treatment was applied, it will be necessary to repeat the entire moistureproofing and fungiproofing process. Instructions for this process are contained in TB SIG 13.

SECTION VII
FINAL TESTING

22. Sensitivity Test

a. GENERAL. The sensitivity of Radio Receiver BC–792–A shall be measured at the middle of each frequency band, under the following conditions.

(1) *Electrical conditions.* (*a*) Output of radio receiver measured across an impedance of 250 ohms to ground.

(*b*) Input signal to radio receiver modulated 50 percent at 400 cps.

(2) *Control settings.*

Control	*Position*
Audio	Near maximum without overloading of receiver.
BFO	OFF.

b. REQUIREMENTS. The frequency band changing system incorporates a variable coil switch having the highest possible electrical efficiency. With a signal plus noise-to-noise power ratio of approximately 4:1 and an audio output of 0.5 volts, the sensitivity of the receiver shall be such that, when the loop is oriented for maximum pick-up, field strengths at the middle of each band shall not exceed the following values:

Band	*Microvolts per meter*
1	120
2	100
3	70
4	70
5	100
6	70
7	70
8	400

c. FINAL CHECK. As a final check on the over-all sensitivity of the receiver, note the necessary signal generator output in microvolts necessary to produce 0.5 volts on the output meter when the loop-to-loop distance is 20 inches. The signal generator output divided by 10 gives the field strength in microvolts per meter at a distance of 20 inches when radiating loop is used. **(See par. 36, fig. 23.)**

d. CHARACTERISTICS. The sensitivity of the receiver under normal conditions averages about 40 microvolts per meter in bands 1 to 4 inclusive. The sensitivity in bands 5 and 6 will average from 50 to 100 microvolts per meter under normal conditions. At the higher frequencies encountered in bands 7 and 8, the introduction of various spurious effects makes the determination of the receiver sensitivity by this method unreliable in the absence of elaborate equipment.

23. Selectivity Test

The selectivity of Radio Receiver BC–792–A shall be tested at one frequency in each band under the conditions specified in the following paragraphs. After measuring the receiver output at the resonant frequency, the signal generator shall be adjusted to provide 10, 100, and 1,000 times the initial voltage input. The receiver shall then be turned to each side of the resonant frequency to obtain the previously measured receiver output. The band widths thus measured for the specified ratio of input voltage off resonance to input voltage at resonance shall conform to the requirements listed below.

	Maximum Band Widths (kc)		
Input voltage off resonance =	10	100	1000
Input voltage at resonance *Band*			
1	15	25	40
2	15	25	40
3	15	30	50
4	20	35	65
5	20	35	65
6	35	55	110
7	40	55	110

24. Dial Calibration Test

The dial calibration of the receiver shall be checked in the middle and the ends of each band. The frequency indication on the receiver shall agree with the test frequency within one scale division.

25. Low-Voltage Operation Test

The radio receiver shall be tested for operation with a 60-volt source for the "B" supply and a 5-volt source for the "A" supply. The receiver shall operate satisfactorily with this voltage supply.

26. Volume Control Transfer Switch Operation Test

Tune the radio receiver signal and adjust receiver volume control to HIGH. Turn control plate volume to LOW. Close suitcase lid slowly until exact point is reached where set operates. Mark this position on the suitcase. Close lid completely to locking position. The minimum distance between the two points marked shall be $\frac{3}{8}$ inch.

27. Operational Test

Install chassis in suitcase, and put in a set of fresh batteries. Turn the receiver ON, and tune in a number of stations on as many bands as possible. The performance of the receiver should be equal to that of an approved model of Radio Receiver BC–792–A, or to any small battery-operated portable receiver of the commercial type. Now attach a short lead to the output terminal of a signal generator. Place the signal generator at various points around the receiver on a radius of approximately 100 feet. With the signal generator broadcasting at various frequencies on all eight bands and the receiver turned ON and tuned to those frequencies, the receiver output should increase and decrease as the suitcase is rotated 360°.

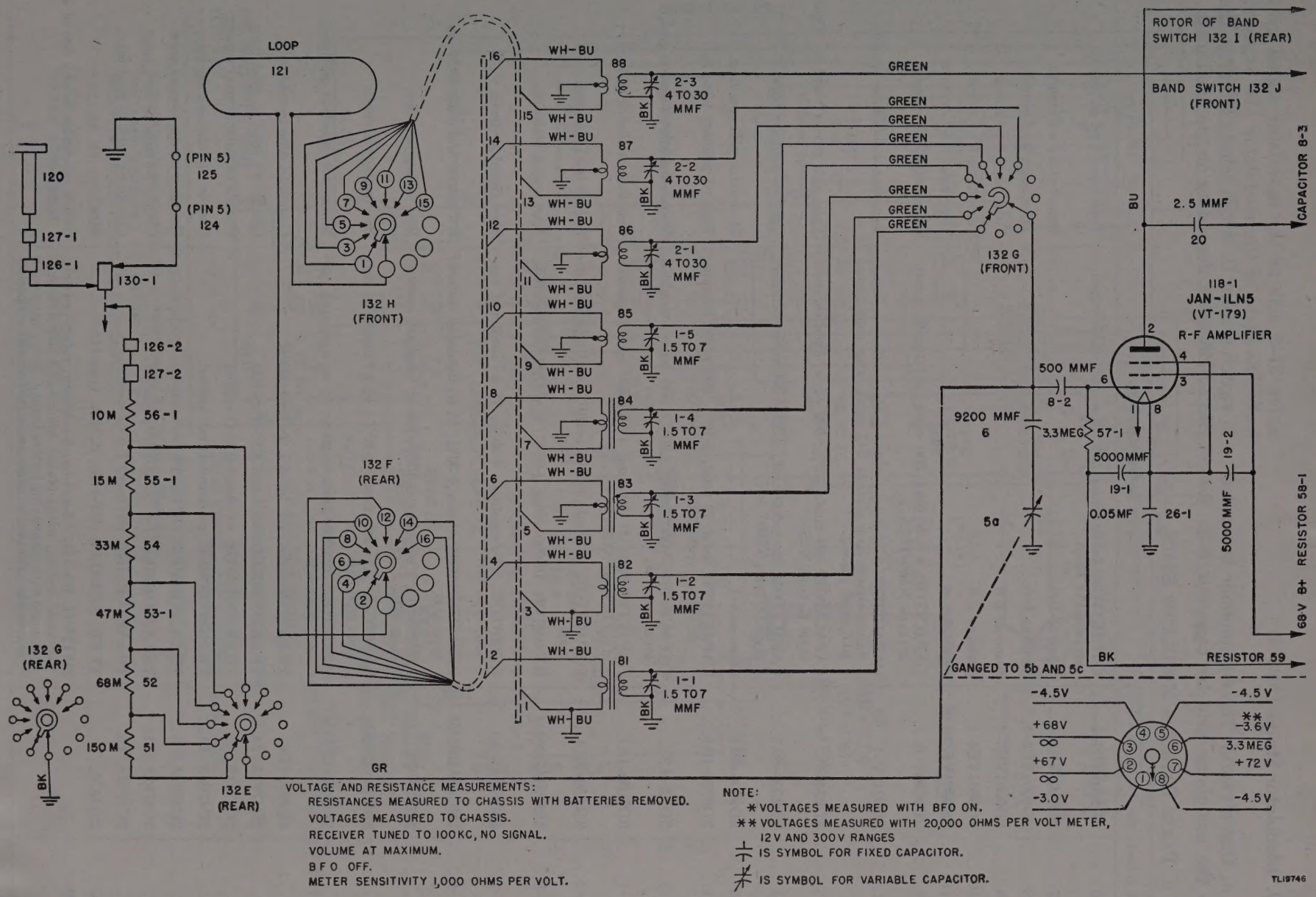
SECTION VIII
INDIVIDUAL STAGE AND CIRCUIT REPAIR DATA

28. Input and R-F Amplifier Stage (fig. 14)

a. DESCRIPTION. The primaries of bands 3 to 8 are balanced to ground to minimize capacitive pick-up by the loop at the higher frequencies. The function of the resistance introduced between the sensing antenna and the tuned circuit is to attenuate the sensing voltage without shifting its phase; it therefore helps "match" the unequal impedances of the sensing antenna and secondary circuit. The ground to within the chassis is made through pin No. 5 on the plug and contact No. 5 on the connector. The output of the r-f tube is coupled to the modulator (mixer) through the r-f transformers for bands 1 through 7 only, as band 8 uses no r-f amplification.

b. PARTS DATA FOR R-F AMPLIFIER STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
5a	3D9241V-1	CAPACITOR: 3-section; variable ganged; effective capacitance change per section 241 mmf; min capacitance 10.6 mmf, special.	Tune ant. r-f and osc circuits.
6	3DA9.200	CAPACITOR: 9,200 mmf, ± 5%; 500 vdcw; moulded mica; type MWBW.	Tune ant. circuit, all bands.
8-2	3D9500-89.1	CAPACITOR, fixed 500 mmf, ±20%; 500 vdcw; ceramic; style D; type N750.	R-f grid coupling.
19-1	3DA5-9.2	CAPACITOR: 5,000 mmf, ±20%; 500 vdcw; moulded mica; type W.	Bypass r-f grid return.
19-2	3DA5-9.2	CAPACITOR: 5,000 mmf, ±20%; 500 vdcw; moulded mica; type W.	Bypass r-f screen grid.
20	3D9002E5-2	CAPACITOR, fixed: 2.5 mmf, ±20%; 500 vdcw; ceramic; style K; type N750.	R-f transformer coupling, bands 1 to 7.
26-1	3DA50-25.2	CAPACITOR: 00.5 mf, +30%, − 10%; 600 v; paper; tubular.	Bypass r-f filament.
51	3RC20AE154M	RESISTOR: 150,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Sensing attenuator.
52	3RC20AE683M	RESISTOR. 68,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Sensing attenuator.
53-1	3RC20AE473M	RESISTOR: 47,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Sensing attenuator.
54	3RC20AE333M	RESISTOR: 33,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Sensing attenuator.
55-1	3RC20AE153M	RESISTOR 15,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Sensing attenuator.
56-1	3RC20AE103M	RESISTOR: 10,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Sensing attentuator.
57-1	3Z6803A3-10	RESISTOR: 3.3 megohms, ±20%; ½ w; insulated carbon; type MB.	R-f grid leak.
81	2C4792A/T7	TRANSFORMER, r-f: band 1 antenna; special	Couple loop to r-f tube.
82	2C4792A/T1	TRANSFORMER, r-f: band 2 antenna; special	Couple loop to r-f tube.
83	2C4792A/T6	TRANSFORMER, r-f: band 3 antenna; special	Couple loop to r-f tube.
84	2C4792A/T13	TRANSFORMER, r-f: band 4 antenna; special	Couple loop to r-f tube.
85	2C4792A/T12	TRANSFORMER, r-f: band 5 antenna; special	Couple loop to r-f tube.
86	2C4792A/T14	TRANSFORMER, r-f: band 6 antenna; special	Couple loop to r-f tube.
87	2C4792A/T81	TRANSFORMER, r-f: band 7 antenna; special	Couple loop to r-f tube.
88	2C4792A/T8	TRANSFORMER, r-f: band 8 antenna; special	Couple loop to mod tube.
118-1	2J1LN5	TUBE: JAN-1LN5 (VT-179). R. M. A. type 1LN5	R-f amplifier.
120	2A294-2	ANTENNA: collapsible "fishpole"; six sections; 31½ inch over-all length when extended; special.	Provide nondirectional pick-up for "sensing."
121	2A1960	ANTENNA: single-turn loop; ⅜" o.d. copper tubing; silver-plated; special.	Provide directional pick-up.
126-1	2Z7111.23	PLUG: single prong	Connect sensing ant. to switch.
126-2	2Z7111.23	Same as 126-1	Connect switch to socket on chassis.
127-1	2Z8671-21	SOCKET: single contact; polystyrene	Connect to sensing ant. and to 126-1.
127-2	2Z8671-21	Same as 127-1	Connect to 58-1 and to 126-2.
132		SWITCH, BAND: 12-section; 8-position; rotary switch; ceramic wafers; silver-plated rotors and clips; wafers stamped with identifying letters E.F.G. and H; fifth clip on each section identified by number 5 stamped on wafer; special.	Switch operation to any one of 8 bands.



VOLTAGE AND RESISTANCE MEASUREMENTS:
RESISTANCES MEASURED TO CHASSIS WITH BATTERIES REMOVED.
VOLTAGES MEASURED TO CHASSIS.
RECEIVER TUNED TO 100KC, NO SIGNAL.
VOLUME AT MAXIMUM.
B F O OFF.
METER SENSITIVITY 1,000 OHMS PER VOLT.

NOTE:
* VOLTAGES MEASURED WITH BFO ON.
** VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER, 12 V AND 300 V RANGES
⊣⊢ IS SYMBOL FOR FIXED CAPACITOR.
⊣/⊢ IS SYMBOL FOR VARIABLE CAPACITOR.

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Figure 14. Radio Receiver BC-792-A, r-f stage.

29. Modulator Stage (fig. 15)

a. DESCRIPTION. The r-f amplifier is coupled to the modulator grid by capacitor 8–3. Resistor 57–2 acts as the modulator signal grid leak. The plate of the modulator 115 connects to switch section D, which selects either of the two i-f channels, depending on the band used.

b. PARTS DATA FOR MODULATOR STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
1–6	3D9001VE5–1	CAPACITOR: 1.5 to 7 mmf; 500 vdcw; adjustable ceramic; type NPO TS2A.	Tune band 1 r-f circuit.
1–7	3D9001VE5–1	Same as 1–6	Tune band 2 r-f circuit.
1–8	3D9001VE5–1	Same as 1–6	Tune band 3 r-f circuit.
1–9	3D9001VE5–1	Same as 1–6	Tube band 4 r-f circuit.
1–10	3D9001VE5–1	Same as 1–6	Tune band 5 r-f circuit.
1–11	3D9001VE5–1	Same as 1–6	Tune band 6 r-f circuit.
2–4	3D9030V–6	CAPACITOR: 4 to 30 mmf; 500 vdcw; adjustable; ceramic; type N500-TS2A.	Tune band 7 r-f circuit.
5B	3D9241V–1	CAPACITOR: 3-section; variable ganged; effective capacitance change per section 241 mmf; min capacitance 10.6 mmf, special.	Tune ant. r-f and osc circuits.
7	3D9540–1	CAPACITOR: 340 mmf; ±2%; 500 vdcw; fixed ceramic; style E, type N750.	Tune ant. circuit band 8. Tune r-f circuit band 7.
8–1	3D9500–89.1	CAPACITOR, fixed: 500 mmf, ±20%; 500 vdcw; ceramic; style D, type N750.	Tune r-f primary band 1.
8–3	3D9500–89.1	Same as 8–1	Modulator grid coupling.
9–1	3D9075–10.1	CAPACITOR, fixed: 75 mmf, ±10%; 500 vdcw; ceramic; style L, type N750.	Tune r-f primary band 2.
19–3	3DA5–9.2	CAPACITOR: 5,000 mmf, ±20%; 500 vdcw; moulded mica; type W.	Bypass modulator screen grid.
21–1	3D9100–15.1	CAPACITOR, fixed: 100 mmf, +5%; 500 vdcw; ceramic; style L; type N750.	Coupling oscillator to mod.
26–2	3DA50–25.2	CAPACITOR: 0.05 mf, +30%, −10%; 600 v paper tubular.	Bypass mod filament.
56–2	3RC20AE103M	RESISTOR: 10,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Mod screen isolation.
57–2	3Z6803A3–10	RESISTOR: 3.3 megohms, +20%; ½ w; insulated carbon; type MB.	Mod signal gridleak.
58–1	3RC20AE222M	RESISTOR: 2,200 ohms, +20%; ½ w; insulated carbon; type MB.	R-f screen and plate isolation
59	3Z6801–34	RESISTOR: 1 megohm, ±10%; 1/3 w; insulated carbon; type MB.	Bias voltage divider.
60	3RC20AE334K	RESISTOR: 330,000 ohms, ±10%; ½ w; insulated carbon; type MB.	Bias voltage divider.
61	3RC20AE224M	RESISTOR: 220,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Modulator injection gridleak.
89	2C4792/T3	TRANSFORMER, r-f: band 1 (r-f) special	Couple r-f tube to mod tube.
90	2C4792A/T4	TRANSFORMER, r-f: band 2 (r-f) special	Couple r-f tube to mod tube.
91	2C4792A/T9	TRANSFORMER, r-f: band 3 (r-f) special	Couple r-f tube to mod tube.
92	2C4792A/T15	TRANSFORMER, r-f: band 4 (r-f) special	Couple r-f tube to mod tube.
93	2C4792A/T5	TRANSFORMER, r-f: band 5 (r-f) special	Couple r-f tube to mod tube.
94	2C4792A/T16	TRANSFORMER, r-f: band 6 (r-f) special	Couple r-f tube to mod tube.
95	2C4792A/T2	TRANSFORMER, r-f: band 7 (r-f) special	Couple r-f tube to mod tube.
115	2J1LC6	TUBE: JAN-1LC6 (VT-178); R.M.A. type 1LC6	Mod.
132		SWITCH, BAND: 12-section; 8-position; rotary switch; ceramic wafers; silver-plated rotors and clips; wafers stamped with identifying letters I and J; fifth clip on each section identified by number 5 stamped on wafer, special.	Switch operation to any one of 3 bands.

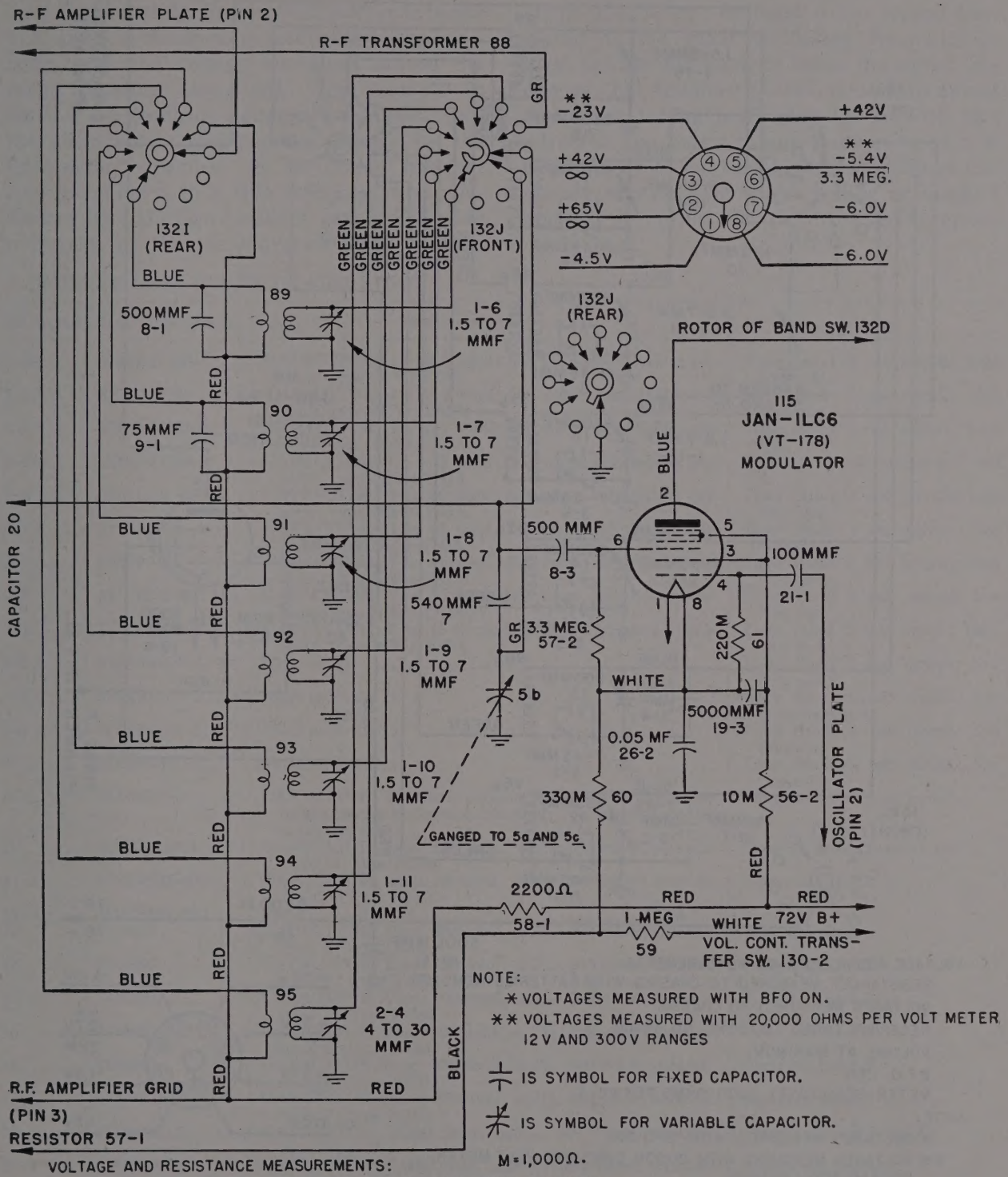
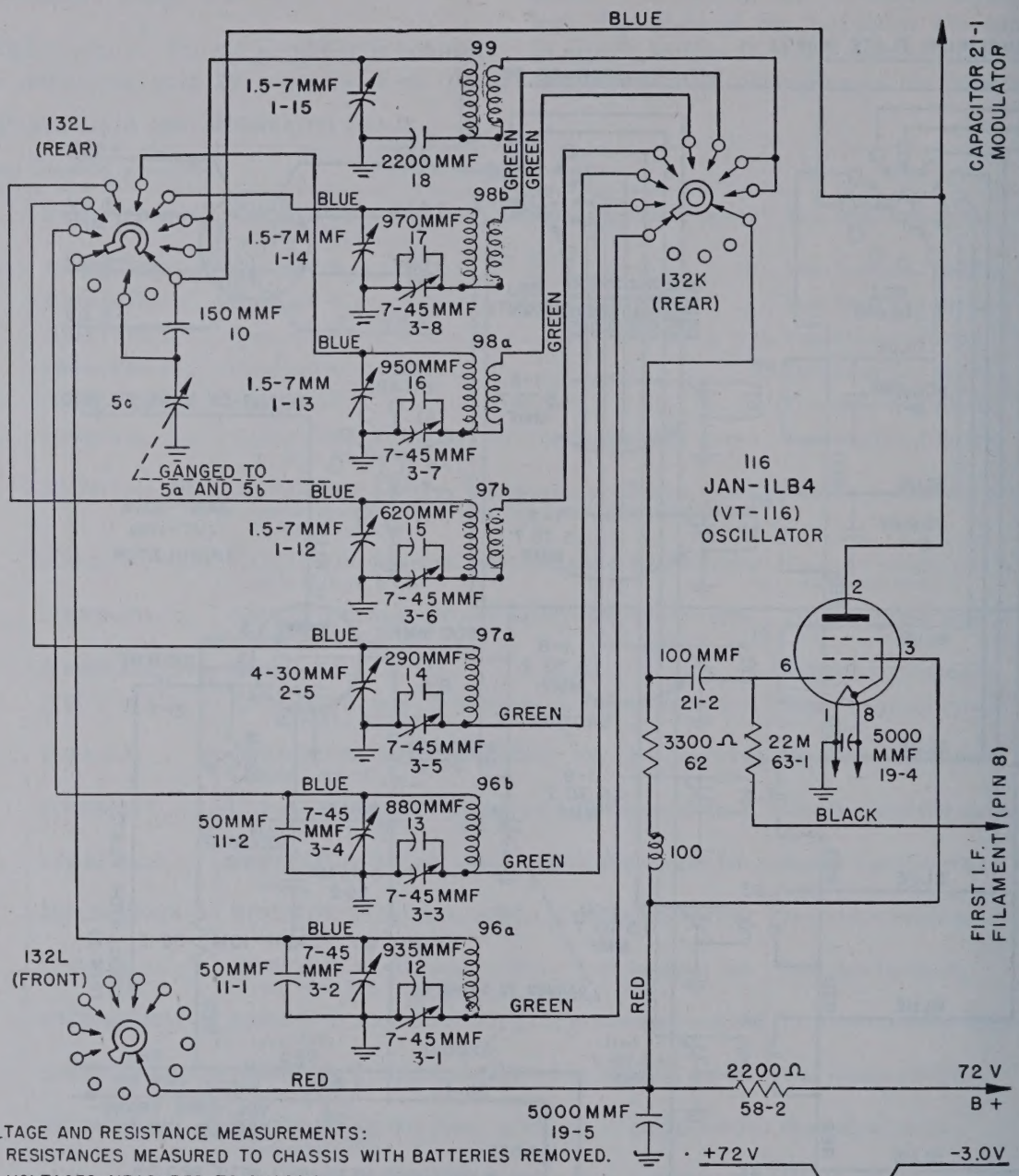


Figure 15. Radio Receiver BC-792-A, modulator stage.



VOLTAGE AND RESISTANCE MEASUREMENTS:
RESISTANCES MEASURED TO CHASSIS WITH BATTERIES REMOVED.
VOLTAGES MEASURED TO CHASSIS.
RECEIVER TUNED TO 100KC, NO SIGNAL.
VOLUME AT MAXIMUM.
BFO OFF.
METER SENSITIVITY 1,000 OHMS PER VOLT.

NOTE:
* VOLTAGES MEASURED WITH BFO ON.
** VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER, 12V AND 300V RANGES

⊣⊢ IS SYMBOL FOR FIXED CAPACITOR.

⊣/⊢ IS SYMBOL FOR VARIABLE CAPACITOR.

M=1,000Ω.

TL19748

Figure 16. Radio Receiver BC-792-A, oscillator stage.

30. Oscillator Stage (fig. 16)

a. DESCRIPTION. Feedback of voltage in bands 1, 2, and 3 is obtained by returning to the oscillator grid the voltage developed across the series padding capacitors. For example in band 1 the feedback voltage is obtained from the adjustable series padder, shunted by the fixed series capacitor. At the higher frequencies in bands 4 to 8 this feedback is supplemented by inductive feedback provided by the primaries of the transformers (97B to 99). In band 7 the oscillation frequency is above the signal frequency. In band 8 the second harmonic of the same oscillation frequency is used, but the harmonic is below the signal frequency. The trimmer (1–15) is used to adjust the upper tuning limit of band 7. With this adjusted, the upper tuning limit of band 8 is simultaneously set, because of the designed frequency relation. The lower tuning of bands 7 and 8 is not adjustable, since the series capacitor is fixed.

b. PARTS DATA FOR OSCILLATOR STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
1–12	3B9001VE5–1	CAPACITOR: 1.5 to 7 mmf; 500 vdcw; adjustable; ceramic; type NPO; TS2A.	Tune Band 4 osc circuit; high freq end.
1–13	3B9001VE5–1	CAPACITOR: 1.5 to 7 mmf; 500 vdcw; adjustable; ceramic; type NPO: TS2A.	Tune Band 5 osc circuit; high freq end.
1–14	3D9001VE5–1	CAPACITOR: 1.5 to 7 mmf; 500 vdcw; adjustable; ceramic; type NPO; TS2A.	Tune Band 6 osc circuit; high freq end.
1–15	3D9001VE5–1	CAPACITOR: 1.5 to 7 mmf; 500 vdcw; adjustable; ceramic; type NPO; TS2A.	Tune osc circuit for Bands 7 and 8.
2–5	3D9030V–6	CAPACITOR: 4 to 30 mmf; 500 vdcw; adjustable; ceramic; type N500–TS2A.	Tune Band 3 osc circuit; high freq end.
3–1	3DK9045V–2	CAPACITOR: 7 to 45 mmf, 500 vdcw; adjustable; ceramic; type N500–TS2A.	Tune Band 1 osc circuit; low freq end.
3–2	3DK9045V–2	CAPACITOR: 7 to 45 mmf, 500 vdcw; adjustable; ceramic; type N500–TS2A.	Tune Band 1 osc circuit; high freq end.
3–3	3DK9045V–2	CAPACITOR: 7 to 45 mmf, 500 vdcw; adjustable; ceramic; type N500–TS2A.	Tune Band 2 osc circuit; low freq end.
3–4	3DK9045V–2	CAPACITOR: 7 to 45 mmf, 500 vdcw; adjustable; ceramic; type N500–TS2A.	Tune Band 2 osc circuit; high freq end.
3–5	3DK9045V–2	Same as 3–1	Tune Band 3 osc circuit; low freq end.
3–6	3DK9045V–2	Same as 3–1	Tune Band 4, osc circuit; low frequency end.
3–7	3DK9045V–2	Same as 3–1	Tune Band 5, osc circuit; low freq end.
3–8	3DK9045V–2	Same as 3–1	Tune Band 6, osc circuit; low freq end.
5C	3D9241V–1	CAPACITOR: 3-section; variable ganged; effective capacitance change per section 241 mmf; min capacitance 10.6 mmf; special.	Tune ant. r-f and osc circuits.
10	3D9150–21.1	CAPACITOR, fixed: 150 mmf, ±1%; 500 vdcw; ceramic; style M; type N750.	Tune osc sec for bands 1 and 2.
11–1	3DK9050–49.1	CAPACITOR: fixed: 50 mmf, ±5%; 500 vdcw; ceramic; style K; type N750.	Tune osc band 1.
11–2	3DK9050–49.1	Same as 11–1.	Tune osc band 2.
12	3D9935	CAPACITOR, fixed: 935 mmf, ±2%; 500 vdcw; ceramic; style F; type N750.	Tune osc band 1.
13	3D9880	CAPACITOR, fixed: 880 mmf, ±2%; 500 vdcw; ceramic; style F; type N 750.	Tune osc band 2.
14	3D9290	CAPACITOR, fixed: 290 mmf, ±5%; 500 vdcw; ceramic; style M; type N750.	Tune osc band 3.
15	3D9620–3	CAPACITOR, fixed: 620 mmf, ± 2%; 500 vdcw; ceramic; style E; type N750.	Tune osc band 4.
16	3D9950	CAPACITOR, fixed: 950 mmf, ±2%; 500 vdcw; ceramic; style F; type N750.	Tune osc band 5.
17	3D9970	CAPACITOR, fixed: 970 mmf, ±2%; 500 vdcw; ceramic; style F; type N750.	Tune osc band 6.
18	3D3022212	CAPACITOR: 2,200 mmf, ±5%; 500 vdcw; moulded mica; type W.	Tune osc bands 7 and 8.
19–4	3DA5–9.2	CAPACITOR: 5,000 mmf, ±20%; 500 vdcw; moulded mica; type W.	Bypass osc filament.
19–5	3DA5–9.2	Same as 19–4	Bypass osc screen grid.
21–2	3D9100–15.1	CAPACITOR, fixed: 100 mmf, ±5%; 500 vdcw; ceramic; style L; type N750.	Osc feedback coupling.
58–2	3RC20AE222M	RESISTOR: 2,200 ohms, ±20%; ½ w; insulated carbon; type MB.	Osc screen and plate isolation.
62	3RC20AE332M	RESISTOR: 3,300 ohms, ±20%; ½ w; insulated carbon; type MB.	Osc feedback.
63–1	3RC20AE223M	RESISTOR: 22,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Osc gridleak.

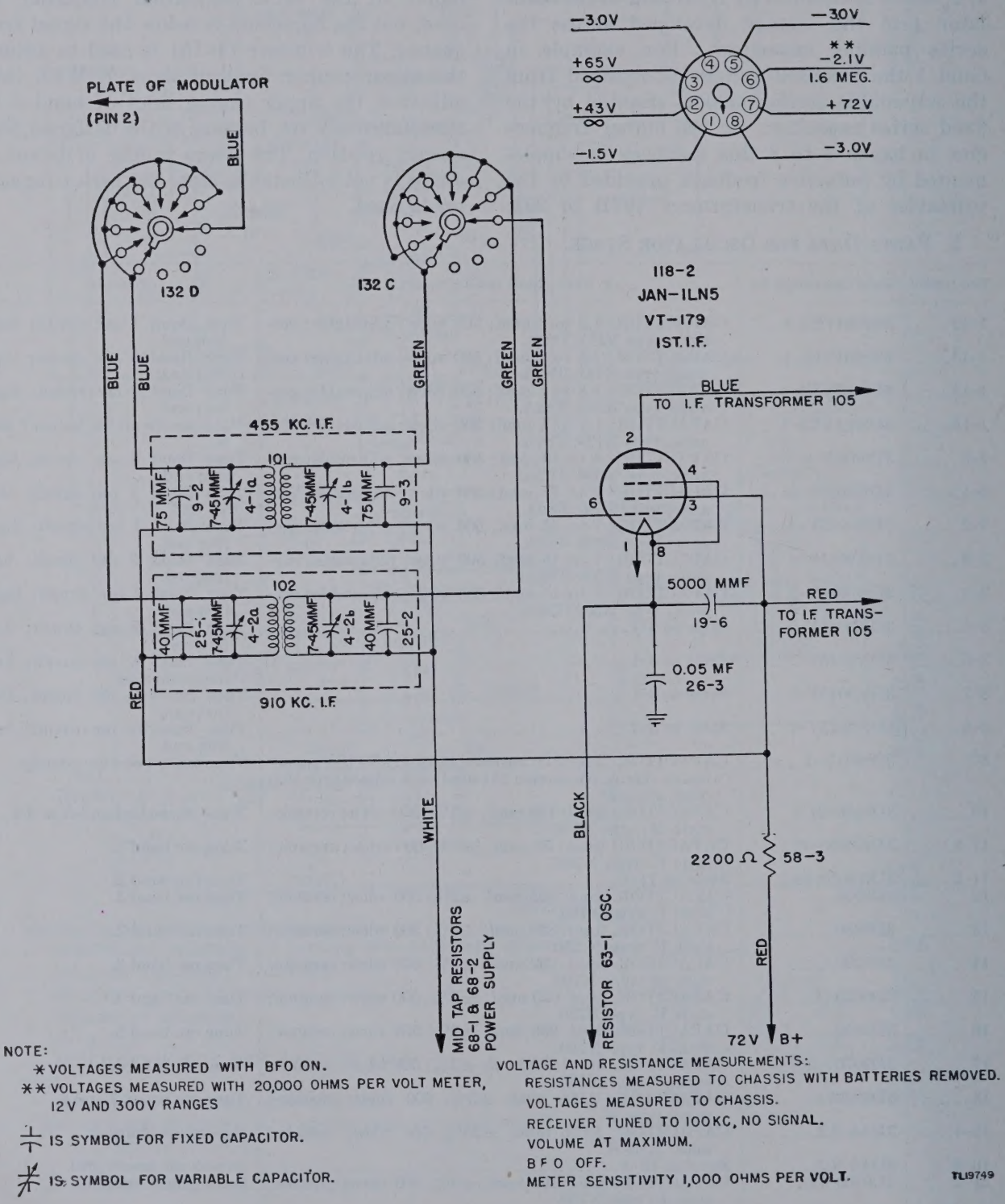


Figure 17. Radio Receiver BC-792-A, first i-f stage.

b. PARTS DATA FOR OSCILLATOR STAGE (*contd.*)

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
96a and 96b.	2C4792A/C4	COIL: Band 1 and 2; osc; (on same form)	Generate a voltage having a freq 455 kc greater than the signal freq on band 1; 910 kc greater on band 2.
97a	2C4792A/T10	COIL: band 3; oscillator	Generate a voltage having a freq 455 kc greater than the signal frequency.
97b	2C4792A/T10	TRANSFORMER r-f: band 4 oscillator	Generate a voltage having a freq 455 kc greater than the signal freq.
98a	2C4792A/C2	TRANSFORMER r-f: band 5, oscillator	Generate a voltage having a freq 455 kc greater than the signal freq.
98b	2C4792A/C2	TRANSFORMER r-f: band 6 oscillator	Generate a voltage having a freq 910 kc greater than the signal freq.
99	2C4792A/C1	TRANSFORMER r-f: bands 7 and 8 oscillator	Generate a voltage 910 kc greater than signals in band 7. Generate a voltage 910 kc less than the signals in band 8.
100	2C4792A/C5	COIL: choke (oscillator r-f)	Provide an impedance in osc grid circuit.
116	2J1LB4	TUBE: JAN-1LBA; R.M.A. type 1LB4	Osc.
132		SWITCH, BAND: 12-section; 8-position; rotary switch; ceramic wafers; silver-plated rotors and clips; wafers stamped with identifying letters K and L; fifth clip on each section identified by number 5 stamped on wafer; special.	Switch operation to any one of 8 bands.

31. I-F Stages (figs. 17 and 18)

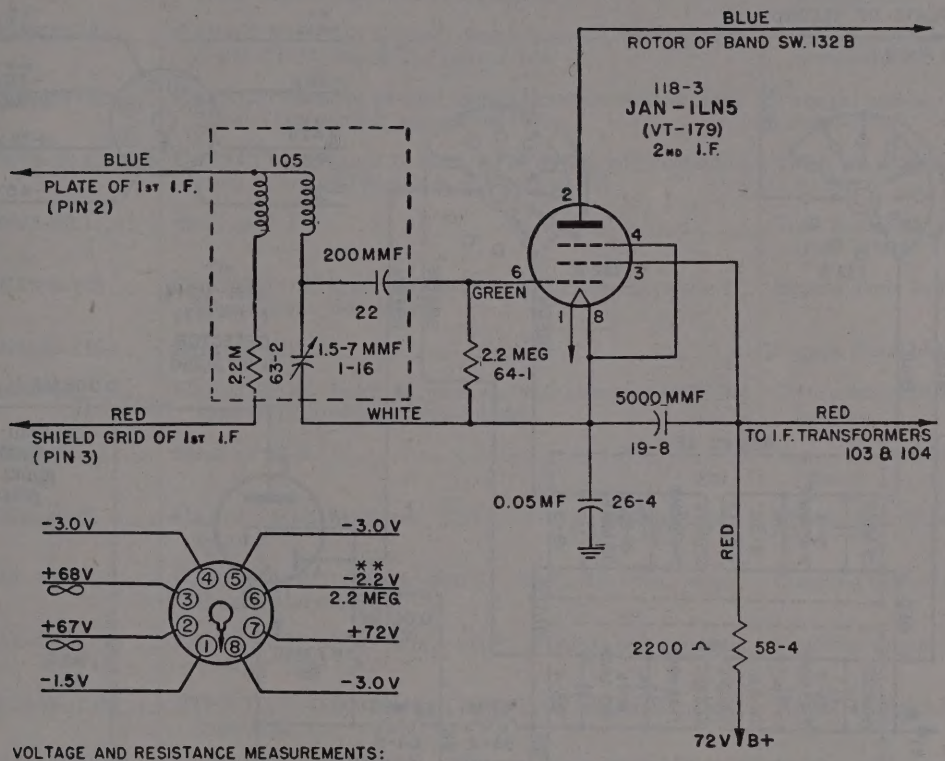
a. DESCRIPTION. Bands 1, 3, 4, and 5 use the 455-kc i-f channel. Bands 2, 6, 7, and 8 use the 910-kc i-f channel. The higher frequency bands 6, 7, and 8 require the 910-kc i-f in order to provide better image rejection, and to keep the tuning control from being excessively critical of "razor-sharp." Band 2 includes 455 kc in its tuning range and therefore it must also use the 910-kc range channel. Transformers 101 and 103 are in the 455-kc channel. Transformers 102, 105, and 104 are in the 910-kc channel. Both the primaries and the secondaries of the four double-tuned transformers are switched by sections A, B, C, and D of the band switch. The single-tuned interstage transformer 105 is not switched. It is tuned to 910 kc by distributed capacitance and the trimmer (1–16). At 455 kc the interstage transformer provides no additional selectivity and only a nominal amplification in conjunction with the first i-f amplifier tube (118–2).

b. PARTS DATA FOR FIRST I-F STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
4–1a	3DK9045V–3	CAPACITOR: 7 to 45 mmf; dual adjustable ceramic; type N500-TD2A; inside and part of 101.	Tune pri and sec of 455-kc mod transformer.
4–1b	3DK9045V–3	Same as 4–1a	Tune pri and sec of 455-kc mod transformer.
4–2a	3DK9045V–3	Same as 4–1a, inside and part of 102	Tune pri and sec of 910-kc mod transformer.
4–2b	3DK9045V–3	Same as 4–1a, inside and part of 102	Tune pri and sec of 910-kc mod transformer.
9–2	3D9075–10.1	CAPACITOR, fixed: 75 mmf, ±10%; 500 vdcw; ceramic; style L, type N750; inside and part of 101.	Tune pri 455-kc mod transformer.
9–3	3D9075	CAPACITOR, fixed: 75 mmf, ±10%; 500 vdcw; ceramic; style L, type N750; inside and part of 101.	Tune sec 455–kc mod transformer.
19–6	3DA5–9.2	CAPACITOR: 5,000 mmf, ±20%; 500 vdcw; moulded mica; type W.	Bypass first i-f screen grid.
25–1	3D9040–14	CAPACITOR, fixed: 40 mmf; ±10%; ceramic; style K; type N750; inside and part of 102.	Tune pri 910-kc mod transformer.
25–2	3D9040–14	Same as 25–1, inside and part of 102	Tune sec 910-kc mod transformer.
26–3	3DA50–25.2	CAPACITOR: 0.05 mf, +30%, −10%; 600 v; paper; tubular.	Bypass first i-f filament.
58–3	3RC2DAE222M	RESISTOR: 2,200 ohms, ±20%; ½ w; insulated carbon; type MB.	First i-f screen and plate isolation.
101	2Z9641.40	TRANSFORMER assembly; modulator, special	Couple mod tube to first i-f tube at 455 kc.
102	2Z9642.20	TRANSFORMER assembly; 910-kc modulator, special	Couple mod tube to first i-f tube at 910 kc.
118–2	2J1LN5	TUBE: JAN-1LN5 (VT–179) R.M.A. type 1LN5	First i-f amplifier.
132		SWITCH, BAND: 12-section; 8-position; rotary switch; ceramic wafers; silver plated rotors and clips; wafers stamped with identifying letters C and D; fifth clip on each section identified by number 5 stamped on wafer; special.	Switch operation to any one of 8 bands.

c. PARTS DATA FOR SECOND I-F STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
1–16	3D9001VE5–1	CAPACITOR: 1.5 to 7 mmf; 500 vdcw; adjustable; ceramic; type NPO TS2A.	Tune interstage i-f transformer; 105.
19–8	3DA5–9.2	CAPACITOR: 5,000 mmf, ± 20%; 500 vdcw; moulded mica; type W.	Bypass second i-f screen grid.
22	3D9200–6.3	CAPACITOR, fixed: 200 mmf, ±20%; ceramic style m; type N750. Inside and part of 105.	Coupling to second i-f grid.
26–4	3DA50–25.2	CAPACITOR: 0.05 mf. + 30%, −10%; 600 v; paper tubular.	Bypass second i-f filament.
58–4	3RC20AE222M	RESISTOR: 2,200 ohms; ±20%; ½ w; insulated carbon; type MB.	Second i-f screen and plate isolation.
63–2	3RC20AE223M	RESISTOR: 22,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Plate circuit damping.
64–1	3RC20AE225M	RESISTOR: 2.2 megohms, ±20%; ½ w; insulated carbon; type MB.	Second i-f gridleak.
105	2Z9642.19	TRANSFORMER: assembly interstage, special	Couple first i-f tube to second i-f tube at 455 kc and 910 kc.
118–3	2J1LN5	TUBE: JAN 1LN5 (VT–179) R.M.A. type 1LN5	Second i-f amplifier.



VOLTAGE AND RESISTANCE MEASUREMENTS:
RESISTANCES MEASURED TO CHASSIS WITH BATTERIES REMOVED.
VOLTAGES MEASURED TO CHASSIS.
RECEIVER TUNED TO 100KC, NO SIGNAL.
VOLUME AT MAXIMUM.
BFO OFF.
METER SENSITIVITY 1,000 OHMS PER VOLT.

NOTE:
* VOLTAGES MEASURED WITH BFO ON.
** VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER, 12V AND 300V RANGES

⊣⊢ IS SYMBOL FOR FIXED CAPACITOR.

⊣≠ IS SYMBOL FOR VARIABLE CAPACITOR.

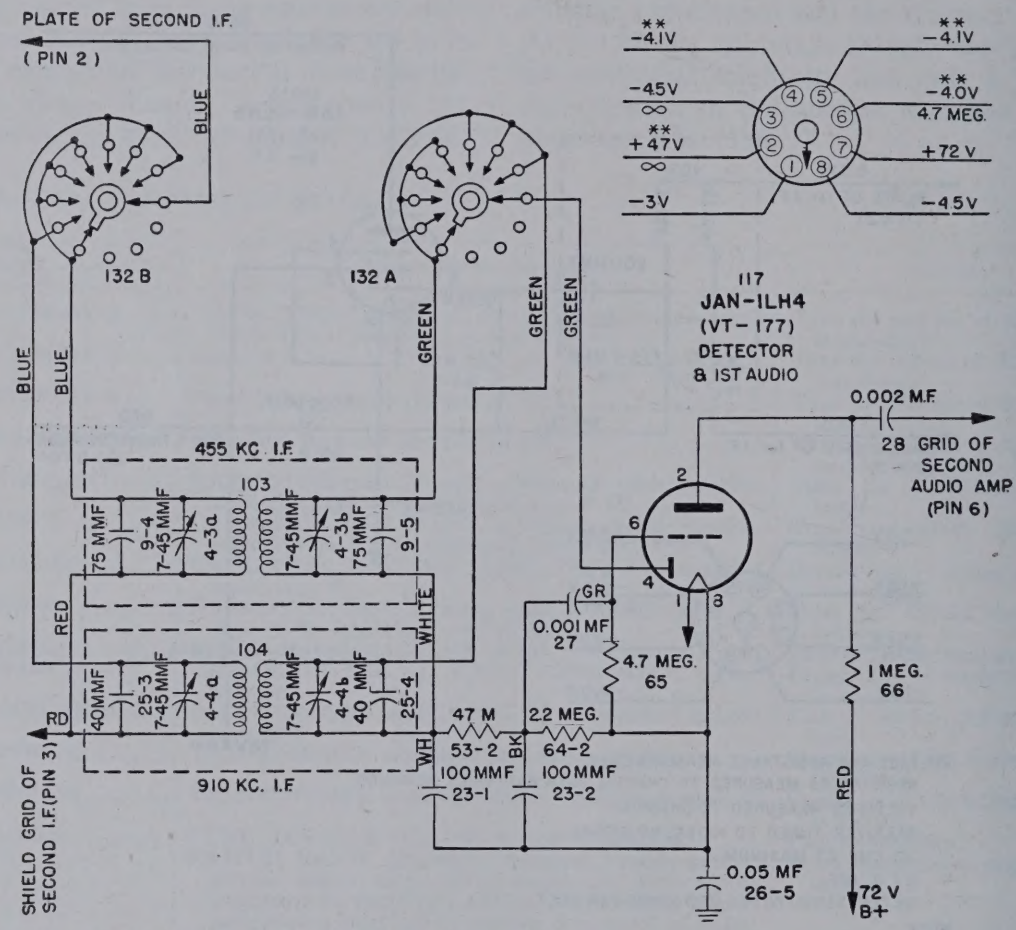
M=1,000Ω.

TL19780

Figure 18. Radio Receiver BC-792-A, second i-f stage.

32. Detector Stage (fig. 19)

a. DESCRIPTION. The output from either i-f channel is rectified in the diode circuit of the detector 117. A "tweet filter" 53–2 and 23–2 in the diode load circuit removes most of the i-f from the desired audio voltage. Capacitors 23–1 and 23–2 by-pass the diode load. Capacitor 27 acts as the coupling to the first a-f grid, and capacitor 28 couples the detector stage to the grid of the output tube.



VOLTAGE AND RESISTANCE MEASUREMENTS:
RESISTANCES MEASURED TO CHASSIS WITH BATTERIES REMOVED.
VOLTAGES MEASURED TO CHASSIS.
RECEIVER TUNED TO 100KC, NO SIGNAL.
VOLUME AT MAXIMUM.
BFO OFF.
METER SENSITIVITY 1,000 OHMS PER VOLT.

NOTE:
* VOLTAGES MEASURED WITH BFO ON.
** VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER, 12V AND 300V RANGES

IS SYMBOL FOR FIXED CAPACITOR.

IS SYMBOL FOR VARIABLE CAPACITOR.

M = 1,000Ω

TL19751

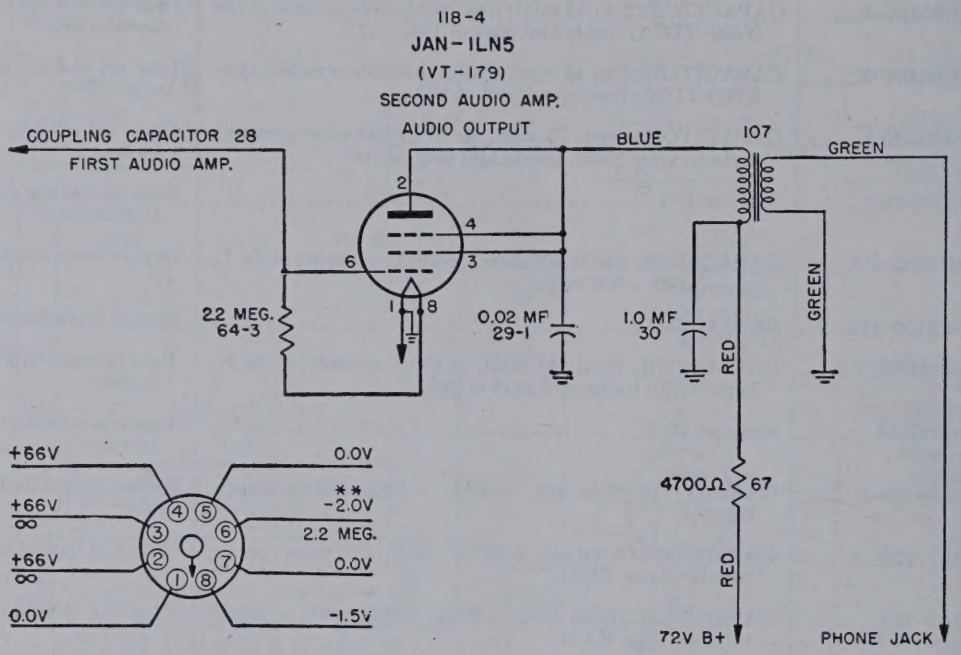
Figure 19. Radio Receiver BC-792-A, detector stage.

b. PARTS DATA FOR DETECTOR STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
4–3a	3DK9045V–3	CAPACITOR: 7 to 45 mmf; dual adjustable ceramic; type N500–TD2A; inside and part of 103.	Tune pri and sec of 455–kc diode transformer.
4–3b	3DK9045V–3	CAPACITOR: 7 to 45 mmf; dual adjustable ceramic; type N500–TD2A; inside and part of 103.	Tune pri and sec of 455–kc diode transformer.
4–4a	3DK9045V–3	CAPACITOR: 7 to 45 mmf; dual adjustable ceramic; type N500–TD2A; inside and part of 104.	Tune pri and sec of 455-kc diode transformer.
4–4b	3DK9045V–3	CAPACITOR: 7 to 45 mmf; dual adjustable ceramic; type N500-TD2A; inside and part of 104.	Tune pri and sec of 455-kc diode transformer.
9–4	3D9075–10.1	CAPACITOR, fixed: 75 mmf, ± 10%; 500 vdcw ceramic; style L; type N750; inside and part of 103.	Tune pri 455-kc diode transformer.
9–5	3D9075–10.1	Same as 9–4	Tune secondary sec 455-kc diode transformer.
23–1	3DK9100–118	CAPACITOR, fixed: 100 mmf, ±20%; ceramic; style L; type N750. 500 vdcw.	Bypass diode load.
23–2	3DK9100–118	Same as 23–1	Bypass diode load.
25–3	3D9040–14	CAPACITOR, fixed: 40 mmf, ±10%; ceramic; style K; type N750; inside and part of 104.	Tune primary 910-kc diode transformer.
25–4	3D9040–14	Same as 25–3	Tune sec 910-kc diode transformer.
26–5	3DA50–25–2	CAPACITOR: 0.05 mf, +30%, −10%; 600 v paper; tubular.	Bypass diode filament.
27	3DA1–102	CAPACITOR: 0.001 mf, +50%, −20%; 600 vdcw; paper; tubular; type PX24.	Coupling to first a-f grid.
28	3DA2–116	CAPACITOR: 0.002 mmf, +50%, −20%; 600 v paper; tubular; type PX24.	Coupling to grid of output tube.
53–2	3RC20AE473M	RESISTOR: 47,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Part of diode load circuit (filter).
64–2	3RC20AE225M	RESISTOR: 2.2 megohms, ±20%; ½ w; insulated carbon; type MB.	Part of diode load.
65	3RC20AE475M	RESISTOR: 4.7 megohms, ±20%; ½ w; insulated carbon; type MB.	Gridleak of first a-f amplifier.
66	3RC20AE105M	RESISTOR: 1 megohm, ±20%; ½ w; insulated carbon; type MB.	Plate load of first a-f amplifier.
103	2Z9641.40	TRANSFORMER: assembly; 455-kc diode; special	Couple second i-f tube to diode; at 455 kc.
104	2Z9642.20	TRANSFORMER: assembly 910-kc diode; special	Couple second i-f tube to diode; at 910 kc.
117	2J1LH4	TUBE: JAN 1LH4 (VT-177); R. M. A. type 1LH4	Diode detector and first a-f amplifier.
132		SWITCH, BAND: 12-section; 8-position; rotary switch; ceramic wafers; silver-plated rotors and clips; wafers stamped with identifying letters A and B; fifth clip on each section identified by number 5 stamped on wafer; special.	Switch operation to any one of 8 bands.

33. Audio Output Stage (fig. 20)

a. DESCRIPTION. The audio signal is coupled to the grid of the first a-f amplifier through the capacitor 27. The output from the audio section of tube 117 is coupled to the output tube 118–4 through the capacitor 28. The output tube, triode connected, is coupled to Headset HS–34–A through the audio transformer 107. The secondary of this transformer is connected to panel Jack JK–34–A and to the HEADSET terminals on the control plate. Connections to the latter are carried through the four-wire cable and plug arrangement 123, 122.



VOLTAGE AND RESISTANCE MEASUREMENTS:
RESISTANCES MEASURED TO CHASSIS WITH BATTERIES REMOVED.
VOLTAGES MEASURED TO CHASSIS
RECEIVER TUNED TO 100KC, NO SIGNAL.
VOLUME AT MAXIMUM.
B F O OFF.
METER SENSITIVITY 1,000 OHMS PER VOLT.

NOTE:
* VOLTAGES MEASURED WITH BFO ON.
** VOLTAGES MEASURED WITH 20,000 OHMS PER VOLT METER, 12 V AND 300 V RANGES

⊣⊢ IS SYMBOL FOR FIXED CAPACITOR.

⊣/⊢ IS SYMBOL FOR VARIABLE CAPACITOR.

TL19752

Figure 20. Radio Receiver BC–792–A, audio output stage.

b. PARTS DATA FOR AUDIO OUTPUT STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
29–1	3DA20.74	CAPACITOR: 0.02 mf, +30%, −10%; 600 v; paper; tubular; type PX24A.	Bypass primary of output transformer.
30	3DA100–169	CAPACITOR: 0.1 mf, + 20%, −10%; 200 v paper; bathtub type can.	Bypass plate return of output tube.
64–3	3RC20AE225M	RESISTOR: 2.2 megohms, ±20%; ½ w; insulated carbon; type MB.	Gridleak of output tube.
67	3RC20AE472M	RESISTOR: 4,700 ohms, ±20%; ½ w; insulated carbon; type MB.	Isolation for output tube.
107	2Z9632.74	TRANSFORMER: audio output, special	Couple the output tube to the headset.
118–4	2J1LN5	TUBE: JAN-1LN5 (VT–179). R.M.A. type 1LN5	Output a-f amplifier.

34. Beat-Frequency Oscillator Stage (fig. 21)

a. DESCRIPTION. The beat-frequency oscillator which is used for monitoring unmodulated signals is tunable to 454 kc by means of trimmer 3–9. The oscillator uses tube 118–5 in a plate tuned inductive feedback circuit. The secondary of the beat-frequency oscillator transformer (106) is shunted with a fixed capacitor (31–3) to provide the proper frequency range. Normally the B-F oscillator is tuned to 454 kc giving a 1,000 cycle beat with the 455 kc i-f. The second harmonic produced by the b-f oscillator is used to beat with the 910 kc i-f. The BFO OFF-ON switch (131–1) on the "B" supply circuit, permits the oscillator to be controlled from the top plate. Coupling from the b-f oscillator to the i-f channels exists through the common supply circuits and by virtue of the strong fields the oscillator produces.

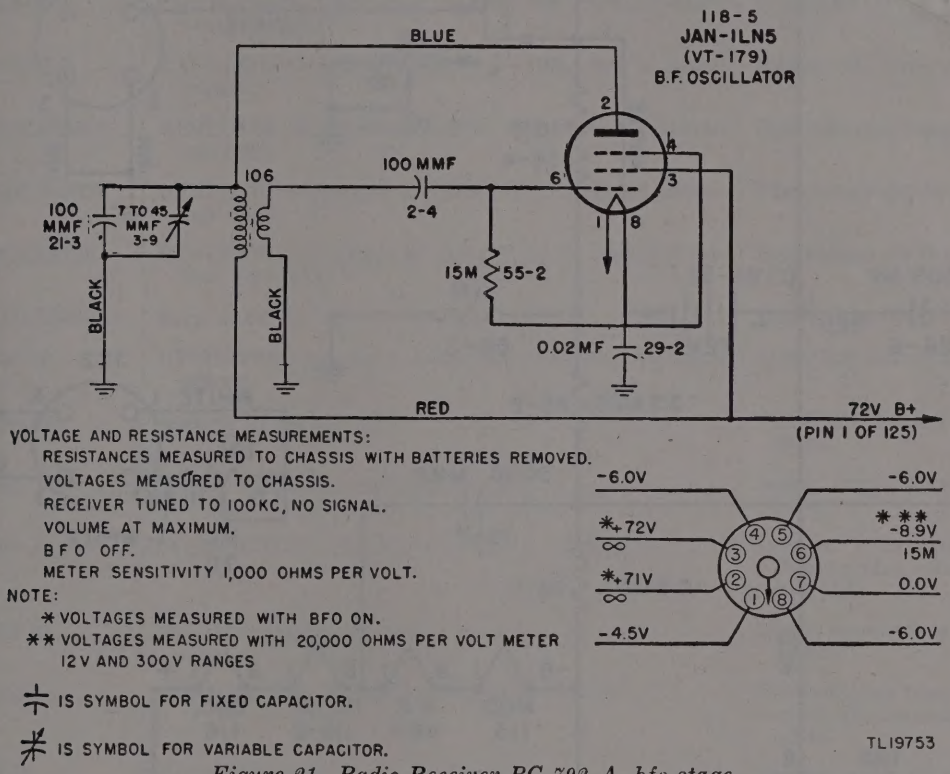
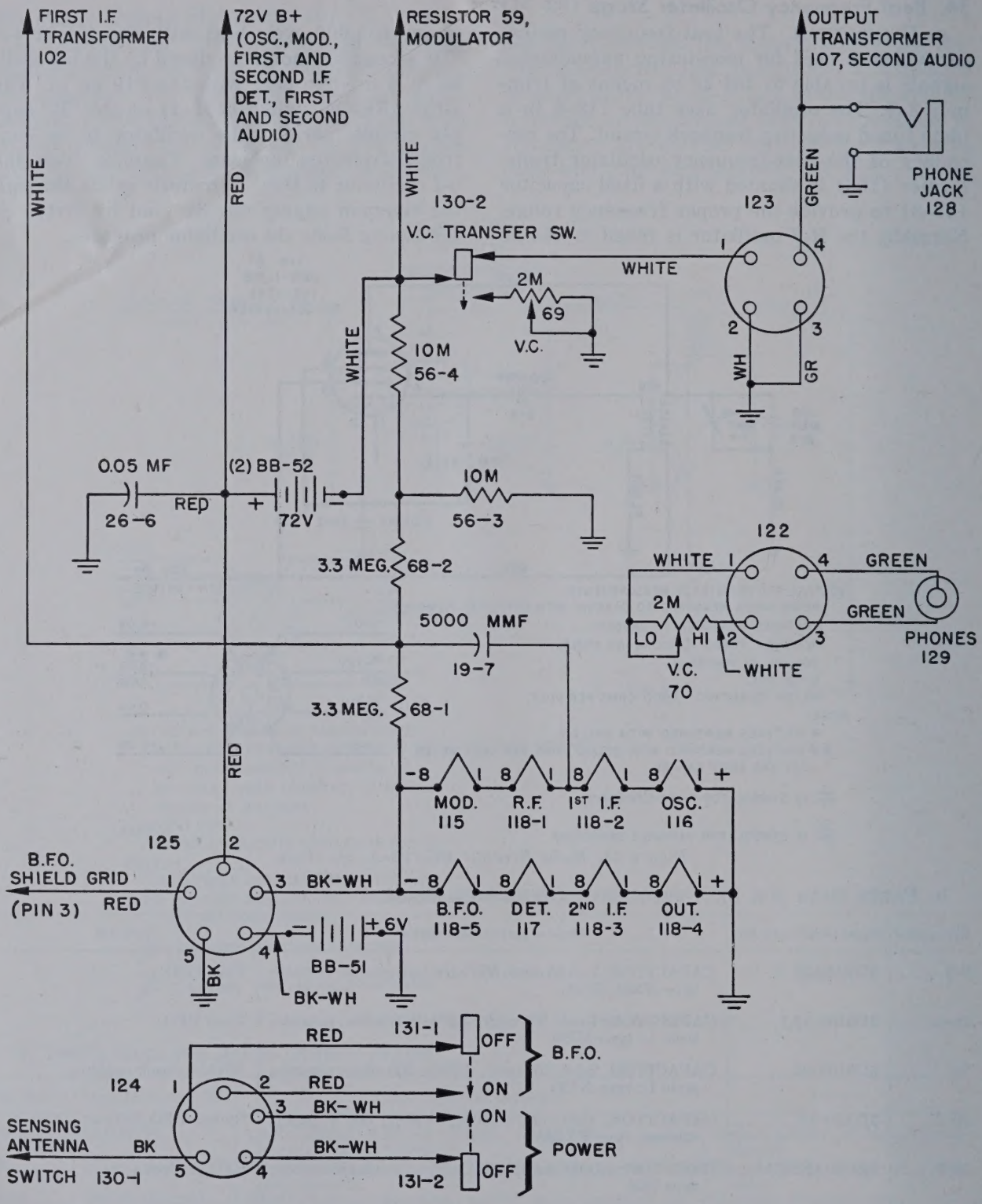


Figure 21. Radio Receiver BC–792–A, bfo stage.

b. PARTS DATA FOR BEAT-FREQUENCY OSCILLATOR STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
3–9	3DK9045V–2	CAPACITOR: 7 to 45 mmf; 500 vdcw; adjustable; ceramic; type N500–TS2A.	Tune BFO.
21–3	3D9100–15.1	CAPACITOR: fixed; 100 mmf, ±5%; 500 vdcw; ceramic; style L; type N750.	Tune BFO.
24	3D9100–65	CAPACITOR, fixed: 100 mmf, +10%; 500 vdcw; ceramic; style L; type N750.	BFO feedback coupling.
29–2	3DA20–74	CAPACITOR: 0.02 mf, + 30%, −10%; 600 v paper; tubular; type PX24A.	Bypass BFO filament.
55–2	3RC20AE153M	RESISTOR: 15,000 ohms, ±20%; ½ w; insulated carbon; type MB.	BFO gridleak.
106	2C4793A/C3	TRANSFORMER, i-f: beat-frequency oscillator; special	Generate a voltage of frequency nearly equal to the i-f e.g. 454 kc which beats with 455 kc to produce a 1-kc tone.
118–5	2J1LN5	TUBE: JAN-1LN5 (VT-179). R.M.A. type 1LN5	Beat-frequency oscillator.



NOTE:

⊣⊢ IS SYMBOL FOR FIXED CAPACITOR.

M = 1,000Ω.

TL 19754

Figure 22. Radio Receiver BC-792-A, power supply stage.

35. Power Supply Stage

a. DESCRIPTION. The power supply consis. of three miniature storage batteries, one 6-volt for filament supply and two 36-volt for a 72-volt plate supply. Capacitor 26–6 acts as the anode battery by-pass. Resistors 56–3, 56–4, 68–1, 8–1 are the bias voltage dividers.

b. PARTS DATA FOR POWER SUPPLY STAGE.

Ref. symbol	Signal Corps stock No.	Name of part and description	Function
19–7	3DA5–9.2	CAPACITOR: 5,000 mmf, ±20%; 500 vdcw; moulded mica; type W.	Bypass in. to grid return.
26–6	3DA50–25.2	CAPACITOR: 0.05 mf, +30%, −10%; 600 v paper; tubular.	Bypass "B" battery.
56–3	3RC20AE103M	RESISTOR: 10,000 ohms, ±20%; ½ w; insulated carbon; type MB.	Bias voltage divider.
56–4	3RC20AE103M	RESISTOR: 10,000 ohms, ±20%: ½ w; insulated carbon; type MB.	Bias voltage divider.
8–1	3RC20AE335K	RESISTOR: 3.3 megohms, ±10%; ½ w; insulated carbon; type MB.	Bias voltage divider.
68–2	3RC20AE335K	Same as 68–1	Bias voltage divider.
69	2Z7280–36	RESISTOR: 2,000 ohms, ±10%; 4 w; wire-wound potentiometer.	VOLUME control on panel.
70	2Z7280–56	Same as 69 electrically	VOLUME control on control plate.
122	2Z7254	PLUG: miniature; 4-prong	Make connections to control plate.
123	2Z7234–6	CONNECTOR: miniature; 4-contact; shielded	Connect wires from chassis to 4-prong plug attached to control plate.
124	2Z7115.10	PLUG: miniature; 5-prong	Make connections to control plate.
125	2Z115.11	CONNECTOR: miniature; 5-contact; shielded	Connect wires from chassis to 5-prong plug attached to control plate.
128	2Z5534A	JACK: JK–34–A	Provide outlet on receiver panel for connecting headset.
129	2Z9402.46	JACK PLATE ASSEMBLY: special	Connection to receiver output for Cord CD–655–A.
130–2	3Z9824–261.1	SWITCH: push	Transfer circuit from panel volume control to control plate volume control.
131–1	3Z9835–1	SWITCH: slide; SPST	ON-OFF for filaments.
131–2	3Z9835–1	Same as 131–1	ON-OFF for BFO.

SECTION IX
SUPPLEMENTARY DATA

36. Construction of Radiating Loop

a. The radiating loop is a convenient means of coupling the signal generator to the receiver when the cover is in place. The loop consists of a single turn of ¼-inch tubing, supported by a nonmetalic stand. (See fig. 23.)

b. The resistance should be 150 ohms. When making tests, place the receiver and radiating loop 20 inches apart.

c. The loop, when used at a distance of 20 inches from the receiver loop, produces a field strength at the receiver which is $\frac{1}{10}$ of the signal generator output.

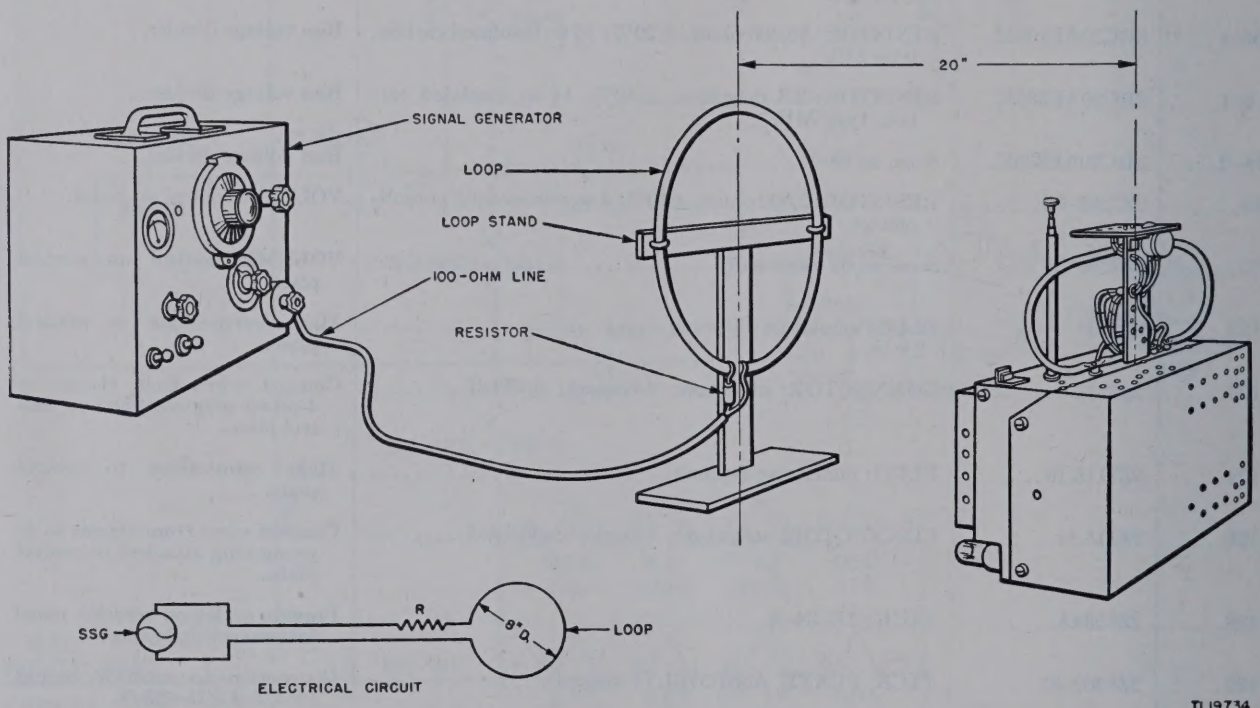


Figure 23. Radio Receiver BC 792-A—test set-up for a radiating loop.

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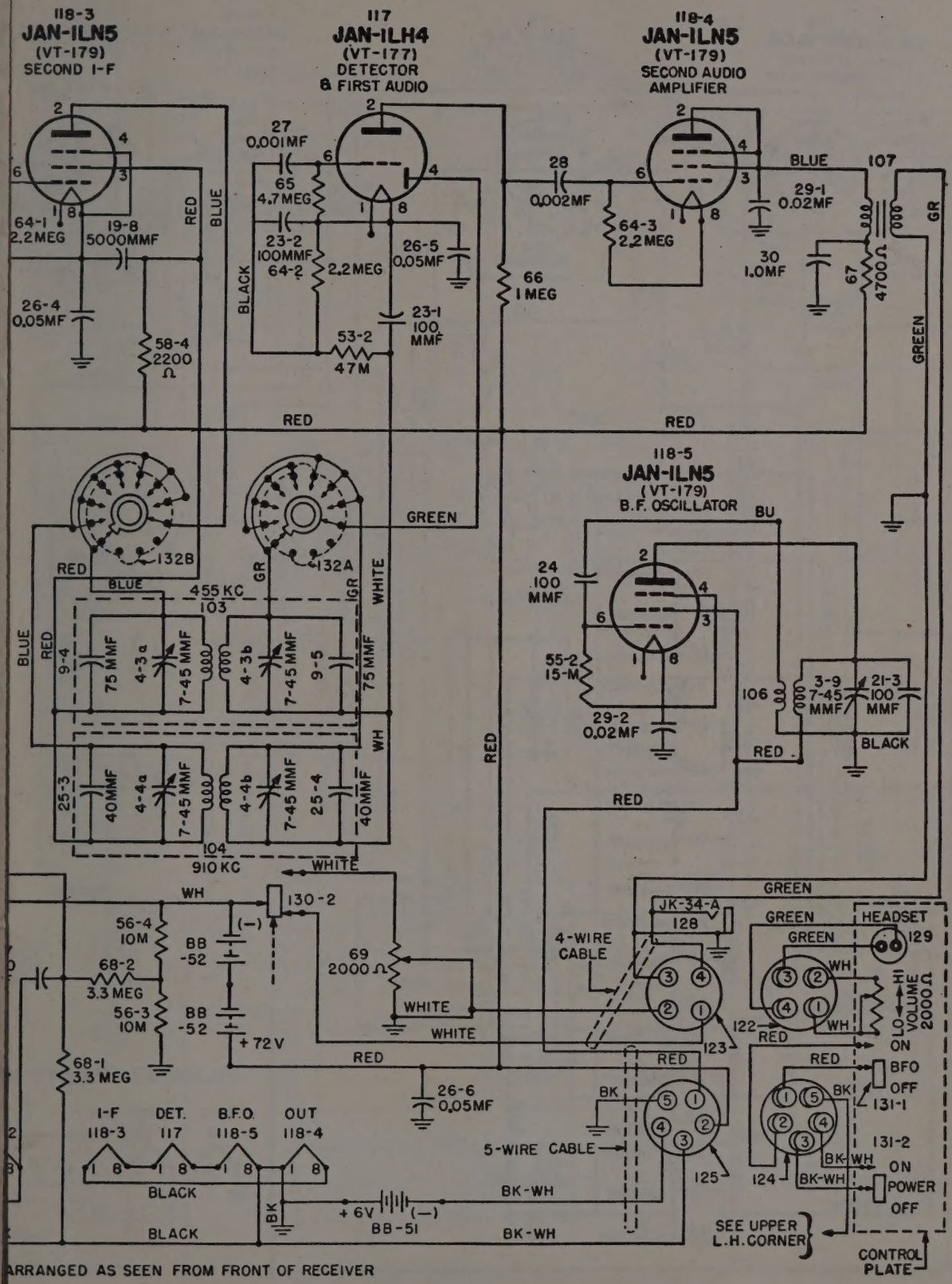


Figure 24. Radio Receiver BC-792-A—schematic diagram.

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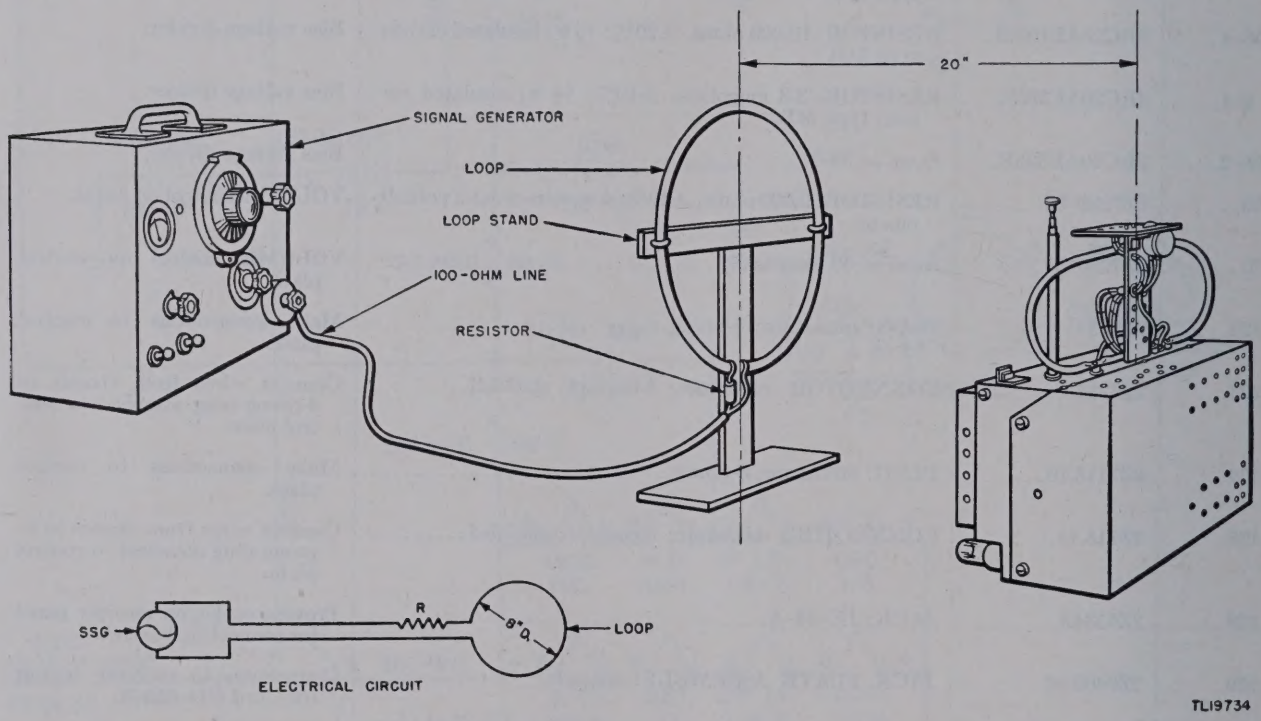


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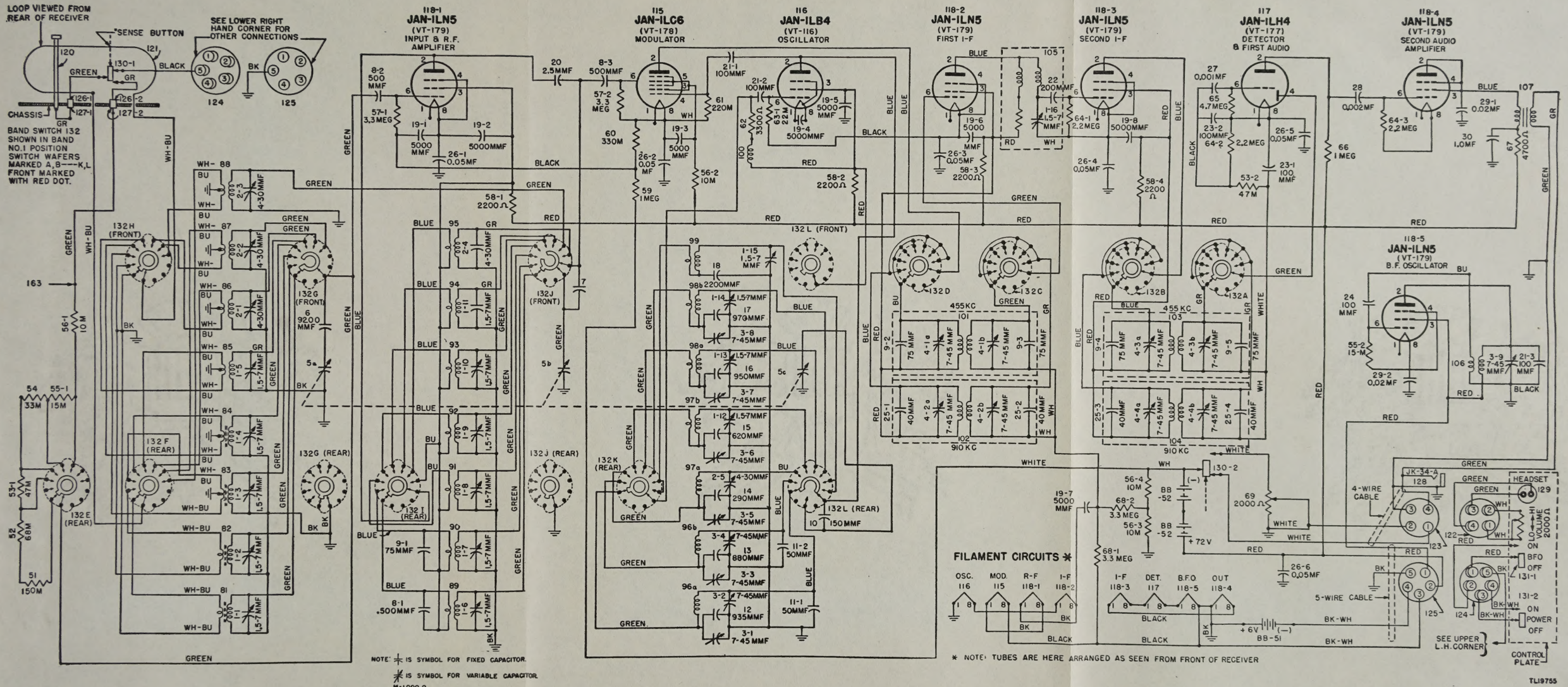
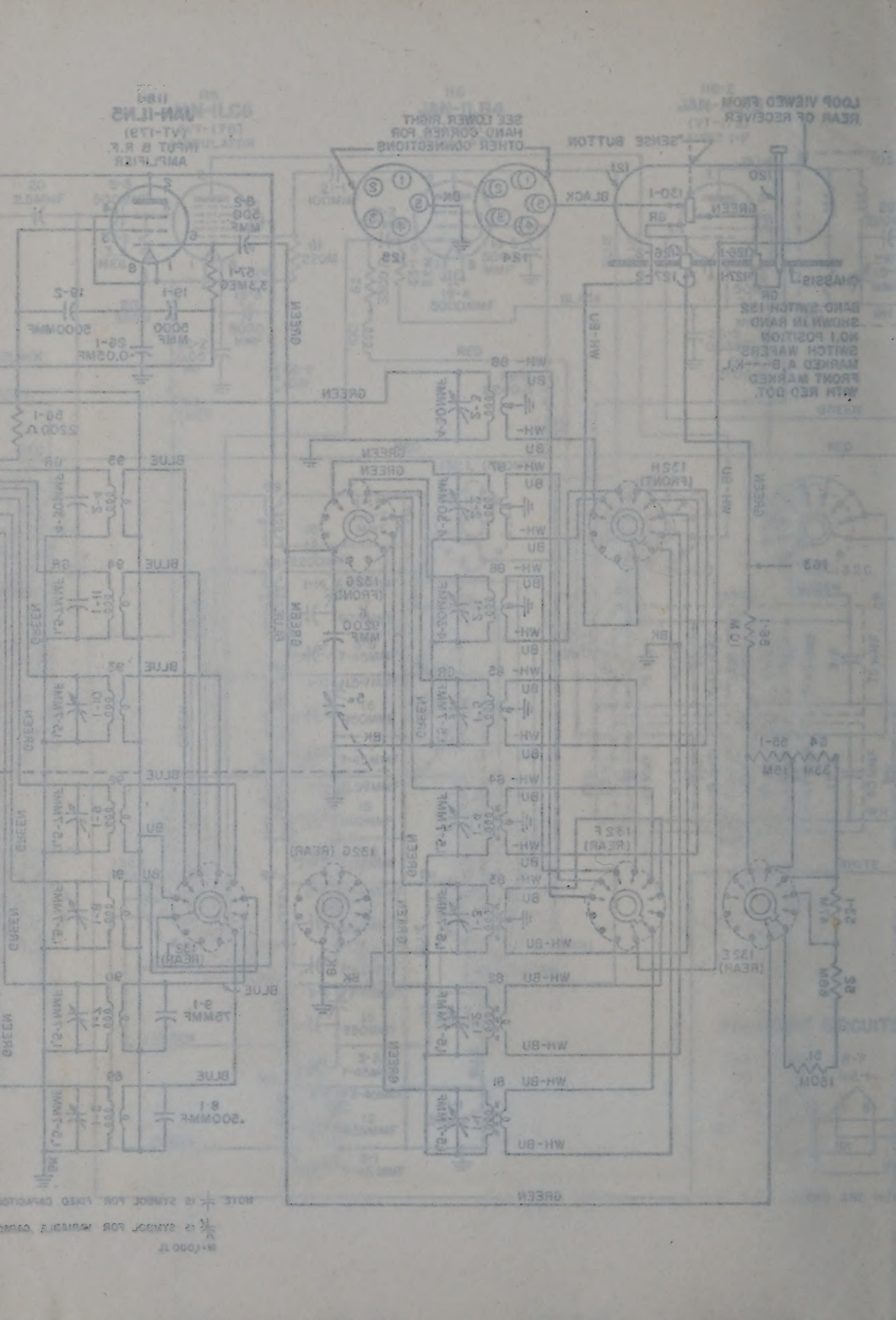


Figure 24. Radio Receiver BC-792-A—schematic diagram.



TM 11-4060-3