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HANDBOOK OF MAINTENANCE INSTRUCTIONS

FOR

RADIO RECEIVERS

BC-348-J, BC-348-N and BC-348-Q

SUCCESS P. & L., INDIANAPOLIS, IND.
4-24-44—23500

17 JULY 1943
REVISED 18 DECEMBER 1943

Published under joint authority of the United States War and Navy Department and the Air Council of the United Kingdom

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UNSATISFACTORY REPORT

FOR U. S. ARMY AIR FORCE PERSONNEL:

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Airplane model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

FOR U. S. NAVY PERSONNEL:

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Material, (location to be specified) and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes—no).
7. Remedy used or proposed to prevent recurrence.

FOR BRITISH PERSONNEL:

Form 1022 procedure shall be used when reporting failure of radio equipment.

DESTRUCTION OF ABANDONED MATERIEL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:

1. Explosives, when provided.
2. Hammers, axes, sledges or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper or wood.
4. Grenades and shots from available arms.
5. Where possible, and when time permits, bury all debris or dispose of it in streams or other bodies of water.

Procedure:

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections and meters.
4. Rip out all wiring in electrical equipment. Smash gas, oil and water cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.

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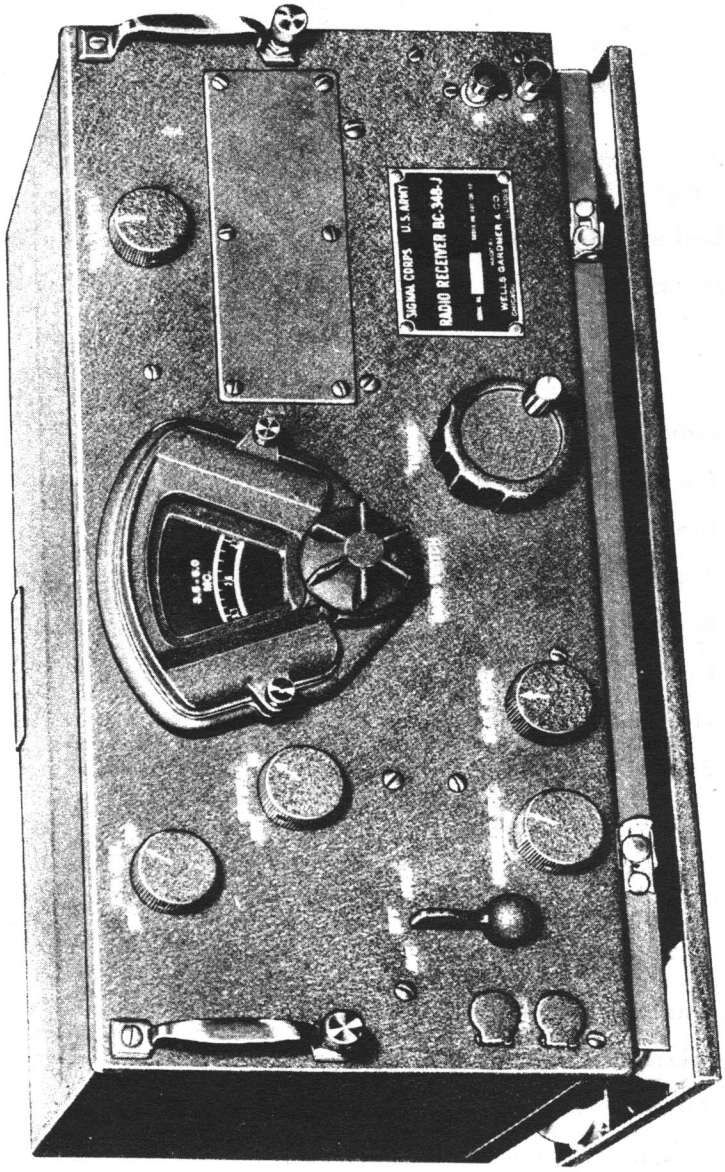


Figure 1 — Radio Receiver BC-348-J

HANDBOOK OF

MAINTENANCE INSTRUCTIONS

for

RADIO RECEIVERS BC-348-J, BC-348-N and BC-348-Q

SPECIAL NOTICE

Radio Receivers BC-348-J, BC-348-N and BC-348-Q are essentially alike. Therefore, reference will be made throughout the book to these receivers as follows: Radio Receiver BC-348-(*). However, all photographs and diagrams will be labeled for the "J" equipment, since it applies equally well to the other two models.

Reference to the dynamotors is mentioned in the same manner. The asterisk indicates that these units are mentioned collectively.

SECTION I
GENERAL DESCRIPTION

1. GENERAL.

Radio Receivers BC-348-J, BC-348-N and BC-348-Q are locally controlled, eight-tube, six-band superheterodyne receivers for use in U. S. Army aircraft. They cover a frequency range of from 200 to 500 kc and 1.5 to 18.0 megacycles. These receivers are designed for operation on a 28-volt power supply. Their power consumption is 60 watts with no power supplied through the output plug to external equipment. All controls are located on the front panel where they may be easily operated by aircraft personnel. Antenna, ground and headphone connections are made on the front panel. Power and interphone connections are made through a connector plug at the back of the receiver. Each receiver is capable of voice, tone and c-w reception. Either manual or automatic volume control may be selected by a switch on the front panel; likewise normal or extreme selectivity is provided by means of an i-f crystal filter that may be switched in or out of the circuit as desired. A beat frequency oscillator is employed for c-w reception. The receivers are not intended for remote control and no provision has been made for this operation.

2. COMPONENT UNITS.

Description	*Size in Inches*	*Weight in Pounds*
1 Radio Receiver BC-348-(*) Complete (Includes Dynamotor DM-28-(*) and Mounting FT-154-J, FT-154-Q or FT-154-AA)	18 x 10½ x 9½ high	38.0
1 Mounting FT-154-J, FT-154-Q or FT-154-AA (Does not include Plug PL-P103 or PL-Q103)	18 x 8½ x 1⅜ high	3.843
1 Plug PL-P103 or Plug PL-Q103	1⅝ x 2⅛ x 2⅞ high 2 x 2⅛ x 3 high	.312 .375
1 Set of 8 Vacuum Tubes, 2 Pilot Lights, 1 Fuse		.563

3. CABINET.

Radio Receiver BC-348-(*), is housed in an aluminum cabinet 18″ long, 8 15/16″ deep, and 8 5/8″ high and is of spot-welded construction. The outside has a black wrinkle finish. An opening is provided at the rear of the cabinet for the connector plug. A plate is attached to the bottom, which reinforces the cabinet and provides a mounting for four mounting studs.

A flange on the front of the plate mounts two snap-slides which are used to lock the cabinet to the receiver mounting. The top and back of the cabinet are strengthened by embossed grooves that run nearly the length of the cabinet.

4. CHASSIS.

The chassis of Radio Receiver BC-348-(*) is an aluminum casting with plates mounted on both ends. These end plates have cutouts to facilitate servicing. They serve as a mounting for parts and as runners for the chassis when it is installed or removed.

5. DIAL AND MASK ASSEMBLY.

The dial and mask assembly is a casting which mounts a dial scale calibrated in six frequency ranges, a dial mask with windows, a band switch shaft, a detent wheel and mechanism, and drive gears. A stop arm provides a positive stop at each end of the frequency range. The use of split gear tuning minimizes backlash. The drive ratio is such that approximately 100 revolutions of the tuning control are required to turn the tuning capacitors through the frequency range. The assembly is mounted on the front panel, and indicates the range and frequency to which the receiver is tuned.

6. DYNAMOTOR.

Mounted at the left (from front of chassis) rear of the chassis is the dynamotor assembly. It consists of Dynamotor DM-28-(*) and an r-f filter unit that supplies all the high voltage direct current for the operation of Radio Receiver BC-348-(*). In addition to the power supplied by the dynamotor to the receiver, there is available at the connected plug 20 milliamperes at approximately 200 volts for the operation, when necessary, of accessory equipment. To remove the unit for servicing or replacement, disconnect the connections at the terminal strip and loosen the four mounting bolts at each corner of the mounting plate.

7. I-F TRANSFORMERS, CRYSTAL FILTER, C-W OSCILLATOR.

The i-f transformer assemblies are mounted on the left (from front of chassis) front section of the chassis near the i-f tubes. Fixed capacitors are used across the primaries and secondaries. They are adjusted by varying the transformer cores. On the same section of the chassis, but on the underside in front of the 2nd i-f tube socket, is the crystal filter coil. The crystal and switch may be seen from the upper side of the chassis, mounted on the front panel above the coil. With the switch in the IN position, sharp selectivity is obtained on all bands. Near the crystal filter coil, but mounted on the front panel in back of the beat frequency control knob, is the c-w oscillator coil. The position in which the coil is mounted allows direct control of the variable core from the front panel for adjusting the beat frequency.

8. MOUNTING.

The mounting base is a metal plate upon which four shock absorbers are mounted. A second metal plate, with grooves and cutouts to fit the mounting studs on the bottom of the cabinet and studs to fit the snap-slides, is attached to the top of the shock absorbers. A metal stiffener is attached to the bottom of this plate to strengthen the assembly, and provision is made at the rear of the plate for mounting the connector plug.

9. PANEL.

The front panel is attached to the chassis. The controls, the input and output connections, and the handles are located on it. Through the lower part of these handles pass thumbscrew rods that fasten the chassis to the cabinet. On the right side of the panel is a small metal plate held in place by six screws and covering an opening that gives access for servicing to the underside of the r-f tube shelf. Both the front panel and the r-f tube shelf plate have a black wrinkle finish. White lettering identifies each control and indicates the switch positions.

10. PLUG.

The eight-contact connector plug which provides power connections at the rear of the receiver is mounted by screws on the receiver mounting. The wiring terminals are accessible by removing the rear cover on the plug housing. The connector, when provided with a straight fitting, is identified as Plug PL-P103. When it is provided with a right angle fitting, it becomes PL-Q103, regardless of whether the fitting is mounted toward the right, left or back of the receiver.

11. R-F AND OSCILLATOR UNITS.

The antenna, r-f, 1st detector and oscillator units are sub-assemblies consisting of a shield can, coils, trim-

mer condensers, band switch section, resistors, fixed capacitors and in the oscillator unit, the 1st detector and oscillator tube, Tube VT-150. The four units are mounted at the right (from front of chassis) rear of the chassis and bonded together by common ground straps. The band switch sections are ganged by connecting the arms on the switch shafts together with slotted bars and tension springs, and are controlled as a unit from the front panel.

Section II
INSTALLATION AND ADJUSTMENT

12. INITIAL PROCEDURE.

a. UNPACKING. — Radio Receiver BC-348-(*) is packed in a wooden box with Mounting FT-154-J, FT-154-Q or FT-154-AA.

To unpack the receiver preparatory to installation, the following steps should be taken in the order given:

(1) Pull out the nails in the top of the box and remove the cover.

(2) Remove the large cardboard filler in the top of the box.

(3) Remove the cardboard carton containing Mounting FT-154-J, FT-154-Q, or FT-154-AA.

(4) With the wooden packing box placed on the floor, stand at one end, place the palms of the hands against each side of the cardboard carton containing the receiver and lift the carton from the packing box.

(5) Break the seal on the top of the cardboard carton.

(6) Remove the filler in the top of the carton.

(7) Grasp the handles on the front of the receiver and lift the receiver out of the carton.

(8) Break the seal and open both ends of the carton containing Mounting FT-154-J, FT-154-Q, or FT-154-AA.

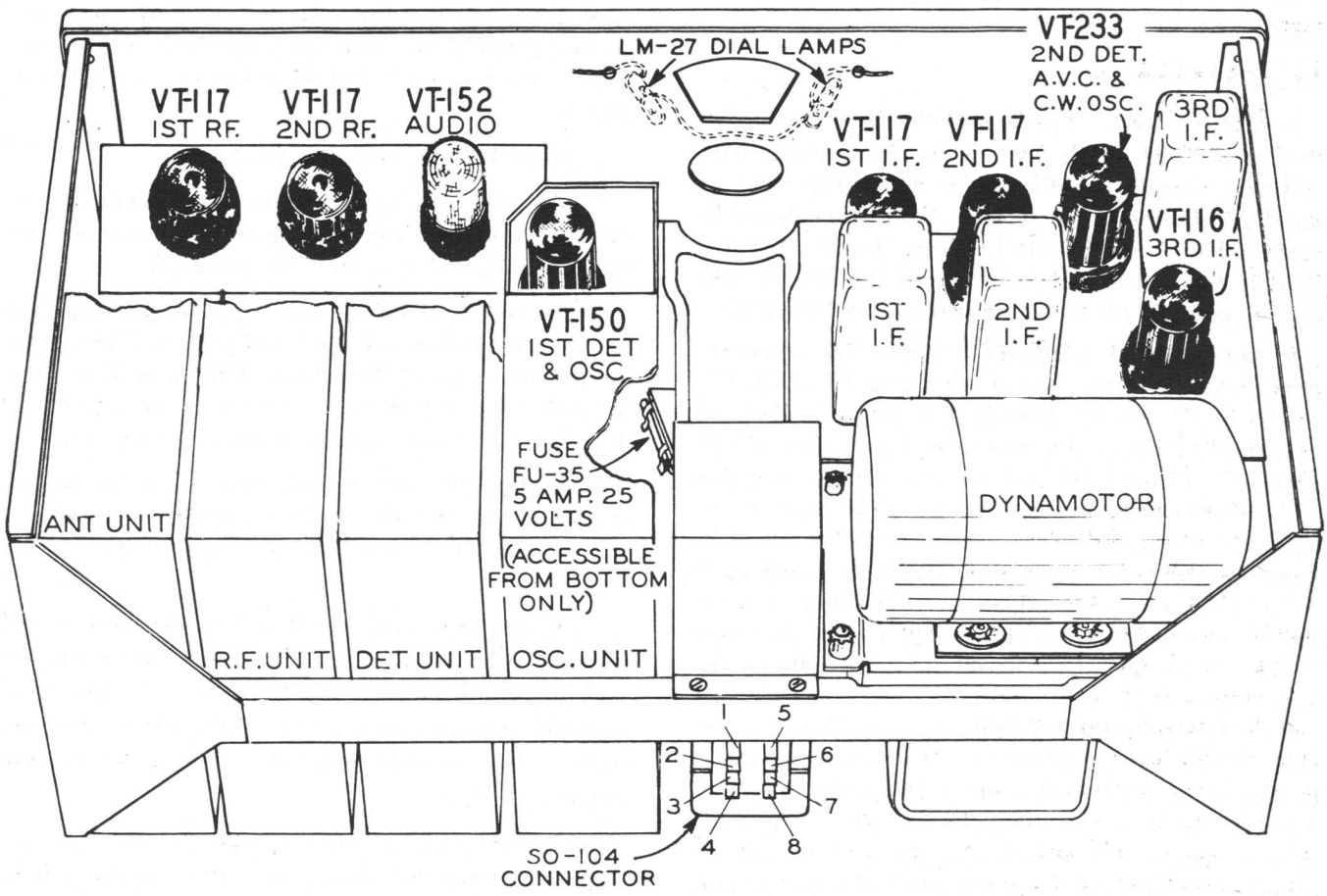


Figure 2 — Radio Receiver BC-348-J, Tube Positions

(9) Slide the mounting out of the carton and place with the receiver.

(10) Loosen the thumbscrews in the lower part of the handles on the front panel and pull the chassis from the cabinet.

(11) Remove the cardboard filler over the dynamotor and replace the chassis in the cabinet.

b. INSPECTION.

(1) Figure 2 shows the position of each tube, dial lamp and fuse. Before the receiver is installed, loosen the thumbscrews in the lower part of the handles on the front panel and pull the chassis from the cabinet. Make certain the tubes are well pushed down and firmly seated, and that the fuse and dial lamps are correctly and securely inserted.

(2) The dynamotor and the electrical connections to the dynamotor must be securely fastened in position. The dynamotor is fastened by four mounting screws at the corners of the mounting plate and the electrical connections are made at a terminal strip accessible through a cutout in the left (from front of chassis) chassis end plate.

13. INSTALLATION.

a. MOUNTING.—The receiver should be mounted as near as possible to the antenna lead-in insulator with sufficient clearance on all sides to allow free action of the shock absorbers. A permanent installation should be made and Mounting FT-154-J, FT-154-Q, or FT-154-AA, securely fastened to a rigid section of the aircraft. The drilling plan for the mounting is shown in Figure 29.

b. ELECTRICAL CONNECTIONS.—The connector plug mounted on the rear of Mounting FT-154-J, FT-154-Q, or FT-154-AA (Figure 19), provides electrical connections between the receiver and the other aircraft equipment (Figure 32). On the rear of this plug is a cover held in place with two screws. After these screws have been removed the cover may be taken off and eight terminals exposed. Four of these terminals (numbers 3, 4, 7 and 8) are used for connections to the aircraft power supply. Two terminals, numbers 2 and 6, carry the screen voltage circuit out of the receiver to terminals on the transmitter relay so that the screen circuit may be opened and the receiver protected while the transmitter is operated. Should the transmitter be removed or the receiver be used in an installation with no transmitter, terminals 2 and 6 must be connected together in order to have the receiver operate. The aircraft interphone system may be connected to terminals 1 and 5 at which the receiver output is available. These terminals may be left open if output is desired only for headphones, and the headphones plugged into jacks on the front panel. See Section II, paragraph 14*b*(9). Should it be necessary to supply power to additional external equipment, a maximum of 20 milliamperes at approximately 200 volts is available from terminals 2 and 5.

All leads should be carefully measured and cut to the correct length, inserted through the fitting on the bottom of the connector plug and soldered to the correct terminals. After all connections have been made, check carefully to make certain that the terminals are wired correctly, and replace the cover on the rear of the connector plug. The plug may now be mounted in position. The two pair of leads carrying the power to the receiver through terminals 3, 4, 7 and 8 may be replaced with one pair of leads, each of which must have a cross sectional area equal to the two replaced leads.

c. ELIMINATION OF ELECTRICAL INTERFERENCE.—Electrical disturbances are set up by the aircraft ignition system and electrical devices. This interference must be either eliminated or lowered to a level below the strength of the signals to be received. This is accomplished by shielding the entire electrical ignition system and devices, filtering the electrical connections between the devices, and the bonding of all metal parts to a common ground.

d. MOUNTING THE RECEIVER.

(1) After Mounting FT-154-J, FT-154-Q or FT-154-AA is located and the electrical connections are made, the receiver is ready to be installed.

(2) Make certain the thumbscrew rods holding the chassis to the cabinet are tight, and push both snapslides toward the center of the cabinet. Lift the receiver onto the mounting so that the rear studs on the bottom of the cabinet are in the groove on the mounting plate.

(3) Push the cabinet towards the rear of the mounting and at the same time lower the front of the cabinet. The studs will drop into holes provided for them in the mounting.

(4) Push the receiver still farther backwards (more pressure will have to be exerted, as the studs fit into the slots provided for them), until it will go no farther. Now push the snapslides on the front of the cabinet over the studs on the mounting plate, thus locking the receiver to the mounting.

(5) Insert safety wire through the holes in the snapslides. Twist the ends together and turn the ends in so there will be no danger of scratches or minor injuries to the personnel.

e. ANTENNA AND GROUND CONNECTIONS. The antenna and ground binding posts are on the front panel at the lower right-hand side where they may be identified by the letters "A" and "G." Connections to these binding posts should be made with short, low resistance leads having sufficient slack to prevent the transmission of vibration to the receiver. The antenna lead should connect to the antenna insulator, and the ground lead to some metal part of the aircraft where it should be soldered, if practicable. The receiver may be used with any type of antenna. However, the most efficient antenna is one which has the greatest effective length away from the grounded metal fuselage.

14. PREPARATION FOR USE.

a. INSPECTION. — After the installation has been completed, a final check on the points listed below should be made followed by an operating test:

(1) Check the connections at the aircraft power supply.

(2) Check the connections at the transmitter relay.

(3) Check the connections at the interphone system, if used.

(4) Check the power connections to auxiliary equipment, if used.

(5) Check the antenna and ground connections.

(6) Make sure the thumbscrew rods holding the chassis in the cabinet are tight.

(7) Make sure the snapslides are locked and secured with safety wire.

b. CONTROLS.—The operator should become thoroughly familiar with the controls on the front panel (see Figure 3) and their function before beginning the operating test.

(1) AVC-OFF-MVC. — Power to the receiver is controlled by the AVC-OFF-MVC receiver switch. With this switch in the OFF position, no power is supplied to the receiver. When switched to either the MVC or AVC position, power from the primary source is supplied to the tube heaters and dynamotor, placing the equipment in operation. The screen grid voltage supply leads are carried out of the receiver through the power plug to the keying relay of the associated transmitter where the circuit is opened when actually transmitting. (See Section II, paragraph 13*b*).

(2) DIAL LIGHTS. — The brilliancy of the dial illumination is controlled by this knob. The dial lamps may be adjusted for any desired degree of illumination or turned off completely.

(3) BAND SWITCH. — The frequency band in which the receiver is operating is indicated on the dial mask visible through the dial window. This band may be changed to any desired frequency band by turning the band switch control.

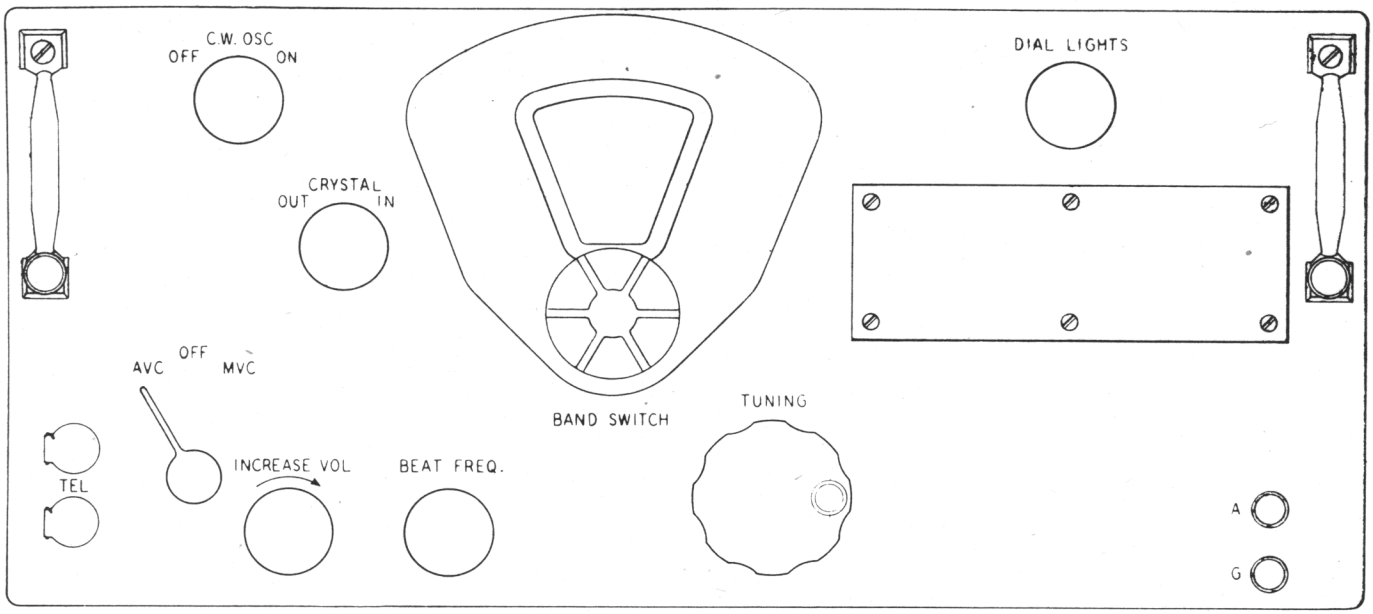


Figure 3 — Radio Receiver BC-348-J, View of Front Panel

(4) TUNING.—Reception is accomplished by tuning the receiver to the desired signal with this control. The frequency to which the receiver is tuned is indicated at all times on the dial scale.

(5) INCREASE VOL.—The volume level of the audio signal is controlled by this knob. When the receiver is operated with manual volume control, the sensitivity of the receiver is controlled. When automatic volume control is desired, the level of the audio signal fed into the output tube is controlled.

(6) C-W OSC.—The c-w oscillator is turned ON for c-w, or OFF for voice reception with this knob. The a-v-c time constant is also changed at the same time to conform with the type of signal to be received.

(7) BEAT FREQ.—This knob adjusts the frequency of the c-w oscillator and allows the operator to adjust the tone of the received signal to the pitch he considers the most suitable.

(8) CRYSTAL.—This control inserts a crystal filter into the circuit when turned to the IN position. This filter increases the selectivity of the receiver, enabling reception through heavy interference.

(9) TEL. JACKS.—Dual output is provided through two open circuit phone jacks. These jacks are connected to the output circuit of the receiver and permit headphone reception by the operator.

(10) ANTENNA AND GROUND BINDING POSTS.—The antenna is connected to the binding post marked "A", while the ground lead is connected to the binding post marked "G."

SECTION III
OPERATION

15. PROCEDURE.

a. OPERATING TEST.—When the receiver has been completely installed, an operating test should be made as follows:

(1) Plug a headset into one of the jacks marked "TEL." Set receiver switch to MVC. Start the dynamotor. After the tubes have warmed up (approximately 30 seconds), advance volume control knob until a slight background noise is heard. Set band switch to the frequency band in which test signals are available.

(2) Using the tuning knob with reference to the calibrated scale on the dial, tune in the desired signal.

NOTE

All tuning should be done on MVC switch with the volume control advanced only enough to give the desired signal strength. In the absence of a signal the setting of the volume control can be judged by the loudness of the background noise. On MVC with the volume control set at maximum, very strong carrier waves will block the receiver and intelligible signals cannot be received.

(3) Set the receiver switch to AVC. The desired signal should still be heard.

(4) With the beat frequency adjustment at zero beat position (arrow on knob pointing up), turn the c-w oscillator switch to the ON position. An audible beat note should be heard which should vary in pitch when the beat frequency adjustment is changed.

(5) With the c-w oscillator still on, throw the crystal filter switch to IN. Noise should be greatly reduced and the signal can be tuned out by a much smaller movement of the tuning control knob than when the crystal filter switch is in the OUT position.

(6) Turn the dial light rheostat and observe if control of illumination is secured with both dial lights functioning.

(7) A check should be made before flight with the airplane engines running. An increase of background noise when the engine starts, indicates imperfect shielding, imperfect bonding, faulty generator regulator, faulty generator, open filter capacitors, or a combination of these faults.

(8) Always turn the receiver switch to the OFF position when the receiver is not being used.

b. RECEPTION.

(1) MODULATED SIGNAL RECEPTION.—For the reception of modulated signals in the frequency bands covered by this receiver, turn the AVC-OFF-MVC switch to MVC, the C-W OSC. control to OFF and the CRYSTAL control to the OUT position.

NOTE

Tuning should be done in the MVC position with the volume control advanced only as far as required for a comfortable output level. While waiting for the tubes to warm up, adjust the dial light control for the desired dial illumination and turn the band switch to the frequency band in which the signals to be received are transmitted.

After the tubes have warmed up (approximately 30 seconds), adjust the volume control until the background noise can be heard. Turn the tuning control until the frequency of the desired signal is reached and the signal is heard in the headphones. Turn the tuning control slowly back and forth until the position at which the signal is received the strongest is found. After the signal is tuned in, if automatic volume control is desired it may be used by switching the AVC-OFF-MVC control to the AVC position and readjusting the volume control for the desired output. In the event interference is encountered, the crystal filter may be switched into the circuit, increasing selectivity and permitting reception that would be exceedingly difficult otherwise.

(2) C-W RECEPTION.—For the reception of c-w signals, turn the c-w oscillator control to ON and the beat frequency control to the zero beat position (arrow on knob pointing up). Proceed as instructed for the reception of modulated signals and when the signal is tuned in, adjust the beat frequency control to the position producing the most satisfactory tone. Automatic volume control may be used when desired by switching to the AVC position and readjusting the volume control. The crystal filter should be used to increase the selectivity of the receiver if objectionable interference is encountered. A slight readjustment of the tuning, beat frequency and volume controls may be required to secure

the desired beat note frequency and volume level after the crystal filter is switched in.

The sensitivity may sometimes be slightly improved by readjusting the positions of the beat frequency knob and the tuning control.

NOTE

The crystal band pass filter is intended primarily for use in c-w reception. However, the added selectivity may at times prove helpful in receiving modulated signals through heavy interference.

SECTION IV
MECHANICAL AND ELECTRICAL CHARACTERISTICS

16. CIRCUITS.

Electrically, the receiver comprises two stages of tuned radio frequency amplification preceding the first detector, a temperature - compensated heterodyne oscillator, three intermediate frequency amplifier stages, a second detector and one stage of audio-frequency amplification with a transformer output circuit. A crystal band-pass filter and beat-frequency oscillator are also included. The former is for increasing selectivity and the latter for receiving c-w signals. The schematic and wiring diagrams are shown in Section VIII.

17. FREQUENCY RANGE AND BANDS.

Six bands controlled by a band change switch are covered. The frequency range for each of the six bands is given in the following table:

Band	*Frequency Range*
1	200 — 500 Kilocycles
2	1.5 — 3.5 Megacycles
3	3.5 — 6.0 Megacycles
4	6.0 — 9.5 Megacycles
5	9.5 — 13.5 Megacycles
6	13.5 — 18.0 Megacycles

18. INPUT COUPLING.

The antenna input circuit is designed to operate properly with antennas having capacities ranging from 50 to 250 mmf.

19. RADIO FREQUENCY AMPLIFIER.

The radio frequency preselector comprises three tuned circuits coupled by two Tubes VT-117. Separate inductors are employed for each frequency band.

20. FIRST DETECTOR.

The first detector employs Tube VT-150 which also functions as the heterodyne oscillator. The low signal level at the grid of the first detector, together with the r-f preselection, insures a minimum of undesired responses.

Fixed bias is provided by returning the control grid circuit through a filter resistor to the low potential end of a 25 ohm resistor (Refs. 108-1 and 108-2 in parallel). The bias consists of the drop across this resistor which is in the negative plate supply line.

21. HETERODYNE OSCILLATOR.

The heterodyne oscillator employs a tuned grid circuit. Excitation is secured by means of a cathode winding tightly coupled to the grid winding. The high value grid resistor and the low grid coupling capacity used, together with the inherent stability of Tube VT-150, makes a voltage regulator unnecessary. The effects of wide variations in ambient temperatures under service conditions on the oscillator frequency have been reduced to a minimum by the use of a highly stable tuning capacitor and temperature-compensation with ceramic fixed capacitors (35-1, 35-2, 42-1, 42-2, 45, 48, 49-2).

Individual inductors and trimmers are employed for each frequency band. On the four lower frequency tuning bands, the oscillator frequency is higher than the desired signal by the intermediate frequency. On the two higher frequency bands 5 and 6, the oscillator is on the low frequency side of the desired signal. The latter results in an improvement in the image rejection ratio.

22. INTERMEDIATE FREQUENCY AMPLIFIER.

The intermediate frequency amplifier comprises two low-gain amplifying stages coupled by three highly selective, double-tuned circuit transformers and one resistance coupled stage. The intermediate frequency employed is 915 kc. The i-f transformers are tuned by means of adjustable iron cores and fixed capacitors. The lowered tuned circuit impedance, secured by the relatively large fixed tuning capacitors, provides an inherently stable amplifier. Two Tubes VT-117 function as the first and second i-f amplifiers and Tube VT-116 is employed as the third i-f amplifier. A relatively high level signal is supplied to the second detector diodes of Tube VT-233 which also functions as the c-w oscillator.

23. C-W OSCILLATOR.

a. The c-w oscillator employs the triode section of Tube VT-233 (second detector) in a tuned grid, plate feedback circuit. The variable iron core in the grid inductance 151 is used for frequency adjustment, and is so mounted that about one turn of the beat frequency knob

on the front panel will vary the frequency of the c-w oscillator approximately 4,000 cycles each side of the zero beat position. (Arrow on knob pointing up.)

The effects of ambient temperature variations are minimized by the use of a temperature compensated tuned circuit. The c-w oscillator operates at an extremely low level, minimizing harmonics and stray oscillator pickup. The output is capacitively coupled to the plate circuit of the second amplifier tube by a twisted wire capacitor. Amplification by the third i-f amplifier stage, the gain of which is not controlled either manually or by a-v-c, provides sufficient output from the c-w oscillator to the diode detector. This value of oscillator output is somewhat below the level at which the a-v-c operates, thus permitting the use of automatic volume control even for c-w reception.

b. C-W oscillator switch 168 in the ON position supplies the oscillator plate voltage and increases the a-v-c time constant by connecting the additional capacitor 64. Switch 168 supplies the oscillator plate voltage by connecting to the screen grids of the first and second i-f tubes. The same switching shunts resistor 101-2 across plate resistor 101-1, which drops the gain in the first i-f tube to a value that reduces the sensitivity by an amount sufficient to keep the overall set noise essentially constant.

24. CRYSTAL BAND-PASS FILTER.

Additional selectivity is available by the use of the i-f crystal filter following the first i-f amplifier tube. Of interest in connection with this filter is the bridge circuit composed of auto transformer 150, a neutralizing capacitor and the capacity of the crystal holder. See Figure 5. Undesired signals transmitted through the capacity of the crystal holder to the grid of the second i-f tube are neutralized by an opposite voltage developed in the auto transformer, and made equal to the undesired grid voltage by the neutralizing capacitor.

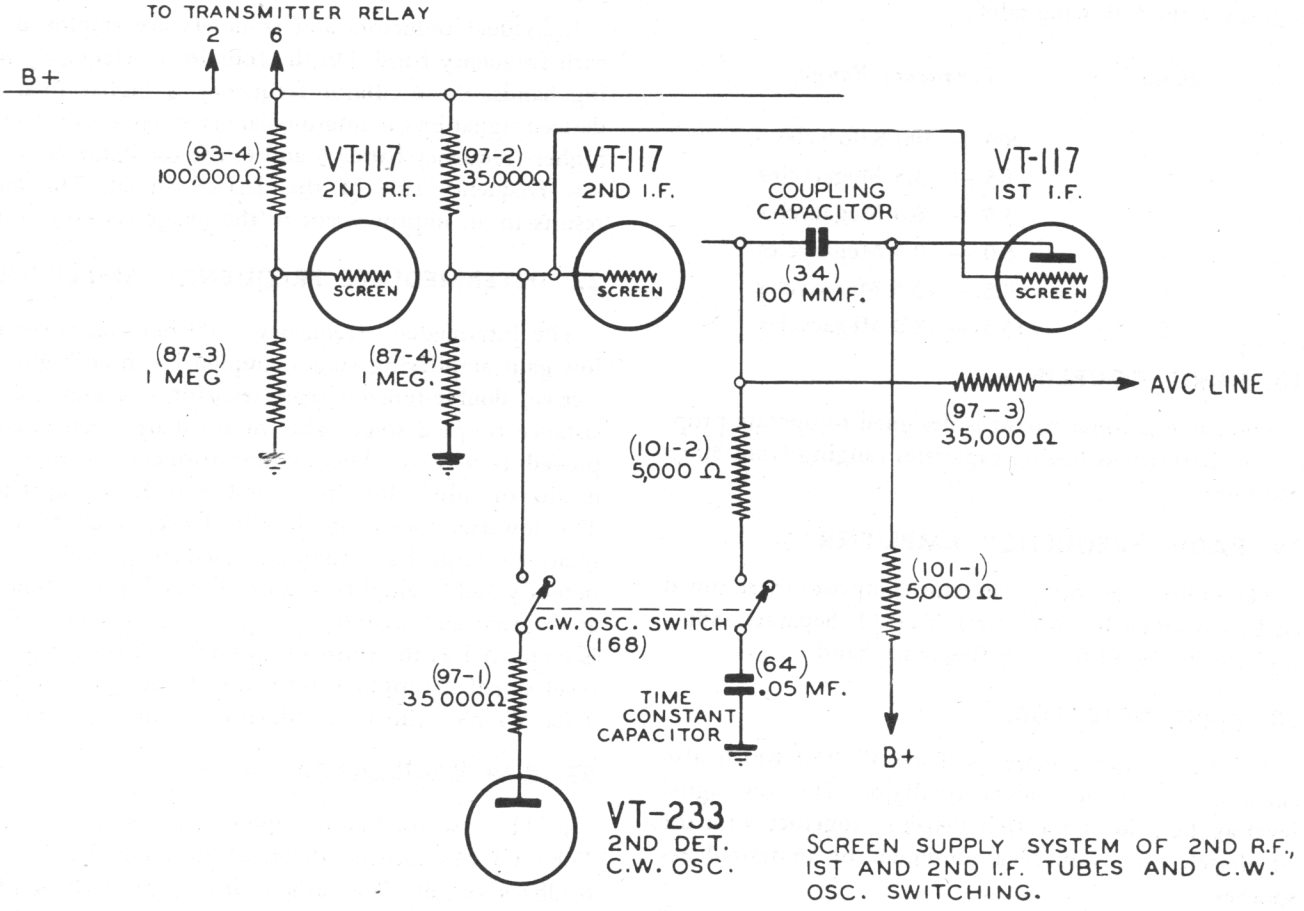


Figure 4 — C-W Oscillator Switching

The crystal filter may be switched in or out of the circuit by the crystal "Out-In" switch 167 which is actuated from the front panel. The filter band width is adjusted by the neutralizing capacitor. See Figure 5. This capacitor consists of two wires and two lugs extending from the neutralizing coil. See Figure 11. For adjustment, see Paragraph 34*e*(10).

25. SECOND DETECTOR.

Tube VT-233 also functions as the second detector. A relatively high level signal is supplied by the third i-f amplifier to the diodes of this tube. One diode functions as the signal linear detector while the other diode is capacity coupled and provides high level, delayed a-v-c control bias.

26. OUTPUT.

a. DESCRIPTION.—The high level signal diode supplies audio output for driving output Tube VT-152 without additional audio amplification. The design choice of three i-f amplifier stages and high level detection results in a number of operating advantages. The high level detection is relatively free from distortion due to avoiding the characteristic curvature at the lower end of the diode curve. The direct drive of the output tube from the diode detector simplifies the dynamotor ripple filtering and eliminates possible microphonics resulting from high audio amplification. The high diode level further provides relatively high bias voltgae insuring an unusually flat automatic volume control characteristic with the desired time delay. The dual volume control 110 comprises the 350,000-ohm audio control potentiometer and the 20,000-ohm bias control potentiometer. The audio volume control functions only with switch 169 in the a-v-c position and in this position it permits the desired adjustment of the audio level to the output tube and load. See Figure 6. The bias volume control also varies to some extent the r-f and i-f tube bias. For manual volume control with switch 169 in the m-v-c position, the bias volume control becomes the active control operating on the cathode bias of the first and second r-f and the first and second i-f amplifier tubes. These potentiometers provide a smooth variation of sensitivity.

b. CONSTANT INTERNAL RECEIVER NOISE.—The flat gain characteristics of the r-f and detector coils insures a uniform noise level over the bands. This is obtained by a combination of inductive and capacitive coupling in the coils.

27. DYNAMOTOR DM-28-(*).

The dynamotor and associated r-f filter circuits are assembled in one unit (Ref. 400) which supplies all of the high voltage direct current required for the operation of the receiver. In addition, a maximum of 20 milliamperes at approximately 200 volts d-c is available at contacts 2 and 5 on the connector plug at the rear of the receiver for the operation of external accessory equipment.

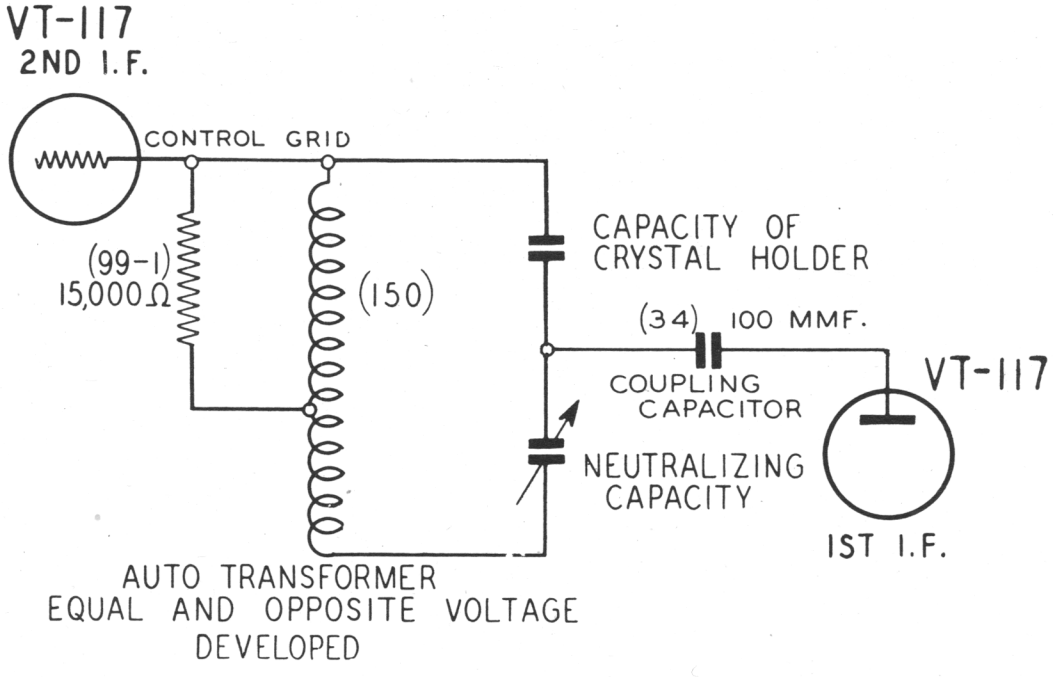


Figure 5 — Crystal Filter Circuit

TABLE A — CHARACTERISTICS OF TUBES, LAMPS AND FUSE

TUBE CHARACTERISTICS

Tube Type	*RMA Equivalent*	*Heater Volts*	*Heater Amps.*	*Plate Volts*	*Screen Volts*	*Grid Volts*	*Plate Ma.*	*Screen Ma.*	*Mu*	*Plate Resistance*	*Transconductance Micromhos*
VT-116	6SJ7	6.3	0.30	250	100	— 3.0	3.0	0.8	2500	1,500,000	1650
VT-117	6SK7	6.3	0.30	250	100	— 3.0	9.2	2.4	1600	800,000	2000
VT-150	6SA7	6.3	0.30	250	100	— 2.0	3.4	8.0		800,000	
VT-152	6K6GT	6.3	0.40	250	250	—18.0	32.0	5.5	150	68,000	2200
VT-233	6SR7	6.3	0.30	250		— 9.0	9.5		16	8,500	1900

DIAL LAMPS

Type	*RMA Equivalent*	*Volts*	*Amps.*
LM-27	No. 44	6.3	0.25

FUSE

Type	*Volts*	*Amps.*
FU-35	25	5.0

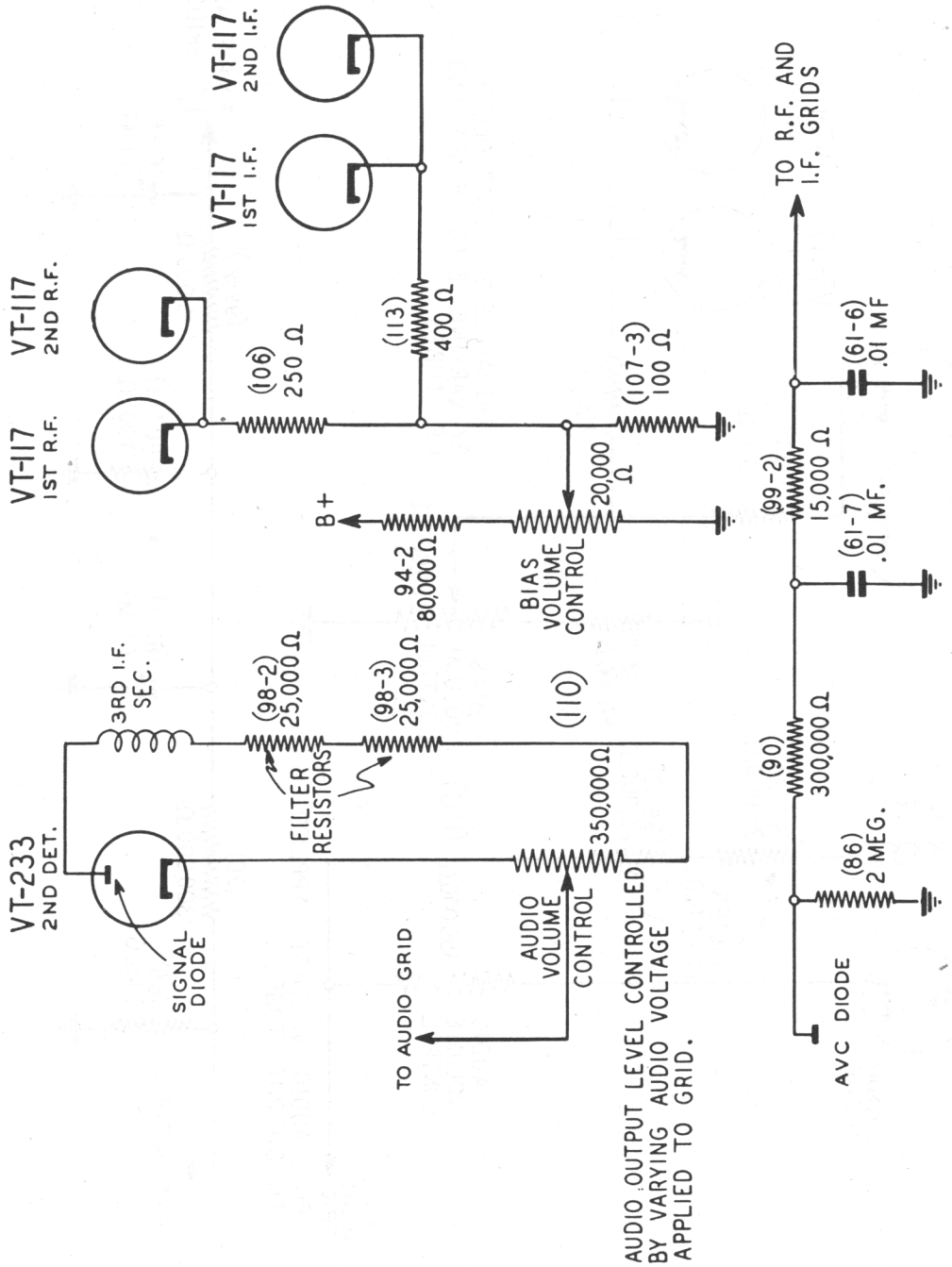


Figure 6 — AVC Connections

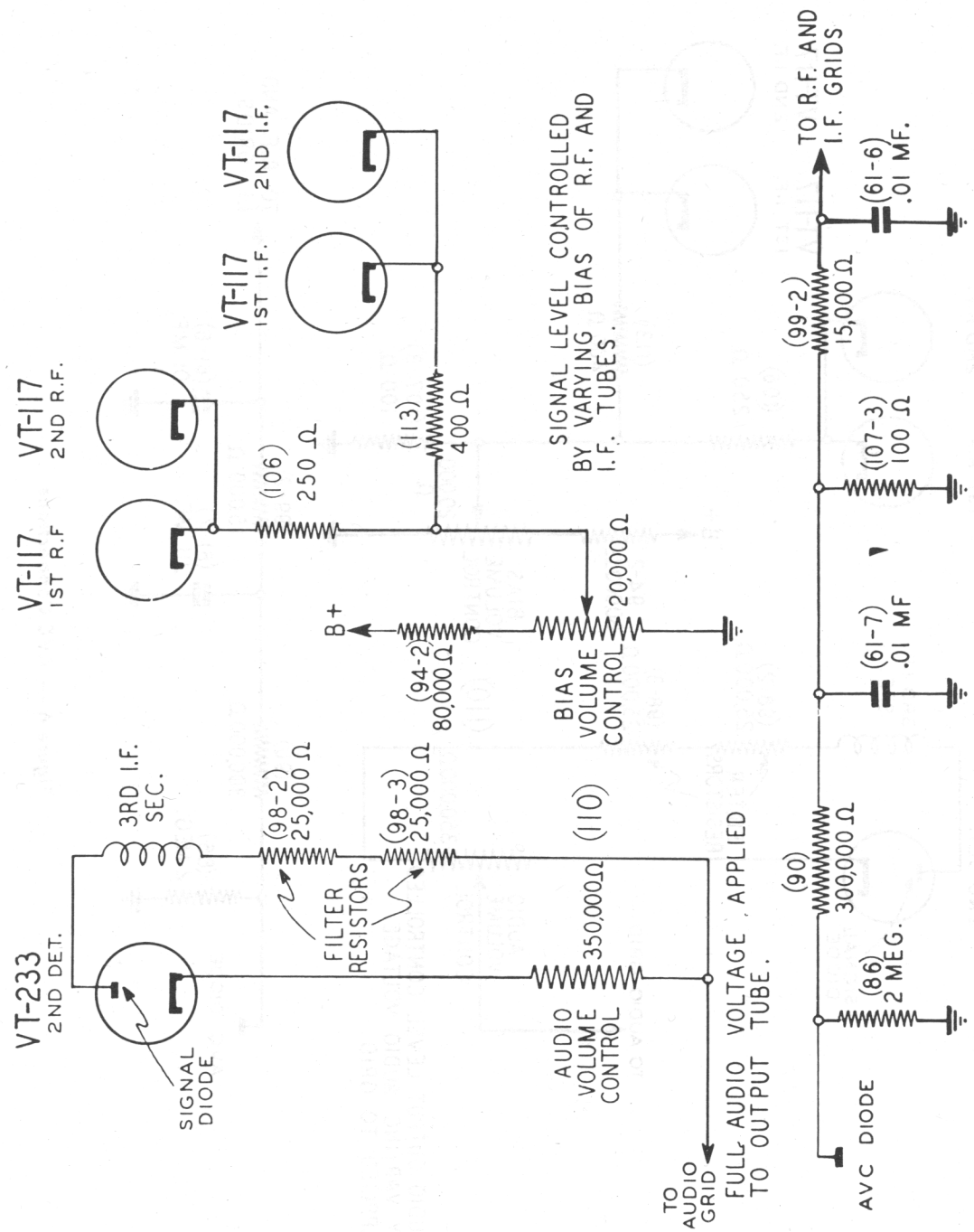


Figure 7 — MVC Connections

SECTION V
MAINTENANCE

NOTE

Servicing of either a mechanical or electrical nature should not be attempted except at Signal Corps Repair Shops and Signal Corps Radio Sections (or Signal Sections) at Air Depots, unless the proper equipment and facilities are available and authority to repair has been granted by the Corps Area Signal Officer. A standard signal generator, a phantom antenna, a Test Set I-56-A and other like equipment should be used when servicing and aligning Radio Receiver BC-348-(*) as instructed on the pages that follow in this section.

28. INSPECTION.

a. DAILY.—Turn on receiver. Check dial lamps. Check for operation on all bands with the c-w oscillator "ON". This test can be made by observing the noise level with the volume control at maximum.

b. TWENTY HOURS. — Repeat above. Check antenna, ground and cable connections for effects of vibration.

c. FORTY HOURS.—Repeat above. Check all dial lamps and vacuum tubes with Model 685 Tube Checker in Test Set I-56-A.

d. SIX MONTHS.—Repeat above. After 6 months or 1000 hours of service, the dynamotor should be cleaned and lubricated as instructed in Paragraph 29*b*.

e. ONE YEAR.—Repeat above. Inspect and replace dynamotor brushes if necessary. Lubricate dial and tuning capacitor drive mechanism. Check dynamotor and tube socket voltages as described in Paragraphs 34*e*(1) and 34*b*(1).

29. DYNAMOTOR SERVICE AND MAINTENANCE.

a. REMOVAL FROM CHASSIS. — The dynamotor and filter assembly (Figure 8, reference 400) may be removed easily from the receiver chassis by repeating the following steps in the order given:

(1) Loosen two thumbscrews 299 on the front panel, and remove the chassis from the cabinet.

(2) Loosen the five screws on the dynamotor terminal strip 422, and withdraw the five leads with spade terminals from under them. Retighten the five screws partially in order that they will clear the chassis when the dynamotor is removed.

(3) Push the left (from front of chassis) thumbscrew rod stop spring towards the end plate with a screwdriver, and withdraw thumbscrew rod 299 until the second stop position is reached.

(4) Loosen the four captive screws 426 which fasten the dynamotor to the chassis, and lift the dynamotor vertically from the receiver.

The parts in the dynamotor filter are made available for servicing by removing the metal cover and fibre insulator on the bottom of the unit.

b. LUBRICATION.—This dynamotor requires lubricating after 1,000 hours or approximately six months of ordinary service and should be lubricated only with Air Corps Soft Grade 375 grease. The directions for lubrication are stamped on the inside of dust covers 415.

To reach dynamotor bearings 425 for lubrication, it is only necessary to cut the safety wires, remove retaining screws 416 and dust covers and then take out the screws holding retaining plates 414. Take off the retaining plates, gaskets 413 and washers 412. Care should be taken not to lose or interchange the parts. The bearings are now accessible for lubrication. *Do not pack the lubricant in the bearings, merely add a small quantity so that no pressure is built up.*

c. COMMUTATOR.—When necessary to replace the ball bearings 425, or to turn down the commutators, first remove the brushes from the brush holders. Remove the nuts from tie bolts 411 which hold bearing support brackets 408 and 409 and pull one bracket away from the frame.

NOTE

The bearing support bracket is more readily removable from the frame by a slight tilting back and forth of the frame with respect to the bracket.

Armature 403 and the other bracket support may now be removed from the frame. Examine the brushes to see that they are free from hard spots and are wearing properly. Should hard spots be apparent (they generally cause grooves in the commutator surface), the brush should be replaced and the commutator smoothed down. To smooth down the commutator, rotate it in a lathe and hold a fine grade of sand paper, not coarser than size 00, preferably either 5/0 or 6/0, against the commutator surface. Do not use emery cloth. All residue of dust, sand and dirt should be wiped away to leave a clean, smooth, polished commutator surface. If air

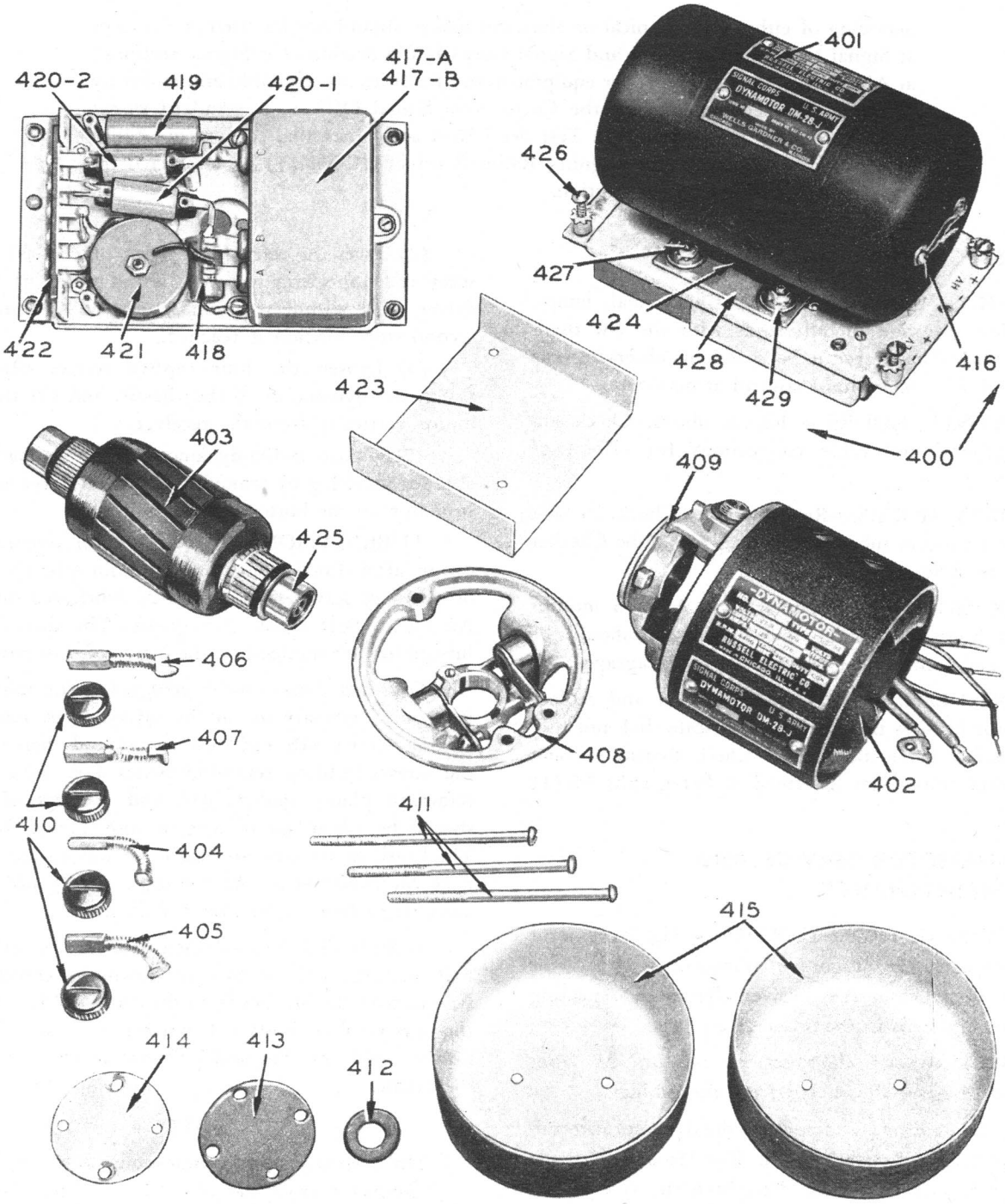


Figure 8 — Dynamotor DM-28-J and Filter

is available, the unit should be cleaned by air pressure. A commutator having a smooth or polished surface should never be sanded or turned down simply because it is discolored and well seasoned. If the commutator is turned down in a lathe, the mica segment separators must be undercut but not more than $\frac{1}{32}$".

d. BEARINGS.—In changing ball bearings 425, it will be necessary to use a bearing puller since the shaft is machined closely to the dimension of the ball bearing inner race. Actually, the inner race is a light press fit, and the bearing cannot be removed from the shaft without considerable force. The outer races of the ball bearings are merely snug fits in bearing support brackets 408 and 409, and in the disassembly process it should be easy to remove the bracket from the ball bearings. If the grease slinger becomes bent during removal of the ball bearings, it should be straightened and replaced on the shaft before relpacing the bearing.

e. REASSEMBLY.—Reassembly of the dynamotor is accomplished in substantially the reverse of the disassembly procedure. In replacing the brushes check to see that the + and — markings on the brushes correspond with those on the brush holder supports, and that the marked side of the brush is towards the top of the dynamotor. Armature 403 must be given a final inspection for free running, cleanliness and absence of grease or oil. Bearing support brackets 408 and 409 should be wiped clean and dry before replacing them on the dynamotor.

TABLE B — DYNAMOTOR DM-28-(*) RATINGS

INPUT		OUTPUT	
Volts	*Amperes*	*Volts*	*Milliamperes*
24	0.7	215	0.
24	1.1	210	30.
24	1.3	202	60.
28	0.8	258	0.
28	1.1	246	40.
28	1.5	236	75.

f. POWER RATING.—The nominal rating of Dynamotor DM-28-(*) is: Input, 1.3 amperes at 27.9 volts; Output, 70 milliamperes at 224 volts; Regulation, 12 per cent. Average performance data on Dynamotor DM-28-(*) is as shown in Table B. (Dynamotor and filter disconnected from receiver and negative high voltage connection made to case of unit.)

30. REMOVAL OF FRONT PANEL.

a. The adjustment of the dial and mask and the servicing of certain parts requires the removal of the front panel.

Remove the chassis from the cabinet and place it on the repair bench with the front facing the repairman. Loosen thumbscrews 253 that hold window frame assembly 252 in place, and remove the window frame. Unsolder the white and black tracer lead running to the left panel light socket 171 and the white lead at the antenna binding post 174-1. Hold the thumbscrew rod stop-springs against the sides of the end plates with a screwdriver, and withdraw thumbscrew rods 299 from the receiver.

Remove knobs 290, 291, 292, 293 and 294, and retaining nuts from all controls except the DIAL LIGHTS control, the handles 295, the felt washer on the tuning shaft and the friction spring 242 under the BEAT FREQ. control. Also remove the retaining nuts and covers 300 on the TEL. jacks and the four bolts and eight screws securing the chassis, dial assembly, and cable clamp to the panel. The panel may now be lifted from the chassis after placing the chassis on its back.

b. The process of replacing the panel on the chassis is the reverse of its removal. However, when the BEAT FREQ. control is replaced, follow the instructions given in Paragraph 34*e*(9) for the adjustment of the control knob on the shaft.

31. DIAL AND MASK ASSEMBLY.

The dial and mask assembly is fastened to both the front panel and receiver chassis. For service, the entire assembly consisting of dial scale, dial mask, band switch shaft, detent wheel and the drive gears may be removed from the chassis as a unit.

At the front of cast aluminum housing 255, (see Figure 9) on which the parts are mounted, is the dial scale calibrated in six frequency bands and the dial mask with the cutout for each band. Both these and the index plate are visible through the glass dial window on the front panel. The index plate is positioned betweeen the dial and mask where it indicates the frequency to which the receiver is tuned.

The dial is turned with the tuning knob by means of a large split gear and pinion assembly 266 that meshes with the large gear on the back of the dial. On the rear of the housing below cross shaft 269 is a metal mounting plate fastened with two screws. This plate mounts the split gear and pinion assembly 266 and after loosening the two mounting screws, the gears may be adjusted to a position that minimizes backlash.

Mounted at the bottom front of the housing is stop arm assembly 260. The right (from front of chassis) end of the arm ends in a hook. The left end has a roller that is held firmly against the outer edge of the dial by a spring. A portion of the outer edge of the dial is cut away so that as the ends of the dial scales are reached, and as the roller on the stop arm follows the dial, the hook on the other end of the dial drops and engages the rotating stop 263 mounted on the tuning shaft in front of the pinion gear. This action provides a positive stop at the ends of the tuning ranges on all bands.

The tuning shaft is geared to the tuning capacitor through worm gear 265, small split gear 267, pinion gear and bushing assembly 268 and the split gear on the tuning capacitor shaft. Pinion gear and bushing assembly 268 is fastened to the cross shaft by means of two set screws. When these screws are loosened, the tuning capacitor is disengaged from the dial and mask assembly, and the relationship between the dial and the tuning capacitor may be adjusted.

Attached near the top of the housing is guide arm assembly 271, which, with the spring 274, positions detent wheel 273. The detent wheel is the six-pointed wheel mounted near the end of the band switch shaft and serves to position the band switches. The slotted coupling on the end of the band switch shaft couples the band switch shaft to bracket and gear assembly 277.

32. SERVICING THE DIAL AND MASK ASSEMBLY.

a. REMOVAL.—Before the dial and mask assembly may be removed for servicing, the front panel must be removed as directed in Paragraph 30*a*. When this has been done, the dial and mask assembly is held in place by only two hex head mounting screws found on the underside of the chassis. One of these screws is under the i-f shield plate 231, (see Figure 18) and is accessible only after this plate is removed. After the two mounting screws are removed, the assembly may be lifted from the chassis and serviced.

b. DISASSEMBLY.—To remove dial mask 256, dial 257, dial index plate 258, or the band switch shaft, the taper pin fastening the hub of the mask to the shaft must be removed. While this is being done, be certain to support the shaft so excess strain will not be placed on the center bushing and shaft. After the taper pin has been driven out, the parts may be readily removed.

c. DIAL REPLACEMENT. — Before replacing the dial, be certain that spring washer 289 between the dial hub and the housing is mounted with its convex side towards the dial hub.

The dial is slipped on over the center bushing and the teeth in the dial gear engaged with the teeth of the

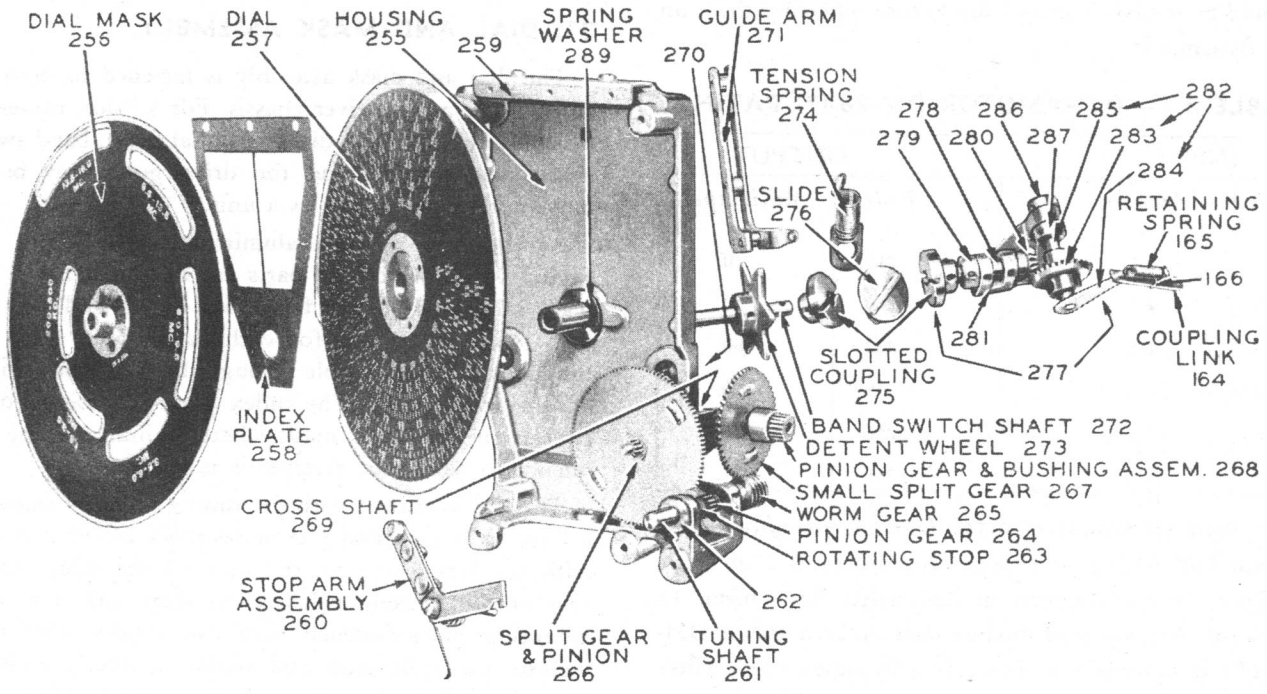


Figure 9 — Radio Receiver BC-348-J, Dial and Mask Assembly

small pinion gear. This operation may result in an incorrect stop position. If so, the dial gear will have to be adjusted a tooth at a time until the correct position is reached. The hook on the roller arm should engage the stop on the tuning shaft as the index mark on the low frequency end of the 13.5-18.0 mc scale lines up with the frequency indicator of the index plate. However, the stop arm hook must not start to descend until the rotating stop has passed under it on the last revolution of the tuning shaft.

d. STOP ARM REPLACEMENT.—Replacement of the stop arm may also require a readjustment to obtain the correct stop position. This is done by lengthening or shortening the roller end of the stop arm after loosening the two nuts on the arm.

e. REPLACEMENT OF DIAL AND MASK ASSEMBLY.—When the dial and mask assembly is replaced, the position of coupling 275 on the bracket and gear assembly and coupling 275 on the dial and mask assembly must be such that the position of the dial mask will correspond with the band switch position.

The correct relative positions are obtained when the mask is set to the 200-500 kc position and when coupling link 164 (see Figure 16), connecting the band switch drive mechanism to the band switch, is in a nearly vertical position, even with the front of the output transformer and filter choke unit 155.

f. DIAL CALIBRATION. — Correct dial calibration may be obtained after replacing a dial and mask assembly by adjusting the relation between the dial and tuning capacitor. To do this, loosen the two set screws in pinion gear and bushing assembly 268 until the gear will rotate freely on the shaft. Turn the tuning condenser until it is completely closed (rotor plates meshed with stator plates). Set the band switch for the 13.5-18.0 mc band. Turn the tuning knob until the isolated index mark at the low frequency end of the dial scale is aligned with the frequency indicator on the index plate. Tighten the two set screws in the pinion gear and bushing assembly 268 carefully in order to avoid changing the position of the tuning capacitor, and apply glyptal to the heads of the set screws.

33. REMOVAL OF ANTENNA, R-F, DETECTOR AND OSCILLATOR UNITS

a. When the removal of the top or bottom cover plate does not give sufficient access to the antenna, r-f, or detector units, or when the oscillator unit is serviced, the entire assembly must be removed. This may be accomplished by repeating the following steps in the order given:

(1) Unsolder the leads at the front of the unit.

(2) With the rear of the receiver towards the repairman, remove top covers 225 on the unit to be serviced and the adjacent unit at the left.

(3) Set the band switch control to the 3.5-6.0 mc band.

(4) One end of each retaining spring 165 is hooked over the band switch arm nearest the front of the chassis. Use long nose pliers and lift the ends of the two springs off the arms (for the antenna unit only one spring must be removed). Also lift coupling links 164 over the ends of the arms.

(5) Remove the tie strips on the top of the cans, front 229 and rear 227.

(6) Remove the screws fastening the bottom tie strips 227 and 228 to the unit to be removed.

(7) Remove the mounting screws at the front and rear of the unit.

(8) Carefully lift the unit from the chassis.

b. To replace a unit, reverse the procedure given above. Do not tighten the screws fastening the unit until after the band switch sections have been reconnected and the band switch operated a few times. This will allow the unit to reposition itself.

34. TROUBLE LOCATION AND REMEDY.

a. QUICK CHECK.—Most service men, given a faulty receiver to repair, will seek a clue which will result in a rapid location of the trouble. If the user can be questioned, a helpful answer is often obtained.

A careful visual and mechanical inspection of the chassis and connections is generally one of the first steps. Pulling at the various parts, including resistors, capacitors, wires and solder connections, will often locate a faulty connection.

Inspect parts and wiring for grounds or shorted connections and open circuits. Inspect resistors and coils for charred surfaces or discolorations that indicate an excessive current condition. The odor of overheated insulation often tells the story of overload carried by the conductor.

If nothing is disclosed by the visual and mechanical inspection of the chassis and connections, the tubes may next be checked, since they are often the cause of the faulty operation. This may be done with a tube checker or by replacement with known good tubes.

NOTE

All tubes of a given type supplied with the equipment shall be consumed prior to employment of tubes from general stock.

If the tubes are good, connect the power to the chassis (with latter out of the case) and again move and tap the various parts and wires as a further means of locating opens, shorts and grounds. Hum, squeals, howls, distortion and other audible indications, dead voltage points, etc., may disclose the source of difficulty.

Failure of the quick check to disclose the source of the trouble should be followed by the reading of voltages at socket terminals and other points, continuity resistance measurements, realignment, signal tracing to isolate the faulty stages and replacement of major units as explained in succeeding paragraphs.

b. SENSITIVITY.—The normal sensitivity (number of microvolts input to produce 10 milliwatts output into a 4,000 ohm resistance load) of the receiver is less than 3 microvolts (except on range 1, which is 5 microvolts) when measured as follows:

(1) With the AVC-OFF-MVC switch in the MVC position, the c-w oscillator OFF, the crystal filter OUT and a 4,000 ohm non-inductive resistance as the output load, feed a modulated signal from a signal generator into the receiver through a 100 mmf. dummy antenna. Adjust the output of the signal generator until the receiver output is 10 milliwatts. Turn off the signal generator modulation and adjust the receiver volume control until the noise output level is 2.5 milliwatts. Turn on the modulation and raise the signal generator output until the 10 milliwatt output is again indicated on the output meter.

(2) This sensitivity will, of course, be subject to variation with time due to tube aging, etc. Therefore, it is recommended that no attempt be made to retrim or realign the equipment unless the sensitivity is found to be worse than 7 microvolts with new, average tubes.

The receiver has been carefully adjusted and aligned by the manufacturer before shipment and should maintain these adjustments over reasonably long periods of time. Major adjustments and repairs should be made only in an authorized repair shop equipped with the necessary servicing tools and equipment. *All others must refrain from changing any of the adjustments of the radio frequency circuits.*

c. TROUBLE LOCATION AND CORRECTION PROCEDURE.—The following is a generalized trouble shooting procedure which may be used if no clue to

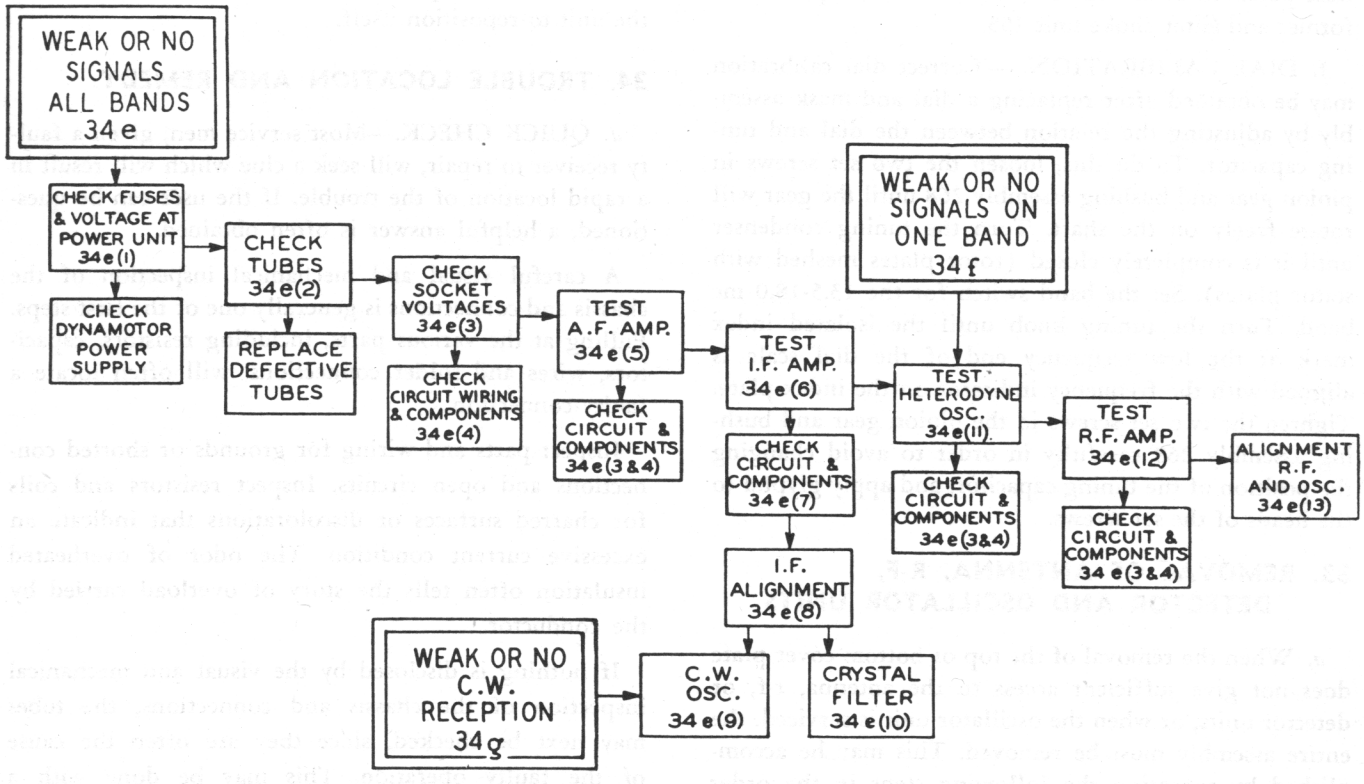


Figure 10 — Trouble Location and Correction Chart

the trouble source has been found. It has been divided into the following:

Equipment required—See paragraph 34*d*
Weak or no signals on all bands;
Modulated reception—See paragraph 34*e*
Weak or no signals on any one band;
Modulated reception—See paragraph 34*f*
Weak or no signals on all bands;
C-W reception (modulated reception normal)—See paragraph 34*g*

d. EQUIPMENT REQUIRED. — Few instruments other than those found in a standard set analyzer (Test Set I-56-A) are required in locating the most probable troubles in this receiver. The individual instruments required are as follows:

(1) A modulated test oscillator (standard signal generator) with a frequency range from 200 to 18,000 kc with provision for calibration accuracy better than 0.1% at aligning frequencies.

(2) *Voltmeter — 1,000 ohms per volt, ranges: 0-10; 0-100; 0-250; 0-500 volts.

(3) *Continuity tester.

(4) *Output meter rectifier type, 0-15 volt, 4,000 ohms.

(5) Microammeter, 0-200 Microamperes.

(6) Audio frequency oscillator.

(7) Headphones.

(8) Adapter FT-211 consisting of an 8-prong octal plug, and an 8-prong octal socket connected together by a short length of 8-conductor cable, to permit use of the Test Set I-56-A Analyzer on octal tubes.

e. WEAK OR NO SIGNALS ON ALL BANDS, MODULATED RECEPTION.

(1) CHECK OF DYNAMOTOR VOLTAGES.—When all signals on all bands are weak or no signals are heard even when known to be present, check the dynamotor voltages at the dynamotor terminal strip (Figure 12, Socket Voltages). The voltages should approximate the values shown. Conditions of measurements are:

Input voltage 28V; AVC-OFF-MVC switch MVC; Crystal control OUT; C-W Osc. OFF; Volume Control maximum; Load 4,000 ohms non-inductive re-resistance. If these voltage readings do not approximate the values shown, the fuse should be checked, as well as the dynamotor and filter circuits, wiring and components.

*Part of Test Set I-56-A.

(2) TUBE CHECK.—If the voltages at the dynamotor terminal strip approximate the values given, proceed to check all tubes with the Model 685 tube checker for emission and characteristics or replace all tubes with those of known average characteristics, if this has not been done in the "Quick Check".

(3) CHECK OF SOCKET VOLTAGES.—If tubes check satisfactorily, or if after replacing with tubes known to be good the sensitivity is still low, proceed to check all tube socket voltages as outlined under Paragraph 34*b*(1) with Test Set I-56-A. The average socket voltages for Radio Receiver BC-348-(*) are given in Table C Socket Voltages.

(4) CHECK CIRCUIT WIRING AND COMPONENTS.—If the tube socket voltages do not approximate the values shown in Table C Socket Voltages, the associated circuits and components should be checked for grounds, shorts and similar defects using Test Set I-56-A, the wiring diagram Figure 30, Table D Resistance Between Socket Terminals and Ground, and Table E.

(5) TEST OF AUDIO FREQUENCY AMPLIFIER.—After checking socket voltages, circuit wiring and components, proceed to the test of the audio frequency amplifier. This can be checked by capacitively coupling a 400 cycle voltage of approximately 2 volts R.M.S. from the detector signal diode to ground using a capacitor of .5 mf. As an alternative, a modulated 915 kc signal of 2 volts may be coupled through a .1 mf capacitor from the plate of the 3rd i-f. Tube VT-116 to ground.

Proper functioning of the audio amplifier will be indicated by an output of 50 milliwatts for the 2 volt audio signal or 1 milliwatt output for the 915 kc signal input. Circuits, wiring and components should be checked if this order of response is not obtained.

(6) TEST OF INTERMEDIATE FREQUENCY AMPLIFIER.—Following a satisfactory test of the audio amplifier, check the intermediate frequency amplifier by capacitively coupling the modulated signal generator to the control grid of the 1st detector tube and ground, through a 0.1 mf. capacitor, the frequency being adjusted to 915 kc. A rough check of the proper functioning of the i-f ampilfier is indicated by a comfortable headphone output level with low input from the signal generator. (Approximately 35 microvolts input for 10 milliwatts output.) See Table G Alignment Chart, 1st i-f column, for connections and detailed information.

(7) I-F AMPLIFIER CIRCUIT CHECK.—If the i-f amplifier does not respond as above or lacks sensiti-

vity, a progressive check, stage-by-stage, should be made. To do this, couple the signal generator to the 3rd i-f tube control grid through a .1 mf capacitor. Set the controls and make the connections as described in Table G, Alignment Chart, 3rd i-f column.

If the receiver is in proper order from the output to this stage, a signal of 60,000 microvolts from the signal generator will provide a 10 milliwatt output level.

Then couple the signal generator to the 2nd i-f and 1st detector tubes as explained in the next two columns in the alignment chart, and check the input signal required for standard output.

A faulty stage should be carefully checked for shorts, grounds and faulty components using the wiring diagrams in Section V and Resistance Tables D and E.

(8) ALIGNMENT OF I-F AMPLIFIER.—When all stages have been tested, the i-f amplifier alignment may be checked and realigning done if necessary. This is done by following the procedure as given in the 1st, 2nd and 3rd i-f columns in Table G Alignment Chart.

(9) CHECK AND ALIGNMENT OF C-W OSCILLATOR.—The c-w oscillator is checked and adjusted after setting the receiver controls as instructed for i-f alignment in Table G Alignment Chart. A 915 kc signal of about 30 microvolts is fed into the control grid of the 1st detector. Remove the modulation from the signal generator. Turn the c-w oscillator to the ON position. Rotate the beat frequency knob to zero beat position. The arrow on this knob should be vertical and pointing upward. If it is not, loosen the set screws and set this knob properly.

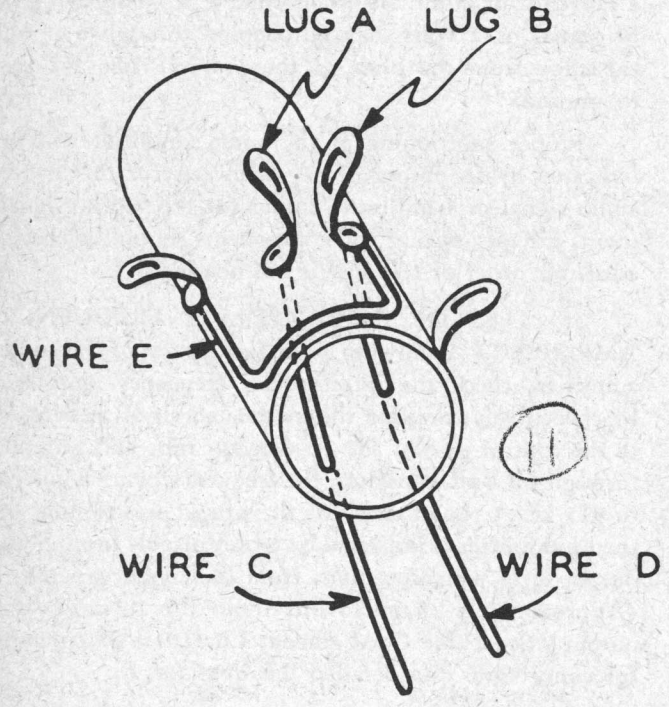


Figure 11 — Crystal Filter Coil

If no beat note is heard, check the c-w oscillator circuit for grounds, shorts and defective components using Test Set I-56-A and the readings given in Table C Socket Voltages, and Resistance Tables D and E.

(10) NEUTRALIZING THE CRYSTAL CIRCUIT.—All crystal circuits are properly neutralized at the factory before being shipped. Ordinarily, reneutralizing is not required unless the neutralizing coil and capacitor (Ref. 150) or crystal and switch assembly (Ref. 160 and 167) have been replaced, or unless the crystal circuit appears to be excessively broad. If neutralizing is necessary it may be done as follows:

Disconnect the output meter and put an 0-200 microammeter in the line from the volume control (rear section) to the second detector cathode. This is most easily done by unsoldering the lead at the volume control lug.

Set all receiver and signal generator controls as for i-f alignment. Turn the crystal control to the IN position.

Rotate the signal generator tuning knob slightly until the crystal peak is located, observing the microammeter. Tune carefully to the exact peak. Note the frequency of the generator. This will be the frequency of the crystal, which should not be more than 1.3 kc above or below 915 kc.

Detune the signal generator 10 kc below the crystal frequency. For example, if the crystal frequency is 916.2 kc, tune the signal generator to 906.2 kc.

Turn modulation of signal generator off and increase the output to about 1 volt.

Extending from the neutralizing coil are two lugs A and B and two corresponding wires C and D. See Figure 11.

Extending from lug B is a wire E passing around the edge of the coil form. Increase and decrease the capacity between wires C and D by bending them closer to each other and farther apart until the microammeter reading is at a minimum. In cases where low capacity is required, cut off the wires C and D. If extreme low capacity is required, cut off lugs A and B. Also move wire E away from lug A.

(11) CHECK OF HETERODYNE OSCILLATOR. Having checked the functioning of the i-f and audio amplifiers, if signals are not heard on any band, the heterodyne oscillator should be checked for oscillation.

This can be done by coupling a 915 kc signal through a .1 mf. capacitor to the control grid of the 1st detector. Short the stator of the oscillator section of the tuning capacitor (Section 1-D) to ground. The output should go up. This indicates that the oscillator was functioning satisfactorily. Do this on all bands.

(12) R-F AMPLIFIER AND HETERODYNE OSCILLATOR. — Having completed the test and alignment of the audio amplifier, i-f amplifier and heterodyne oscillator, test the r-f amplifier as follows:

Turn the band switch to band No. 1. Set the receiver and generator controls as described in Table G Alignment Chart, No. 1 band column, but use a .1 mf. dummy antenna and make the antenna connection to the control grid of the 1st detector tube. Turn the tuning control until the test signal is picked up and carefully tuned in. The receiver dial should indicate the same frequency as the signal generator. If there is more than .75 per cent variation, the oscillator must be realigned as described below.

Proceed to check the r-f amplifier, stage-by-stage, working towards the antenna. Couple the signal generator through the .1 mf. dummy antenna to the control grids of the 2nd r-f tube and the 1st r-f tube. Then, using a dummy antenna of 100 mmf, couple the signal generator to the antenna binding post. At each stage, the receiver output should increase substantially indicating the stage gain. If there is no gain, the stage should be checked for defective components, shorts and grounds, using Tables C, D and E.

Do this on all bands.

(13) R-F AMPLIFIER AND HETERODYNE OSCILLATOR ALIGNMENT.—Instructions are given in Table G Alignment Chart for completely aligning the r-f amplifier and heterodyne oscillator circuits. Start with number 1 band column and continue with all columns to the right.

f. WEAK OR NO SIGNALS ON ANY ONE BAND, MODULATED RECEPTION.—The condition of satisfactory reception on several bands and weak or no signals on one or more bands indicates the correct functioning of the i-f and a-f amplifiers, and requires checking only the r-f amplifier and heterodyne oscillator for the defective band or bands. The procedure outlined in Paragraphs 34*e*(11) to 34*e*(13) should be followed for the defective band or bands.

g. WEAK OR NO SIGNALS ON ALL BANDS — C-W RECEPTION (MODULATED RECEPTION NORMAL).—Weak or no signals on all bands for c-w reception, with satisfactory modulated signal reception, requires testing and alignment of the c-w oscillator. Proceed as outlined in Paragraphs 34*e*(9) and 34*e*(10).

h. MEASUREMENTS WITH TEST SET I-56-A. — The tables that follow show voltage and resistance measurements made from the chassis ground to the tube socket terminals and other important points. These measurements were made with Model 665 Analyzer and other equipment contained in Test Set I-56-A. They are typical readings that will be approximated in Signal Corps Repair Shops when using this equipment on receivers in good operating condition. When faulty operation of Radio Receiver BC-348-(*) is encountered, see that all plugs are firmly seated and check carefully the cables and plugs with Model 564 Voltohmmeter as instructed on page 11 of the instruction book for Test Set I-56-A under "Detailed Tests on Radio Sets." If the trouble is not located in the cables, remove the chassis and check the tubes with Model 685 Tube Tester as instructed on page 11 of the test set instructions. After this is done, proceed with the voltage and continuity measurements described below:

(1) VOLTAGE AND CURRENT MEASUREMENTS.—Instructions are given on page 12 of the test set instruction book for making voltage and current measurements with Model 665 Analyzer and Model 666 Socket Selector. Latest instructions which include the use of the octal socket adapter are necessary. These instructions should be followed for measurements on all except the second r-f tube.

NOTE

When making measurements at the second r-f tube, the flexible lead on the orange adapter plug must be removed from the pin jack marked GND and inserted in the outer No. 3 jack, as the shield is not grounded.

Great care must be exercised when inserting the analyzer plug into the sockets on the r-f tube shelf in order to avoid damage to the prongs, as the shelf is mounted at an angle that just permits the insertion of the plug.

PROCEDURE

1. With the chassis removed from the cabinet and power supplied to the receiver through the connector plug, place the controls in the positions designated on the voltage table.

2. Set up the 665 Analyzer and the 666 Socket Selector for making readings on metal tubes as instructed on page 12 of the test set instructions. (See note above for second r-f tube setup.)

3. Throw the analyzer AC-DC switch to DC and the VOLTS-MA-OHMS switch to VOLTS-MA.

4. Use the voltmeter ranges indicated on the voltage table and proceed to make the desired readings between the chassis ground and the terminals given on the voltage chart.

When using Model 666 Socket Selector to read voltages, the capacity between the leads in the cable may cause oscillations which will affect voltages and currents. In the case of a voltage that is found to read considerably different from that shown on the table, replace the tube in the receiver and read the voltage at the socket terminal with test prods before attempting to locate the source of the incorrect voltage.

(2) RESISTANCE AND CONTINUITY MEASUREMENTS. — Resistance and continuity measurements are to be made with Model 665 Analyzer as instructed on page 12 of test set instructions.

The tables that follow show resistance measurements made from the chassis ground to the tube socket teminals and other important points that are easily accessible. These measurements may be made with the test prods at the terminals, or in the case of tube sockets, Model 666 Socket Selector may be used as instructed in paragraph 34*h*(1).

Whenever possible, select an ohmmeter range that will allow the readings to be made on the 0 to 60 section of the ohmmeter scale, as greater accuracy is obtained over this portion of the scale.

Always set the ohmmeter to zero ohms each time a different scale is used, or before making the initial measurements. To do this, short together the two test prods and turn the "battery adjustment" knob until the meter reads exactly zero ohms. If the meter cannot be adjusted to zero, the battery in the analyzer will have to be changed. For instructions, see the section on battery replacement under "Maintenance" on page 42 of the test set instruction book.

PROCEDURE

1. With the chassis removed from the cabinet and no power supplied to the receiver, place the controls in the positions designated on the resistance and continuity chart.

2. Set up the Model 665 Analyzer and the Model 666 Socket Selector, if used, as instructed on page 12 of the test set instructions.

3. Throw the analyzer AC-DC switch to DC and VOLTS-MA-OHMS switch to OHMS.

4. Proceed to make the desired readings between chassis ground and terminals as indicated on the resistance and continuity tables.

i. FAILURE OF DIAL LIGHTS. — The two dial lamps are connected in series; hence the lack of dial illumination does not indicate failure of both lamps. Removal of the dial light housing gives ready access to the lamps.

TABLE C — TUBE SOCKET VOLTAGE CHART

THE VOLTAGES ARE READ BETWEEN THE SOCKET TERMINAL AND GROUND UNDER THE FOLLOWING CONDITIONS UNLESS OTHERWISE STATED:

Headphones, Antenna and Ground disconnected.
Band Switch set for Band No. 1, 200-500 kc.
Tuning Control set at 200 kc.
Crystal Control OUT position.
C-W Oscillator OFF position.
Volume Control maximum.
Dial Light Control maximum.

AVC-OFF-MVC Switch in MVC position.

All readings taken with 1000 ohm per volt meter.

Plate and Screen voltages read on 500 volt scale. Other voltages read on appropriate scales.

See last paragraph in 34*b*(1) regarding possibilities of fictitious voltages when using socket analyzer.

Socket Terminal or Block No.	*VT-117 1st R-F*	*VT-117 2nd R-F*	*VT-150 1st Det*	*VT-117 1st I-F*	*VT-117 2nd I-F*	*VT-116 3rd I-F*	*VT-233 2nd Det. C-W Osc.*	*VT-152 Audio*
1.	Shell 0 V.	Shell 3.8 V. Note A	Shell 0 V.	Shell 0 V.	Shell 0 V.	Shell 0 V.	Shell 0 V.	0 V.
2.	Heater 18.9 V.	Heater 12.6 V.	Heater 0 V.	Heater 25.2 V.	Heater 12.6 V.	Heater 6.3 V.	Grid 6 V. Note D	Heater 25.3 V.
3.	Sup. 0 V.	Sup. 3.8 V.	Plate 210 V. 2 Ma.	Sup. 5.8 V.	Sup. 5.8 V.	Sup. 16.5 V.	Cathode 16.5 V.	Plate 200 V. 18 Ma.
4.	Grid 0 V.	Grid 0 V.	Screen 100 V. Note C 6.2 Ma.	Grid 0 V.	Grid 0 V.	Grid 14 V.	Diode 2 V.	Screen 210 V. 3.4 Ma.
5.	Cathode 3.8 V.	Cathode 3.8 V.	Osc. Grid —.4 V.	Cathode 5.8 V.	Cathode 5.8 V.	Cathode 16.5 V.	Diode 0 V.	Grid —8 V. Note E
6.	Screen 100 V. 2 Ma.	Screen 85 V. 1.6 Ma.	Cathode 0 V.	Screen 105 V. 1.6 Ma.	Screen 105 V. 1.6 Ma.	Screen 100 V. .85 Ma.	Plate 55 V. Note B (CW Osc. ON) .95 Ma.	Tie Terminal .2 V.
7.	Heater 12.6 V.	Heater 6.3 V.	Heater 6.3 V.	Heater 18.9 V.	Heater 18.9 V.	Heater 0 V.	Heater 6.3 V.	Heater 18.9 V.
8.	Plate 100 V. 9 Ma.	Plate 170 V. 6 Ma.	Grid —1.8 V.	Plate 185 V. 5.4 Ma.	Plate 210 V. 5.8 Ma.	Plate 210 V. 3.5 Ma. Note F	Heater 12.6 V.	Cathode 0 V.

Note A—The shell (No. 1 Terminal) of the 2nd r-f tube is not at ground potential but is connected to the cathode. For that reason the flexible Lead from the Octal Socket Adapter is not inserted into the ground pin jack but is inserted into the Adapter No. 3 outer pin jack.
Note B—55 volts read at socket terminal. 45 volts read with adapter plug—see last paragraph of 34*b*(1).
Note C—60 volts read with analyzer. See Note B.
Note D—As read on 50-volt scale.
Note E—As read on 500-volt scale.
Note F—650 volts read with analyzer. See Note B.

TABLE D — RESISTANCES BETWEEN SOCKET TERMINALS AND GROUND

RESISTANCE READINGS ARE MADE UNDER THE FOLLOWING CONDITIONS:

Power Plug, Headphones, Antenna and Ground disconnected.

Tubes cold and left in socket to complete series heater connections.

Band Switch set for Band No. 1, 200-500 kc. Tuning Control set at 200 kc.

Crystal Control OUT position.

C-W Osc. OFF position.

Volume Control maximum.

Dial Light Control maximum.

AVC-OFF-MVC Switch MVC position (except for values preceded by AVC which are read in that position).

Unless otherwise specified, all resistances shown in ohms.

Socket Term. or Block No.	*VT-117 1st R-F*	*VT-117 2nd R-F*	*VT-150 1st Det.*	*VT-117 1st I-F*	*VT-117 2nd I-F*	*VT-116 3rd I-F*	*VT-233 2nd Det. C-W Osc.*	*VT-152 Audio*
1.	Shell 0	Shell 250 Note A	Shell 0	Shell 0	Shell 0	Shell 0	Shell 0	0
2.	Heater 6.5	Heater 5.5	Heater 0	Heater 6.5	Heater 5.5	Heater 3	Grid 100,000	Heater 6.5
3.	Sup. 0	Sup. 250	Plate 520	Sup. 420	Sup. 420	Sup. 4000	Cathode 4000	Plate 1200
4.	Grid 1 meg. AVC 3.3 Meg.	Grid 90,000 AVC 2.4 Meg.	Screen 20,000	Grid 15,000 AVC 2.3 Meg.	Grid 15,000 AVC 2.3 Meg.	Grid 3500	Diode 400,000	Screen 500
5.	Cathode 250	Cathode 250	Osc. Grid 80,000	Cathode 420	Cathode 420	Cathode 4000	Diode 260,000 AVC 2 Meg.	Grid 1.1 meg.
6.	Screen 15,000	Screen 500,000	Cathode 1.2	Screen 500,000	Screen 500,000	Screen 120,000	Plate 500,000 5 Meg. Osc. ON	Tie Terminal 5
7.	Heater 5.5	Heater 4	Heater 4	Heater 6.5	Heater 6.5	Heater 0	Heater 3	Heater 6.5
8.	Plate 15,000	Plate 10,000	Grid 1 Meg.	Plate 5500	Plate 500	Plate 1500	Heater 5.5	Cathode 0

Note A—The shell (No. 1 Terminal) of the 2nd r-f tube is not at ground potential but is connected to the cathode. For that reason the flexible Lead from the Octal Socket Adapter is not inserted into the ground pin jack but is inserted into the Adapter No. 3 outer pin jack.

TABLE E — ADDITIONAL POINTS TO MAKE CONTINUITY RESISTANCE READINGS TO GROUND

RESISTANCE READINGS MADE UNDER THE SAME CONDITIONS AS FOR TUBE SOCKET READINGS

POWER CONNECTOR (175)		OUTPUT TRANSFORMER and CHOKE (155-A and B)		DYNAMOTOR TERMINAL STRIP
Terminal Numbers on Connector	*Resistance*	*Terminal Numbers on Unit*	*Resistance*	*Readings from Low Voltage to High Voltage End*
1.	150 ohms	1.	16 ohms	0
2.	500 ohms	2.	150 ohms	1.5 ohms Note A
3.	1.5 ohms Note A	3.	500 ohms	1.5 ohms Note A
4.	1.5 ohms Note A	4.	1200 ohms	270 ohms
5.	0	5.	25 ohms	500 ohms
6.	500,000 ohms	6.	270 ohms	
7.	0			
8.	0			

Note A—This reading may be found to vary and may be as high as 11 ohms. This condition is normal and jarring the dynamotor will often return the reading to approximately the value shown.

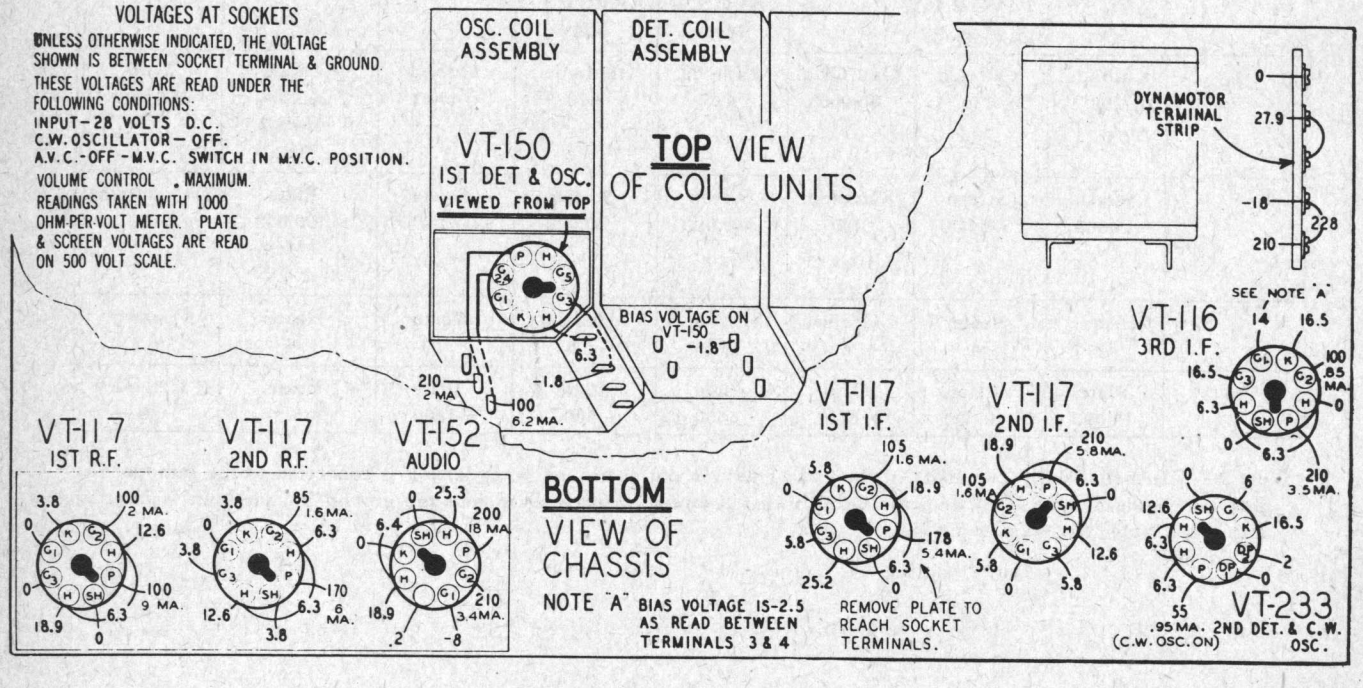


Figure 12 — Socket Voltages

TABLE F — COIL CHARACTERISTICS

Inductance Readings Given in Microhenries.
Inductance Measurements Made at 1,000 Cycles With Coil Removed from Shield.
Primary Inductance Readings Within ±5%.
Secondary Inductance Readings Within ±2%.
All D.C. Resistance Readings Given in Ohms.
Resistance Readings Within ±10%.
"Q" Readings Made With Coil Removed From Shield.
"Q" Readings Within ±20%.

Band No.	*Coil Ref. No.*	*Inductance* Pri.	Sec.	*D.C. Resistance* Pri.	Sec.	*Q* Pri.	Sec.	*Frequency for "Q" Measurement*
				ANTENNA UNIT				
1	120	1348.7	1864.7	125	16.5		88	500 KC (5)
2	121	298.7	27.8	13.8	.75		145	1.5 MC(5)
3	122	39.0	4.6	4.5	.18		122	6.0 MC(5)
4	123	14.5	1.1	3.0	.11		157	9.5 MC(5)
5	124	10.2	0.6	2.4	.03		139	13.5 MC(5)
6	125	3.0	0.1	1.4	.02		173	18.0 MC(5)
				R-F UNIT				
1	126		2439.7		61.5		74	500 KC
2	127		41.6	.49	3.1		99	1.5 MC
3	128		7.0	.53	.2		161	6.0 MC
4	129		2.0	.52	.1		162	9.5 MC
5	130		1.2	.52	.04		217	13.5 MC
6	131		0.3	.75	.03		220	18.0 MC
				DETECTOR UNIT				
1	132		2433.7		61.5		74	500 KC
2	133		41.6	.49	3.1		99	1.5 MC
3	134		7.0	.53	.2		161	6.0 MC
4	135		2.0	.52	.1		162	9.5 MC
5	136		1.2	.52	.04		217	13.5 MC
6	137		0.3	.75	.03		220	18.0 MC
				OSCILLATOR UNIT				
1	138		346.9	1.2	6.3		96	1.0 MC
2	139		25.8	.7	1.1		152	2.5 MC
3	140		5.3	.54	.24		114	7.0 MC
4	141		1.6	.9	.07		156	10.5 MC
5	142		1.5	.4	.06		160	12.5 MC
6	143		0.4	.76	.03		179	17.0 MC
				I-F COILS				
1st I-F	147	120(1)	120(1)	1.5(2)	1.5(2)	128	128	915 KC (3)
2nd I-F	148	120(1)	120(1)	1.5(2)	1.5(2)	128	128	915 KC (3)
3rd I-F	149	120(1)	242(1)	1.5(2)	5.0(2)	128	112	915 KC (3)
				MISCELLANEOUS COILS				
Crystal Neutralizing	150		2.03		52.75		56(6)	400 KC
C-W Osc.	151	1.9(1)	125.5(1)	.21(2)	1.74(2)		77	915 KC (3)
I-F Trap	152		60.9		2.3		74	915 KC
Choke	420		466.2(4)		12.0			
Choke	421		79.1(4)		.15			

Coils 126, 132 and 138 have no primaries. Other primary inductances too small for practical measurement.

(1) Coil in can and resonated to 915 KC. Readings made at 1,000 cycles.
(2) ±5%.
(3) Reading made with coil in can, tuning capacitor removed and replaced with Q Meter capacity of equal value and iron cores adjusted until circuit resonates at 915 KC.
(4) ±10%.
(5) Primary shorted.
(6) Measured across total inductance.

TABLE G — ALIGNMENT CHART

Follow alignment in order from left to right. Start with 3rd I-F adjustment in first column, then 2nd I-F, etc. Connect signal generator to ground post of receiver using a short heavy lead. Allow receiver and signal generator to heat up for several minutes.

		3rd I.F.	*2nd I.F.*	*1st I.F.*	*No. 1 Band*
RECEIVER CONTROLS	*C.W. Osc.*	OFF	OFF	OFF	OFF
	Crystal	OUT	OUT	OUT	OUT
	AVC-OFF-MVC	MVC	MVC	MVC	MVC
	Volume	Maximum	Maximum	Maximum	Maximum
	Band Sw. Setting	No. 2 Band 1.5-3.5 Mc	No. 2 Band 1.5-3.5 Mc	No. 2 Band 1.5-3.5 Mc	No. 1 Band 200-500 kc.
	Tuning Control Position	1.5 Mc	1.5 Mc	1.5 Mc	470 kc.
SIGNAL GENERATOR	*Antenna Connections*	3rd I.F. Tube VT-116 Control Grid Socket Terminal No. 4	2nd I.F. Tube VT-117 Control Grid Socket Terminal No. 4	1st Det. Tube VT-150 Control Grid External Terminal	Antenna Post
	Dummy Ant.	.1 MFD	.1 MFD	.1 MFD	100 MMF
	Frequency Setting	915 kc. ±1000 Cycles or less	915 kc. ±1000 Cycles or less	915 kc. ±1000 Cycles or less	470 kc.
PROCEDURE	*Sensitivity*	60,000 Microvolts	2,100 Microvolts	35 Microvolts	9 Microvolts See Note A
	Trimmers Adjusted	3rd I.F. Tuning Cores See Fig. 13	2nd I.F. Tuning Cores See Fig. 13	1st I.F. Tuning Cores See Fig. 13	No. 1 Trimmers on Osc. Det. R.F. and Antenna Units See Fig. 13
	Procedure	Increase Sig. Gen. to about 1 volt. Adjust 3rd I.F. Tuning Core screws, first top screw and then bottom. Adjust top and bottom screws again and then a third time to maximum output.	Decrease input from Sig. Gen. to 10 milliwatt output level. Adjust 2nd I.F. Tuning Core screws, top screw first, then bottom. Adjust top and bottom screws again, and then a third time to maximum output.	Decrease input from Sig. Gen. to 10 milliwatt output level. Adjust 1st I.F. Tuning Core screws, top screw first, and then bottom. Adjust top and bottom screws again, and then a third time to maximum output.	Adjust No. 1 Trimmer on Osc. Unit to max. output. Then adjust Trimmers on Det., R.F., and Antenna Units, in that order to maximum output, and decrease signal as required to maintain 10 milliwatts output. Repeat above.

NEUTRALIZING THE CRYSTAL CIRCUIT

Neutralizing of the crystal circuit is not required in ordinary alignment procedure. It should not be attempted unless one of the neutralizing circuit elements as mentioned in Paragraph 34*e*(10) have been replaced or unless the tuning band of the crystal circuit appears to be excessively wide.

C-W OSCILLATOR CHECK

The C-W Oscillator adjustment is likewise not required in ordinary alignment procedure. It may be done as explained in Paragraph 34*e*(9).

Connect Signal Generator Ground Lead to Ground Post of Receiver Using a Short Heavy Lead.

Allow Chassis and Signal Generator to Heat up for Several Minutes.

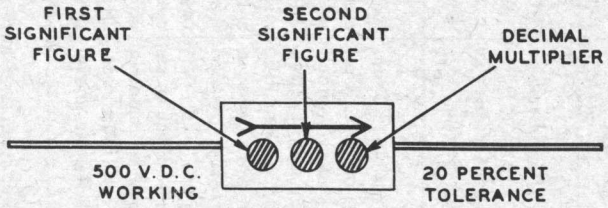
215 kc. Osc. Padder	*No. 2 Band*	*No. 3 Band*	*No. 4 Band*	*No. 5 Band*	*No. 6 Band*
OFF	OFF	OFF	OFF	OFF	OFF
OUT	OUT	OUT	OUT	OUT	OUT
MVC	MVC	MVC	MVC	MVC	MVC
Maximum	Maximum	Maximum	Maximum	Maximum	Maximum
No. 1 Band 200-500 kc.	No. 2 Band 1.5-3.5 Mc	No. 3 Band 3.5-6 Mc	No. 4 Band 6-9.5 Mc	No. 5 Band 9.5-13.5 Mc	No. 6 Band 13.5-18 Mc
215 kc.	3.3 Mc	5.7 Mc	9.0 Mc	13.0 Mc	17.3 Mc
Antenna Post	Antenna Post	Antenna Post	Antenna Post	Antenna Post	Antenna Post
100 MMF	100 MMF	100 MMF	100 MMF	100 MMF	100 MMF
Shut Off Signal Generator See Note B	3.3 Mc	5.7 Mc	9.0 Mc	13.0 Mc	17.3 Mc
	3-7 Microvolts See Note A	3-7 Microvolts See Note A	3-7 Microvolts See Note A	3-7 Microvolts See Note A	3-7 Microvolts See Note A
215 kc. Oscillator Padder See Fig. 13	No. 2 Trimmers on Osc. Det. R.F. and Antenna Units. See Fig. 13	No. 3 Trimmers on Osc. Det. R.F. and Antenna Units. See Fig. 13	No. 4 Trimmers on Osc. Det. R.F. and Antenna Units. See Fig. 13	No. 5 Trimmers on Osc. Det. R.F. and Antenna Units. See Fig. 13	No. 6 Trimmers on Osc. Det. R.F. and Antenna Units. See Fig. 13
Adjust 215 kc. Osc. Padder to max. output. Repeat No. 1 Band adjustment & 215 kc. Osc. Padder adjustments 2 or 3 times to insure correct tracking and dial calibration.	Adjust No. 2 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., & Ant. Units in that order to max. output and decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 3 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., and Ant. Units in that order to max. output and decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 4 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., and Ant. Units in that order to max. output and decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 5 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., and Ant. Units in that order to max. output and decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 6 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., and Ant. Units in that order to max. output and decrease signal as required to maintain 10 milliwatt output. Repeat above.

Note A—SENSITIVITY—Adjust Signal Generator until output is 10 milliwatts. Turn off modulation of Signal Generator. Turn down receiver Volume Control until 2.5 milliwatts of noise output is reached. Turn on generator modulation again, and raise generator output to 10 milliwatts on output meter.

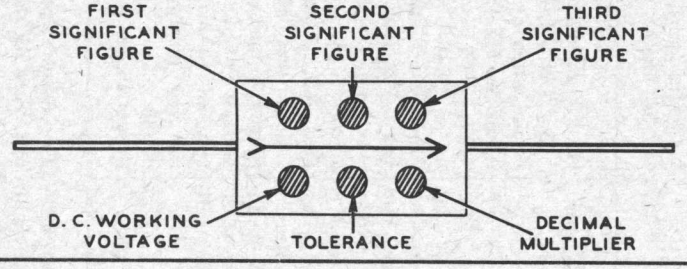
Note B—This adjustment uses the noise developed in the receiver as the only signal.

TABLE H — COLOR CODES

RMA COLOR CODES FOR CAPACITORS (MMFD)



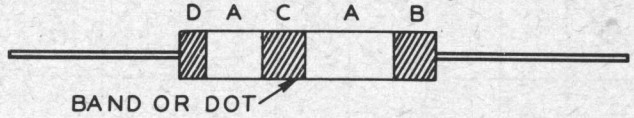
COLOR	NUMERAL	VOLTS	MULTIPLIER	TOLERANCE
BLACK	0		1	
BROWN	1	100	10	1%
RED	2	200	100	2%
ORANGE	3	300	1,000	3%
YELLOW	4	400	10,000	4%
GREEN	5	500	100,000	5%
BLUE	6	600	1,000,000	6%
VIOLET	7	700	10,000,000	7%
GRAY	8	800	100,000,000	8%
WHITE	9	900	1,000,000,000	9%
GOLD		1000	0.1	5%
SILVER		2000	0.01	10%
NO COLOR		500		20%



RMA COLOR CODE FOR RESISTORS (OHMS)

COLOR	A 1st DIGIT	B 2nd DIGIT	C MULTIPLIER
SILVER			0.01
GOLD			0.1
BLACK		0	1.0
BROWN	1	1	10
RED	2	2	100
ORANGE	3	3	1,000
YELLOW	4	4	10,000
GREEN	5	5	100,000
BLUE	6	6	1,000,000
PURPLE	7	7	10,000,000
GRAY	8	8	100,000,000
WHITE	9	9	

D — TOLERANCE CODE:
GOLD = 5% SILVER = 10% NO COLOR = 20%



OLD COLOR ARRANGEMENT

NEW COLOR ARRANGEMENT

BODY COLOR (NEW COLOR ARRANGEMENT ONLY) INDICATES TYPE OF RESISTOR, AS FOLLOWS:—

BLACK — COMPOSITION, NON-INSULATED
TAN, OLIVE OR WHITE — COMPOSITION, INSULATED
DARK BROWN — WIRE-WOUND, INSULATED

SECTION VI
SUPPLEMENTARY DATA

35. GENERAL.

a. The table of replaceable parts that follows omits standard types of hardware such as screws, rivets, washers and other miscellaneous parts used in Radio Receiver BC-348-(*).

Those parts having identical reference numbers followed by a hyphen and letter are constructed as common assemblies. Reference numbers followed by a hyphen and number indicate a part used two or more times.

The figure numbers of the illustrations in which the parts are shown are given in parenthesis directly below the reference numbers in the first column. Likewise, the quantity used of each item, if more than one and not indicated in the reference number column by a hyphen and number, is shown in parenthesis in the description column below the description.

In some positions, two capacitors or resistors have been used connected in parallel in place of the individual unit shown in the schematic, illustrations and parts list. If the replacement of any of these units is ever found to be necessary, the correct individual part listed in the parts list should be used.

b. The table that follows in Section VII serves as a guide to the alphabetical code used in the drawing number column to indicate the manufacturer or source of supply for replacement parts.

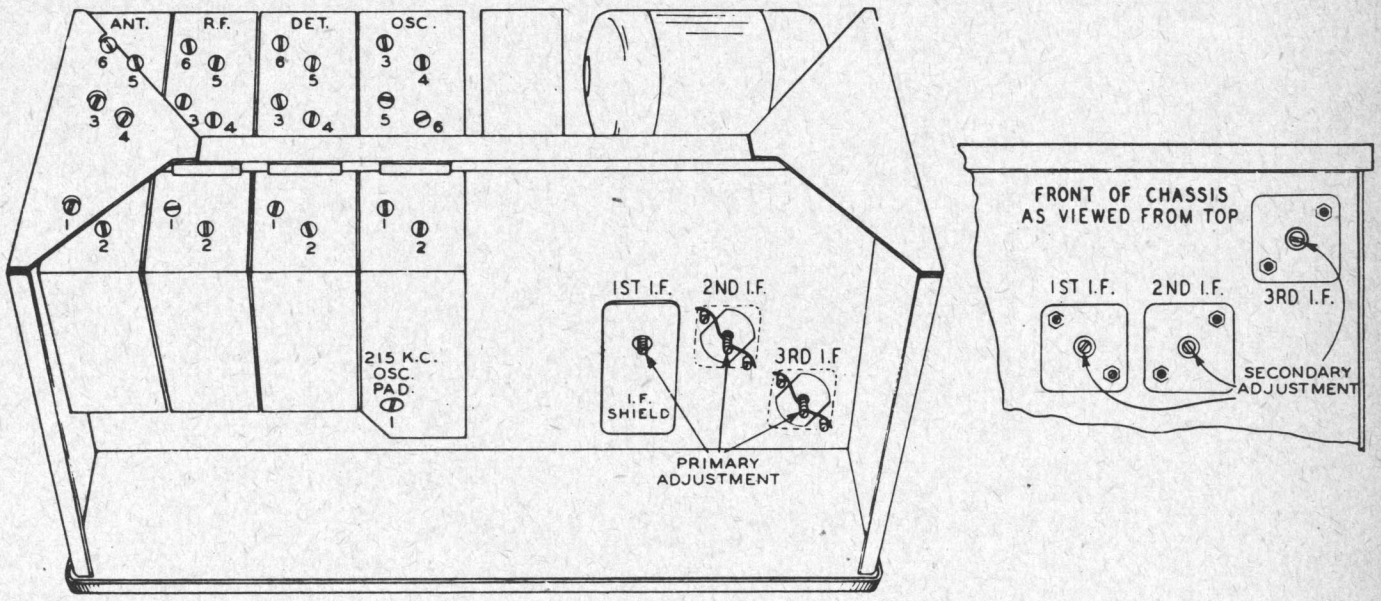


Figure 13 — Location of Trimmer Capacitors

SECTION VII

TABLE OF REPLACEABLE PARTS

NOTE

Each Service using this list has established certain depots and service groups for the storage and issue of spare parts to its organizations requiring them. The regulations of each Service should be studied to determine the method and source for requisitioning spare parts. The information in this list, as to manufacturer's or contractor's name, type, model or drawing number, is not to be interpreted as authorization to field agencies to attempt to purchase identical or comparable spare parts direct from the manufacturer or a wholesale or retail store except under emergency conditions as covered by existing regulations of the Service concerned.

MODEL: Radio Receivers BC-348-J, BC-348-N and BC-348-Q — **MAJOR UNIT: Radio Receiver BC-348-(★)**

Reference Symbol	Army Stock No. Navy Type No. British Ref. No.	Name of Part and Description	Function	Mfr. and Designation	Drawing or Spec. No.
1-A 1-B 1-C 1-D	3D9361VE8	TUNING CAPACITOR: 4-section, Variable ganged; A section, 361.8 mmf.; B section, 241.2 mmf.; C section 241.2 mmf.; D Section, 241.2 mmf.	Tuning	O	14A161
2-1A 2-1B	3D9020V-19		Antenna trimmer; Band 1 Antenna trimmer; Band 2		
2-2A 2-2B			Antenna trimmer; Band 3 Antenna trimmer; Band 4		
2-3A 2-3B			Antenna trimmer; Band 5 Antenna trimmer; Band 6		
2-4A 2-4B		CAPACITOR: Dual ceramic trimmer; 5-20 mmf.	R-F trimmer; Band 3 R-F trimmer; Band 4	ER or C	17A198
2-5A 2-5B			Det. trimmer; Band 3 Det. trimmer; Band 4		
2-6A 2-6B			Det. trimmer; Band 5 Det. trimmer; Band 6		
2-7A*** 2-7B			R-F trimmer; Band 5 R-F trimmer; Band 6		
3-1A* 3-1B**	3D9012V-1		R-F trimmer; Band 1 R-F trimmer; Band 2		

* Reference applies only to Radio Receiver BC-348-J.
** Reference applies only to Radio Receiver BC-348-N.
*** Reference applies only to Radio Receiver BC-348-Q.

TABLE OF REPLACEABLE PARTS (Continued)

MODEL: Radio Receivers BC-348-J, BC-348-N and BC-348-Q — **MAJOR UNIT: Radio Receiver BC-348-(*)**

Reference Symbol	Army Stock No. Navy Type No. British Ref. No.	Name of Part and Description	Function	Mfr. and Designation	Drawing or Spec. No.
3-2A*			R-F trimmer; Band 5		
3-2B**			R-F trimmer; Band 6		
3-2A***			Det. trimmer; Band 1		
3-2B			Det. trimmer; Band 2		
3-3A*			Det. trimmer; Band 1		
3-3B**			Det. trimmer; Band 2		
3-3A***		CAPACITOR: Dual ceramic trimmer; 3-12 mmf.	Osc. trimmer; Band 1	ER or C	17A199
3-3B			Osc. trimmer; Band 2		
3-4A*			Osc. trimmer; Band 1		
3-4B**			Osc. trimmer; Band 2		
3-4A***			Osc. trimmer; Band 3		
3-4B			Osc. trimmer; Band 4		
3-5A*			Osc. trimmer; Band 3		
3-5B**			Osc. trimmer; Band 4		
3-5A***			Osc. trimmer; Band 5		
3-5B			Osc. trimmer; Band 6		
3-6A*		CAPACITOR: Dual ceramic trimmer; 3-12 mmf.	Osc. trimmer; Band 5	ER or C	17A199
3-6B*			Osc. trimmer; Band 6		
4	3D9020V-20	CAPACITOR: Ceramic trimmer; 4-20 mmf.	Series adjustment; osc., Band 1	C	17A200
6	3DA1.54A1	CAPACITOR: Molded; silvered mica, 1,054 mmf., ±2.5%.	Osc. unit; series padder, Band 4	M; Type PW	47X215
7	3D9734A1	CAPACITOR: Molded; silvered mica, 734.1 mmf., ±1.5%.	Osc. unit; series padder, Band 3	M; Type PW	47X214
10	3D9403A1	CAPACITOR: Molded; silvered mica, 403.1 mmf., ±1%.	Osc. unit; series padder, Band 2	M or MC; Type PO or Ceramic, MC Type 61PNOK40	47X213
11	3D9367E8	CAPACITOR: Molded; silvered mica, 367.8 mmf., ±1.5%.	Osc. unit; series padder, Band 5	M or MC; Type PO or Ceramic, MC Type 61PNOK40	47X216
12	3D9346-1A2	CAPACITOR: Molded; silvered mica, 346.2 mmf., ±1.5%.	Osc. unit; series padder, Band 6	M or MC; Type PO or Ceramic, MC Type 61PNOK40	47X217

* Reference applies only to Radio Receiver BC-348-J.
** Reference applies only to Radio Receiver BC-348-N.
*** Reference applies only to Radio Receiver BC-348-Q.

13-1 13-2	3D9338	CAPACITOR: Molded; silvered mica, 338 mmf., ±1.5%.	R-F unit; tuning capacitor series, Bands 5 and 6; Det. unit; Tuning capacitor series, Bands 5 and 6	M or C; Type PO or Ceramic, C Class D	47X227
14	3D9300-8.1	CAPACITOR: Molded; silvered mica, 300 mmf., ±20%.	C-W osc. plate coupling	M; Type PO	47X274
15-1 15-2 15-3 15-4 15-5	3D9250-18	CAPACITOR: Molded; silvered mica, 250 mmf., ±5%.	3rd I-F trans., primary tuning; 1st I-F trans., primary tuning 1st I-F trans., sec. tuning; 2nd I-F trans., primary tuning; 2nd I-F trans., sec. tuning	M; Type PO	47X205
16	3D9125	CAPACITOR: Molded; silvered mica, 125 mmf., ±5%.	3rd I-F trans., secondary tuning	M; Type PO	47X250
17	3D9050-33.1	CAPACITOR: Molded; silvered mica, 50 mmf., ±10%.	C-W osc.; grid coupling	M or C; Type PO or Ceramic, C Class D	47X267
19	3D9250-18.1	CAPACITOR: Molded; silvered mica, 250 mmf., ±2%.	C-W osc.; secondary tuning	M; Type PO	47X281
20-1 20-2	3DA6-36	CAPACITOR: Molded; 6,000 mmf., ±5%.	R-F unit, AVC bypass; Det. unit; grid bias filter	M; Type W	47X228
21	3DA3-20	CAPACITOR: Molded; 3,000 mmf., ±3%.	Ant. unit; series capacitor; Bands 3 and 4	M or CD; Type W or CD, Type 1W	47X245
22	3DA2-61	CAPACITOR: Molded; 2,000 mmf., ±5%.	Ant. unit; Ant. series	M or CD; Type W or CD, Type 1W	47X257
23-1 23-2	3DA2-61.1	CAPACITOR: Molded; 2,000 mmf., ±2%.	R-F unit; AVC bypass; Det. unit; grid bias filter; bands 3 and 4	M or CD; Type W or PW or CD, Type 1W	47X229
24-1 24-2	3DA1.500-3	CAPACITOR: Molded; 1,500 mmf., ±20%.	3rd I-F grid; return bypass audio plate bypass	M; Type W	47X264
25	3DA1.250-1	CAPACITOR: Molded; 1,250 mmf., ±10%.	Audio grid coupling	M; Type W	47X268
26	3D9200-23.1	CAPACITOR: Molded; 200 mmf., ±20%.	Det. unit; plate series	M; Type O	47X226
27-1 27-2 27-3	3D9100-56 or 3DK9100-108	CAPACITOR: Molded; 100 mmf., ±20%.	2nd Det., AVC diode coupling; 2nd Det., diode filter; 2nd Det., diode filter	M or C; Type O or Ceramic, C Class D	47X266
31	3D9160-1	CAPACITOR: Ceramic, 160 mmf., ±1.5%, Class B.	Ant. unit; shunt band 4	C	47X248
32	3D9138	CAPACITOR AND INSULATOR ASSEMBLY: Ceramic; 138 mmf., ±1%, Class B.	Ant. unit; tuning capacitor shunt, band 6		25A444
33	3D9110-1	CAPACITOR: Ceramic; 110 mmf., +0 −5%, Class C.	Ant. unit; shunt, band 3	C	47X247
34	3D9100-55.1	CAPACITOR: Ceramic; 100 mmf., ±20%, Class D.	Crystal filter; stage coupling	C	47X269
35-1 35-2	3D9095-1	CAPACITOR: Ceramic; 95 mmf., ±1.5%, Class C.	Osc. unit, compensating capacitor, band 4; Osc. unit, compensating capacitor, band 6	C	47X261
36	3D9095-2	CAPACITOR: Ceramic; 95 mmf. ±1%, Class C.	Ant. unit; tuning capacitor shunt, band 5	C	47X275

TABLE OF REPLACEABLE PARTS (Continued)

MODEL: Radio Receivers BC-348-J, BC-348-N and BC-348-Q — **MAJOR UNIT: Radio Receiver BC-348-(★)**

Reference Symbol	Army Stock No. Navy Type No. British Ref. No.	Name of Part and Description	Function	Mfr. and Designation	Drawing or Spec. No.
38	3DK9085-6	CAPACITOR: Ceramic; 85 mmf., ±2.5%, Class C.	R-F unit; shunt, band 4	C	47X223
39-1 39-2	3D9081	CAPACITOR: Ceramic; 81 mmf., ±2.5%, Class C.	Det. unit, shunt, band 4; Det. unit tuning, capacitor, shunt, band 6	C	47X279
40	3D9074	CAPACITOR: Ceramic; 74 mmf., ±2.5%, Class C or MC.	R-F unit tuning capacitor shunt, band 6	C or MC; Type 31N150	47X283
41	3DK9075-14	CAPACITOR: Ceramic; 75 mmf., ±5%, Class C or MC.	Ant. unit; primary tuning capacitor	C or MC; Type 38N200	47X246
42-1 42-2	3D9067E5	CAPACITOR: Ceramic; 67.5 mmf., ±1.5%, Class C.	Osc. unit, compensating capacitor, band 3; Osc. unit compensating capacitor, band 5	C	47X240
43-1 43-2	3D9062-1	CAPACITOR: Ceramic; 62 mmf., ±3%, Class D.	R-F unit tuning; capacitor shunt, band 5; Det. unit tuning capacitor shunt, band 5	C	47X224
44-1 44-2	3D9056-6	CAPACITOR: Ceramic; 56 mmf. ±2.5%, Class C.	R-F unit, shunt, band 3; Det. unit, shunt, band 3	C	47X222
45	3D9053	CAPACITOR: Ceramic; 53 mmf., ±2%, Class D or MC.	Osc. unit, series padder, shunt, band 1	C or MC; Type 38N100	47X259
46	3D9050-72	CAPACITOR: Ceramic; 50 mmf., ±20%, Class D or MC.	2nd Det., diode filter	C or MC; Type ¾ 31PNOO	47X282
47-1 47-2	3D9025-35	CAPACITOR: Ceramic; 25 mmf., ±10%, Class D.	Ant. unit, grid isolation; osc. unit, grid coupling	C	47X273
48	3D9022-3	CAPACITOR: Ceramic; 22 mmf., ±5%, Class D.	Osc. unit, compensating capacitor, band 2	C	47X239
49-1 49-2	3D9020-13	CAPACITOR: Ceramic; 20 mmf., ±5%, Class D.	Ant. unit, shunt, band 2; Osc. unit, compensating capacitor, band 1	C	47X258
50	3D9020-12	CAPACITOR: Ceramic; 20 mmf., ±1.5%, Class D.	Ant. unit, shunt, band 5	C	47X249
51	3D9010-34	CAPACITOR: Ceramic; 10 mmf., ±10%, Class D.	R-F unit, shunt, band 2	C	47X221
52	3D9007-3	CAPACITOR: Ceramic; 7 mmf., ±.5 mmf., Class D.	Det. unit, shunt, band 2	C	47X277
53	3D9007-3.1	CAPACITOR: Ceramic; 7 mmf., ±.5 mmf., Class D.	Ant. unit, antenna coupling	C	47X255
55	3D9005-25	CAPACITOR: Ceramic; 5 mmf., ±10%, Class D.	Ant. unit, ant. series, band 1	C	47X253

56	3D9003E25	CAPACITOR: Ceramic; 3 mmf., ±.25 mmf., Class D.	Ant. unit, ant. series, band 2	C	47X254
60	3DA50-61	CAPACITOR: Tubular; .05 mf., 400 v, ±10%.	Osc. unit, screen bypass	JEF	46X344
61-1	3DA10-165	CAPACITOR: Tubular; .01 mf., 400 v, ±10%.	1st R-F tube, plate series		
61-2			2nd R-F stage, screen bypass		
61-3			1st and 2nd I-F, screen bypass		
61-4			3rd I-F, screen bypass		
61-5			3rd I-F, plate filter		
61-6			AVC filter	JEF	46X343
61-7			AVC filter		
61-8			Audio output filter		
61-9			"A" line bypass		
61-10			Transmitter relay bypass		
63-1	3DA100-144	CAPACITOR: Tubular; .1 mf., 150 v, ±10%.	Cathode bypass, 1st and 2nd I-F	JEF	46X349
63-2			Audio bias filter		
64	3DA50-62	CAPACITOR: Tubular; .05 mf., 150 v, ±10%.	AVC time constant	JEF	46X346
65	3DA250-44	CAPACITOR: Tubular; .25 mf., 100 v, ±10%.	Cathode bypass for R-F stages	JEF	46X350
66	3DA250-45	CAPACITOR: Tubular; .25 mf., 100 v, ±10%.	Manual volume control bypass	JEF	46X352
70-A	3DB6-10	CAPACITOR: Filter block; 6 mf., 400 v, +35% −5%; 1 mf.,	High voltage filter	JEF	48X231
70-B		100 v, +35% −5%.	2nd Det., C-W osc., cathode bypass		
81	3Z6006-11	RESISTOR: Wire wound; 60 ohms, 2.0 w, ±10%.	Pilot light series	UR; Type 5-BW	43X139
82	3Z6019-1	RESISTOR: Carbon; 190 ohms, 2.0 w, ±10%.	Heater shunt	C; Type 316	D94191
83	3Z6620-67	RESISTOR: Carbon; 20,000 ohms, 1.0 w, ±10%.	1st Det. and osc. screen	C; Type 314	C94203
84	3Z5997-4	RESISTOR: Carbon; 7 ohms, 1.0 w, ±20%.	Heater series	SC; Type MB-1	C85070
85	3Z5995-9	RESISTOR: Carbon; 5 ohms, 1.0 w, ±20%.	Heater series	SC; Type MB-1	C85050
86	3ZK6802-18	RESISTOR: Carbon; 2 megohms, 0.5 w, ±10%.	AVC diode	C; Type 710	B84205
87-1	3Z6801-39	RESISTOR: Carbon; 1 megohm, 0.5 w, ±10%.	Ant. unit, AVC grid	C; Type 710	B84105
87-2			Det. unit, grid bias		
87-3			R-F screen bleeder		
87-4			I-F screen bleeder		
87-5			Audio grid		
88	3ZK6750-42	RESISTOR: Carbon; 0.5 megohm, 0.5 w, ±10%.	Ant. unit, pri. shunt, band 1	C; Type 710	B84504
89	3Z6630-36	RESISTOR: Carbon; 30,000 ohms, 0.2 w, ±10%.	R-F unit, tuning capacitor shunt, band 5	C; Type 713	A84303
90	3ZK6730-13	RESISTOR: Carbon; 0.3 megohm, 0.5 w, ±10%.	AVC diode, isolating	C; Type 710	B84304
91	3ZK6725-29	RESISTOR: Carbon; 0.25 megohm, 0.5 w, ±10%.	Audio bias filter	C; Type 710	B84254
92	3ZK6712-5	RESISTOR: Carbon; 0.12 megohm, 0.5 w, ±10%.	Third I-F screen	C; Type 710	B84124

TABLE OF REPLACEABLE PARTS (Continued)

MODEL: Radio Receivers BC-348-J, BC-348-N and BC-348-Q **MAJOR UNIT: Radio Receiver BC-348-(★)**

Reference Symbol	Army Stock No. Navy Type No. British Ref. No.	Name of Part and Description	Function	Mfr. and Designation	Drawing or Spec. No.
93-1 93-2 93-3 93-4	3Z6700-50	RESISTOR: Carbon; 0.1 megohm, 0.5 w, ±10%.	R-F unit, AVC filter, band 3 and 4 Det. unit, grid bias filter, band 3 and 4 C-W osc. grid 2nd R-F screen	C; Type 710	B84104
94-1 94-2	3Z6680-9	RESISTOR: Carbon; 80,000 ohms, 0.5 w, ±10%.	Osc. unit, grid leak High voltage bleeder	C; Type 710	B84803
95	3ZK6670-21	RESISTOR: Carbon; 70,000 ohms, 0.5 w, ±10%.	Output trans., primary shunt	C; Type 710	B84703
96-1 96-2	3Z6650-43	RESISTOR: Carbon; 50,000 ohms, 0.5 w, ±10%.	Audio grid filter AVC filter	C; Type 710	B84503
97-1 97-2 97-3	3Z6635-7	RESISTOR: Carbon; 35,000 ohms, 0.5 w, ±10%.	C-W osc. plate load 1st and 2nd I-F screen Noise reducing circuit	C; Type 710	B84353
98-1 98-2 98-3	3Z6625-23	RESISTOR: Carbon; 25,000 ohms, 0.5 w, ±10%.	R-F unit, AVC line Diode filter Diode filter	C; Type 710	B84253
99-1 99-2 99-3	3Z6615-37	RESISTOR: Carbon; 15,000 ohms, 0.5 w, ±10%.	2nd I-F grid AVC filter 1st R-F plate load	C; Type 710	B84153
100-1 100-2	3Z6610-67	RESISTOR: Carbon; 10,000 ohms, 0.5 w, ±10%.	Ant. Unit, pri. shunt, band 2 R-F plate load	C; Type 710	B84103
101-1 101-2	3Z6500-63	RESISTOR: Carbon; 5,000 ohms, 0.5 w, ±10%.	1st I-F plate load Noise reducing circuit	C; Type 710	B84502
102	3Z6350-11	RESISTOR: Carbon; 3,500 ohms, 0.5 w, ±10%.	AVC delay	C; Type 710	B84352
103	3Z6100-91	RESISTOR: Carbon; 1,000 ohms, 0.5 w, ±10%.	3rd I-F plate filter	C; Type 710	B84102
104*	3ZK6075-29	RESISTOR: Carbon; 750 ohms, 0.5 w, ±10%.	Osc. unit, primary shunt, band 6	C; Type 710	B84751
105	3Z6060-19	RESISTOR: Carbon; 600 ohms, 0.5 w, ±10%.	3rd I-F cathode	C; Type 710	B84601
106	3Z6025-15	RESISTOR: Carbon; 250 ohms, 0.5 w, ±10%.	R-F bias	C; Type 710	B84251
107-1 107-2 107-3	3Z6010-35	RESISTOR: Carbon; 100 ohms, 0.5 w, ±10%.	R-F unit, coupling, band 1 Det. unit, coupling, band 1 AVC compensator	C; Type 710	B84101

108-1 108-2	3Z6005-42	RESISTOR: Carbon; 50 ohms, 0.2 w, ±10%.	Det. unit, audio and 1st Det. bias Audio and 1st Det. bias	C; Type 713	A84500
109-1 109-2	3ZK6715-34	RESISTOR: Carbon; 0.15 megohm, 0.5 w, ±10%.	R-F unit, secondary shunt, band 1 Det. unit, secondary shunt, band 1	C; Type 710	B84154
110	2Z7284-8	RESISTOR: Vol. control; front section, 20,000 ohms, ±20%; Vol. control; rear section, 350,000 ohms, ±20%.	Vol. control, MVC operation Vol. control, AVC operation	CTS	36X325
111	3Z7200-4	RESISTOR: Rheostat; 200 ohms.	Dial illumination control	CTS	43X141
112	3Z6620-66	RESISTOR: Carbon; 20,000 ohms, 0.2 w, ±10%.	R-F unit, tuning capacitor shunt, band 6	C; Type 713	A84203
113	3Z6040-22	RESISTOR: Carbon; 400 ohms, 0.5 w, −0 +20%.	1st and 2nd I-F bias	C; Type 710	B86401
120	3CK1084E-1	R-F COIL: Ant. Band 1.	Ant. to 1st R-F tube coupling		9A1571
121	3CK1084E-2	R-F COIL: Ant. Band 2.	Ant. to 1st R-F tube coupling		9A1572
122	3CK1084E-3	R-F COIL: Ant. Band 3.	Ant. to 1st R-F tube coupling		9A1573
123	3CK1084E-4	R-F COIL: Ant. Band 4.	Ant. to 1st R-F tube coupling		9A1568
124	3CK1084E-5	R-F COIL: Ant. Band 5.	Ant. to 1st R-F tube coupling		9A1569
125	3CK1084E-6	R-F COIL: Ant. Band 6.	Ant. to 1st R-F tube coupling		9A1570
126	3CK1084E-7	R-F COIL: R-F Band 1.	1st R-F tube to 2nd R-F tube coupling		9A1583
127	3CK1084E-8	R-F COIL: R-F Band 2.	1st R-F tube to 2nd R-F tube coupling		9A1584
128	3CK1084E-9	R-F COIL: R-F Band 3.	1st R-F tube to 2nd R-F tube coupling		9A1585
129	3CK1084E-10	R-F COIL: R-F Band 4.	1st R-F tube to 2nd R-F tube coupling		9A1580
130	3CK1084E-11	R-F COIL: R-F Band 5.	1st R-F tube to 2nd R-F tube coupling		9A1581
131	3CK1084E-12	R-F COIL: R-F Band 6.	1st R-F tube to 2nd R-F tube coupling		9A1582
132	3CK312-3	DET. COIL: Det. Band 1.	2nd R-F tube to 1st Det. tube coupling		9A1577
133	3CK312-4	DET. COIL: Det. Band 2.	2nd R-F tube to 1st Det. tube coupling		9A1578
134	3CK312-5	DET. COIL: Det. Band 3.	2nd R-F tube to 1st Det. tube coupling		9A1579
135	3CK312-6	DET. COIL: Det Band 4.	2nd R-F tube to 1st Det. tube coupling		9A1574

TABLE OF REPLACEABLE PARTS (Continued)

MODEL: Radio Receivers BC-348-J, BC-348-N and BC-348-Q **MAJOR UNIT: Radio Receiver BC-348-(★)**

Reference Symbol	Army Stock No. Navy Type No. British Ref. No.	Name of Part and Description	Function	Mfr. and Designation	Drawing or Spec. No.
136	3CK312-7	DET. COIL: Det. Band 5.	2nd R-F tube to 1st Det. tube coupling		9A1575
137	3CK312-8	DET. COIL: Det. Band 6.	2nd R-F tube to 1st Det. tube coupling		9A1576
138	3CK1081-8A	OSC. COIL: Osc. Band 1.	Osc. coupling		9A1591
139	3CK1081-8B	OSC. COIL: Osc. Band 2.	Osc. coupling		9A1590
140	3CK1081-8C	OSC. COIL: Osc. Band 3.	Osc. coupling		9A1589
141	3CK1081-8D	OSC. COIL: Osc. Band 4.	Osc. coupling		9A1588
142	3CK1081-8E	OSC. COIL: Osc. Band 5.	Osc. coupling		9A1586
143	3CK1081-8F	OSC. COIL: Osc. Band 6.	Osc. coupling		9A1587
147	2Z9642.6	I-F COIL ASSEM.: 1st I-F; Incl. Refs., 15-2, 15-3, 232-1.	1st Det. tube to 1st I-F tube coupling		9A1592
148	2Z9642.6	I-F COIL ASSEM.: 2nd I-F; Incl. Refs., 15-4, 15-5, 232-2.	2nd I-F tube to 3rd I-F tube coupling		9A1593
149	2Z9642.10	I-F COIL ASSEM.: 3rd I-F; Incl. Refs., 15-1, 16, 232-3.	3rd I-F tube to 2nd Det. tube coupling		9A1594
150	3C1084E	COIL: Crystal neutralizing coil.	Noise suppression		9A1597
151	2Z9642.12	C-W OSC. COIL ASSEMBLY: C-W Osc.; Incl. Refs., 14, 17, 19, 233.	C-W osc. plate to grid coupling		9A1596
152	2Z9642.8	I-F TRAP ASSEMBLY: Filter trap; Incl. Ref. 8.	Det. unit, filters I-F from bands 1 and 2		9A1606
155-A 155-B	2Z9626.4	AUDIO PACK ASSEMBLY: Audio transformer, power supply choke.	Output Power supply filter and audio bias	ST or MT or RD	51X106
161	3Z9825-68.2	SWITCH: Six position, two section wafer type.	Antenna unit band switch	C	2A244
162-1 162-2	3Z9825-68.3	SWITCH: Six position, two section wafer type.	R-F unit band switch Det. unit band switch	C	2A245
163	3Z9825-68.4	SWITCH: Six position, two section wafer type.	Osc. unit band switch	C	2A246
168	3Z9825-69	SWITCH: D. P. S. T.	C-W osc. OFF-ON and time constant change	CTS	2A251

169	3Z9825-68.1	SWITCH: Three position, wafer type.	AVC-MVC selector and receiver OFF-ON switch	C	2A250
170	2Z8678.12	SOCKET: 8 prong, octal molded; 8 used.	Tube mounting	NF or RM	3A328
171		SOCKET: Bayonet type; 2 used.	Dial lamp mounting	D	7A158
172	3Z2909	FUSE BOARD ASSEMBLY: Insulator strip with fuse clips.	Fuse receptacle	L	16X72
173-1 173-2	2ZK5531.6	JACK: Single circuit.	Head phone connector	UR	3A332
174-1 174-2	3Z737-14	BINDING POST: Spring locking.	Antenna connection Ground connection	E	30X288
175	2Z3084	SO-104: 8-prong, power connector.	Power connections		6A254
185	2Z5927	DIAL LAMP LM-27: 6-8 v, .25 amp., No. 44 Mazda; 2 used.	Dial illumination	GE	7A160
186	3Z1935	FUSE FU-35: 5 amp., 25 v.	Receiver protection	L; Type 4-AG	16X71
190	2C4348Q/T5	ANTENNA UNIT ASSEMBLY: Complete with shields, incl. Refs. 2-1A, 2-1B, 2-2A, 2-2B, 2-3A, 2-3B, 9, 21, 22, 31, 32, 33, 36, 41, 47-1, 49-1, 50, 53, 55, 56, 87-1, 88, 100-1, 120, 121, 122, 123, 124, 125, 161, 164, 165, 166, 199, 204, 220, 225.	Antenna to 1st R-F tube coupling		25A384
191	2C4348Q/T2	R-F UNIT ASSEMBLY: Complete with shields, incl. Refs. 2-4A, 2-4B, 3-1A, 3-1B, 3-2A, 3-2B, 13-1, 20-1, 23-1, 38, 40, 43-1, 44-1, 51, 89, 93-1, 98-1, 107-1, 109-1, 112, 126, 127, 128, 129, 130, 131, 162-1, 164, 165, 166, 199, 221, 225.	1st R-F tube to 2nd R-F tube coupling		25A391
192	2C4348Q/T3	DET. UNIT ASSEMBLY: Complete with shields, incl. Refs. 2-5A, 2-5B, 2-6A, 2-6B, 3-3A, 3-3B, 8, 13-2, 20-2, 23-2, 26, 39-1, 39-2, 43-2, 44-2, 52, 87-2, 93-2, 107-2, 108-1, 109-2, 132, 133, 134, 135, 136, 137, 152, 162-2, 164, 165, 166, 199, 222, 225.	2nd R-F tube to 1st Det. tube coupling		25A389
193	2C4348Q/T4	OSC. UNIT ASSEMBLY: Complete with shields, incl. Refs. 3-4A, 3-4B, 3-5A, 3-5B, 3-6A, 3-6B, 4, 6, 7, 10, 11, 12, 35-1, 35-2, 42-1, 42-2, 45, 47-2, 48, 49-2, 60, 83, 94-1, 104, 138, 139, 140, 141, 142, 143, 163, 164, 165, 166, 170, 200, 201, 223, 224, 246.	Osc. coupling		25A395
195	2Z3419.2	CRYSTAL AND SWITCH ASSEMBLY: 915 kc crystal; in molded case with switch.	I-F filter		25A439
253	6L7986-16.8	SCREW: Knurled thumb screw; 2 used.	Fastens window frame to Ref. 250	SW or AS	20X516
288	2C4224B/S4	STUD: Slotted hex. head; 2 used.	Mounts Ref. 254 to Chassis	PM or RS	20X597
289		SPRING WASHER: Thrust washer; 2 used.	Holds Ref. 257 from 255	SW or OM	28X364
290	2Z5748	KNOB ASSEMBLY: Control less 1 Ref. 303 set screw.	Tuning capacitor		25A380
291	2Z5748.3	KNOB: Control less 1 Ref. 302 set screw.	Band switch	DD	10A477
292	2Z5748.2	KNOB: Control less 2 Ref. 305 set screws.	Beat frequency		10A481

TABLE OF REPLACEABLE PARTS (Continued)

MODEL: Radio Receivers BC-348-J, BC-348-N and BC-348-Q **MAJOR UNIT: Radio Receiver BC-348-(★)**

Reference Symbol	Army Stock No. Navy Type No. British Ref. No.	Name of Part and Description	Function	Mfr. and Designation	Drawing or Spec. No.
293	2Z5748.1	KNOB: Control less 1 Ref. 304 set screw; 4 used.	Volume, crystal, C-W osc. OFF-ON and dial light illumination	DD	10A478
294	2Z6190	LEVER: Control less 1 Ref. 302 set screw.	AVC-OFF-MVC	DD	37X215
295	6Z5018	HANDLE: Handle (mounted on front panel); 2 used.	Facilitates chassis removal	NL	4X699
301	2Z7093-2	PLATE: Front panel insert.	Cover for R-F tube shelf opening	AG	34X351
333	2Z703.1	PLUG PL-Q103: Power connector with 8 terminals and right angle fitting.	Power connections		25A426
334*	2Z703.2	PLUG PL-P103: Power connector with 8 terminals and straight fitting.	Power connections		25A438
346*	6L6440-4.6A	SCREW: Special shouldered round head; 4 used.	Mounts Refs. 333 or 334 to 330	GS	20X600
401	3H1628J	DM-28-J: 27.9 v., 1.23 amp., 224 v., 0.70 amp., 4400 RPM.	Dynamotor machine	RE; Type 355	25A419
401	3H1628N	DM-28-N: 27.9 v., 1.23 amp., 224 v., 0.70 amp., 4400 RPM.	Dynamotor machine	RE; Type 355	25A419
401	3H1628Q	DM-28-Q: 27.9 v., 1.23 amp., 224 v., 0.70 amp., 4400 RPM.	Dynamotor machine	RE; Type 355	25A419
403	3H1628H/A1	ARMATURE: Windings, commutators and bearings.	Power supply	RE	22A217
404	3H1624F/B3	BRUSH:	High voltage positive	RE; Type 101	22A209
405	3H1624F/B4	BRUSH:	High voltage negative	RE; Type 114	22A210
406	3H1624F/B5	BRUSH:	Low voltage positive	RE; Type 204	22A211
407	3H1624F/B6	BRUSH:	Low voltage negative	RE; Type 205	22A212
417-A 417-B	3DB2.230	CAPACITOR: Filter block; 2.6 mf., 400 v, ±10%; 0.5 mf., 100 v, ±10%.	Filter for dynamotor output Filter for dynamotor input	JEF	48X230
418	3DA10-165	CAPACITOR: Tubular; .01 mf., 400 v, ±10%.	Dynamotor filter	JEF	46X351
419	3DA100-145	CAPACITOR: Tubular; .1 mf., 320 v, ±10%.	Dynamotor filter	JEF	46X345
420-1 420-2	3C329-1	FILTER COIL: RF.	Filter for dynamotor B— output Filter for dynamotor B+ output		9A1605
421	3C329	CHOKE: R-F.	Filter for dynamotor input		9A1598
425	3H1624F/B1	BEARING: Ball bearing assembly; 2 used.	Armature mounting	RE	22A213
426	2C4224B/S3	SPECIAL SCREW: Captive R. H. M. S.; 4 used.	Ref. 400 mounting	GS	20X566
427	6L6832-9.7A	SPECIAL SCREW: Shouldered flathead; 4 used.	Mounts Ref. 401 to 428	AP or MM	20X503

LIST OF MANUFACTURERS AND SYMBOLS

Symbol	*Company*	*Symbol*	*Company*
AG	Aluminum Goods Mfg. Co.	M	Micamold Radio Co.
AM	American Phenolic Corp.	MC	The Muter Co.
AP	Aurora Precision Devices	MI	Micarta
AS	Armstrong Screw Products	MR	M & R Specialty Co.
B	Bristol Company	MS	Micro-Matic Spring Co.
BG	Boston Gear Works	MT	Merit Coil and Transformer Corp.
BM	Barnes Metal Products Co.	NF	National Fabricated Products
C	Centralab	NL	National Lock Co.
CD	Cornell-Dubilier Electric Corp.	O	Oak Mfg. Co.
CM	Cinch Mfg. Corp.	OM	Olson Mfg. Co.
CT	Crescent Tool & Die Co.	P	Poray, Inc.
CTS	Chicago Telephone Supply Co.	PM	Pheoll Mfg. Co.
D	Drake Mfg. Co.	PR	Pierce Roberts Rubber Co.
DD	Doehler Die Casting Co.	RD	Robertson Davis Company, Inc.
E	Hugh H. Eby, Inc.	RE	Russell Electric Co.
ER	Erie Resistor Corp.	RES	Real Equity Shop
F	The Felters Co., Inc.	RM	Rohden Mfg. Co.
FG	Franke Gear Works	RS	Rockford Screw Products Co.
GE	General Electric Co.	S	The F. W. Sickles Co.
GS	General Screw Mfg.	SC	Stackpole Carbon Co.
GSM	Grand Sheet Metal Works	SF	Spaulding Fibre Co., Inc.
HS	Hudson Screw Machine Products Co.	SM	F. H. Smith Mfg. Co.
IM	Industrial Molded Products Co.	SP	Shakeproof, Inc.
INS	Industrial Spring Co.	SS	Set Screw & Mfg. Co.
IS	International Spring Co.	ST	Standard Transformer Corp.
JEF	John E. Fast & Co.	SW	Stewart Warner Corp.
K	The Kirby Co.	UC	Universal Castings Corp.
L	Littelfuse, Inc.	UR	Utah Radio Products
LS	Lemke Screw Products Co.	W	Webster Chicago Corp.

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SECTION VIII
DRAWINGS

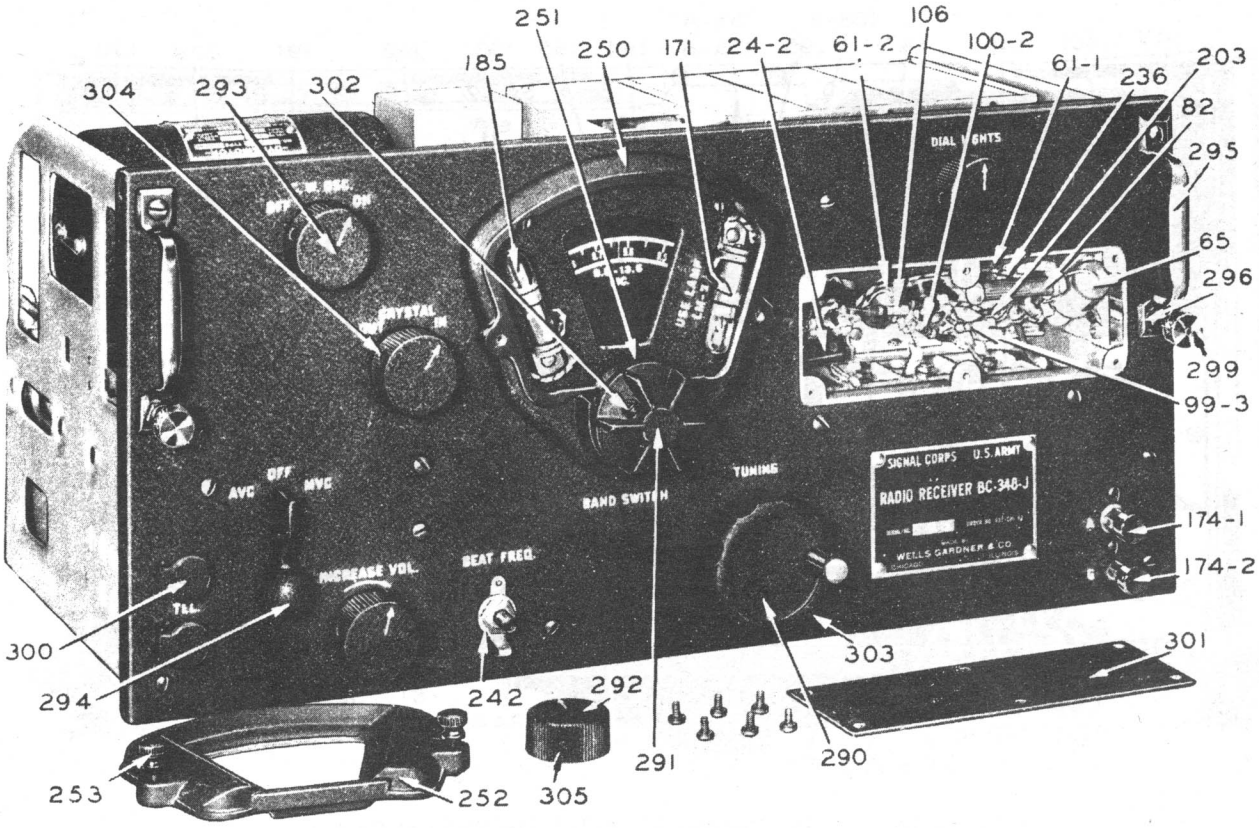

Figure 14 — Radio Receiver BC-348-J, Front View

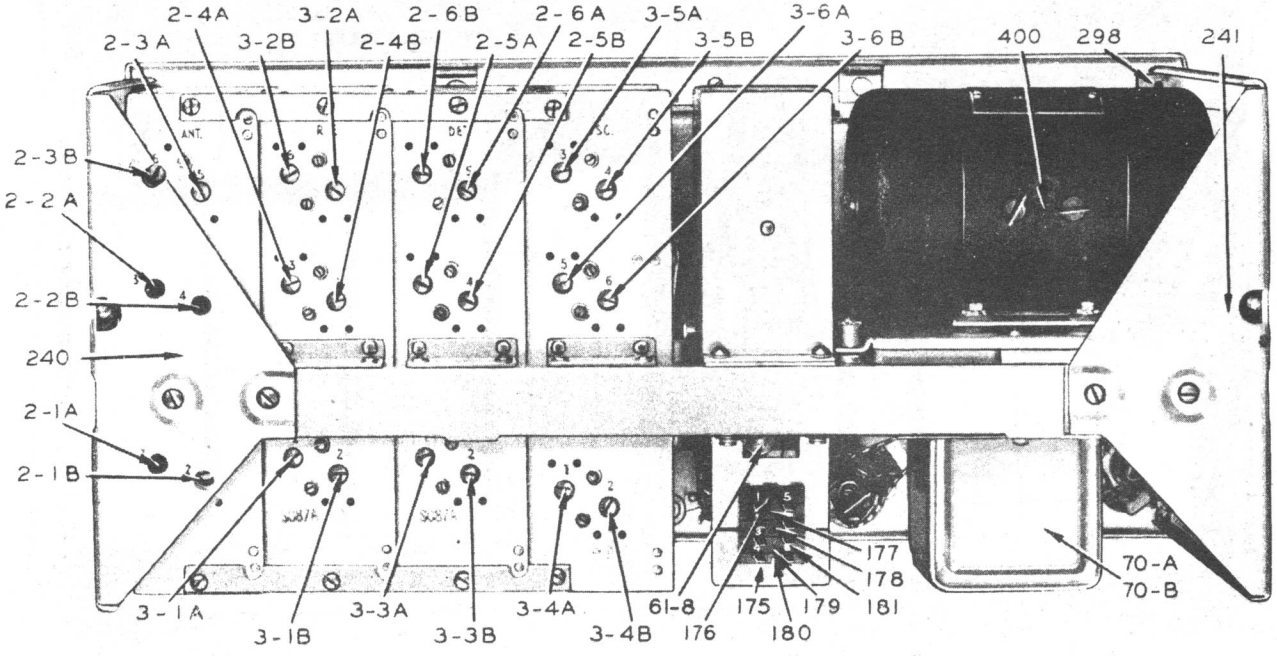

Figure 15 — Radio Receiver BC-348-J, Rear View of Chassis

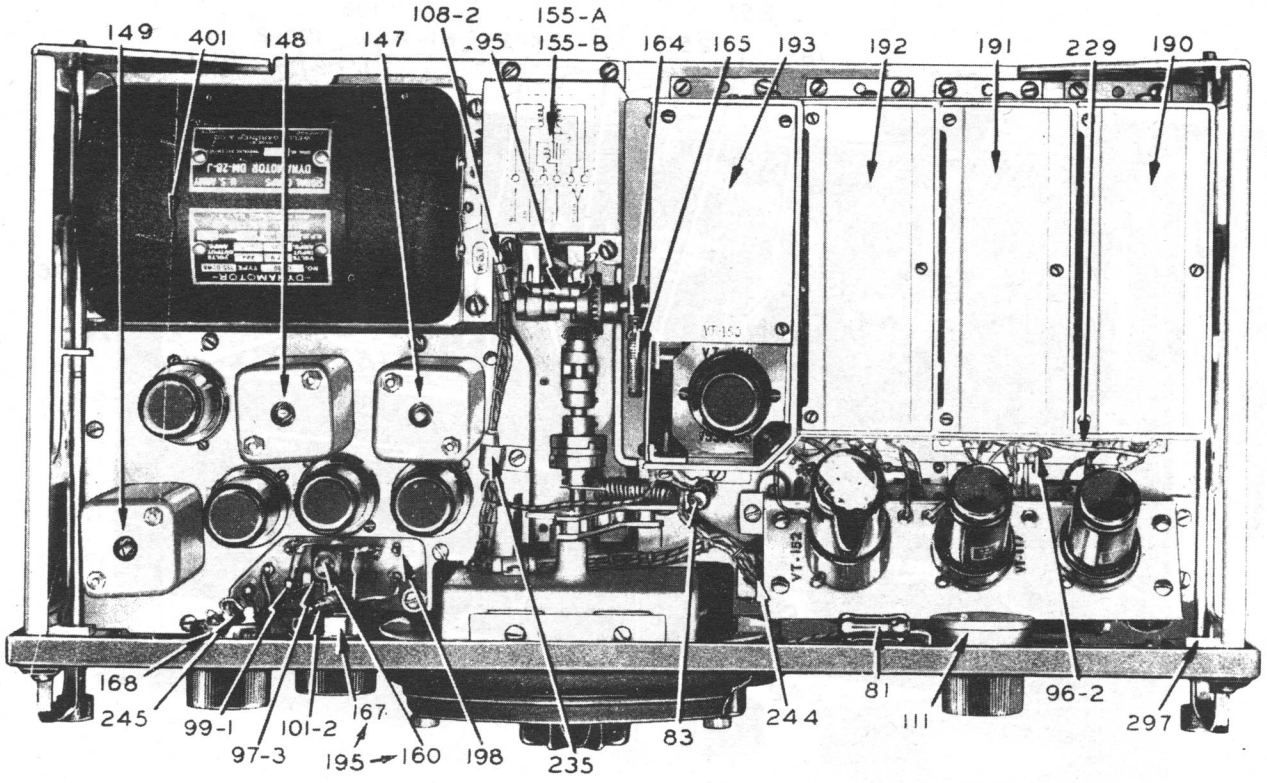

Figure 16 — Radio Receiver BC-348-J, Top View of Chassis

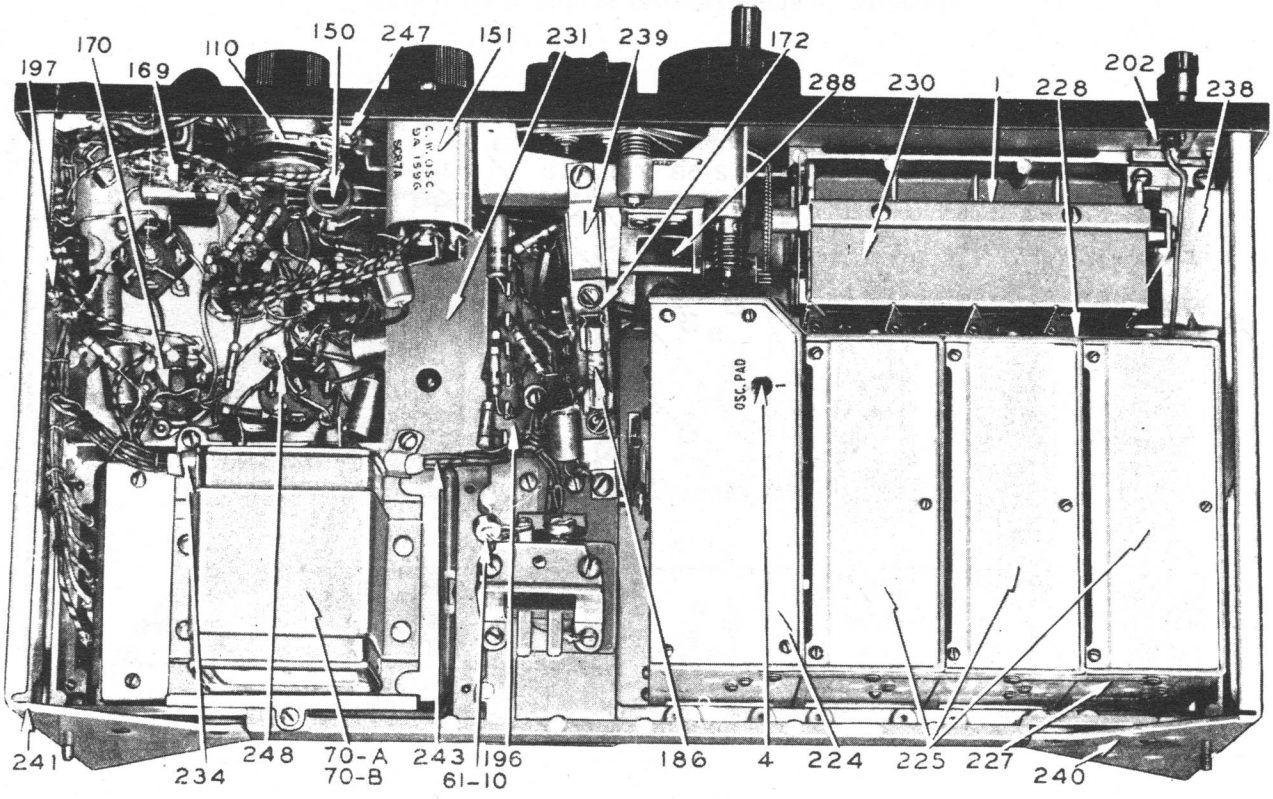

Figure 17 — Radio Receiver BC-348-J, Bottom View of Chassis

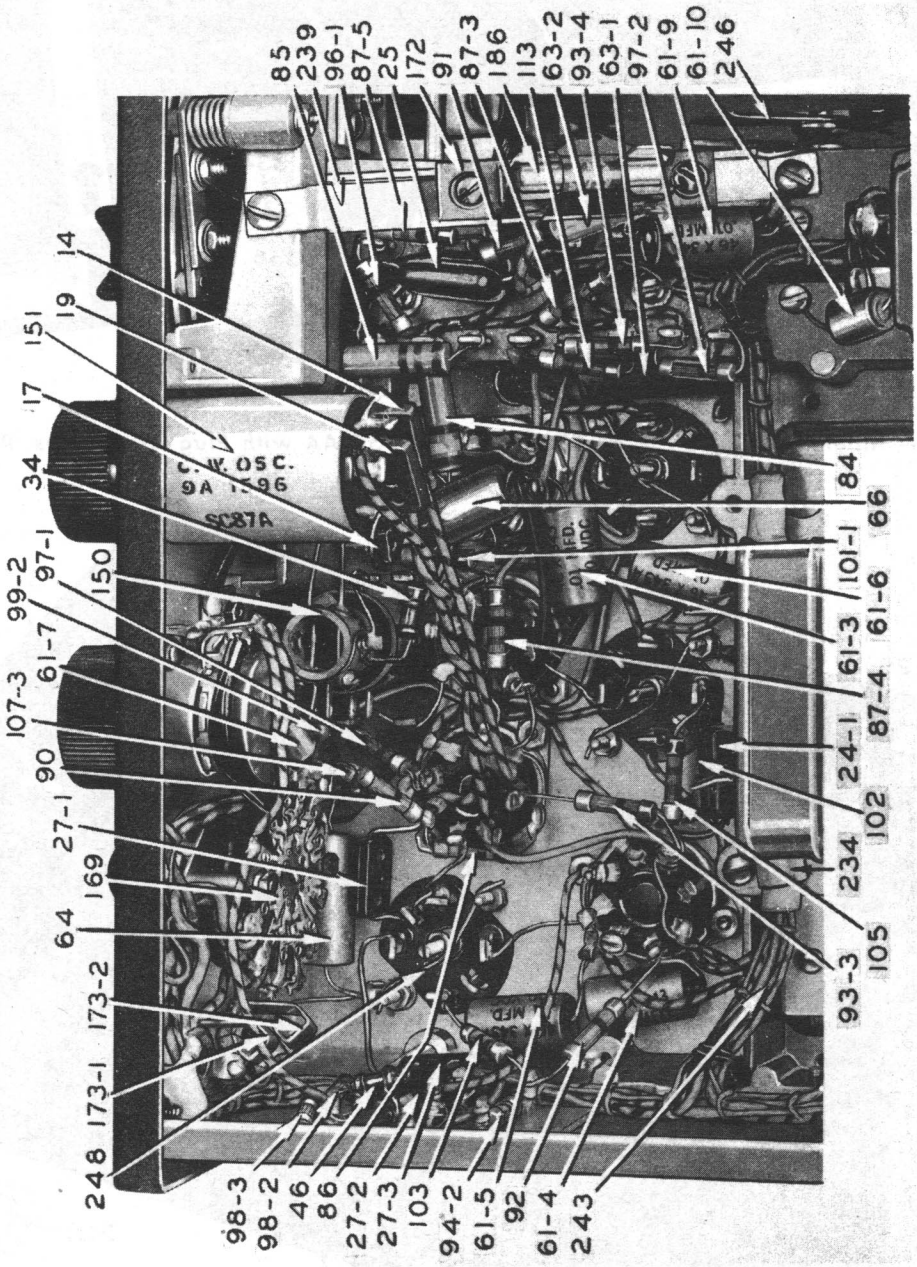

Figure 18 — Radio Receiver BC-348-J, Partial Bottom View

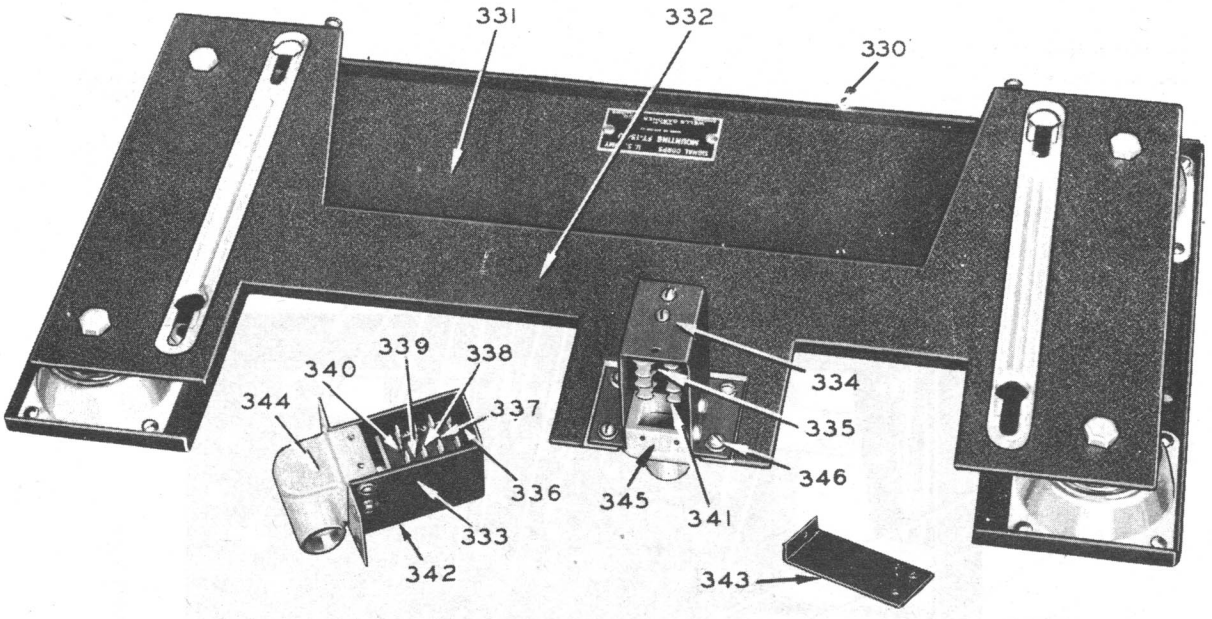

Figure 19 — Mountings FT-154-J, FT-154-Q, and FT-154-AA with Plug Assemblies, Rear View

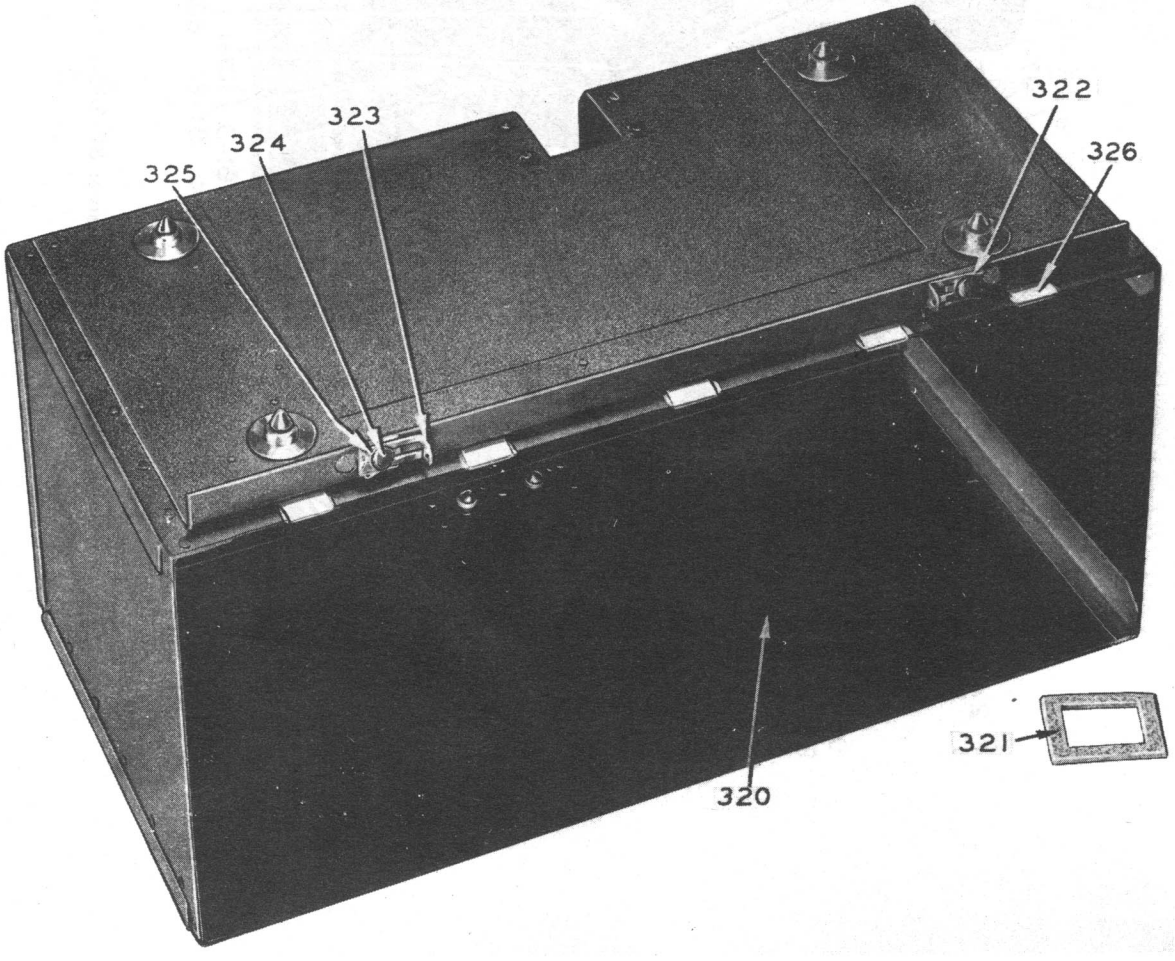

Figure 20 — Radio Receiver BC-348-J, Front View of Cabinet

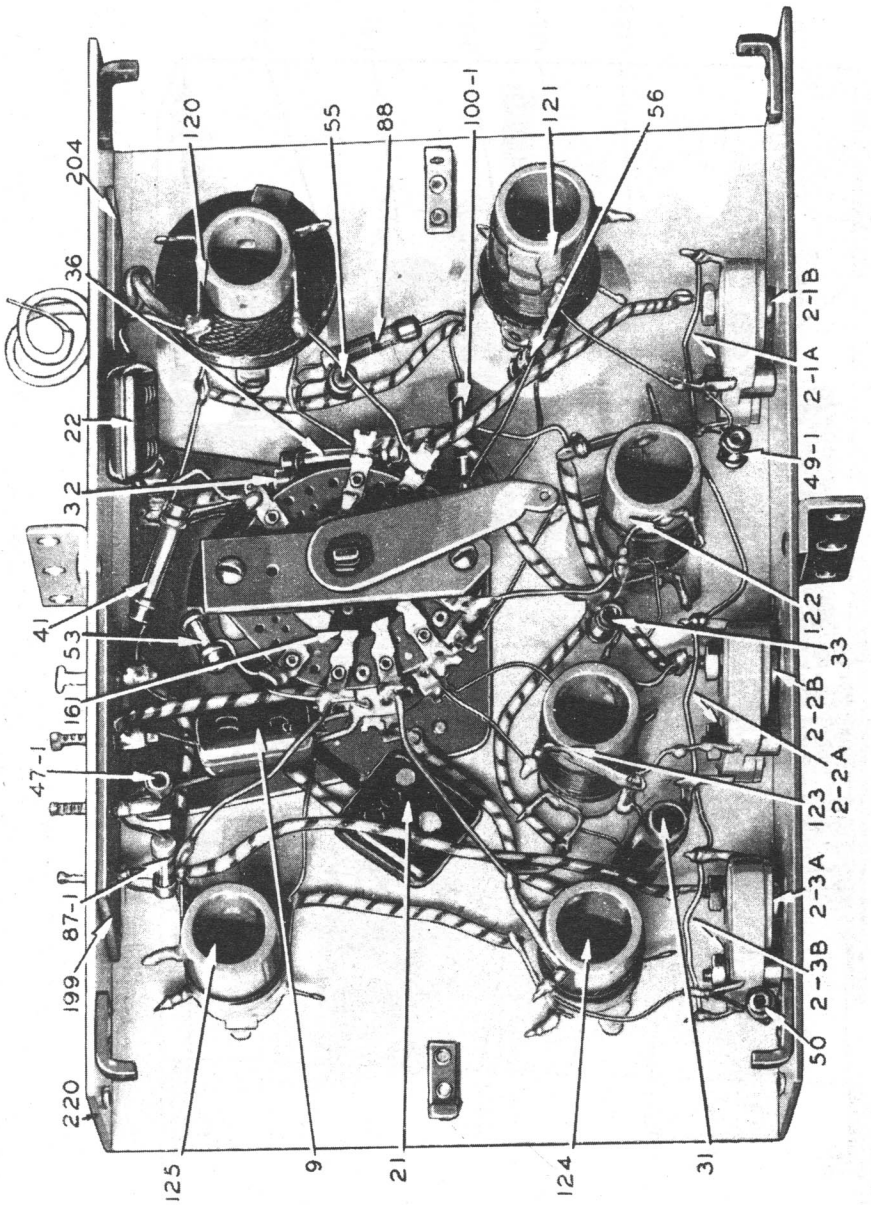

Figure 21 — Antenna Unit

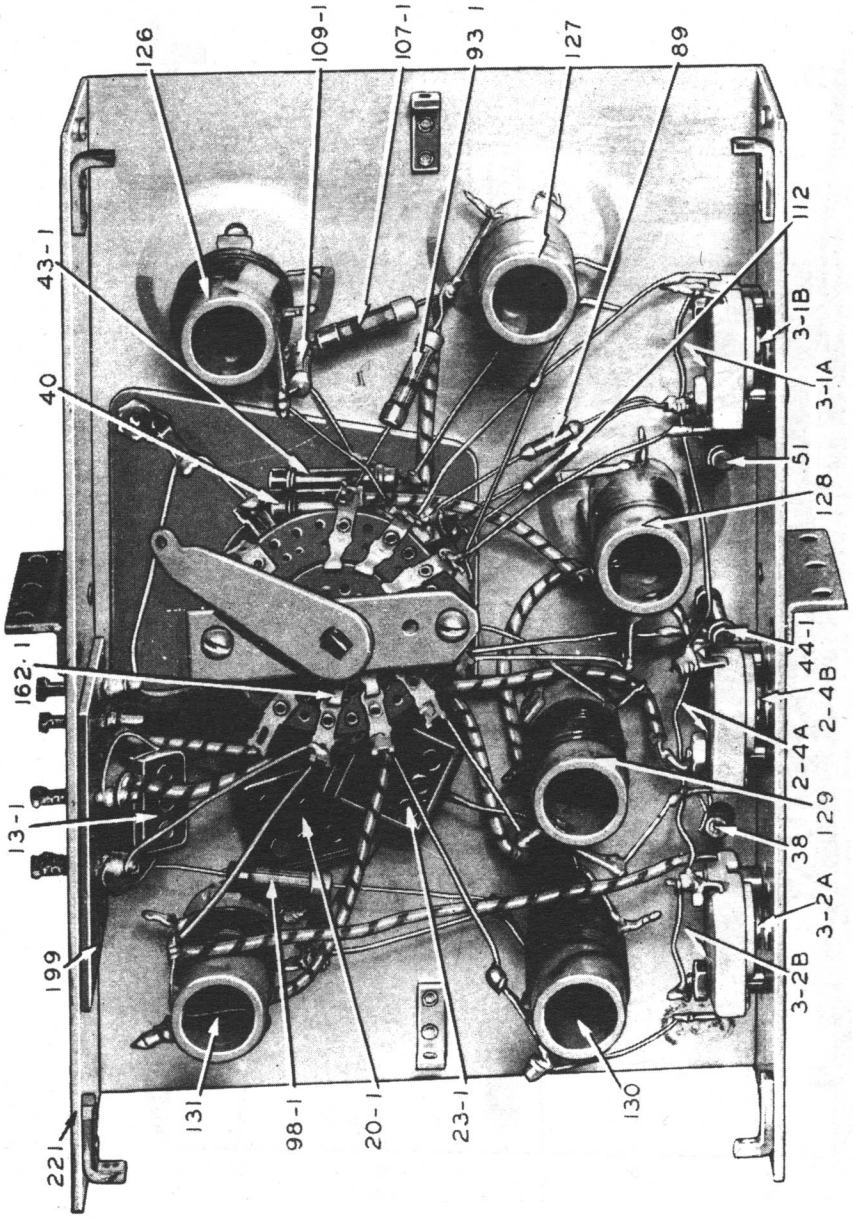

Figure 22 — R-F Unit

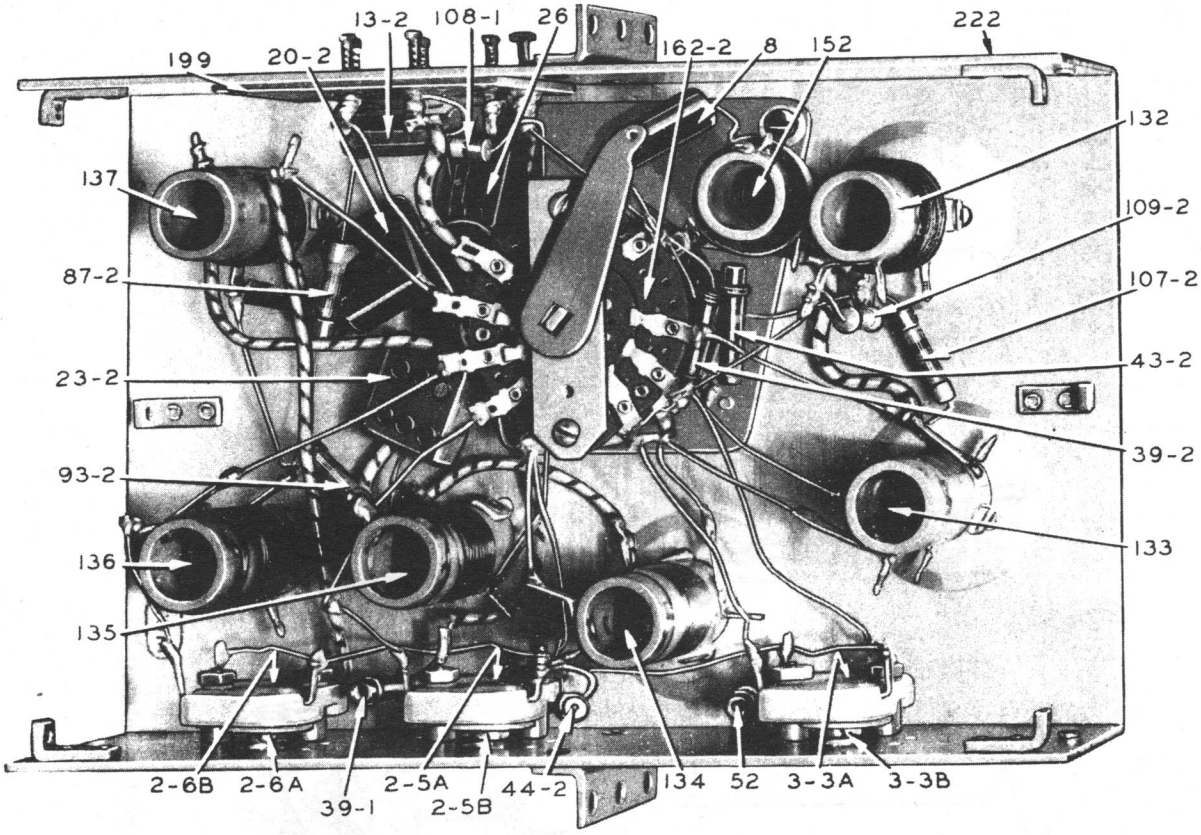

Figure 23 — Detector Unit

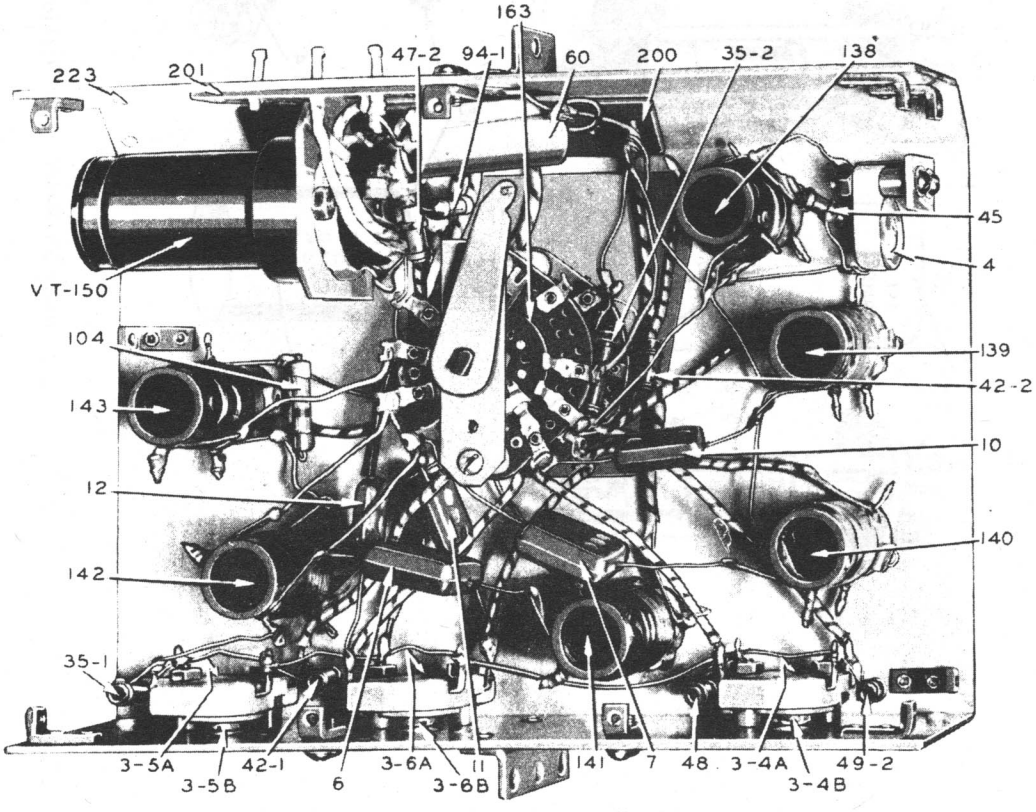

Figure 24 — Oscillator Unit

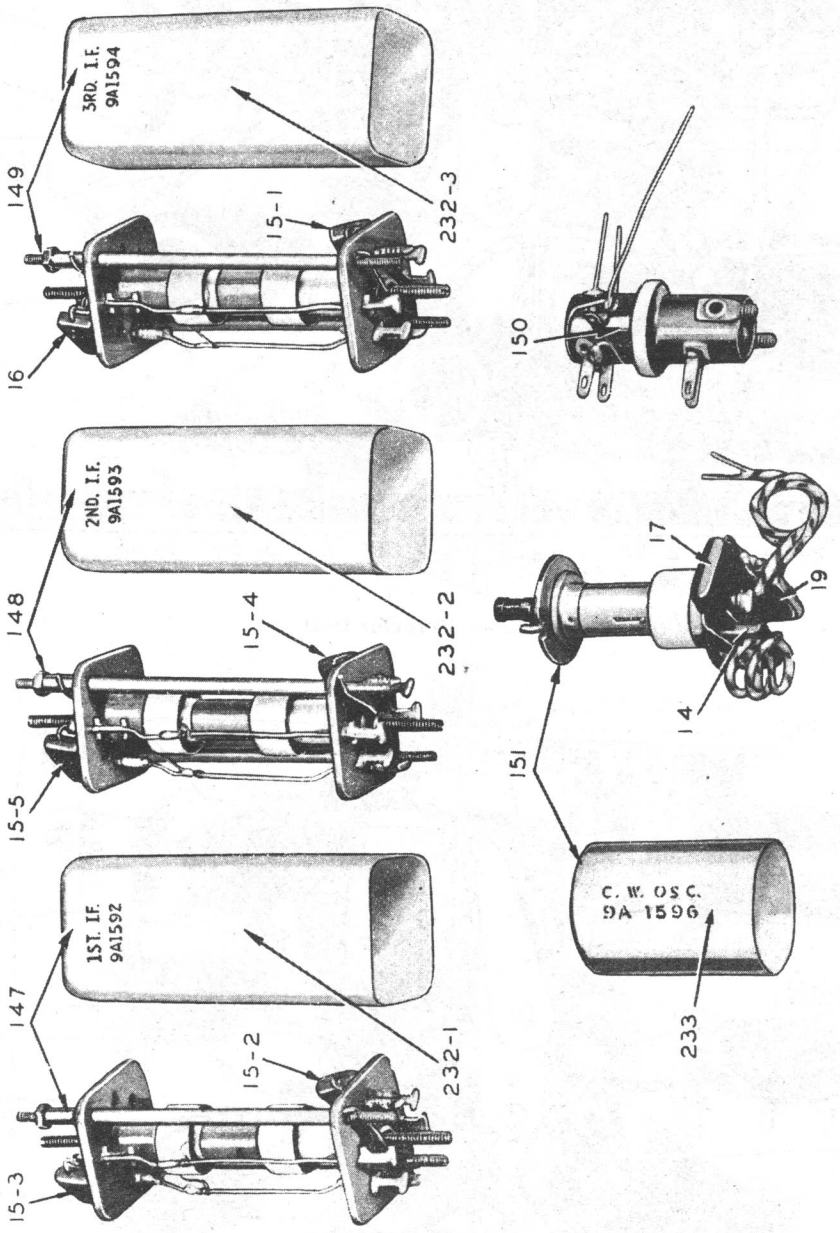

Figure 25 — I-F C-W Oscillator and Crystal Coil Assemblies

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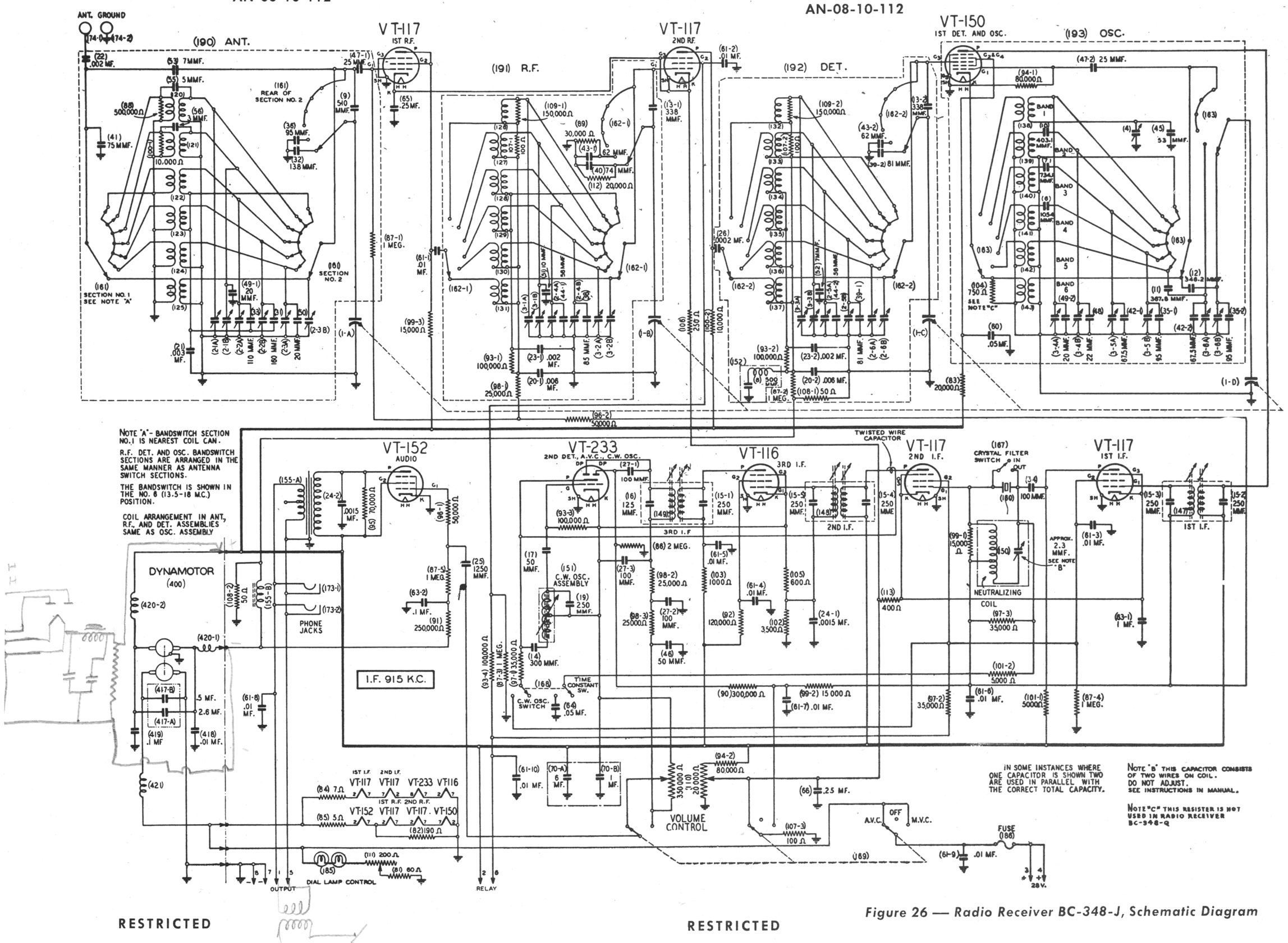

Figure 26 — Radio Receiver BC-348-J, Schematic Diagram

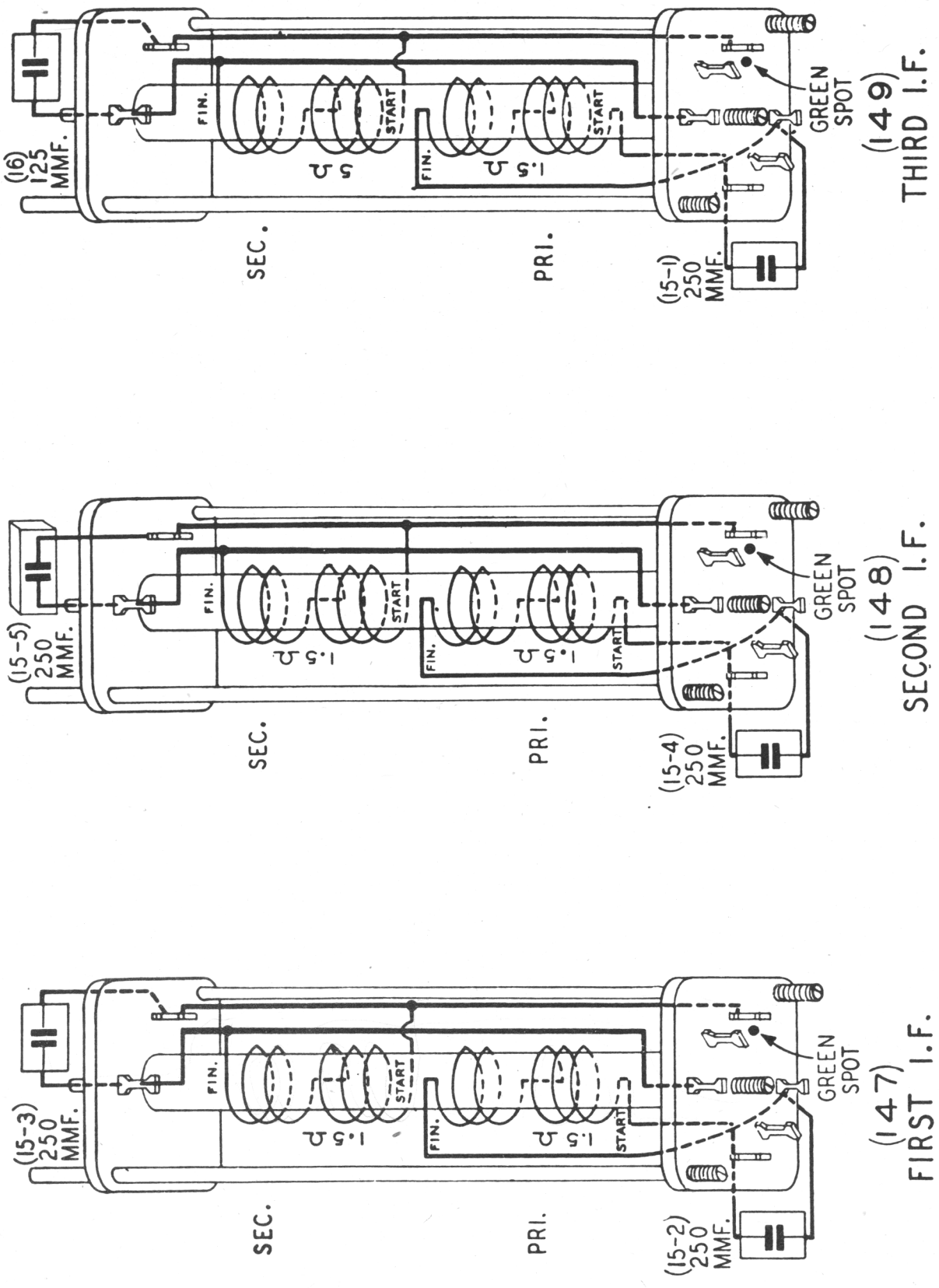

Figure 27 — I-F Transformers, Wiring Diagram

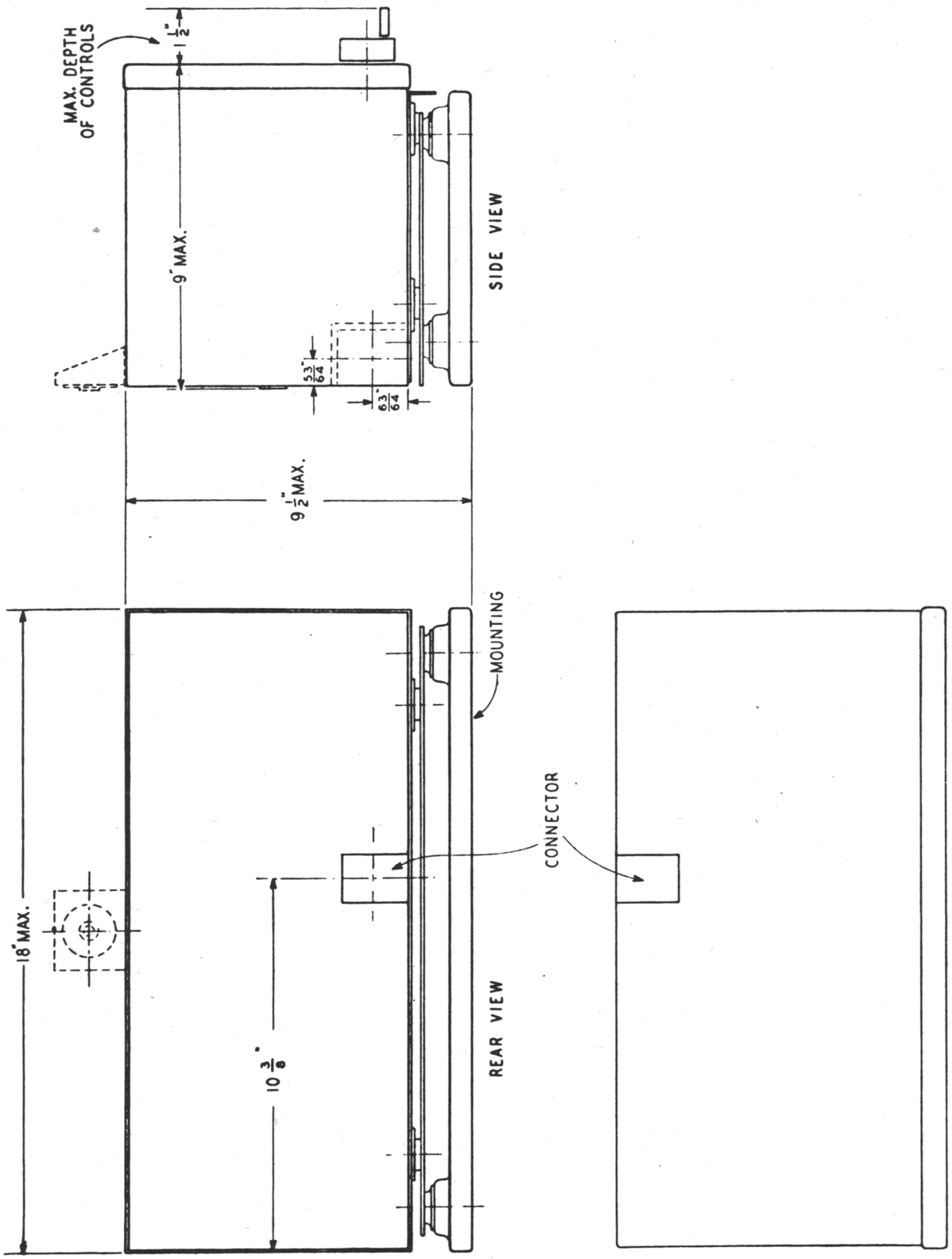

Figure 28 — Radio Receiver BC-348-J, Outline Dimensional Sketch

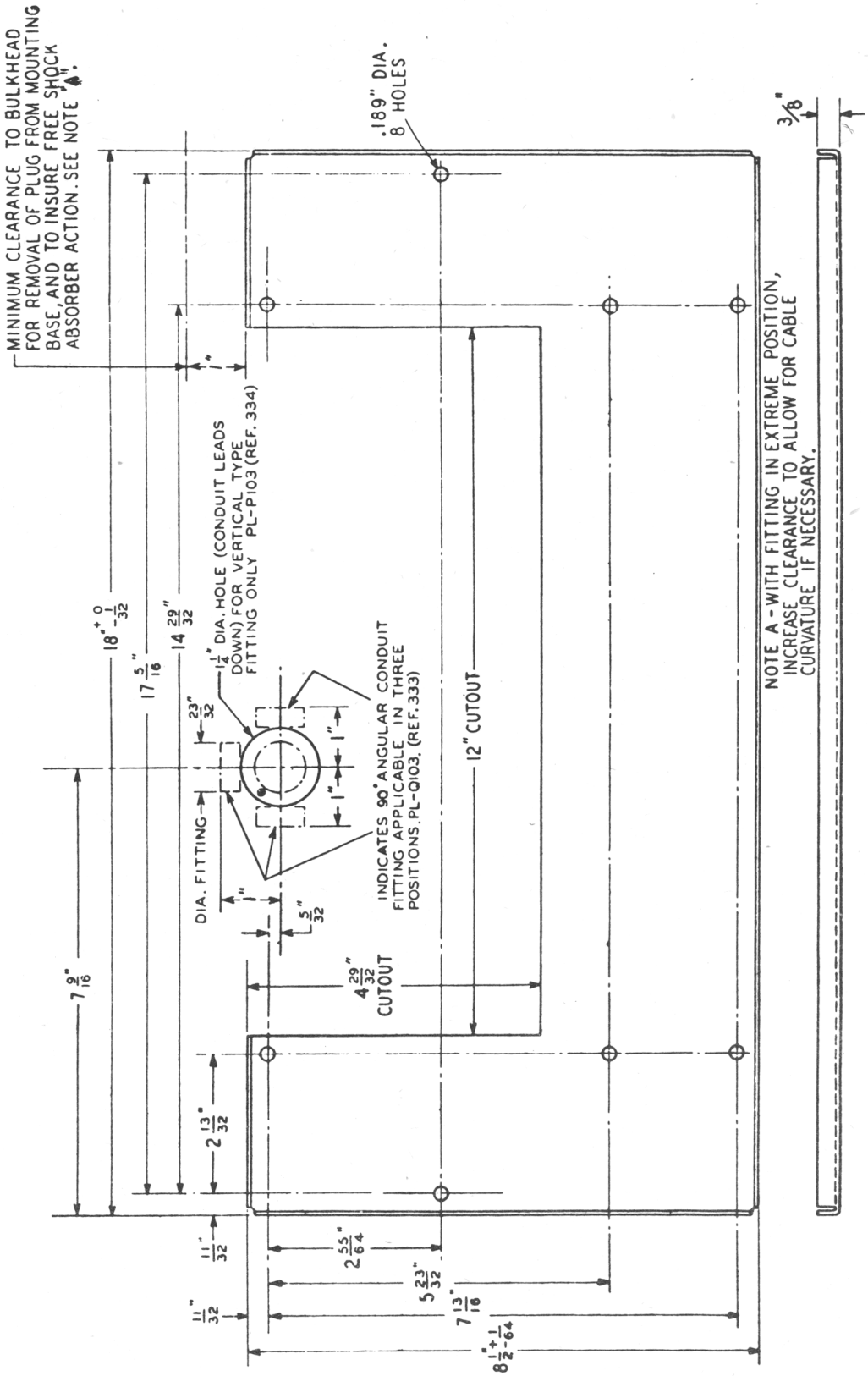

Figure 29 — Mounting FT-154-J, Drilling Plan

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Section VIII

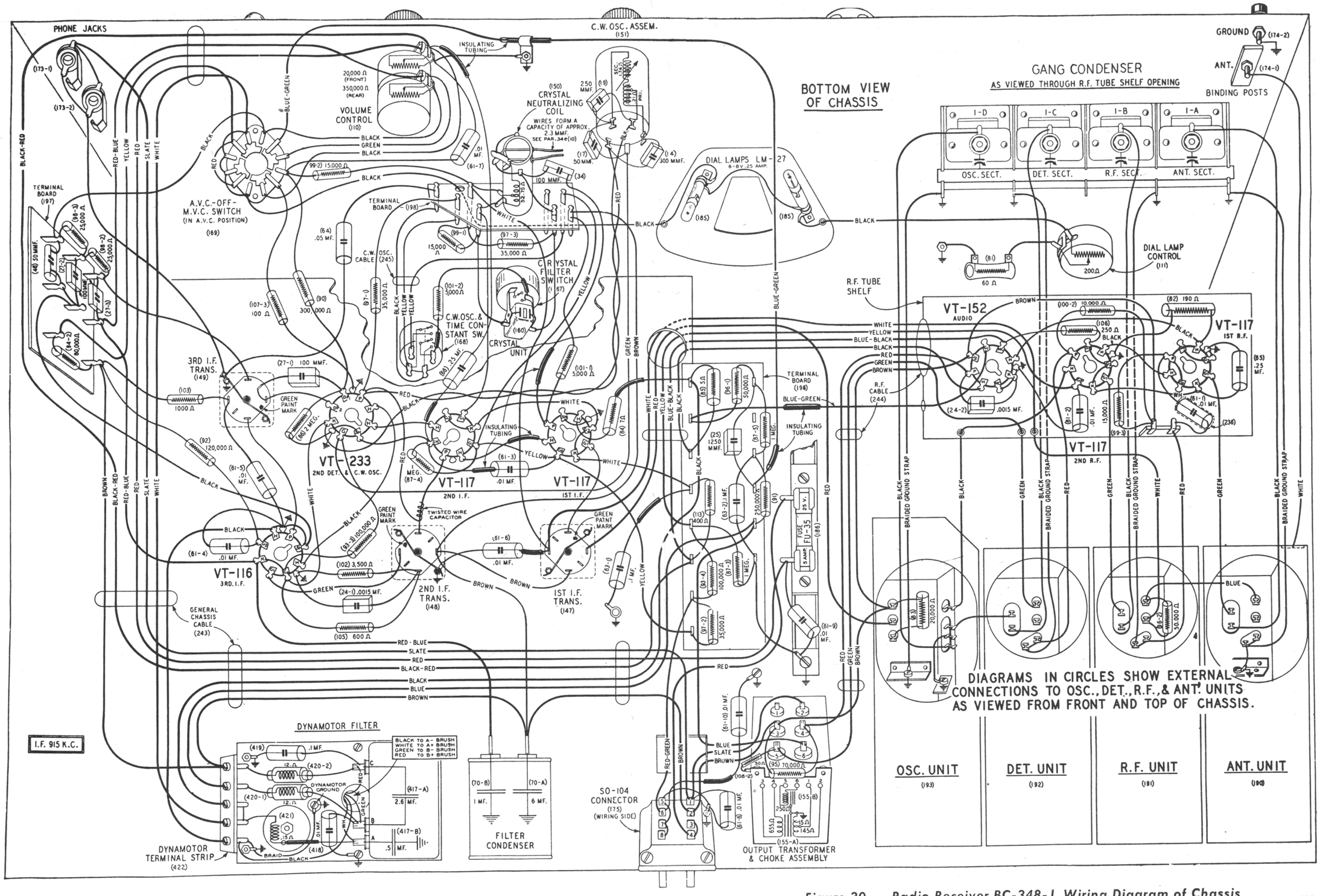

Figure 30 — Radio Receiver BC-348-J, Wiring Diagram of Chassis

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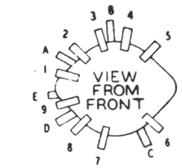
Section VIII

NOTE -
TURN BAND SWITCH TO BAND COIL IS IN, BEFORE READING COIL RESISTANCES

ALL BAND SWITCH SECTIONS ARE SHOWN IN THE NO.6 POSITION (13.5-18 M.C.).



VIEW OF SWITCH CONTACT LOCATING NUMBERING

BAND SWITCH SECTION NO.1 IS NEAREST COIL CAN.

OSC. BAND SWITCH CONNECTIONS

SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	6 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR	A—B		4—B			

DETECTOR BAND SWITCH CONNECTIONS

SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	6 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						

R.F. BAND SWITCH CONNECTIONS

SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	6 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						

ANTENNA BAND SWITCH CONNECTIONS

		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
SECT. NO.1	FRONT	8 | C	7—8 9 | C	1 7—8—9 | C	2 1—7—8—9 | C	3 1—2—7—8—9 | C	4 1—2—3—7—8—9 | C
	REAR						
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						

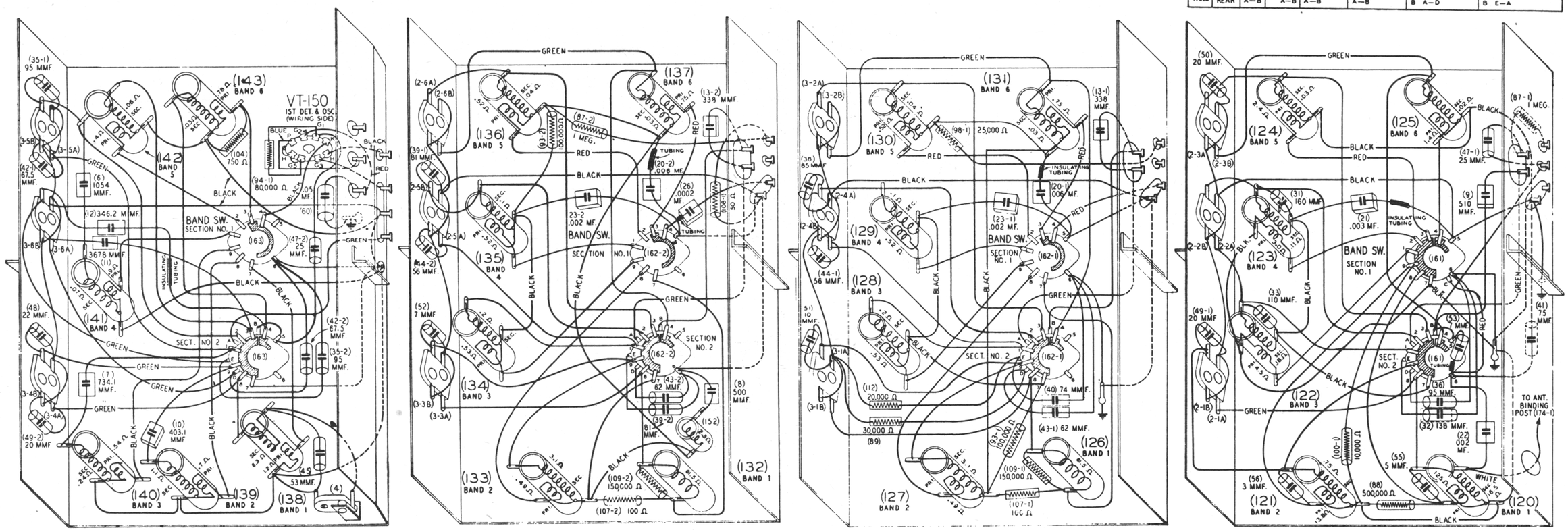


Figure 31 — Antenna, R-F, Detector and Oscillator Units, Wiring Diagram

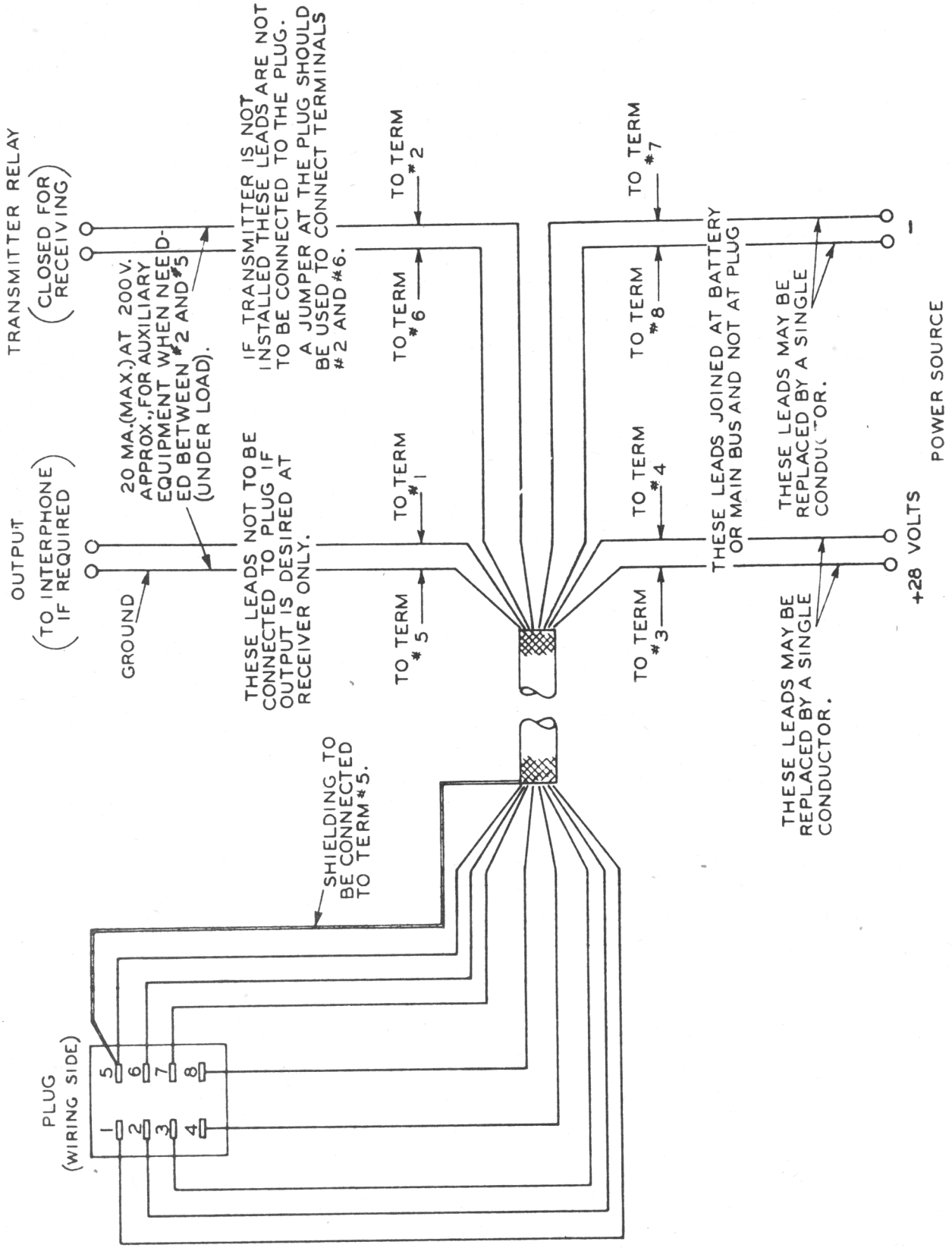


Figure 32 — Radio Receiver BC-348-J, Plug Connections