TM 11-880

WAR DEPARTMENT TECHNICAL MANUAL

RADIO RECEIVERS

RCA MODELS AR-88D and F

WAR DEPARTMENT • 11 DECEMBER 1945

THIS ADDENDA WILL REMAIN IN EFFECT ONLY UNTIL THE INFORMATION IS PUBLISHED IN AN OFFICIAL WAR DEPARTMENT PUBLICATION.

ADDENDA

1 February 1946

ADDENDA TO

TM 11-880

RADIO RECEIVERS (RCA MODELS AR-88D AND F

This addenda is published to correct the following errors in TM 11-880. Personnel using the equipment and having custody of this technical manual will enter suitable notations in each affected paragraph in the technical manual to indicate these corrections.

Page 44. Par. 53a, second column, line 18. Change capacitor C31 to C1.

Page 50. Par. 56b, line 11. Change resistor R23 to R33.

Page 53. Par. 60, line 2. Change Tube JAN-6SG7 to Tube JAN-6SJ7.

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RADIO
RECEIVERS
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WAR DEPARTMENT • 11 DECEMBER 1945

United States Government Printing Office
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WAR DEPARTMENT
WASHINGTON 25, D. C., 11 DEC. 1945

TM 11-880, Radio Receivers (RCA Models AR-88D and F), is published for the information and guidance of all concerned.

[A. G. 300.7 (10 Aug. 44)]

BY ORDER OF THE SECRETARY OF WAR:

DWIGHT D. EISENHOWER
Chief of Staff

OFFICIAL:
EDWARD F. WITSELL
Major General
Acting The Adjutant General

DISTRIBUTION:
AAF (5); AGF (5); ASF (2); S Div ASF (1).
(For explanation of symbols see FM 21–6.)

WARNING

HIGH VOLTAGE

is used in the operation of
this equipment

DEATH ON CONTACT

may result if operating personnel
fail to observe safety precautions.

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LIST OF ILLUSTRATIONS

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DESTRUCTION NOTICE

WHY — To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN — When ordered by your commander.

HOW — 1. Smash — Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut — Use axes, handaxes, machetes.

3. Burn — Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives — Use firearms, grenades, TNT.

5. Disposal — Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT — 1. Smash — Meters, controls, panels.

2. Cut — Cables and all wiring.

3. Burn — Resistors, capacitors, all technical manuals, instruction books, tube charts.

4. Bury or scatter — Any or all of the above pieces after destroying their usefulness.

DESTROY EVERYTHING

SAFETY NOTICE

VOLTAGES AS HIGH AS 600 VOLTS A-C ARE USED IN THE OPERATION OF THIS EQUIPMENT. THESE VOLTAGES ARE DANGEROUS TO LIFE.

A FEW SERVICE CHECKS MUST BE MADE INSIDE THE SET WITH THE HIGH VOLTAGE ON. WHEN MAKING THESE CHECKS, ALWAYS HAVE PRESENT ANOTHER PERSON CAPABLE OF RENDERING FIRST AID. KEEP ONE HAND IN YOUR POCKET WHILE MAKING HIGH-VOLTAGE MEASUREMENTS. THIS PRECAUTION WILL PREVENT TOUCHING THE ELECTRICAL CIRCUIT WITH MORE THAN ONE PART OF THE BODY AT ONE TIME.

RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

TREATMENT.

a. Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only*, remove the victim to another location, but no farther than is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(*1*) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(*2*) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib;

(*3*) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim;

(*4*) the operator's elbows are straight and locked.

f. The resuscitation procedure is as follows:

(*1*) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(*2*) Swing back, suddenly releasing pressure, and sit on the heels.

(*3*) After 2 seconds rest, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4

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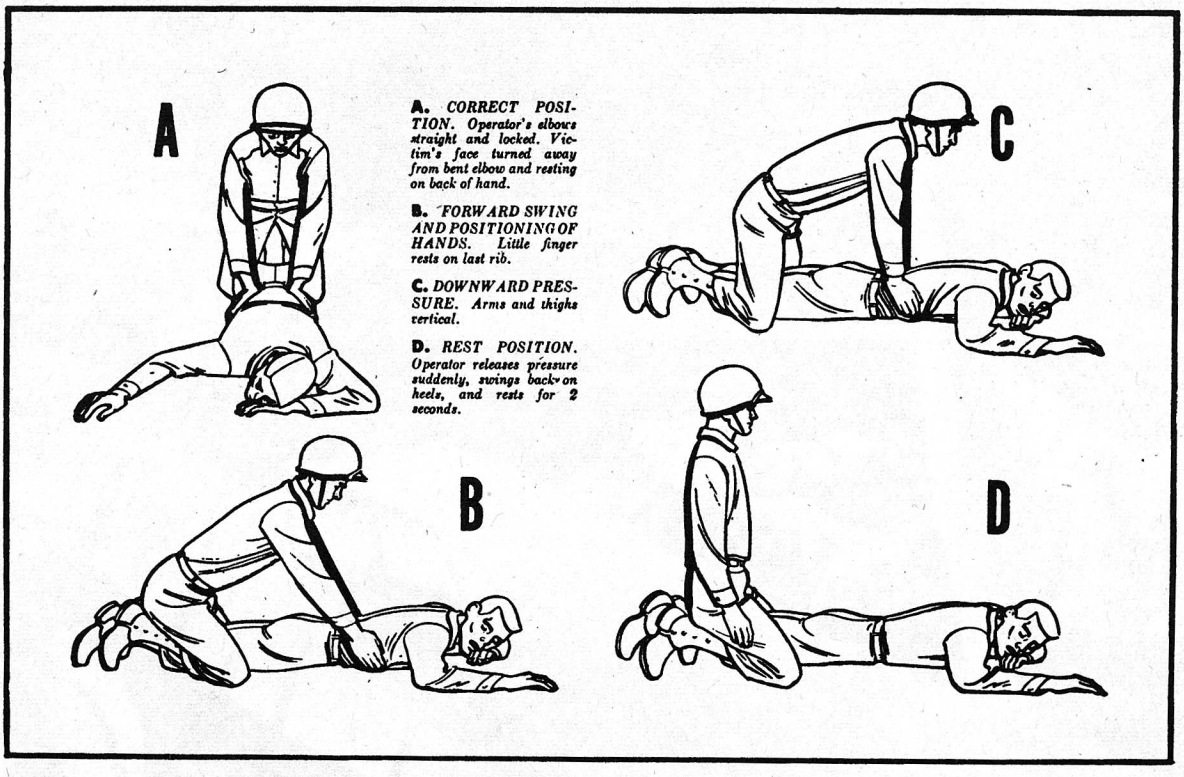

seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.

h. Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

RELIEVING OPERATOR.

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

STIMULANTS.

a. If an inhalant stimulant is used, such as aromatic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

b. After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing ½ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

CAUTIONS.

a. After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim must be watched carefully as he may suddenly stop breathing. *Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.*

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TL 13701-S

PART ONE

INTRODUCTION

SECTION I. DESCRIPTION

1. GENERAL.

a. Radio receiver (RCA model AR-88(*)) is a 14-tube, superheterodyne receiver with a frequency range of from 540 to 32,000 kilocycles (kc). It is designed for the reception of continuous-wave (c-w), modulated-continuous-wave (m-c-w), or amplitude-modulated (a-m) signals.

b. This manual pertains to radio receiver (RCA model AR-88D) and radio receiver (RCA model AR-88F). Throughout the manual when reference is made to both models, the basic nomenclature is followed by (*); thus, radio receiver (RCA model AR-88(*)) represents both models.

c. The two models of this equipment which are treated by this manual are very similar. The main differences which exist are outlined in paragraph 7.

2. APPLICATION.

a. Radio receiver (RCA model AR-88D) is a general purpose communications receiver used principally for high-frequency communication. The additional equipment required for its operation is shown in figure 1.

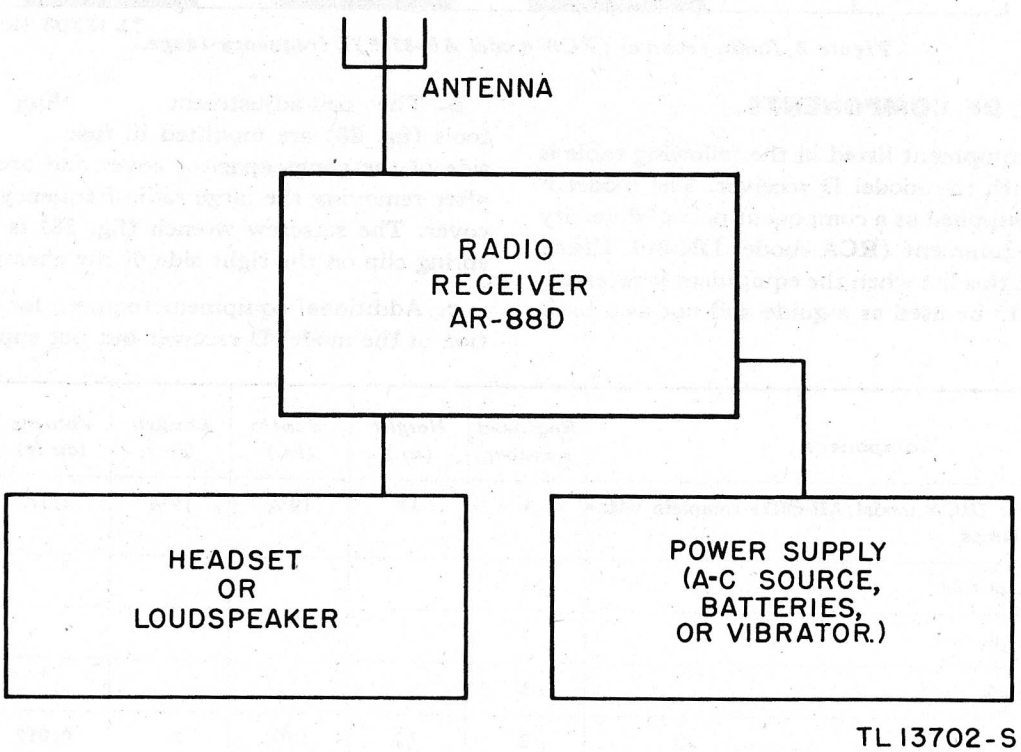

Figure 1. Block diagram of equipment used with radio receiver (RCA model AR-88D).

b. Radio receiver (RCA model AR-88F) is designed for use in diversity receiving equipment (RCA model DR-89). This equipment which uses three radio receivers (RCA model AR-88F) is discussed in TM 11-889, Diversity Receiving Equipment (RCA model DR-89) (when published).

c. Radio receiver (RCA model AR-88(*)), when used individually or in diversity receiving equipment, has numerous applications. Among these are rebroadcast pick-up, airbase to airbase service, ship to shore service, and island to island service.

3. TECHNICAL CHARACTERISTICS OF RADIO RECEIVER (RCA MODEL AR-88(*)).

Frequency range (fig. 2):

Band 1	540 to 1,600 kc
Band 2	1,570 to 4,550 kc
Band 3	4,450 to 12,150 kc
Band 4	11,900 to 16,600 kc
Band 5	16,100 to 22,700 kc
Band 6	22,000 to 32,000 kc

Types of signals which can be received	cw, mcw, or a-m voice
Antenna type	various
Number of tubes	14
Type of receiver	superheterodyne
Intermediate frequency	455 kc
Output impedance	2.5 ohms and 600 ohms
Maximum undistorted output	approximately 2.5 watts
Power input	100 watts
Power supply	100–165 or 190–260 volts; 50- to 60-cycle ac or 6-volt A-supply and 250- to 300-volt 90-ma B-supply during battery or vibrator power supply operation
Size	19¼ in. wide by 11 in. high by 19¼ in. deep
Weight	98 lb

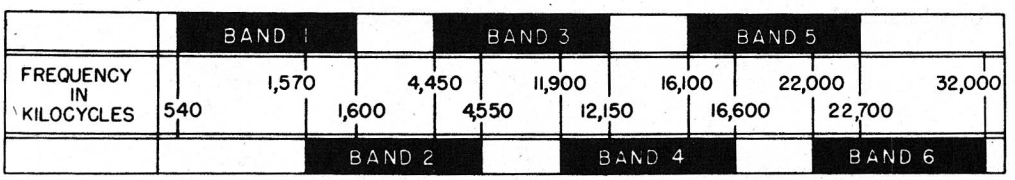

Figure 2. Radio receiver (RCA model AR-88(*)), frequency range.

4. TABLE OF COMPONENTS.

a. The equipment listed in the following table is supplied with the model D receiver. The model F receiver is supplied as a component part of diversity receiving equipment (RCA model DR-89). Check and correct this list when the equipment is received. The list is to be used as a guide and not as a basis for issue.

b. The coil-adjustment and plunger-trimmer tools (fig. 28) are mounted in fuse clips on either side of the gang-capacitor cover and are available after removing the large radio-frequency (r-f) unit cover. The setscrew wrench (fig. 28) is held by a spring clip on the right side of the chassis.

c. Additional equipment required for the operation of the model D receiver but not supplied with

Component	*Required number*	*Height (in.)*	*Depth (in.)*	*Length (in.)*	*Volume (cu ft)*	*Weight (lb)*
Radio receiver (RCA model AR-88D) complete with tubes and lamps.	1	11	19¼	19¼	2.37	98
Coil-adjustment tool	1					
Plunger-trimmer tool	1					
Setscrew wrench	1					
TM 11-880	2	¼	10½	8	0.012	0.4

NOTE: This list is for general information only. See appropriate publications for information pertaining to requisition of spare parts.

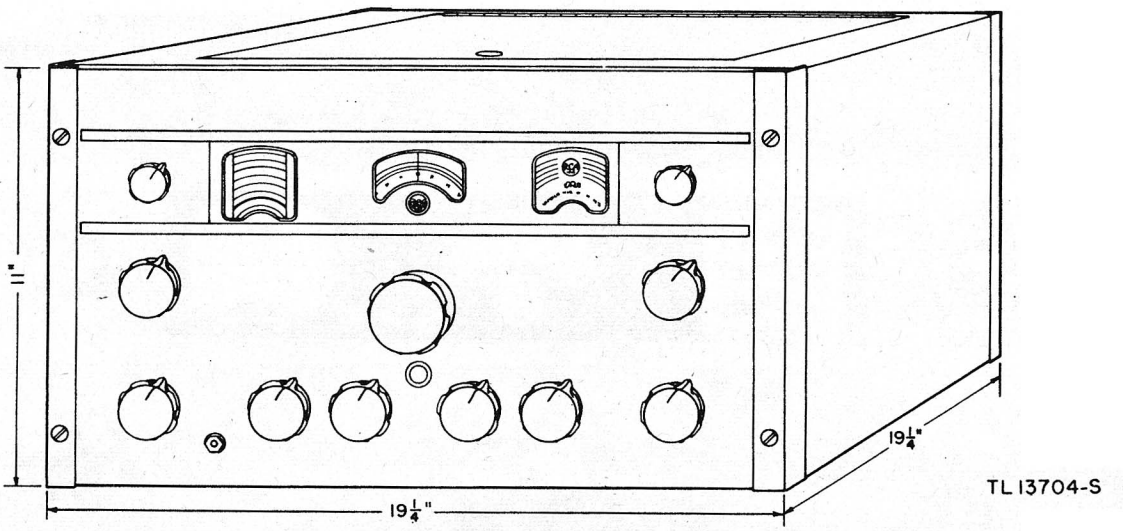

Figure 3. Radio receiver (RCA model AR-88D), outline dimensional drawing.

the receiver includes headphones or loudspeaker; an antenna system; and an alternating-current (a-c) source of power, batteries, or a vibrator power supply unit.

5. PACKAGING DATA.

NOTE: Items may be packaged in a different manner from that shown, depending upon supply channels.

a. The model D and model F receivers are wrapped with waterproof wrappings and nested in wood excelsior which is inclosed in wooden cases 29 inches long, 26½ inches wide, and 18¼ inches deep. The total weight packed is approximately 140 pounds. The volume is 8.15 cubic feet. For dimensions of an unpacked receiver, see figure 3 and paragraph 4a.

b. Three cases containing model F receivers and four other cases as described in TM 11–889 (when published) constitute the complete diversity receiving equipment (RCA model DR-89).

6. DESCRIPTION OF MAJOR COMPONENTS.

a. Radio Receiver (RCA Model AR-88D) (fig. 4). The model D receiver consists of a receiver chassis assembly, control panel, and tubes completely inclosed in a metal cabinet for table mounting.

b. Radio Receiver (RCA Model AR-88F). The model F receiver consists of a receiver chassis assembly complete with tubes attached to a control panel. Since this receiver is intended for rack mounting, an inclosing cabinet is not provided.

c. Radio Receiver (RCA Model AR-(*)). All switches, controls, two dials, a nameplate, and a phone jack are mounted on the control panel of both models. At the rear of the chassis are found various output and antenna terminals, an a-c line cord, and a switch for adjusting the receiver for operation at the available line voltage. Openings for moving-coil adjustments and a socket for battery or vibrator connections are also provided on the rear of the chassis.

7. DIFFERENCES IN MODELS.

Radio receiver (RCA model AR-88D) is used independently for purposes of general communication, while radio receiver (RCA model AR-88F) is used as a component of diversity receiving equipment (RCA model DR-89). Because of the variation in the use of these two models certain differences exist which are explained in various sections of this manual. Basically these differences consist of the following points:

a. The model F receiver is issued without a cabinet since it is intended for rack mounting, while the model D receiver is provided with a cabinet.

b. Some of the output terminals at the rear of the chassis of the two models differ since the model F receiver is intended for connection to a tone keyer unit of the diversity receiving equipment, while the model D receiver has provision for connection to a transmitter relay (figs. 10 and 12).

c. The control panels of the two models differ in one respect. The model F receiver has an additional control at the lower right side of the panel, which is marked DIVERSITY IF GAIN. Compare figures 4 and 5.

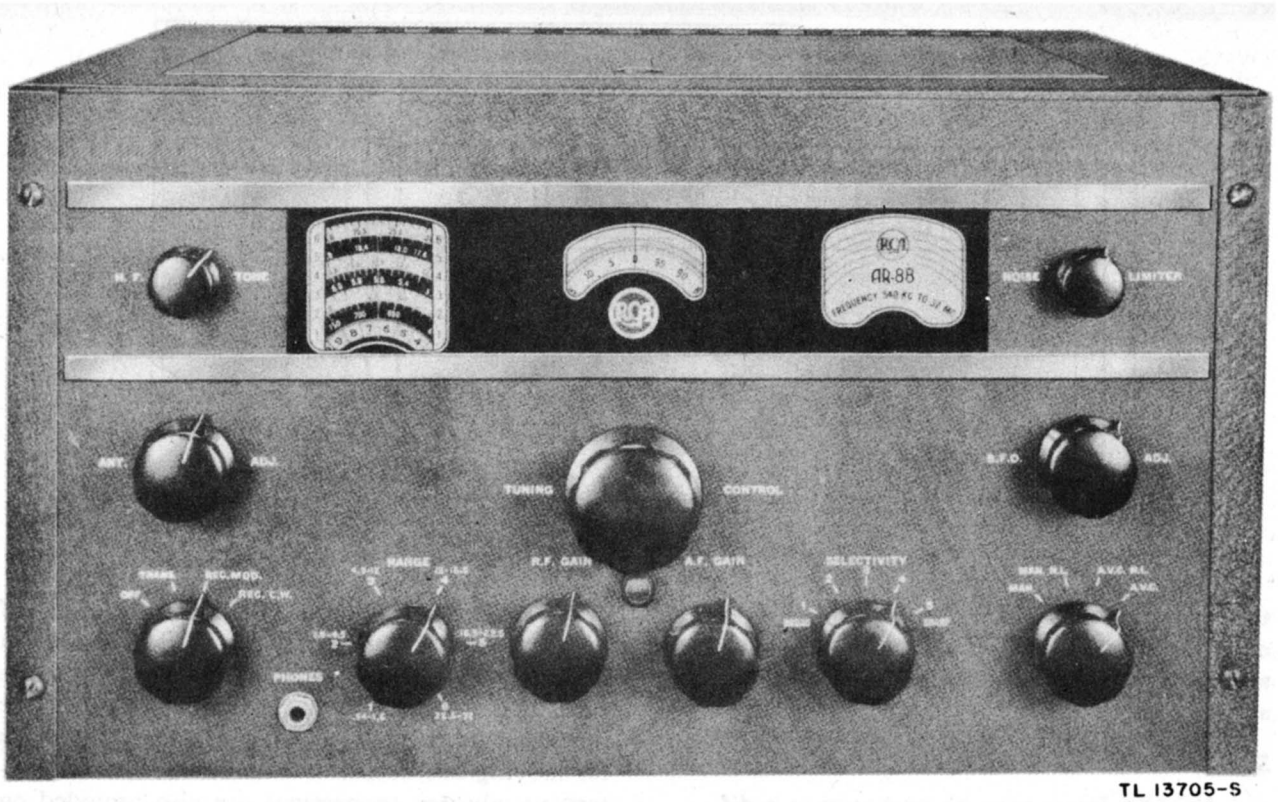

Figure 4. Radio receiver (RCA model AR-88D).

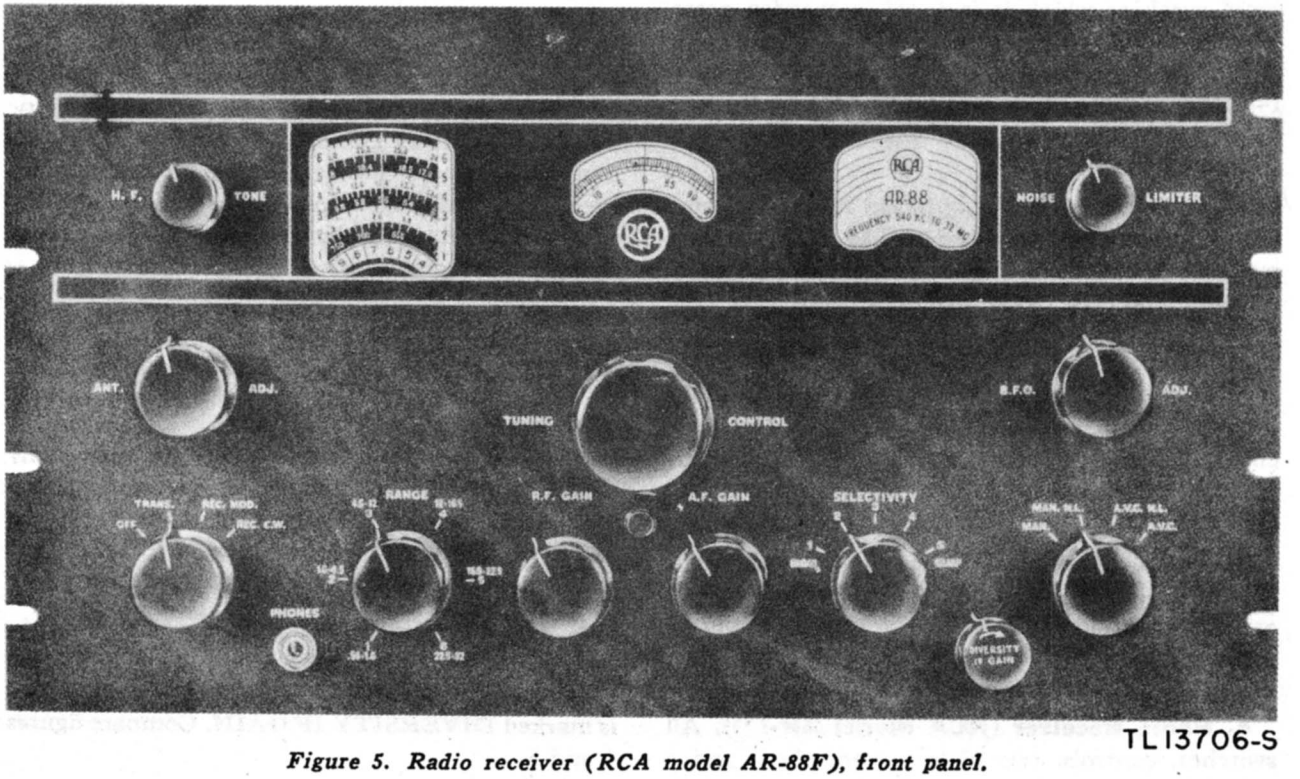

Figure 5. Radio receiver (RCA model AR-88F), front panel.

SECTION II. INSTALLATION OF RADIO RECEIVER (RCA MODEL AR-88(*))

8. SITING.

Best reception is obtained on radio receiver (RCA model AR-88(*)) when the antenna or antennas are located in an open area with no large structures nearby which might tend to attenuate the incoming signal. Avoid operation near steel bridges or steel buildings, if possible. Figure 6 shows good and bad sites for operation.

9. UNPACKING, UNCRATING, AND CHECKING.

Use particular care when unpacking or handling the receiver; it may be damaged easily when not protected by the packing case. Inspect the receiver for any damage during shipment and check the components against the table of components (par. 4). Radio receiver (RCA model AR-88(*)) is supplied with all tubes and crystal installed. Refer to figure 7 and unpack the receiver as follows:

a. Place the packing case conveniently near the operating location.

b. Cut and remove the strap-iron bands from each end.

c. Remove the lid of the case (so marked) which is fastened in place by nails. Use a nail puller. *Prying the lid off may result in damage to the equipment.*

d. Remove the waterproof paper cover and excelsior from the case.

e. Remove the carton from the case.

f. Remove the waterproof wrapper from the outside carton.

g. Remove the 3-inch gummed tape from the carton.

h. Lift the moistureproof and vaporproof bag from the carton and cut the seam at the top with a scissors or any sharp instrument.

i. Lift the carton from the bag.

j. Cut 3-inch gummed tape from top of the carton.

k. Slide the receiver from the carton.

l. Remove the supports from the front panel and the pad from under the receiver.

m. Lift the lid of the cabinet and loosen the one wood screw which holds the wood transformer supports in place.

n. Remove the bags of silica gel (dehydrating agent) and the wood transformer supports from the cabinet, and close lid.

o. Place the receiver in or near its final location.

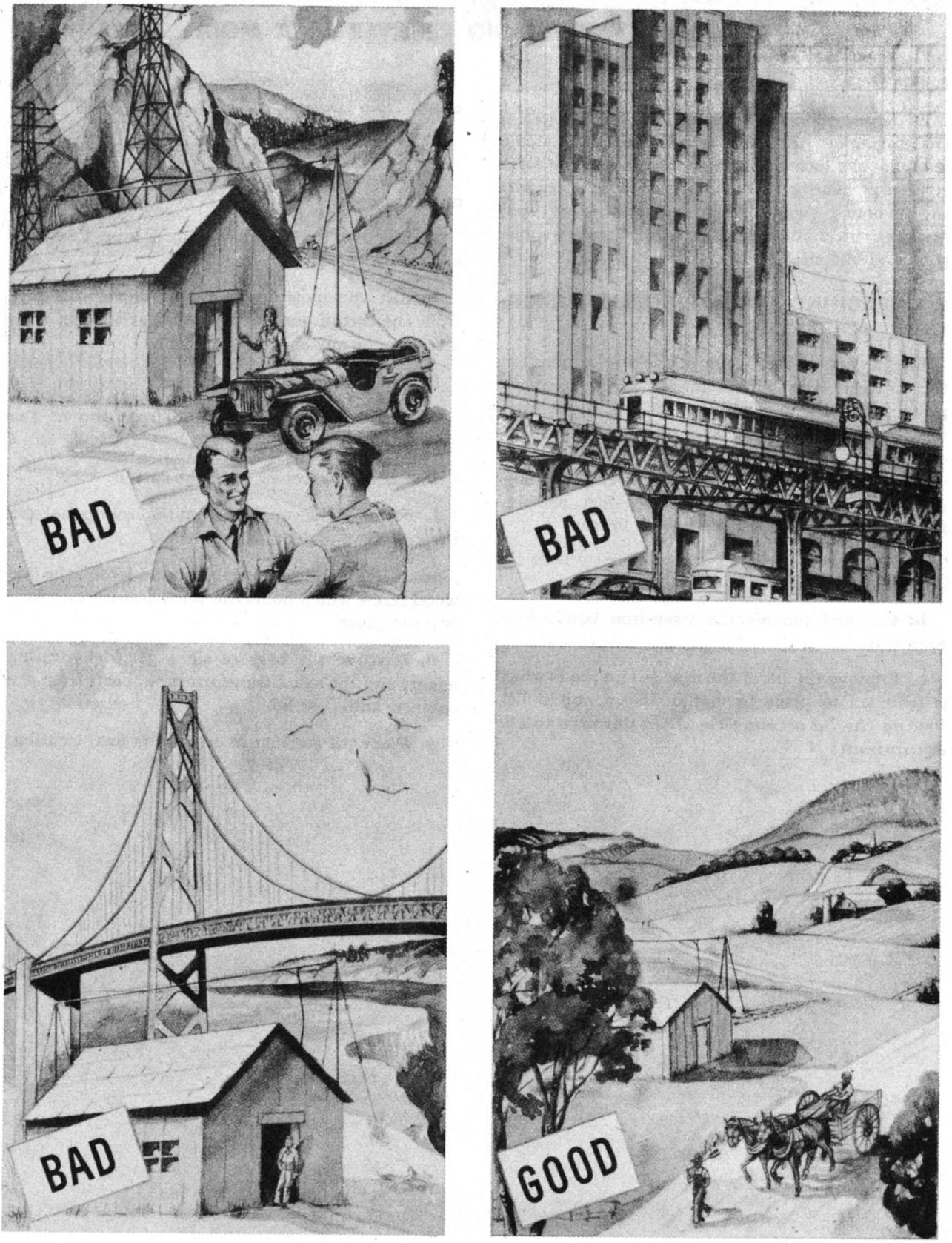

Figure 6. Siting, good and bad locations.

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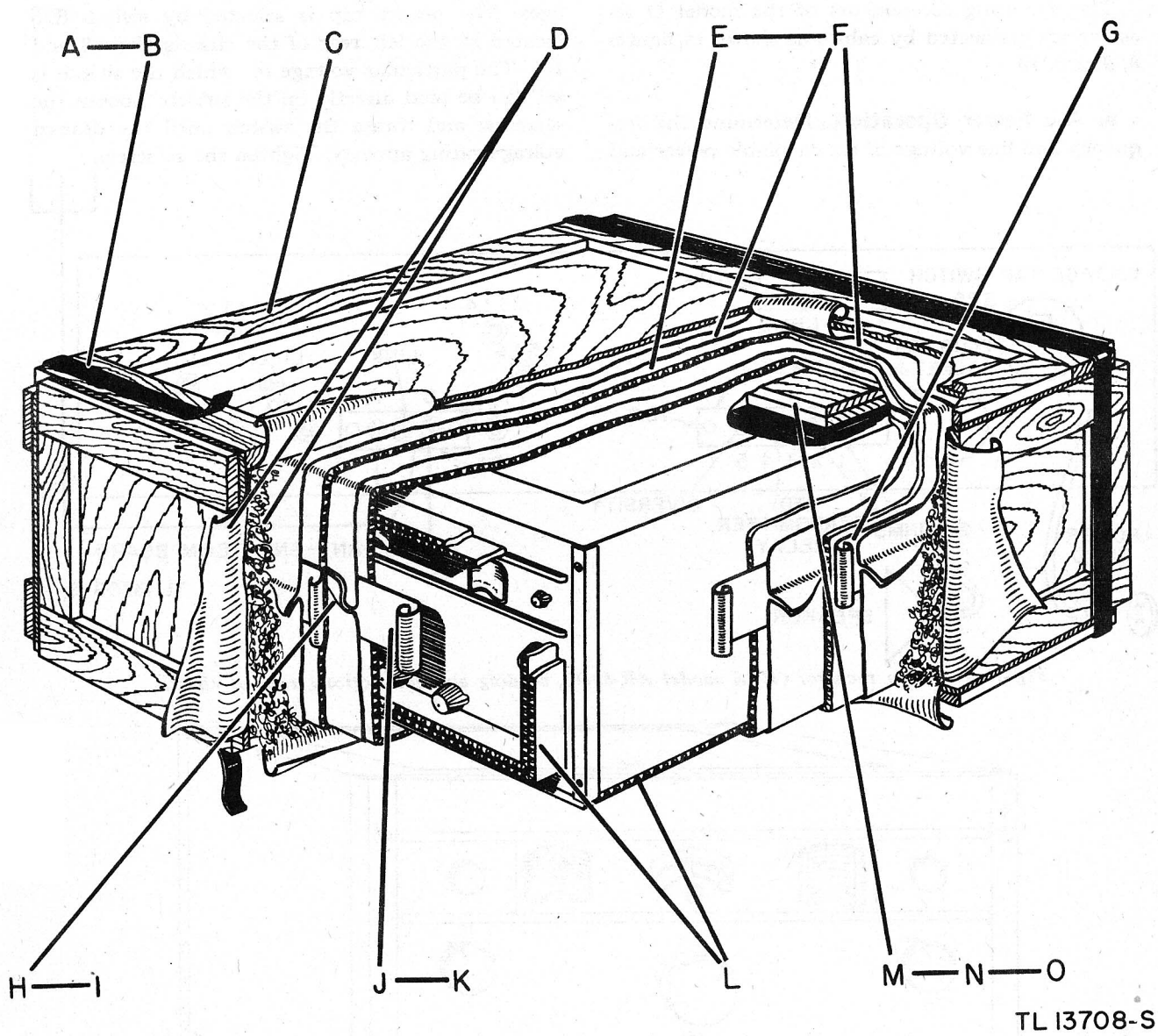

Figure 7. Cutaway packaging illustration.

10. CONNECTIONS OF RADIO RECEIVER (RCA MODEL AR-88D)

The operating components of the model D receiver are connected by cables as shown in figures 8, 9, and 10.

a. A-c Power Operation. Determine the frequency and line voltage of the available power and check these with the rating of the receiver (par. 3). The primary of the power transformer is tapped to allow for the use of a number of different line voltages. The proper tap is selected by switch S25 located at the left rear of the chassis (figs. 8 and 10). The particular voltage for which the switch is set can be read directly on the switch. Loosen the setscrew and rotate the switch until the desired voltage rating appears. Tighten the setscrew.

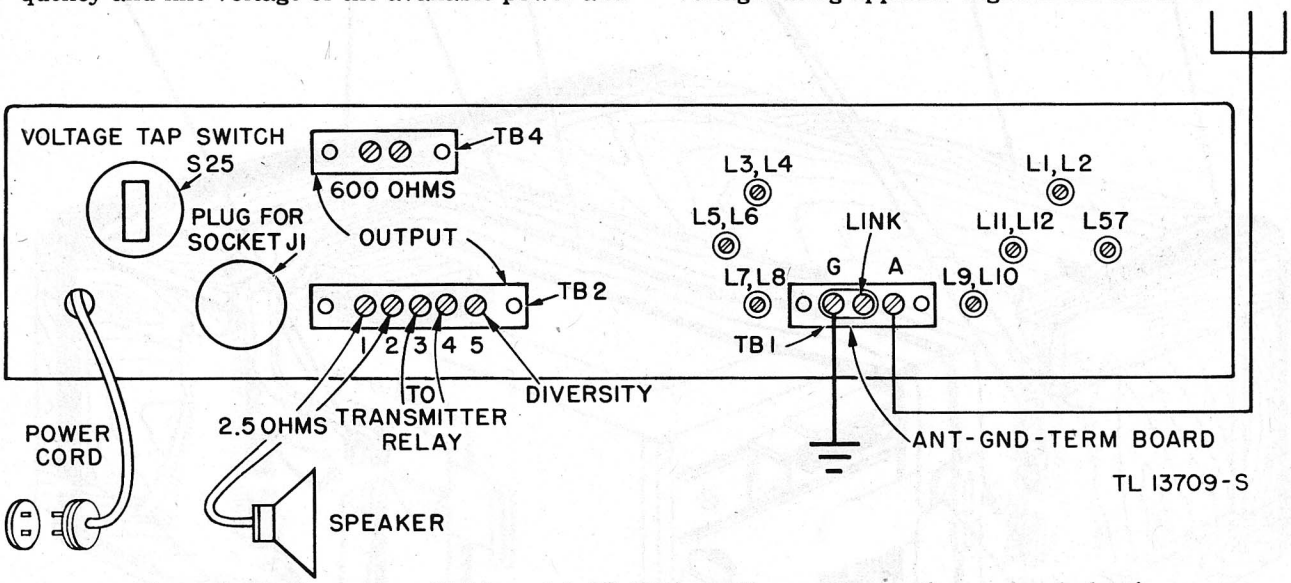

Figure 8. Radio receiver (RCA model AR-88D), cording and connections, rear of chassis.

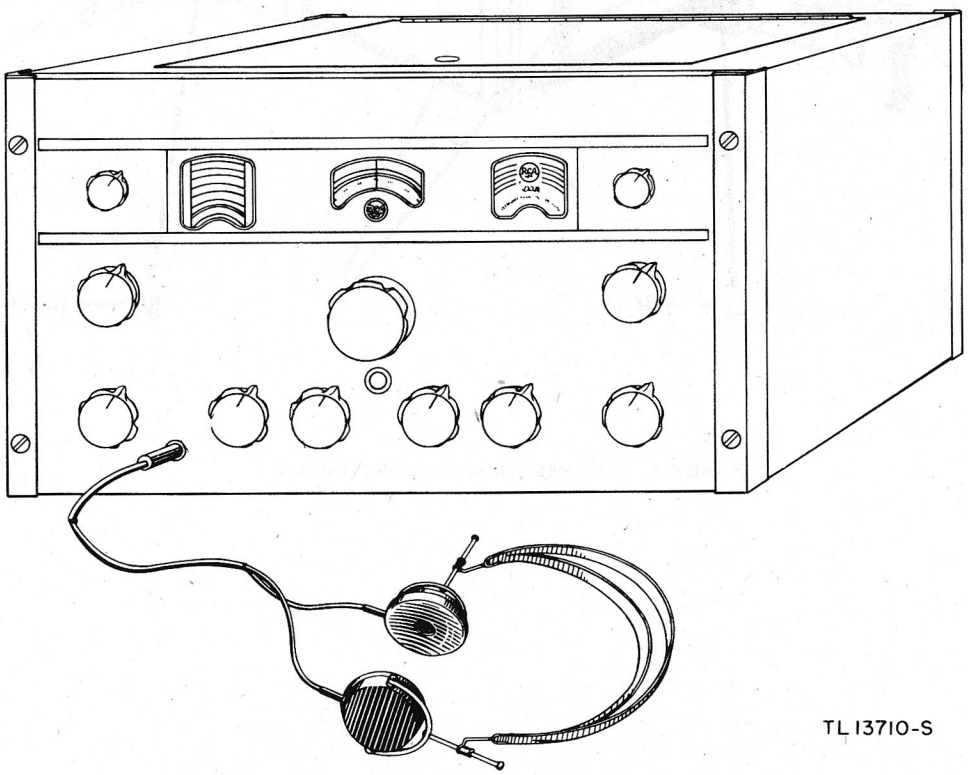

Figure 9. Radio receiver (RCA model AR-88D), cording and connections, front panel.

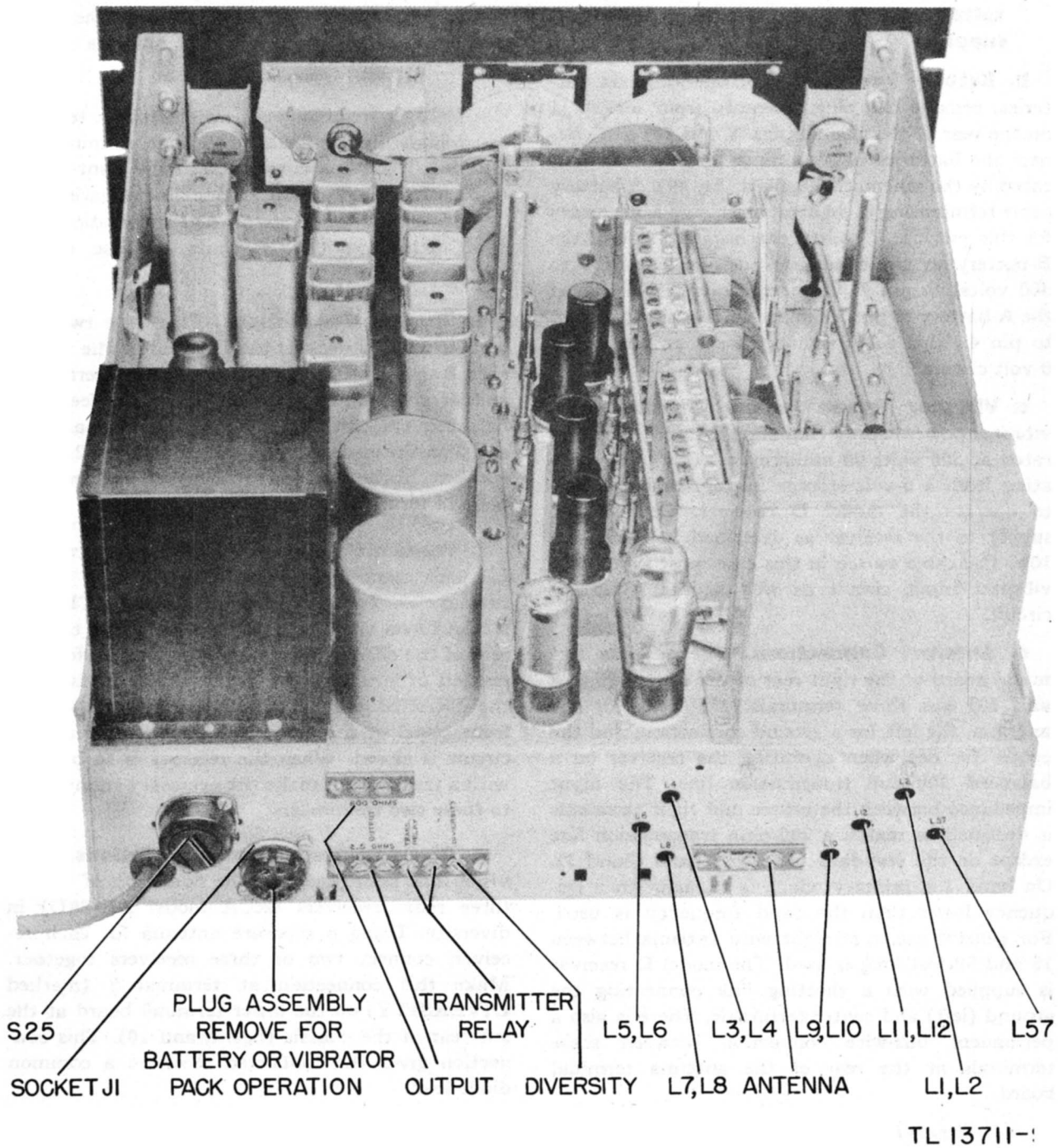

Figure 10. Radio receiver (RCA model AR-88D), rear of chassis.

CAUTION: Before making final connections to an external source of power be sure that voltage tap switch S25 is set for receiver operation at the voltage rating of the available power supply.

b. Battery Operation. For operation on batteries, remove the plug assembly from socket J1 on the rear of the chassis (figs. 8 and 10) and connect the batteries to the proper terminals as indicated by the schematic diagram (fig. 49). A battery cable terminating in an octal male plug is necessary for this purpose. Connect the negative side of the B-battery to pin 6 and its positive side (250 to 300 volts) to pin 7. Connect the negative side of the A-battery to pin 5 and its positive side (6 volts) to pin 4. This cable should have a switch in the 6-volt circuit.

c. Vibrator Power Supply Operation. A vibrator power supply (not supplied with receiver) rated at 300 volts 90 milliamperes (ma) and operating from a 6-volt storage battery may be used to operate the model D receiver. Connect the supply to the receiver as described in paragraph 10b. The cable switch in this case must switch the vibrator input circuit as well as the A-battery circuit.

d. Antenna Connections. The antenna terminal board at the right rear of the chassis (figs. 8 and 10) has three terminals: the right for the antenna, the left for a ground connection, and the center for use when operating the receiver on a balanced 200-ohm transmission line. The input impedance between the center and right terminals is designed to match a 200-ohm transmission line except on the standard broadcast band (band 1). On band 1 a primary which is resonant to a frequency lower than the band frequency is used. For general use, a straight wire antenna between 25 and 50 feet long is used. The model D receiver is supplied with a shorting link connecting the ground (left) and center terminals. There is also a permanent bus-wire connection between these terminals at the rear of the antenna terminal board.

(*1*) *Straight Wire Antenna Connections.* When operating the receiver on a straight wire antenna, do not disturb the link or bus-wire connections between the ground and center terminals. Connect the antenna to the antenna (right) terminal and connect the ground (left) terminal to a good ground.

(*2*) *Balanced Transmission Line Connections.* When operating the receiver on a balanced 200-ohm transmission line, open the shorting link and remove the bus-wire connection between the ground and center terminals. Connect the transmission line to the center and antenna (right) terminals.

NOTE: Removal of bus wire between terminals on the back of antenna terminal board and link connection at the front of the board will result in oscillator radiation in excess of Federal Communications Commission (FCC) limits for use on board ship.

e. Speaker Connections. There are two output terminal boards at the left rear of the chassis (figs. 8 and 10). The upper board has two terminals, neither of which is grounded, for use in feeding a balanced 600-ohm line. The terminals marked 1 and 2 on the lower board are used to feed a 2.5-ohm speaker. Make connection to either of these two pairs of terminals as required.

f. Transmitter Relay Connections. Provision has been made for the use of this receiver with a transmitter. Terminals 3 and 4 (marked TRANS. RELAY) on the lower terminal board at the left rear of the chassis (figs. 8 and 10) provide for connection of a transmitter relay to the receiver. In the TRANS. position of the power switch on the front panel of the receiver, the transmitter relay circuit is closed. When the receiver is to be used with a transmitter, make the necessary connections to these two terminals.

g. Diversity Reception Connections. Provision has been made for the operation of two or three radio receivers (RCA model AR-88D) in diversity. Using a separate antenna for each receiver, connect two or three receivers together. Make this connection at terminal 5 (marked DIVERSITY) on the lower terminal board at the left rear of the chassis (figs. 8 and 10). This connection gives the connected receivers a common diode load.

h. Headphone Connections. A jack is provided on the left of the front panel (fig. 9) for connection to a pair of headphones. This jack has two positions. The first position (halfway in) is for reception on both speaker and phones. The second position (full in) is for phone reception only. Connect phones accordingly.

11. CONNECTIONS AND INTERCONNECTIONS OF RADIO RECEIVER (RCA MODEL AR-88F).

Directions for the interconnection of the model F receiver and the other components of the diversity receiving equipment are given in TM 11–889 (when published). Instructions given in paragraph 10 apply when connection of the model F receiver is required as an independent unit (separated from the diversity equipment). The following additional instructions will also apply.

a. The operating components of the model F receiver are connected by cables as shown by the cording diagram (fig. 11), the photograph of the model F chassis (fig. 12), and the schematic diagram (fig. 50).

b. The model F receiver has no provision for operation with a transmitter. For this reason the TRANS. position of the power switch is not used on this model except to warm up the receiver.

c. Terminals 3, 4, and 5 (marked AVC, DIODE LOAD, and DIODE RETURN respectively) on the lower terminal board at the left rear of the chassis (figs. 11 and 12) are used to connect the model F receiver to the other components of the diversity receiving equipment. Terminals 3, 4, and 5 will not be used when the model F receiver is used independently.

d. Jack J3 (marked MONITOR) at the rear center of the chassis (figs. 11 and 12) is used with the model F receiver as part of the diversity receiving equipment, but will not be used when the model F is used independently.

12. INSTALLATION.

a. Mounting. The model F receiver is rack-mounted as described in TM 11–889. The model D receiver is equipped with standard slots for rack-mounting: it can be mounted on a table in its cabinet, or it can be removed from its cabinet for rack-mounting. To rack-mount the model D receiver, loosen the panel mounting screws and draw the complete panel and chassis forward from the cabinet. Mount on any standard rack with standard mounting bolts.

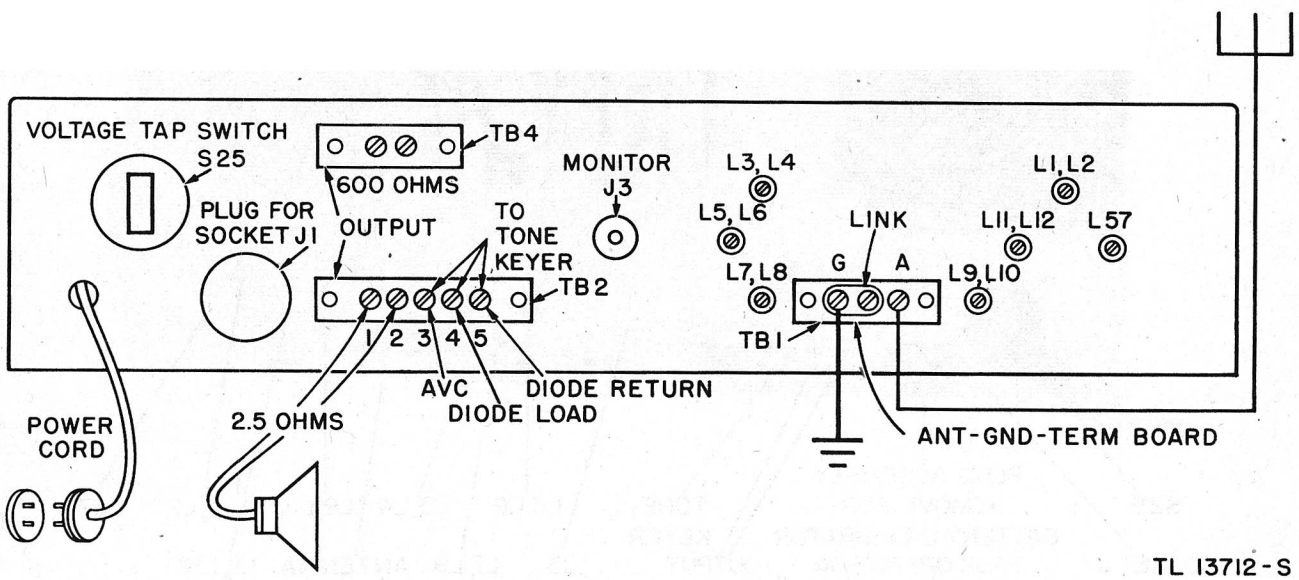

Figure 11. Radio receiver (RCA model AR-88F), cording and connections, rear of chassis

b. Tubes. Before applying power to radio receiver (RCA model AR-88(*)), inspect the chassis and see that all tubes are firmly seated in the correct sockets.

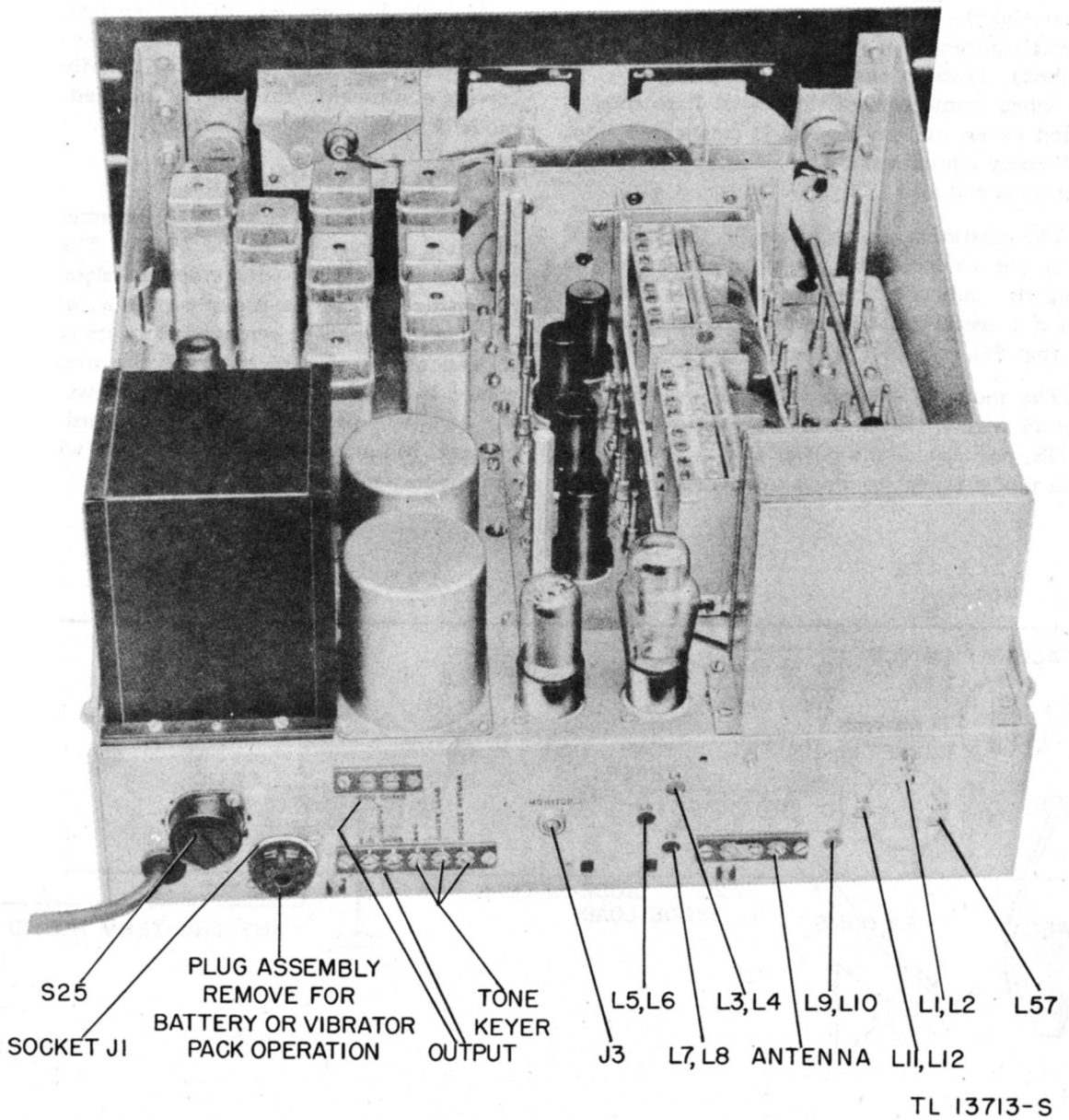

Figure 12. Radio receiver (RCA model AR-88F), rear of chassis.

PART TWO

OPERATING INSTRUCTIONS

NOTE: For information on destroying equipment to prevent enemy use, refer to the destruction notice at the front of the manual.

SECTION III. CONTROLS AND THEIR USE

13. CONTROLS OF RADIO RECEIVER (RCA MODEL AR-88D) (fig. 13).

The following controls, switches, dials, and jack are mounted on the front panel of the model D receiver.

a. The power switch which is labeled OFF-TRANS.-REC. MOD.-REC. C.W. (figs. 13(1) and 14) consists of switches S23 and S24 mounted together to provide four positions which have the following functions:

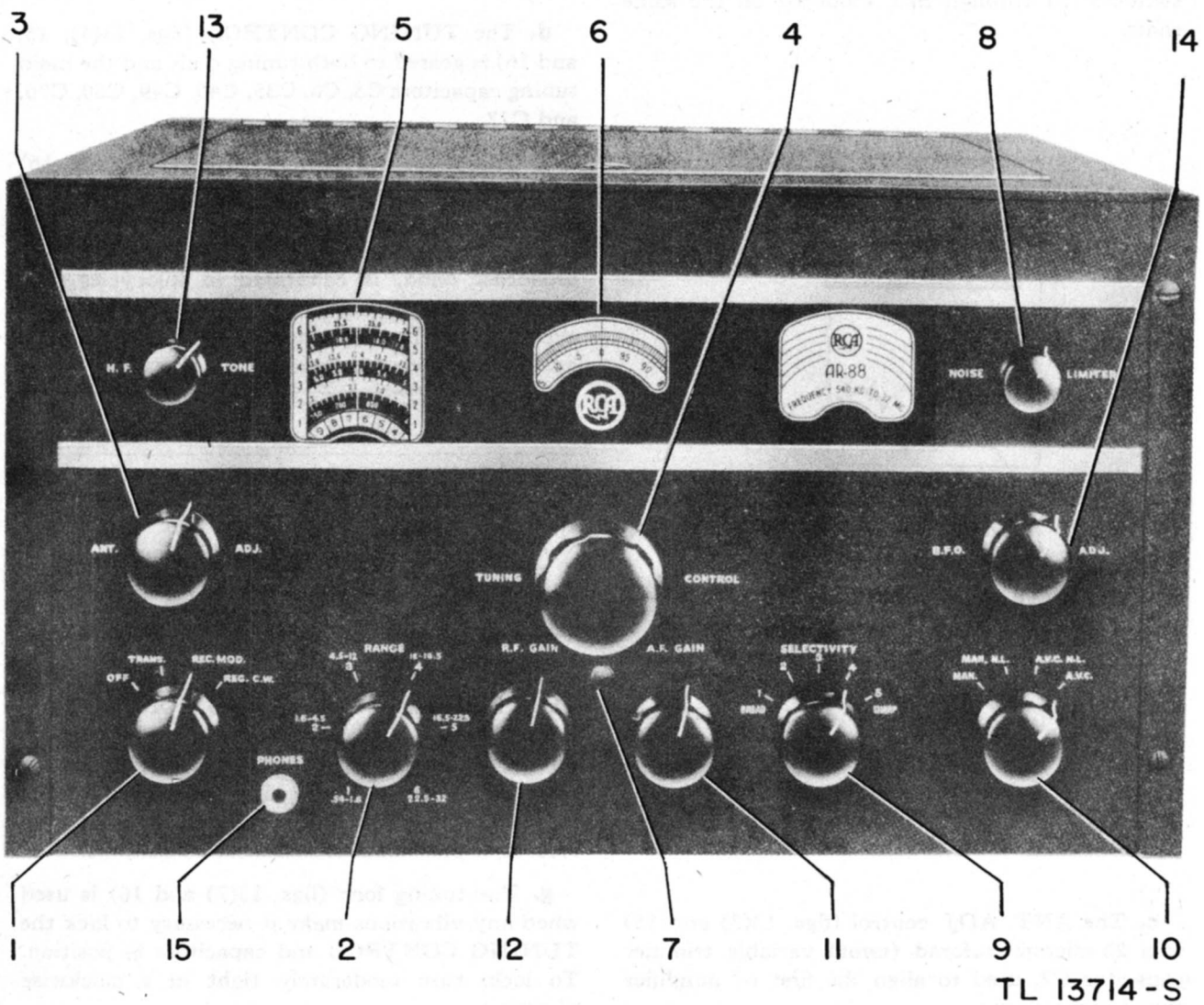

Figure 13. Radio receiver (RCA model AR-88D), front panel controls.

(*1*) The OFF position turns the receiver pov off.

(*2*) The TRANS. position energizes the receiver tube filaments, opens the plate circuits, and provides a closed circuit for a transmitter relay which may be connected to the lower of the two terminal boards at the left rear of the receiver chassis.

(*3*) The REC. MOD. position provides for normal voice reception.

(*4*) The REC. C.W. position turns on the beat frequency oscillator (bfo) and provides for reception of c-w signals.

b. The RANGE switch (figs. 13(2) and 14) provides for selection of any one of the six frequency ranges. This is accomplished by the use of 16 switches, S1 through S16, mounted on the same shaft.

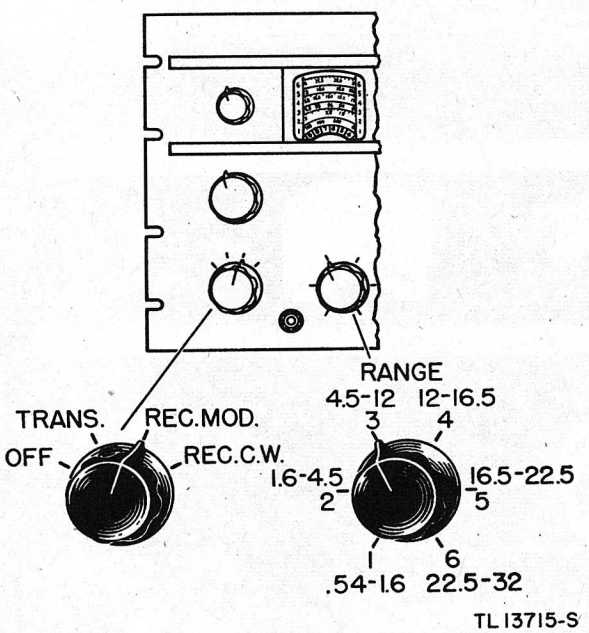

Figure 14. Power and RANGE switches.

c. The ANT. ADJ. control (figs. 13(3) and 15) is a 25-micromicrofarad (mmf) variable trimmer capacitor C2, used to align the first r-f amplifier tuned input circuits.

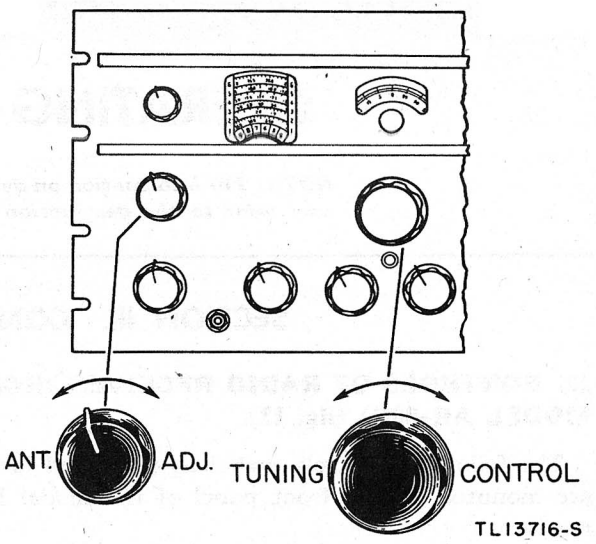

Figure 15. ANT. ADJ. and TUNING CONTROL.

d. The TUNING CONTROL (figs. 13(4), 15, and 16) is geared to both tuning dials and the main tuning capacitors C3, C6, C35, C40, C49, C50, C70, and C77.

e. The main tuning dial (figs. 13(5) and 16) which is geared to the TUNING CONTROL consists of a disk with seven scales, one for each of the six bands and a log scale. Band 1, the standard broadcast band, is calibrated in kilocycles (kc) while bands 2 through 6 are calibrated in megacycles (mc). The scales provided for the six bands have the following ranges and dial divisions:

Band	*Range*	*Dial Divisions*
1	540 to 1,600 kc	10 kc
2	1,570 to 4,550 kc	20 kc and 50 kc
3	4,450 to 12,150 kc	50 kc
4	11,900 to 16,600 kc	100 kc
5	16,100 to 22,700 kc	100 kc
6	22,000 to 32,000 kc	100 kc

f. The venier tuning dial (figs. 13(6) and 16) which is geared to the TUNING CONTROL has a linear scale calibration with dial divisions from zero to 100. It is used in conjunction with the log scale on the main tuning dial to give additional figures for logging and tabulation of exact log records of particular communication stations.

g. The tuning lock (figs. 13(7) and 16) is used when any vibrations make it necessary to lock the TUNING CONTROL and capacitors in position. To lock, turn moderately tight in a clockwise direction

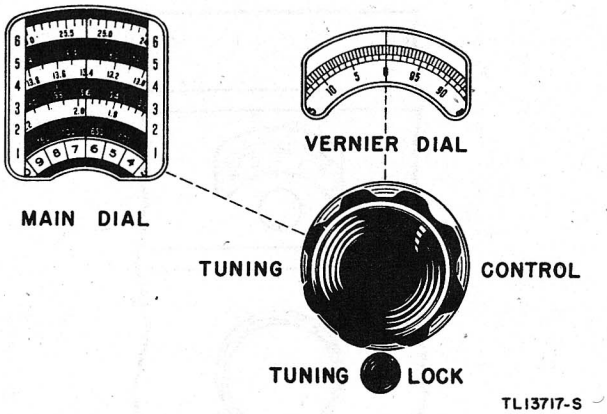

Figure 16. TUNING CONTROL, main tuning and vernier tuning dials, and tuning lock.

h. The NOISE LIMITER control (figs. 13(8) and 17) is a 66,000-ohm potentiometer R48, which is used to set the receiver at the required level of noise limitation. In the fully clockwise position, the control limits the noise interference to 100-percent modulation. In the fully counterclockwise position, the control limits the noise interference to a minimum percentage of modulation. Normally the fully clockwise position should be used, but under extreme conditions of interference a compromise must be made for maximum clarity of the signal with best modulation and least noise.

i. The SELECTIVITY switch (figs. 13(9) and 18) provides five degrees of selectivity. This is accomplished by the use of four switches, S17 through S20, mounted on the same shaft. The first two positions are for modulated reception: position 1, being the least selective, provides high-fidelity reception; position 2 provides normal modulated reception. In the last three positions, a crystal filter is used; position 3 is for normal c-w or selective modulated reception; position 4 provides for sharp c-w; position 5 is for extremely sharp c-w reception.

j. The noise-limiter, automatic-volume-control (a-v-c) switch (figs. 13(10) and 18) which is marked MAN.-MAN.N.L.-A.V.C.N.L.-A.V.C., consists of switches S21 and S22, which provide for the selection of any one of four different types of operation.

(*1*) In the MAN. position output volume is adjusted manually with the R.F. GAIN and A.F. GAIN controls. In this position there is no a-v-c or noise-limiting action; it is therefore most commonly used when receiving continuous wave without the presence of noise interference.

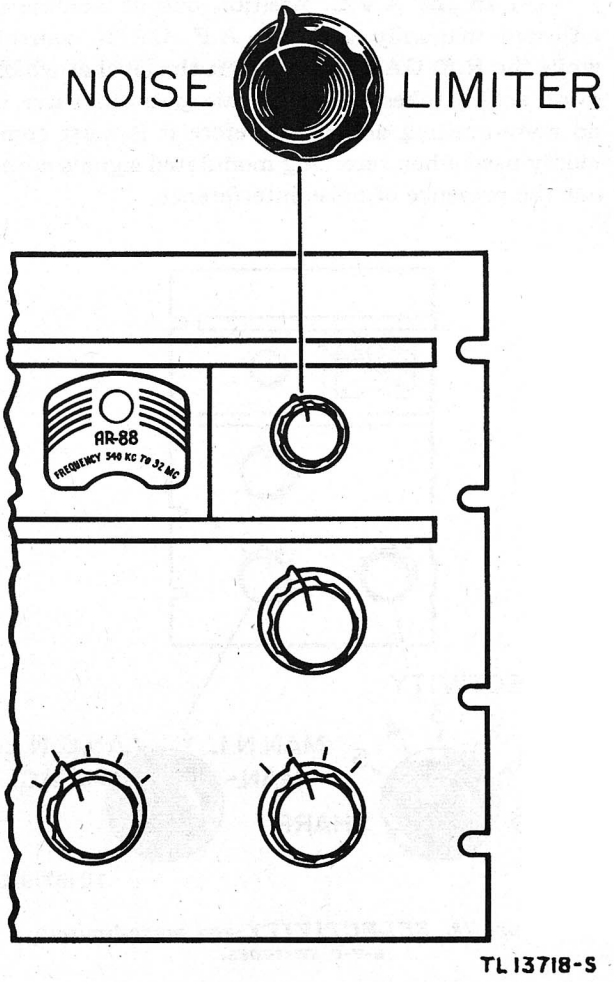

Figure 17. NOISE LIMITER control.

(*2*) In the MAN. N.L. position output volume is adjusted manually. In this position a noise-limiting circuit is in operation, but there is no a-v-c action. This position is most commonly used when receiving continuous wave with the presence of noise interference.

(*3*) In the A.V.C. N.L. position, output volume is adjusted manually with the A.F. GAIN control while the R.F. GAIN control sets the level at which a-v-c action takes place. In this position the noise-limiting circuit is in operation. Normally the R.F. GAIN control is set fully clockwise, setting the delay voltage for automatic volume control comparatively low. Under conditions of extreme noise interference, the delay voltage should be increased by setting back (counterclockwise) the R.F. GAIN control, thus allowing the noise-limiting stage to be more effective. The A.V.C. N.L. position is most commonly used when receiving modulated signals with the presence of noise interference.

(*4*) In the A.V.C. position output volume is adjusted manually with the A.F. GAIN control, while the R.F. GAIN control sets the level at which a-v-c action takes place. In this position there is no noise-limiting action; therefore it is most commonly used when receiving modulated signals without the presence of noise interference.

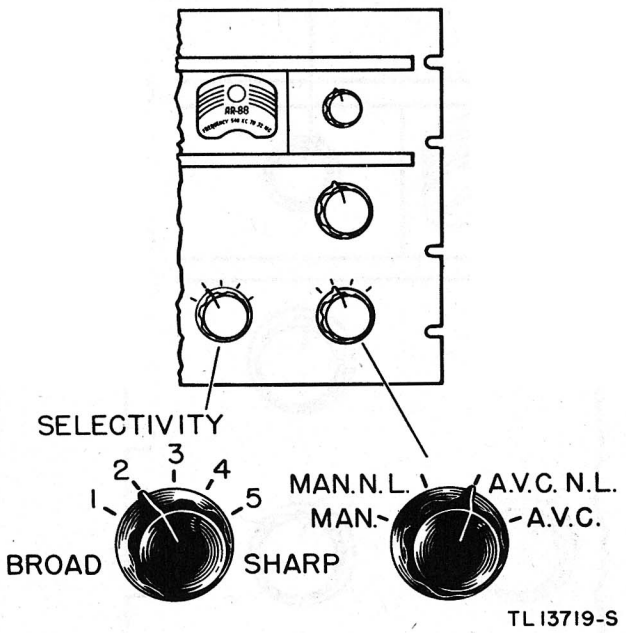

Figure 18. SELECTIVITY and noise-limiter a-v-c switches.

k. The A.F. GAIN control (figs. 13(11) and 19) is a 2-megohm potentiometer R51, which controls the input voltage to the first audio-frequency (a-f) amplifier. This control is used in conjunction with the R.F. GAIN control to adjust the output volume.

l. The R.F. GAIN control (figs. 13(12) and 19), potentiometer R46, controls the gain of the first and second r-f stages and the first and second intermediate-frequency (i-f) stages. When the receiver is set for manual volume control, the R.F. GAIN control works in conjunction with the A.F. GAIN control to adjust the output volume. During a-v-c operation, the R.F. GAIN control sets the delay voltage for automatic volume control. Normally this control is set in its fully clockwise position, at which time the delay voltage will be low and automatic-volume-control (a-v-c) action takes place on reasonably small signals. As the control is rotated counterclockwise, a greater delay voltage is developed and a-v-c action does not take place until the signal voltage is of a greater magnitude.

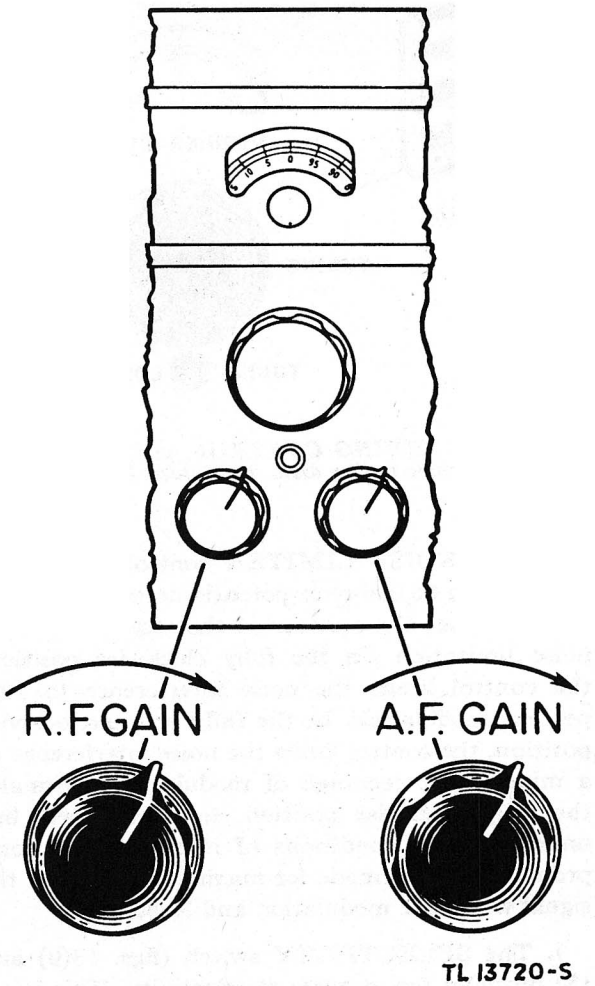

Figure 19. A.F. GAIN and R.F. GAIN controls.

m. The H.F. TONE control (figs. 13(13) and 20) is a 1-megohm potentiometer R52 used to attenuate the higher audio frequencies. This potentiometer is in series with capacitor C117, and the combination of the two is across the output of the first a-f amplifier. In the full clockwise position, full tone is obtained. To attenuate the higher audio frequencies, the control is rotated counterclockwise.

n. The B.F.O. ADJ. control (figs. 13(14) and 21) is a 25-mmf trimmer capacitor C86 used to set the audio tone of c-w signals. After the signal has been accurately tuned, adjust this control to the desired audio tone.

o. The PHONES jack (figs. 13(15) and 22) is a two-position jack J2, which allows for selection of either phone or phone-and-speaker output. With the phone plug in the first position (halfway in), the phones are across the 2.5-ohm output and the

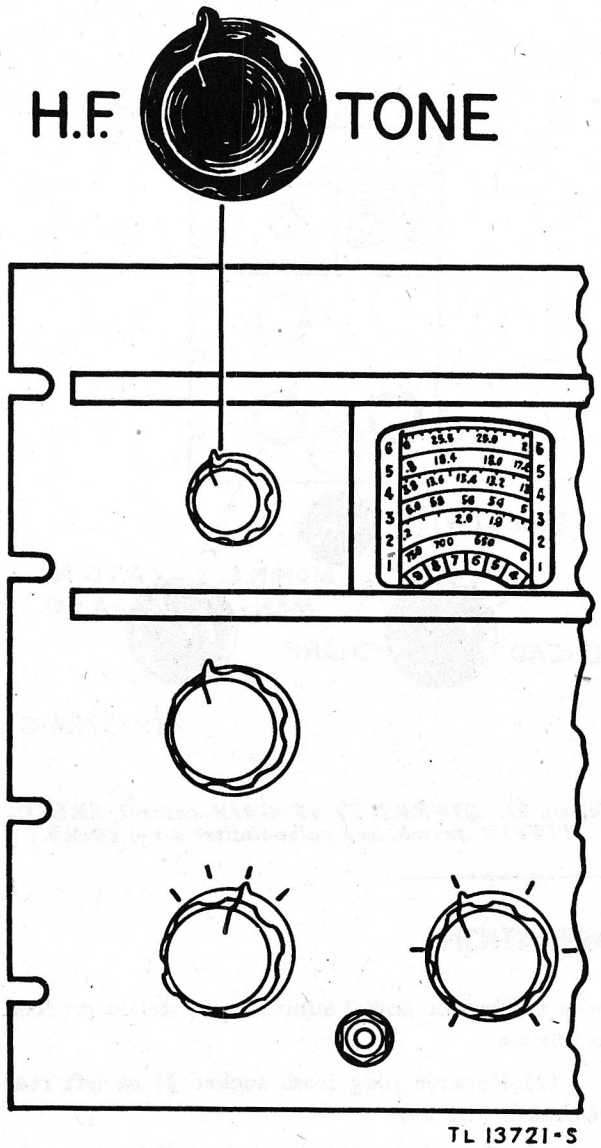

Figure 20. H.F. TONE control.

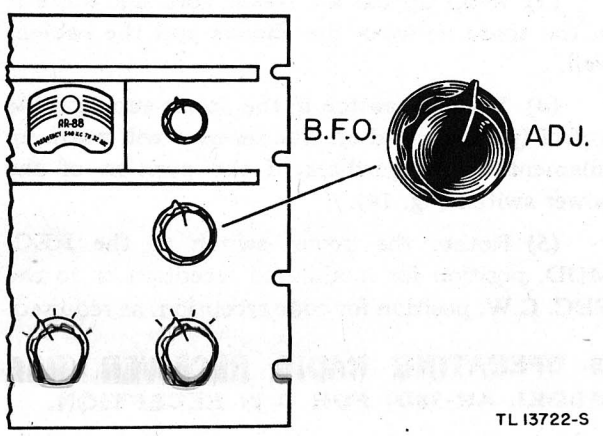

Figure 21. B.F.O. ADJ. control.

speaker and phone circuits are both closed. With the phone plug in the second position (fully in), the phones are across the headphone winding. In this position the speaker circuit is open and the phone circuit is closed. In addition to the 2.5-ohm tapped output winding, a 600-ohm winding is provided to feed a 600-ohm balanced line. If neither the 2.5- or 600-ohm output circuit is loaded, the phone plug should be in the second position (fully in) to prevent improper loading of the output circuit and resulting distortion.

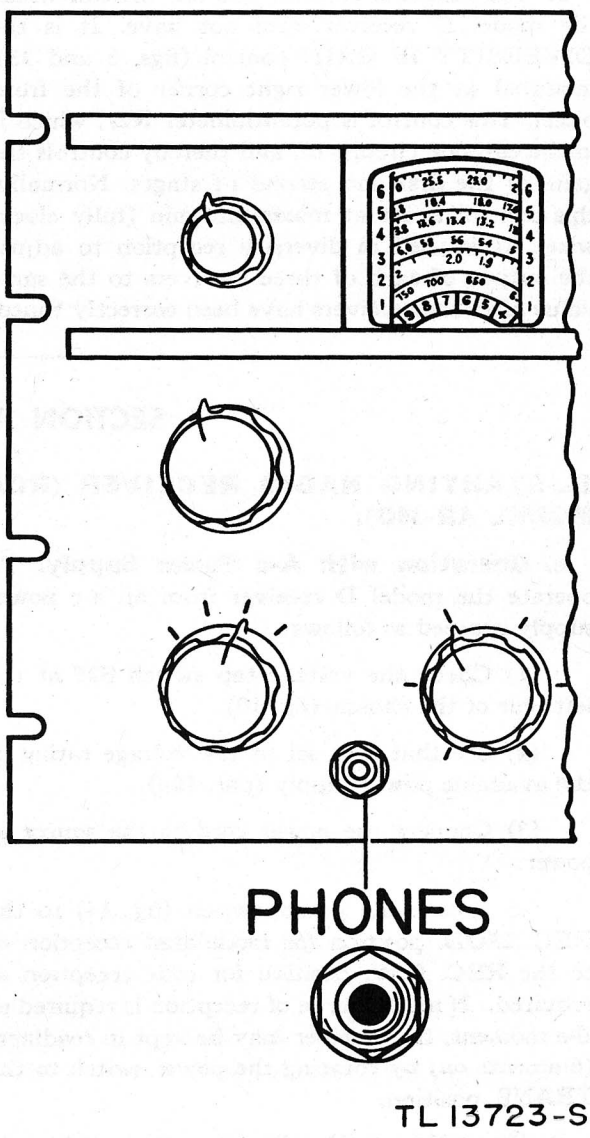

Figure 22. Headphone jack.

14. CONTROLS OF RADIO RECEIVER (RCA MODEL AR-88F).

The information in paragraph 13, which covers controls of the model D receiver, also applies to the controls of the model F receiver with the following exceptions:

a. In the model F receiver, the TRANS. position of the power switch (figs. 13(1) and 14) energizes the receiver tube filaments and opens the plate circuits, but does not have provision for a closed circuit for connection to a transmitter relay. The TRANS. position of the power switch on the model F receiver should not be used except to warm up the receiver.

b. The model F receiver has one control which the model D receiver does not have. It is the DIVERSITY IF GAIN control (figs. 5 and 23), mounted at the lower right corner of the front panel. This control is potentiometer R21, which is in the cathode circuits of, and thereby controls the gain, of the first and second i-f stages. Normally, this control is set at maximum gain (fully clockwise). It is used in diversity reception to adjust the output of each of three receivers to the same value after the receivers have been correctly tuned.

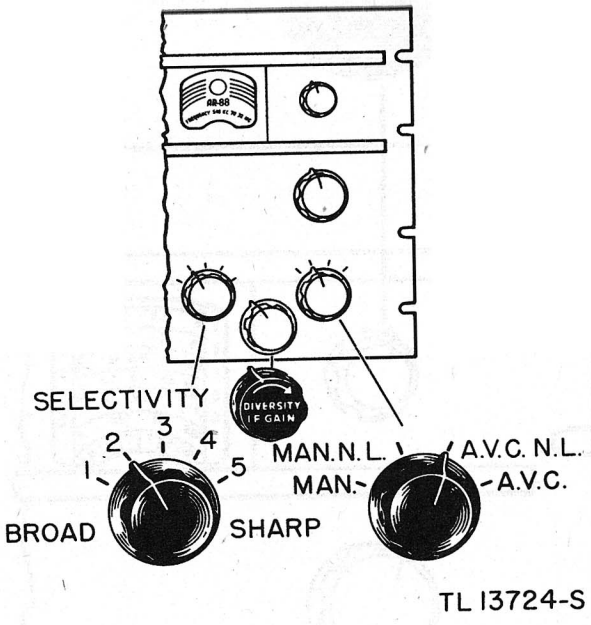

Figure 23. DIVERSITY IF GAIN control, SELECTIVITY switch, and noise-limiter a-v-c switch.

SECTION IV. OPERATION

15. STARTING RADIO RECEIVER (RCA MODEL AR-88D).

a. Operation with A-c Power Supply. To operate the model D receiver from an a-c power supply proceed as follows:

(*1*) Check the voltage tap switch S25 at the left rear of the chassis (fig. 10).

(*2*) See that it is set at the voltage rating of the available power supply (par. 10a).

(*3*) Connect the power cord to the source of power.

(*4*) Rotate the power switch (fig. 14) to the REC. MOD. position for modulated reception or to the REC. C.W. position for code reception as required. If neither type of reception is required at the moment, the receiver may be kept in readiness (filaments on) by rotating the power switch to the TRANS. position.

b. Operation with Vibrator Power Supply or Batteries. To operate the model D receiver from a vibrator power supply or batteries proceed as follows:

(*1*) Remove plug from socket J1 at left rear of chassis (fig. 10).

(*2*) Plug the cable from the vibrator power supply or batteries into socket J1 (par. 10b and c).

(*3*) Wrap up the a-c power cord and store it in the space between the chassis and the cabinet wall.

(*4*) Turn the switch in the power-supply cable to ON (par. 10b and c). The receiver will warm up (filaments on) regardless of the position of the power switch (fig. 14).

(*5*) Rotate the power switch to the REC. MOD. position for modulated reception or to the REC. C.W. position for code reception, as required.

16. OPERATING RADIO RECEIVER (RCA MODEL AR-88D) FOR C-W RECEPTION.

After starting the receiver, proceed as follows when c-w reception has been selected.

a. Set the RANGE switch (fig. 14) for the band required.

b. Adjust the ANT. ADJ. control (fig. 15) for maximum background noise.

c. Set the SELECTIVITY switch (fig. 18) at position 3, 4, or 5 depending on the degree of selectivity required. Position 5 provides the highest degree of selectivity.

d. Set the noise-limiter a-v-c switch (fig. 18) to the MAN. N.L. position if noise interference is present, or to the MAN. position if it is not present.

e. Adjust the R.F. GAIN control (fig. 19) to the full clockwise position.

f. Adjust the A.F. GAIN control (fig. 19) approximately to the halfway position.

g. Adjust the TUNING CONTROL (fig. 16) to tune in the required station.

h. Readjust the R.F. and A.F. GAIN controls (fig. 19) to obtain the desired volume.

i. Adjust the NOISE LIMITER control (fig. 17), when necessary, to a position which provides maximum clarity of the signal and least noise.

j. Reset the SELECTIVITY and noise-limiter a-v-c switches (fig. 18) in accordance with requirements of noise interference and adjacent signal interference.

k. Adjust the B.F.O. ADJ. control (fig. 21) to obtain the desired audio tone.

l. If the receiver is subject to vibration, turn the tuning lock (fig. 16) moderately tight in a clockwise direction.

17. OPERATING RADIO RECEIVER (RCA MODEL AR-88D) FOR MODULATED RECEPTION.

After starting the receiver, proceed as follows when modulated-signal reception has been selected.

a. Set the RANGE switch (fig. 14) for the band required.

b. Adjust the ANT. ADJ. control (fig. 15) for maximum background noise.

c. Set the SELECTIVITY switch (fig. 18) at positions 1, 2, or 3, depending on the degree of fidelity and selectivity required. Position 1 provides the greatest fidelity and the least selectivity.

d. Set the noise-limiter a-v-c switch (fig. 18) to A.V.C. N.L. position if noise interference is present, or to the A.V.C. position if it is not present.

e. Adjust the R.F. GAIN control (fig. 19) to the full clockwise position.

f. Adjust the A.F. GAIN control (fig. 19) approximately to the halfway position.

g. Adjust the TUNING CONTROL (fig. 16) to tune in the required station.

h. Readjust the A.F. GAIN control (fig. 19) to obtain the desired volume.

i. Adjust the NOISE LIMITER control (fig. 17), when necessary, to a position which provides maximum clarity of the signal and least noise.

j. Reset the SELECTIVITY and noise-limiter a-v-c switches (fig. 18) in accordance with requirements of noise interference and adjacent signal interference.

k. Readjust the R.F. GAIN control (fig. 19) in a counterclockwise direction, when necessary, under conditions of extreme noise interference.

l. Adjust the H.F. TONE control (fig. 20) in a counterclockwise direction, if it is desired to attenuate the higher audio frequencies.

m. If the receiver is subject to vibration, turn the tuning lock (fig. 16) moderately tight in a clockwise direction.

18. STOPPING RADIO RECEIVER (RCA MODEL AR-88D).

a. Operation with A-c Power Supply. To stop the model D receiver when operating from an a-c power supply, rotate the power switch (fig. 14) to the OFF position.

b. Operation with Vibrator Power Supply or Batteries. To stop the model D receiver when operating from a vibrator power supply or batteries, turn the switch in the power-supply cable to OFF (par. 10b and c). The receiver will be shut off regardless of the position of the power switch (fig. 14).

19. OPERATION OF RADIO RECEIVER (RCA MODEL AR-88F).

a. Directions for the operation of the model F receiver with the other components of the diversity receiving equipment are given in TM 11–889 (when published). The instructions given in paragraphs 15 through 18 will apply for the most part when operation of the model F receiver is required as

an independent unit (separated from the diversity equipment). The following additional instructions will also apply.

b. Adjust the DIVERSITY IF GAIN control (fig. 23) to the full clockwise position. It is not necessary to readjust this control.

SECTION V. EQUIPMENT PERFORMANCE CHECK LIST

20. PURPOSE AND USE OF CHECK LIST.

a. General. The equipment performance check list (par. 21) will help the operator determine whether radio receiver (RCA model AR-88(*)) is functioning properly. The check list gives the item to be checked, the conditions under which the item is checked, the normal indications of correct operation, and the corrective measures the operator can take. Check items 1 to 3 before starting (before turning the equipment on), items 4 and 5 when starting, items 6 to 18 during operation, and items 19 and 20 when stopping (turning the equipment off). Items 6 to 18 of this list should be checked at least once during a normal operating period or at least four times a day during continuous operation.

b. Action or Condition. For some items, the information given in the action or condition column consists of the settings of various switches and controls under which the item is to be checked. For other items it represents an item that must be taken to check the normal indication given in the normal indication column.

c. Normal Indications. The normal indications listed include the visible and audible signs that the operator will perceive when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. Corrective Measures. The corrective measures listed are those the operator can make without turning the equipment in for repairs. When reference is made in the table to Section XII it indicates that the trouble cannot be corrected during operation and that trouble shooting by an experienced repairman is called for. If the set is completely inoperative or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

e. Items 1 to 5. Items 1 to 5 should be checked each time the equipment is put into operation.

f. Items 6 to 18. The operator should familiarize himself with the operation of radio receiver (RCA model AR-88(*)) so that he knows the characteristics of its reception of normal signals. By becoming familiar with the operation of the receiver, the operator will know the normal position of the A.F. GAIN control. This will aid in an approximate determination of the sensitivity and amplification of the receiver.

g. Items 19 and 20. Items 19 and 20 are checked whenever the radio is taken out of operation. Any abnormal indications at this time are probably caused by trouble in the set and should be corrected before the next expected period of operation

21. EQUIPMENT PERFORMANCE CHECK LIST.

	Item No.	*Item*	*Action or condition*	*Normal indication*	*Corrective measure*
PREPARATORY	1	Antenna.	Antenna connected. Antenna terminal board clean and not cracked.		
	2	Headset.	Headset plugged in PHONES jack.		
	3	Power cord.	Power cord securely connected.		

21. EQUIPMENT PERFORMANCE CHECK LIST (contd).

	Item No.	Item	Action or condition	Normal indication	Corrective measure
START	4	Power switch.	Turn switch clockwise to REC. MOD. position.	Dial lamps light.	Clean and tighten power-cord connections. Replace lamps or refer to section XII.
	5	Warm-up period.	Receiver on.	Rushing noise heard in headset or speaker after few seconds.	
EQUIPMENT PERFORMANCE	6	RANGE switch.	Set to all bands alternately.	Normal signal output on all bands.	Weak or no output on one or more bands, rotate switch several times to clean contacts or refer to section XII.
	7	ANT. ADJ. control.	Set for maximum background noise.	Background-noise output varies.	Refer to section XII.
	8	SELECTIVITY switch.	Set at various settings.	Selectivity varies in steps: position 1, least selective; position 5, most selective.	Refer to section XII.
	9	Noise-limiter, a-v-c switch.	Set at various settings.	N. L. positions provide noise limiting, A.V.C. positions provide constant output.	Refer to section XII.
	10	R.F. GAIN control.	Set fully clockwise.	Output varies when on MAN. operation as control is varied.	Refer to section XII.
	11	A.F. GAIN control.	Set at halfway point.	Output varies as control is varied.	Refer to section XII.
	12	TUNING CONTROL.	Rotate TUNING CONTROL.	Control moves freely in either direction.	Loosen tuning lock.
			Tune to required frequency.	Signal is heard.	Refer to section XII.
	13	NOISE LIMITER control.	Rotate NOISE LIMITER control.	Noise interference varies when operating on N.L.	Refer to section XII.
	14	H.F. TONE control.	Rotate H.F. TONE control.	Tone of output signal varies.	Refer to section XII.
	15	B.F.O. ADJ. control.	Switch to C.W. operation, tune in c-w signal and vary B.F.O. ADJ. control.	Tone of signal varies.	Refer to section XII.
	16	Tuning lock.	Tighten tuning lock under conditions of vibration.	Receiver remains tuned to frequency.	Check tightness of tuning lock.
	17	Headset and loudspeaker.	Headset jack in first position.	Output from both headset and loudspeaker.	Check headset cording, jack, and plug, including position.
			Headset jack in second position.	Output from headset only.	Check headset cording, jack, and plug, including position.
			Flex headset and loudspeaker cords throughout entire length.	No change in output.	Replace cords.
	18	Vacuum tubes.	Noticeable decrease in sensitivity.	High sensitivity.	Remove, check, and replace tubes.
STOP	19	A.F. GAIN control.	Rotate fully counterclockwise.	No signal output.	
	20	Power switch.	Set to fully counterclockwise position.	Dial lamps go out.	

PART THREE

MAINTENANCE INSTRUCTIONS

SECTION VI. PREVENTIVE MAINTENANCE TECHNIQUES

22. MEANING OF PREVENTIVE MAINTENANCE.

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major breakdowns and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent break-downs* and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be over emphasized. A system of radio communication depends on the performance of every set. It must be *ready* to go on the air when it is needed, and it *must* operate efficiently. Therefore, it is vitally important that radio operators and repairmen maintain their radio sets properly. See TB SIG 123, Preventive Maintenance Practices for Ground Signal Equipment.

> **NOTE:** The operations in sections VI and VII are first and second echelon (organization operators and repairmen) maintenance. Some operations in section X are higher echelon maintenance.

23. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES.

a. General. Most of the electrical parts used in radio receiver (RCA model AR-88(*)) require routine preventive maintenance. Some parts require a different kind of maintenance than others. Some require more, some less. Definite and specific instructions must be followed. Hit-or-miss techniques cannot be applied. This section of the manual contains specific instructions to guide personnel assigned to perform the six basic maintenance operations: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this manual the lettering system for the Six operations will be as follows:

F — Feel.
I — Inspect.
T — Tighten.
C — Clean.
A — Adjust.
L — Lubricate.

The first two operations establish the need for the other four. Selection of operations is based on a knowledge of field needs. For example, dust encountered on dirt roads during cross-country travel filters into equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is most needed.

b. Feel. The feel operation is used most often to check rotating machinery, such as dynamotors, blower motors, and drive motors, also to determine whether electrical connections and bushings are overheated. Feeling will show the need for lubrication or the existence of other defects requiring correction. The maintenance man *must* become familiar with the normal operating temperatures of motors, transformers, and other parts, in order to recognize signs of overheating.

> **NOTE:** It is important to perform the feel operation as soon as possible after shutdown and always before any other maintenance is done.

c. Inspect. Inspection is the most important operation in preventive maintenance. A careless observer will overlook evidences of minor trouble. Although these defects may not at the moment interfere with performance of the equipment, invaluable time and effort can be saved if they are corrected *before* they lead to major and costly breakdowns. To be able to recognize the signs of a defective set, make every effort to become thoroughly familiar with indications of *normal* functioning. Inspection consists of *carefully* observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(*1*) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

(*2*) Placement, by observing that all leads and cabling are in their original positions.

(*3*) Cleanliness, by carefully examining all recesses in the unit for accumulation of dust, especially between connecting terminals and binding posts. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity areas, look for fungus growth and mildew.

(*4*) Tightness, by testing any connection or mounting which appears to be loose.

d. Tighten, Clean, and Adjust. These operations are self-explanatory. Specific procedures to be followed in performing them are given wherever necessary throughout part three.

CAUTION: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

Whenever a loose connection is tightened, it should be moistureproofed and fungiproofed again by applying the varnish with a small brush. See section X for details of moistureproofing and fungiproofing.

e. Lubricate. Lubrication refers to the application of grease or oil to the bearings of motors or rotating shafts. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment.

24. VACUUM TUBES.

NOTE: Do not work on the tubes immediately after shut-down. Severe burns may result from contact with the envelopes of hot tubes.

a. Inspect (I).

(*1*) Inspect glass and metal tube envelopes for accumulation of dirt and for corrosion.

(*2*) Inspect the firmness of tubes in their sockets. Make the inspection by pressing the tubes down in the sockets and testing them in that position, *not* by partially withdrawing the tubes and jiggling them from side to side. Movement of a tube tends to weaken the pins in the base and unnecessarily spreads the contacts in the socket. Inspect the tube sockets at the time the tubes are removed.

(*3*) Great care must be used when it is necessary to remove a tube from its socket. Never jar a warm tube.

b. Tighten (T). Tighten all loose connections to the tube sockets. If the connections are dirty or corroded clean them before tightening.

c. Clean (C).

(*1*) Clean all tubes, if necessary. Tubes operating at low voltage and not having exposed grid caps do not require frequent cleaning. However, do not permit dirt to accumulate on low-voltage tubes.

(*2*) Remove dirt and dust from the glass and metal envelopes with a clean, lint-free, dry cloth.

(*3*) When tube sockets are cleaned and the contacts are accessible, fine sandpaper may be used to remove corrosion, oxidation, and dirt.

25. CAPACITORS.

a. Inspect (I).

(*1*) Inspect the terminals of large fixed capacitors for corrosion and loose connections. Carefully inspect the mountings to discover loose mounting screws. Examine the leads for poor insulation, cracks, and evidences of dry rot. Cut away frayed strands on the insulation. If the wire is exposed, wrap it with friction tape. See that the terminal of the capacitors are not cracked or broken.

(*2*) Thoroughly inspect the case of each large fixed capacitor for leaks, bulges, and discoloration.

(*3*) Inspect the plates of variable capacitors for dirt, dust, or lint. Examine the movable set of plates for signs of damage or misalignment that would cause them to touch the fixed plates during tuning. Rotate the movable plates, using the panel tuning control, and thus check for proper operation of the capacitor.

b. Tighten (T). Tighten loose terminals, mountings, and connections on the capacitors, when necessary. Do not break the bushing or damage the gasket.

c. Clean (C).

(*1*) Clean the cases of fixed capacitors, the insulated bushings, and all connections that are dirty or corroded. The capacitor cases and bushings can usually be cleaned with a dry cloth. However, if the deposit of dirt is hard to remove, moisten the cloth in dry-cleaning solvent (SD).

(*2*) Clean the plates of variable capacitors with a small brush or pipe cleaner, removing all dust and lint. Dust, if present, may cause noisy reception.

26. RESISTORS.

a. General. Various types of resistors are used in radio receiver (RCA model AR-88(*)). The connections to the various resistors are either of the pigtail or solder-lug type.

b. Inspect (I). Inspect the coating of the vitreous-enameled resistors for signs of cracks and chipping, especially at the ends. Examine the bodies of all types of resistors for blistering, discoloration, and other indications of overheating. Inspect leads and all other connections for corrosion, dirt, dust, looseness, and broken strands in the connecting wires. Check the security of all mountings. Do not attempt to move resistors with pigtail connections, because there is danger of breaking the connections at the point where they enter the body of the resistor. Such defects cannot be repaired.

c. Tighten (T). Tighten resistor connections and mountings whenever they are found loose. If a resistor is allowed to remain loose, vibration may break the connection or damage the body.

d. Clean (C).

(*1*) Clean all carbon resistors with a small brush.

(*2*) The vitreous-enameled resistors must be kept clean to avoid leakage between the terminals. Wipe them with a dry cloth. However, if the dirt deposit is unusually hard to remove, use dry-cleaning solvent (SD).

(*3*) Resistors with discolored bodies cannot be cleaned. Discoloration indicates that there has been overloading and overheating at some time prior to the inspection. The discoloration is probably due to circuit trouble which requires analysis and correction. Trouble-shooting procedures are described in part five.

27. SWITCHES.

a. Inspect (I).

(*1*) Inspect the mechanical action of each switch and, while so doing, look for signs of dirt or corrosion on all exposed elements. In some cases, it will be necessary to examine the elements of the switch visually; in others, the action of the switch is checked by flipping the control knob or toggle.

(*2*) Visually examine ganged switches S1 through S16, S17 through S20, S21 and S22, and S23 and S24 (fig. 26) to see that they are properly lubricated and that the contacts are clean. Inspection is visual. Do not bend or pry the leaves of the switches apart. The rotary members should make good contact with the stationary members; and as the former slides into the latter, a spreading of the stationary contact leaves should be visible. Switch action should be free. Wiping action of contacts usually removes any dirt at the point of contact.

b. Clean (C). Clean the exterior surfaces of switches with a stiff brush, moistened with dry-cleaning solvent (SD).

c. Lubricate (L). Refer to section VIII.

28. COILS.

a. Inspect (I). Inspect the r-f transformer and choke coils for cleanliness of the coil form and secureness of mounting. Check all leads for proper connections.

b. Tighten (T). Tighten any loose coil mounting or connections by resoldering wires or tightening screws.

c. Clean (C). Clean the coil form and coil with a soft brush. Remember the coil form is actually performing the function of an insulator.

29. POTENTIOMETERS.

a. Inspect (I).

(*1*) Inspect the mechanical condition of potentiometers R46, R48, R51, and R52. The arm should be keyed tightly to the shaft, and the shaft should turn easily in the bushing which supports it.

(*2*) Inspect the assembly, setscrews, and nuts.

(*3*) Examine all metallic parts for dust, dirt, and corrosion.

b. Tighten (T). Tighten loose assembly or mounting nuts.

c. Clean (C).

(*1*) Clean the connections and terminals of the potentiometer whenever they are dirty or corroded.

(*2*) Remove grease and dirt from potentiometer parts with carbon tetrachloride.

(*3*) Clean the body of the potentiometer with a brush or cloth.

30. TERMINAL BOARDS.

a. Inspect (I).

(*1*) Inspect terminal boards for cracks, breakage, dirt, loose connections, and loose mounting screws.

(*2*) Carefully examine connections for mechanical defects, dirt, and corrosion.

b. Tighten (T). Tighten loose screws, lugs, and mounting bolts. When tightening screws, be sure to select a screwdriver of correct size. Do not exert too much pressure. Tighten loose connections.

c. Clean (C). Clean terminal boards with a dry brush. When necessary, use a cloth moistened with dry-cleaning solvent (SD). Thoroughly wipe the board with a cloth and then brush it to remove any lint.

31. JACKS AND PLUGS.

Jacks require very little attention, and then only at infrequent intervals. Occasionally it will be necessary to tighten the mounting nut, clean the contacts, or increase the spring tension. Remove dirt with a brush and carbon tetrachloride; remove corrosion with a piece of crocus cloth followed by a clean cloth. Increase spring tension, when necessary. Try the action of the jack after each adjustment. Be sure to keep all soldered connections intact. To clean dirty or corroded telephone-type plugs, use paste metal polish (Signal Corps stock No. 6G1516). After cleaning, remove all traces of polish remaining with carbon tetrachloride. Finish off with a clean dry cloth.

32. CABINET AND CHASSIS.

a. Inspect (I). Inspect the outside and the inside of radio receiver (RCA model AR-88D) cabinet, thoroughly, paying strict attention to every detail. Check the panel screws and the chassis mounting bolts. Inspect the panel for loose knobs, switches, and jacks. Check for rust and any chipped or scratched surfaces.

b. Clean (C). Clean each cabinet, outside and in, with a clean dry cloth. Use dry compressed air to blow out all accumulated dirt and dust. Repaint any surface that is found scratched, rusted, or chipped.

c. Tighten (T). Tighten all loose mounting bolts, panel screws, and control knobs.

33. COUPLING SHAFTS AND CONTROL KNOBS.

The control of various capacitors, switches, and resistors found throughout the set is effected through coupling shafts that connect these items to control knobs located on the front panel. It is important that these shafts and control knobs be kept tight at all times. Use the setscrew wrench (fig. 28) to tighten these items whenever they are found loose.

34. GEARS.

a. Inspect (I). Inspect the teeth of the gears in the tuning control assembly (fig. 25) for dirt or corrosion.

b. Clean (C). If the gears are dirty, clean them with a pipe cleaner or small brush dipped in dry-cleaning solvent (SD).

c. Lubricate (L). Refer to section VIII.

35. POWER TRANSFORMERS, FILTER CHOKES, AND AUDIO TRANSFORMERS.

Since the power transformer, filter chokes, and audio transformer used in radio receiver (RCA model AR-88(*)) are of similar potted construction, preventive maintenance for them is similar.

a. Feel (F). As soon as possible after shut-down, feel filter chokes L49 and L50 (fig. 25) for abnormal

heating which may indicate an overloaded condition, or imminent failure due to moisture absorption or other causes. Likewise feel audio transformer T2 (fig. 25) for abnormal heating. Power transformer T1 (fig. 25) normally operates at a warm temperature. Feel for abnormal heating, but use care to avoid burns.

b. Inspect (I). Inspect power transformer T1, filter chokes L49 and L50, and audio transformer T2, for signs of blistering, bulging, or leakage of tar or insulating compounds. Inspect for external signs of electrolytic action or corrosion.

c. Tighten (T). Tighten all mounting bolts or screws, but not to the point that threads are destroyed. The securing of such heavy parts as transformers and chokes to the chassis is very important in preventive maintenance. Should a heavy filter choke or transformer break loose from its mounting in vehicular use or in transit, it may smash tubes, variable capacitors, coils, and resistors, and at the same time sever a large number of connections.

d. Clean (C). Clean power transformers, filter chokes, and audio transformers with a dry cloth. Be sure that no dirt, lint, threads, or foreign material is present between terminals. Dirt, lint, and thread absorb moisture which may provide a leakage path for high voltages between these terminals. Be sure that none are present.

SECTION VII. ITEMIZED PREVENTIVE MAINTENANCE

36. INTRODUCTION.

For ease and efficiency of performance, preventive maintenance on radio receiver (RCA model AR-88(*)) will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on the radio receiver at the specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in section VI. These general instructions are not repeated in this section. When performing preventive maintenance, refer to section VI if more information is required for the following items. All work is to be performed with the power removed from the equipment. After preventive maintenance has been performed on a given day, the equipment should be put into operation and checked for satisfactory performance. (See paragraph 21, Equipment Performance Check List.)

37. PREVENTIVE MAINTENANCE TOOLS AND MATERIALS.

The following preventive maintenance tools and materials will be needed:

Common hand tools.
Clean soft rags.
Camel's-hair brush.
Small stiff brush.
Paste metal polish (Signal Corps stock No. 6G516).
#0000 sandpaper.
Crocus cloth.
Screwdriver (long shaft, small).
Set of socket wrenches ($\frac{3}{16}$ to $\frac{1}{2}$ inch).
Allen setscrew wrench.
Carbon tetrachloride.
Engine oil SAE 10 (OE).
Dry-cleaning solvent (SD).

NOTE: Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-cleaning is available as a cleaning fluid through established supply channels. Oil, Fuel, Diesel may be used for cleaning purposes when dry-cleaning solvent (SD) is not at hand. Carbon tetrachloride will be used as a cleaning fluid *only* in the following cases: where inflammable solvents cannot be used because of the fire hazard, and for cleaning electrical contacts including relay contacts, plugs, commutators, etc.

38. ITEM 1, FRONT PANEL AND CABINET (fig. 24).

NOTE: For preventive maintenance of the model F receiver ignore instructions given for maintenance of cabinet.

PRELIMINARY STEPS. Remove the four panel screws and remove the receiver from the cabinet or rack.

OPERATIONS.

IC	Cabinet.
ICL	Cabinet lid hinges and catches.
IC	Dial and nameplate window.
ITC	Switch and control knobs.
ITC	PHONES jack.

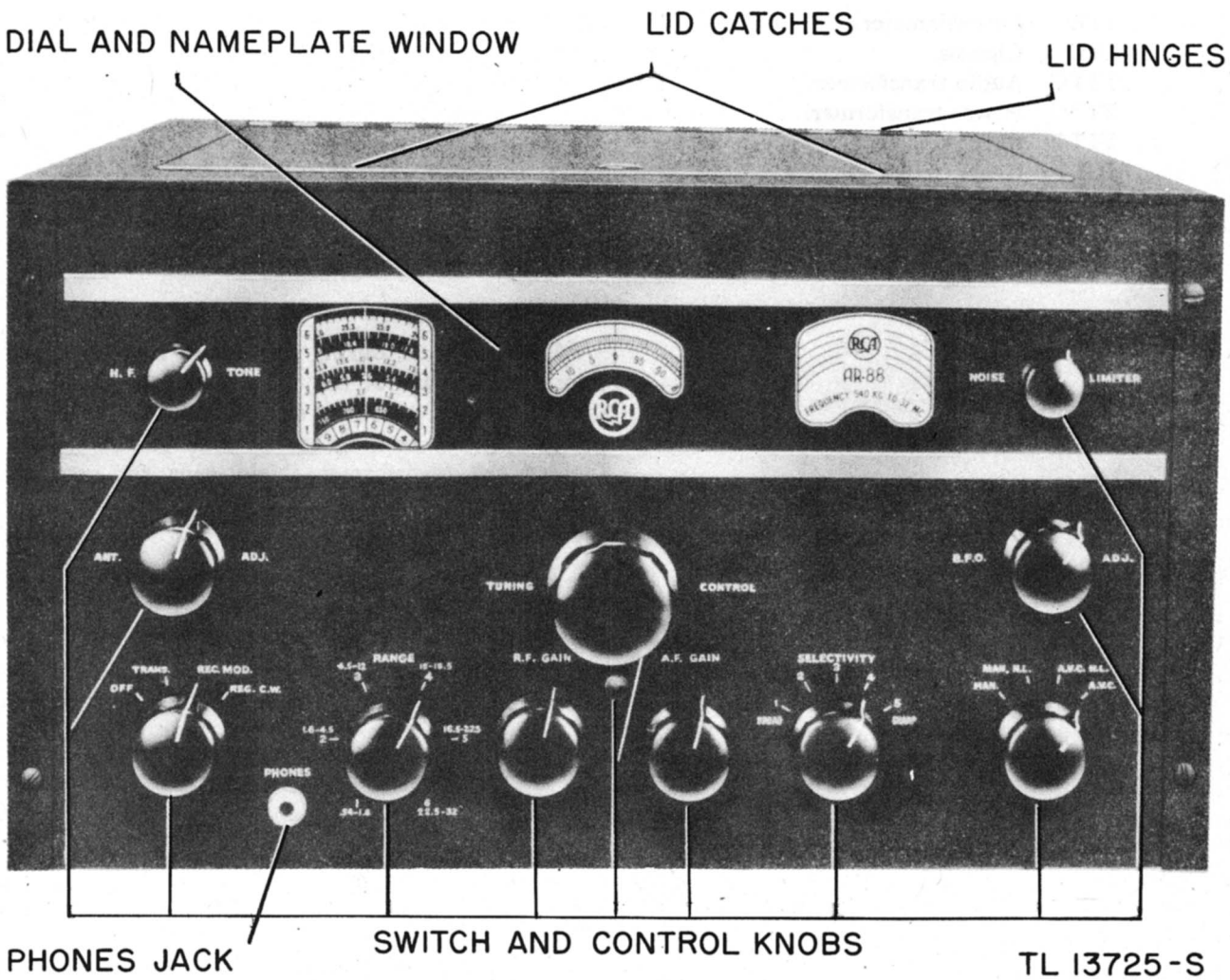

Figure 24. Radio receiver (RCA model AR-88D), panel and cabinet maintenance.

39. ITEM 2, TOP OF CHASSIS (fig. 25).

PRELIMINARY STEPS. Unscrew the four knurled nuts and remove the large top cover of the r-f unit. Unscrew the eight knurled nuts and remove the small cover from the tuning capacitor. Remove the three tools from their mounting brackets.

OPERATIONS.

ITC	Tubes.
ITC	Capacitors.
ITC	Potentiometers.
ITC	Chassis.
FITC	Audio transformer.
FITC	Power transformer.
FITC	Filter chokes.
ICL	Gears.
IC	Shield cans.
ITC	Dial lamps and sockets.

REMARKS. If, during inspection, a milky discoloration is found at the top of any tube, replace the tube. This condition should not be confused with the getter coating on the wall of the tube. Inspect the transformer shield cans for secure mounting and make any tightening required at the bottom of the chassis.

CAUTION: Do not touch adjusting screws of any transformer or the plungers of the plunger type trimmer capacitors.

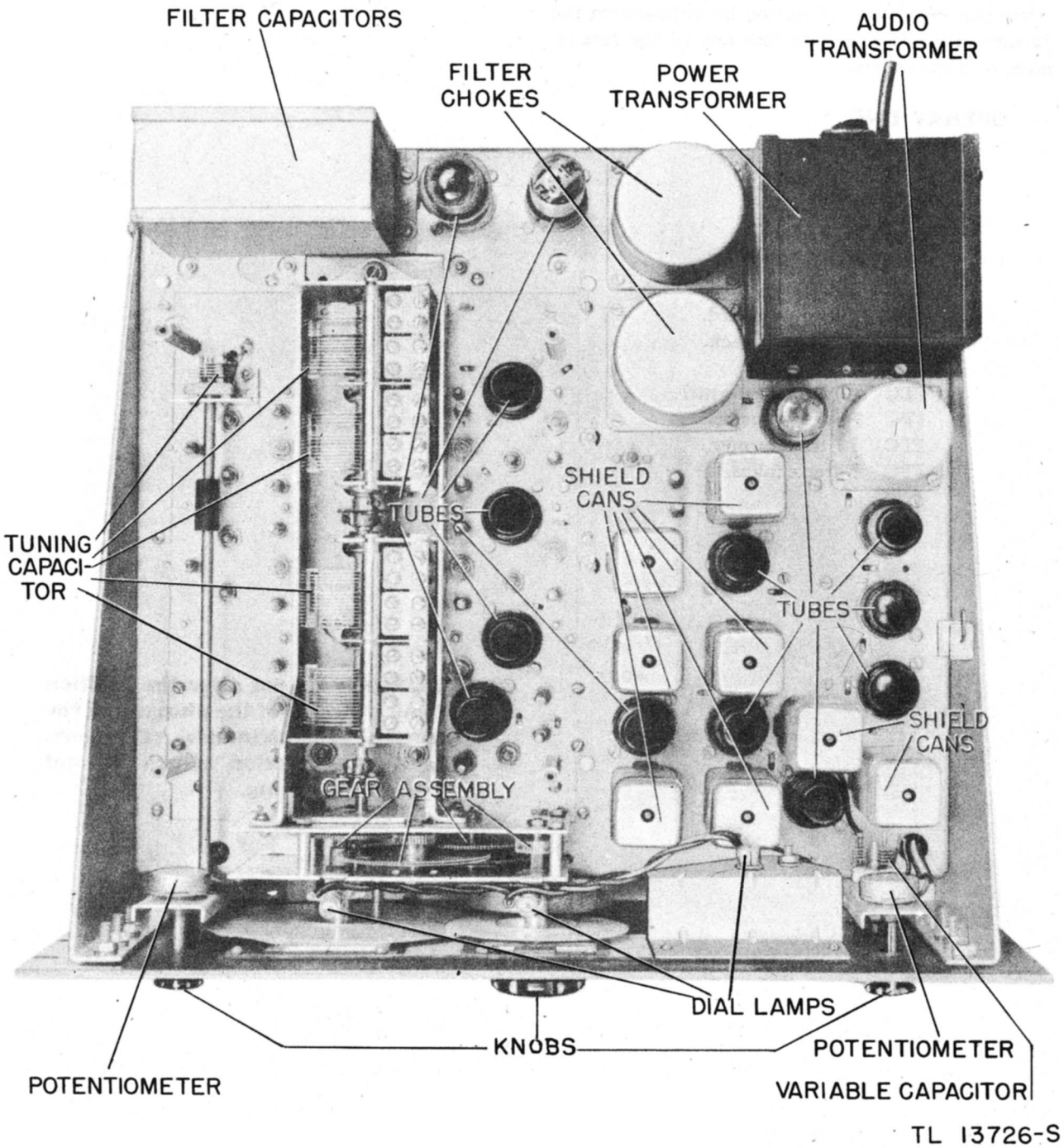

Figure 25. Radio receiver (RCA model AR-88D), top of chassis, maintenance.

40. ITEM 3, BOTTOM OF CHASSIS (Fig.26).

PRELIMINARY STEPS. Remove the small cover plate from the oscillator section by unfastening the eight screws and four nuts. Remove the cover plate from the r-f section by unfastening the 22 nuts. Be careful not to lose any of the screws, nuts, or lockwashers.

OPERATIONS.

ITC Tube sockets.
ITC Capacitors.
ITC Resistors.
ICL Switches.
ITC Coils.
ITC Potentiometers.
ITC Terminal board.
ICA PHONES, jack.
ITC Chassis.
ITC Audio transformer.
ITC Power transformer.
ITC I-f transformer.
ITC Filter chokes.

CAUTION: Do not alter the position of any wiring or of the plungers of the plunger type trimmer capacitors. Make all inspection visual. Do not pry into the wiring.

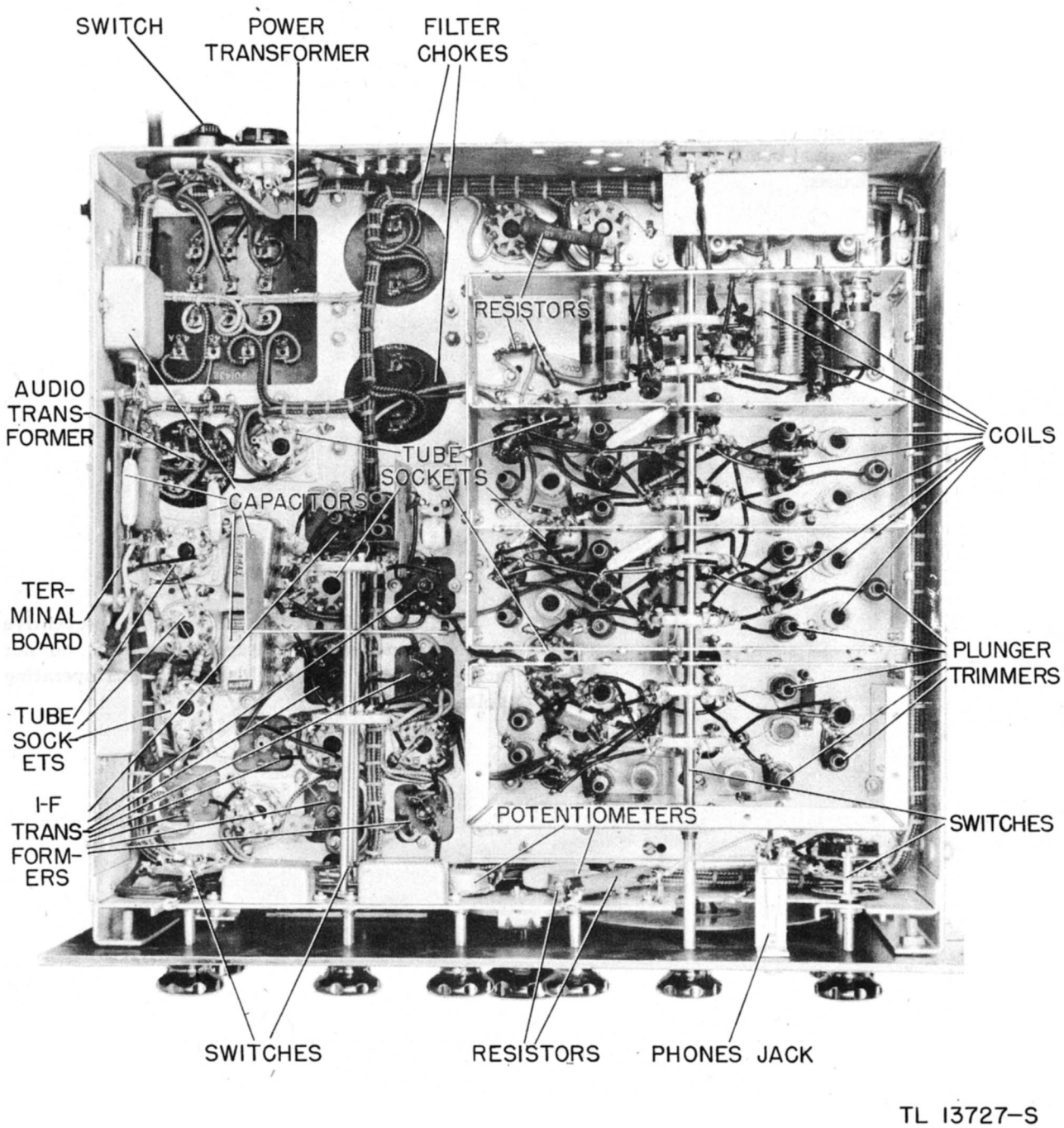

Figure 26. Radio receiver (RCA model AR-88D), bottom of chassis, maintenance.

41. ITEM 4, REAR OF CHASSIS (Fig. 27).

OPERATIONS.

ITC	Battery plug and socket.
ITC	Line cord.
IC	Switch.
ITC	Terminal boards.
IC	Chassis.

REMARKS. After performing preventive maintenance on the voltage tap switch, do not neglect to reset the switch to the proper operating voltage.

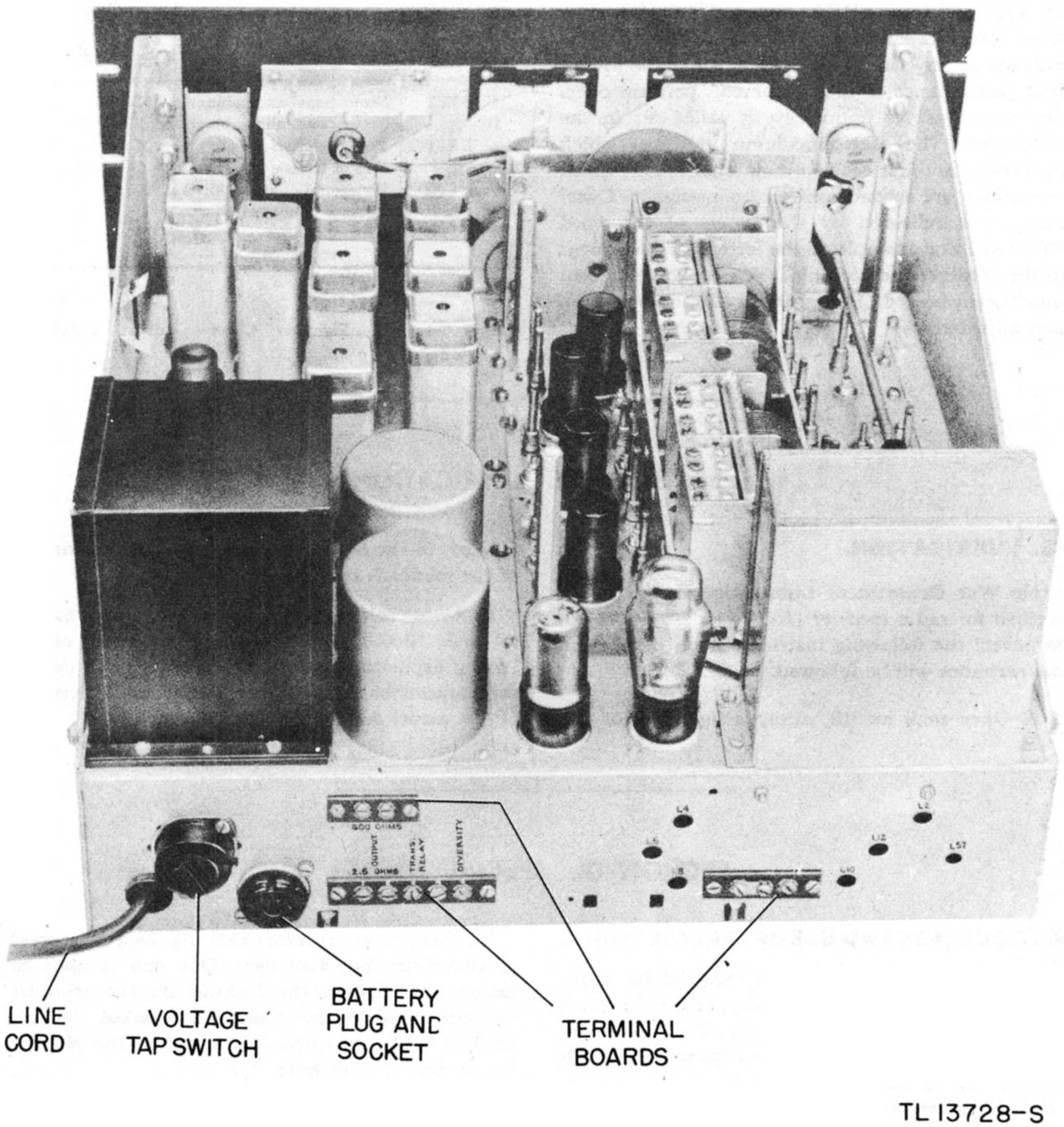

Figure 27. Radio receiver (RCA model AR-88D), rear of chassis, maintenance.

42. PREVENTIVE MAINTENANCE CHECK LIST.

The following check list is a summary of the preventive maintenance operations to be performed on radio receiver (RCA model AR-88(*)). The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. The echelon column indicates which operations are first echelon maintenance and which operations are second echelon maintenance. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

Item No.	*Operations*	*Item*	*When performed*		*Echelon*
			Weekly	*Monthly*	
1	ITC	Front panel and cabinet	X		1st
1	L	Front panel and cabinet		X	1st
2	FITC	Top of chassis	X		2d
2	L	Top of chassis		X	2d
3	ITC	Bottom of chassis	X		2d
3	LA	Bottom of chassis		X	2d
4	ITC	Rear of chassis	X		1st

F Feel — I Inspect — T Tighten — C Clean — A Adjust — L Lubricate

SECTION VIII. LUBRICATION

43. LUBRICATION.

No War Department Lubrication Order is prescribed for radio receiver (RCA model AR-88(*)); however, the following instructions on lubrication maintenance will be followed.

a. Once each month, apply a light film of Oil, Engine, to the hinges and catches of the cabinet lid of the model D receiver (fig. 24).

b. Once each month, apply a light film of engine oil SAE 10 (OE 10) to the gear assembly of the tuning capacitors and to the bearings and detent mechanisms of all rotary switches of radio receiver (RCA model AR-88(*)) (figs. 25 and 26).

SECTION IX. SPECIAL TOOLS

44. LOCATION AND USE OF SPECIAL TOOLS.

Three special tools (fig. 28) required for alignment and maintenance are supplied with radio receiver (RCA model AR-88(*)). The two alignment tools are mounted in fuse clips on either side of the tuning capacitor cover (fig. 45), and are available after removing the large cover of the r-f unit at the top of the chassis. The set screw wrench is held by a spring clip on the right side of the chassis (fig. 45).

a. The coil adjustment tool (fig. 28), the medium sized tool, is used during alignment for the adjustment of all r-f and i-f coils.

b. The plunger trimmer tool (fig. 28), the largest of the three, has two uses. One end is used to loosen and tighten the locknut on the trimmer capacitors, while the other, the hooked end, is used to engage the hole in the end of the plunger for adjustment purposes.

c. The setscrew wrench (fig. 28), the smallest of the three, is used to loosen and tighten the setscrews in all control knobs, except the knob of the main tuning dial on the front panel of radio receiver (RCA model AR-88(*)). A small screwdriver is used to loosen and tighten the main tuning dial knob.

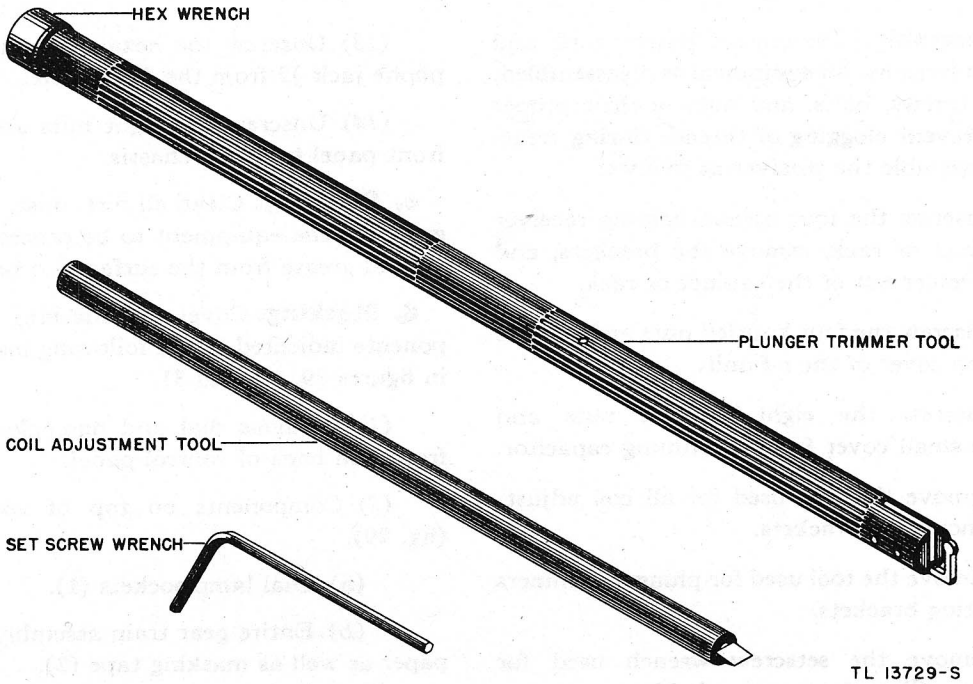

Figure 28. Radio receiver (RCA model AR-88(*)), alignment and maintenance tools.

SECTION X. MOISTUREPROOFING AND FUNGIPROOFING

45. GENERAL.

a. When equipment is operated in highly humid climates, excessive failure of parts and decreased operating efficiency are usually caused by the accumulated effects of moisture, rather than by inferior parts. Rapid temperature changes accompanied by fog, rain, dew, or high humidity promote such failures.

b. The effects of moisture on resistors, capacitors, coils, chokes, transformer windings, terminal boards, and insulating strips can be recognized in the form of corrosion, low insulation resistance, flash-overs, and cross-talk. Moisture also accelerates fungus growth which increases these effects.

46. REDUCING FAILURES.

a. A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. The treatment consists of applying a film of moisture- and fungi-resistant varnish to all susceptible parts of the equipment. This film provides a nonwetting surface. Equipments which have been treated have been marked with the letters MFP and the date of treatment. Equipments not marked should be examined, and if treatment has not been applied, the equipment should be returned to third or higher echelon maintenance units for treatment.

b. TB SIG 13 (and Changes), Moistureproofing and Fungiproofing Signal Corps Equipment, contains a detailed description of this treatment.

c. Re-treatment may be required after a period of use. Need for this re-treatment is indicated by excessive failures or by the effects listed in paragraph 45.

47. TREATING RADIO RECEIVER (RCA MODEL AR-88(*)).

a. Preparation. Make all repairs and adjustments necessary for proper operation of the equipment.

b. Disassembly. Disconnect power cord and speaker connections. As equipment is disassembled, replace all screws, bolts, and nuts in their proper places to prevent clogging of threads during treatment. Disassemble the receiver as follows:

(*1*) Unscrew the four screws holding receiver in the cabinet or rack, remove the brackets, and slide the receiver out of the cabinet or rack.

(*2*) Unscrew the four knurled nuts and remove the large top cover of the r-f unit.

(*3*) Unscrew the eight knurled nuts and remove the small cover from the tuning capacitor.

(*4*) Remove the tool used for all coil adjustments for mounting brackets.

(*5*) Remove the tool used for plunger trimmers from mounting brackets.

(*6*) Remove the setscrew wrench used for knobs and couplings from spring holder.

(*7*) Remove the three dial lamps from their sockets.

(*8*) Unfasten the eight screws and four nuts, and remove the small cover plate from the oscillator section.

(*9*) Unfasten the 22 nuts and remove the cover plate from the r-f section.

(*10*) Remove the dial lock thumbscrew by turning counterclockwise.

(*11*) Using the special setscrew wrench and a screwdriver, remove all knobs from the front of the receiver.

(*12*) Unscrew the two screws and remove the dial lamp support at the rear of the front panel.

(*13*) Unscrew the hexagonal nut and remove phone jack J2 from the front panel.

(*14*) Unscrew the eight nuts and remove the front panel from the chassis.

c. Cleaning. Clean all dirt, dust, rust, and fungus from the equipment to be processed. Clean all oil and grease from the surfaces to be varnished.

d. Masking. Cover with masking tape the components indicated in the following instructions and in figures 29, 30, and 31.

(*1*) Plexiglas dial and nameplate window on front and back of control panel.

(*2*) Components on top of receiver chassis (fig. 29).

(*a*) Dial lamp sockets (1).

(*b*) Entire gear train assembly, using tissue paper as well as masking tape (2).

(*c*) Two plastic dial faces on both sides (3).

(*d*) Holes in tops of all i-f transformer shields (4).

(*e*) Shafts of all air trimmer capacitors of r-f and oscillator sections (5).

(*f*) Setscrew iron core adjustments of the r-f and oscillator coils (6).

(*g*) Antenna trimmer capacitor on r-f unit (7).

(*h*) Beat-frequency oscillator trimmer capacitor (8).

(*i*) Tapped ends of the four supports to which the large cover of the r-f unit is fastened (9).

(*j*) All tubes (10).

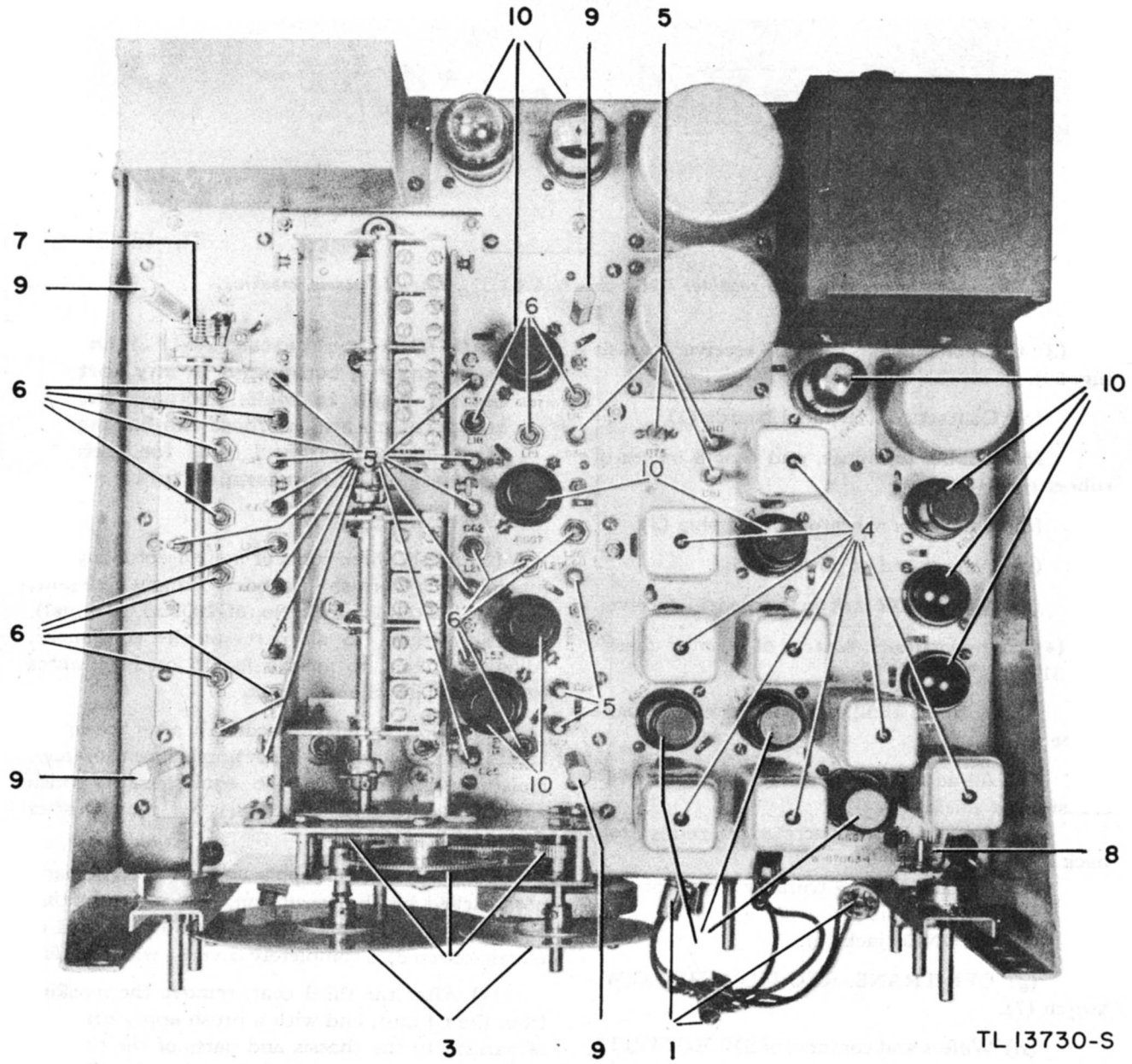

Figure 29. Radio receiver (RCA model AR-88D), top of chassis, masking.

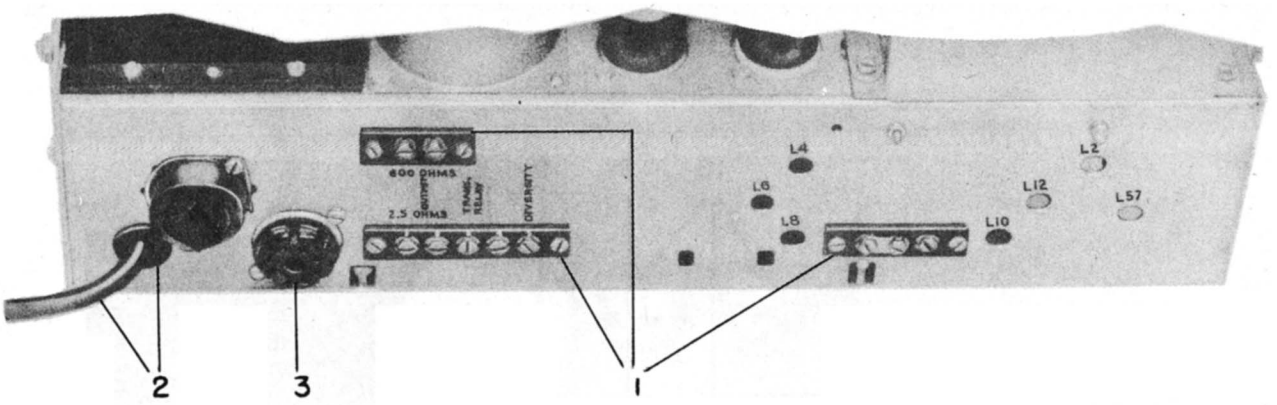

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Figure 30. Radio receiver (RCA model AR-88D), rear of chassis, masking.

(*3*) Components on back of receiver chassis (fig. 30).

(*a*) Contacts on terminal boards (1).

(*b*) Rubber grommet, and 6 or 8 inches of rubber cord (2).

(*c*) Battery or vibrator socket plug (3).

(*d*) Plug at end of power cord.

(*e*) MONITOR jack on the model F receiver.

(*4*) Components on bottom of receiver chassis (fig. 31).

(*a*) Bottoms of all tube sockets except those in the r-f unit (1).

(*b*) All adjustment screws on bottoms of i-f transformer shields (2).

(*c*) Seven adjusting screws projecting from back of r-f unit (3).

(*d*) Crystal phasing trimmer capacitor (4).

(*e*) Crystal unit (5).

(*f*) PHONES jack (6).

(*g*) OFF-TRANS.-REC.MOD.-REC.C.W.-switch (7).

(*h*) Wafers and contacts of SELECTIVITY switch (8).

(*i*) Entire r-f unit, using tissue paper as well as masking tape. This unit is brushed, not sprayed (9).

(*j*) Two plunger-type air trimmer capacitors (10).

e. Drying. Place the receiver and cover plates in an oven and bake approximately 4 to 6 hours at 140° F.

CAUTION: Do not exceed 140° F. If the impregnating compound in any part should begin to melt, decrease the temperature and increase the baking time approximately 1 hour for each decrease of 10° F in temperature.

f. Varnishing.

(*1*) Apply three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, Spec No. 71-2202 (stock No. 6G1005.3), or equal), with spray gun, to all parts of the equipment. Allow each coat to air-dry for 15 or 20 minutes before applying the next coat.

(*2*) Apply varnish immediately after the equipment is dried. If varnish is not applied immediately, moisture condenses on the equipment. Varnish applied over the moisture peels off readily after the varnish has dried.

(*3*) With a brush, apply varnish to those parts not reached by the spray gun. Make certain that all wiring, except that which is rubber-covered or plastic-covered, is completely covered with varnish.

(*4*) After the third coat, remove the masking from the r-f unit, and with a brush apply *one* coat of varnish to the chassis and parts of the r-f unit. Be extremely careful to keep varnish off clear plastic forms, switch contacts, and plunger-type air trimmer capacitors.

(*5*) When varnish is completely dry, remove all masking. Where there is more than 1 inch of unvarnished wire, apply *one* coat of varnish.

g. Reassembly.

(*1*) Remove all masking tape, being careful not to peel varnish from nearby areas.

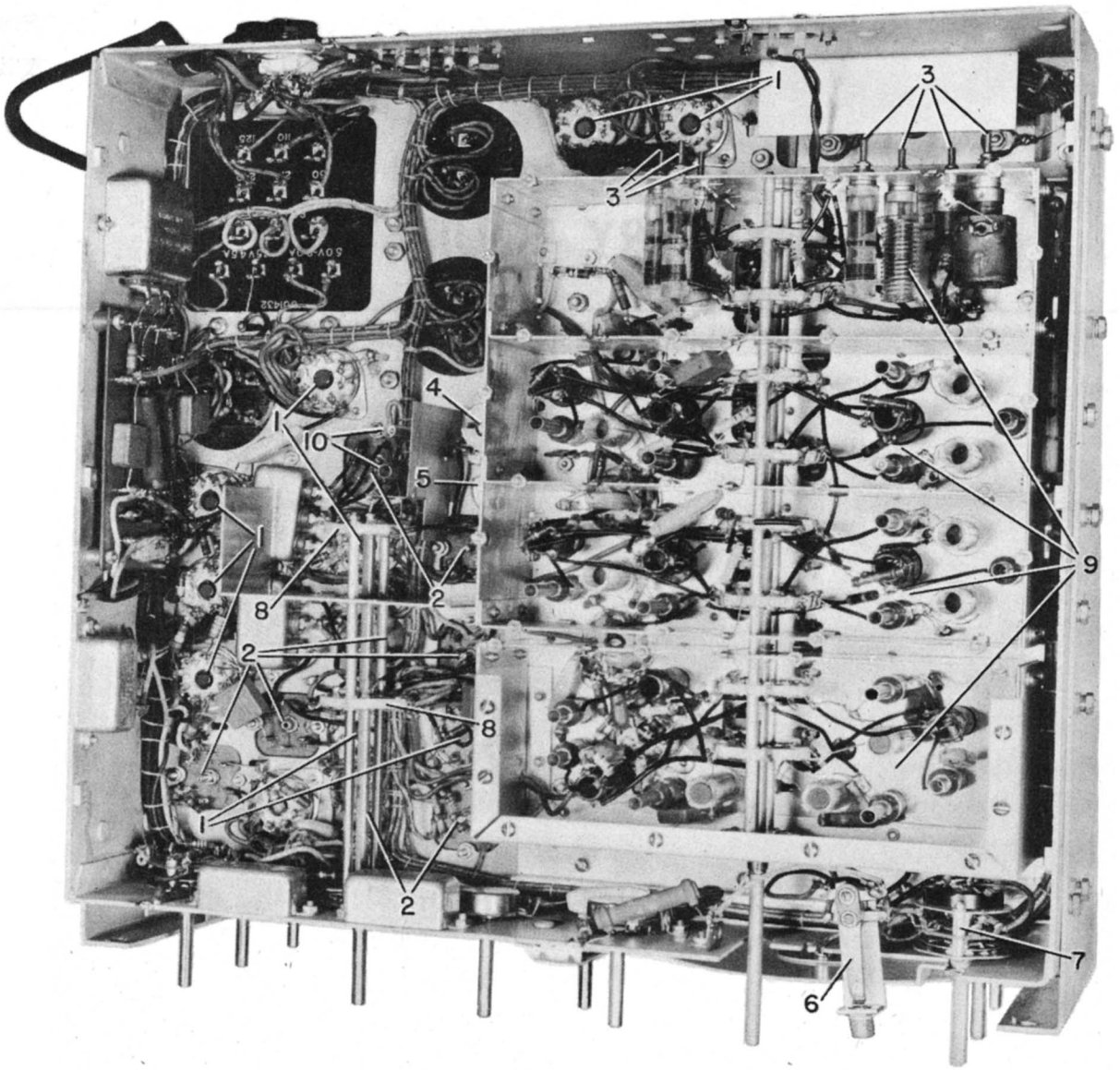


Figure 31. Radio receiver (RCA model AR-88D), bottom of chassis, masking.

(*2*) Clean and burnish all switch contacts.

(*3*) Reassemble the receiver and test its operation.

NOTE: The electrical characteristics of electronic equipment are subject to change over a period of approximately 10 days after the application of varnish. For this reason it is desirable to wait until this period has elapsed before making the final check.

h. Marking. Mark the letters MFP and the date of treatment above the nameplate on the front panel of the receiver.

EXAMPLE: MFP — 8 Jan 45.

48. TREATING EQUIPMENT AFTER REPAIRS.

If the coating of protective varnish has been punctured or broken during repairs and if complete treatment is not needed to reseal the equipment, brush-coat the affected part. Be sure the break is completely sealed.

PART FOUR

AUXILIARY EQUIPMENT

NOT USED

PART FIVE

REPAIR INSTRUCTIONS

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form No. 54 (Unsatisfactory Report). If either form is not available, prepare the data according to the sample form reproduced in figure 46.

SECTION XI. THEORY OF EQUIPMENT

49. GENERAL.

Radio receiver (RCA model AR-88(*)) is a 14-tube superheterodyne receiver covering a frequency range of 540 kc to 32,000 kc in six bands. The model D receiver can be used for general reception of amplitude-modulated (a-m) or c-w signals in this frequency range. The model F receiver can be used in like manner as a general purpose receiver. In addition the model F is designed for use with other equipment for diversity reception. These receivers can be operated from 50- to 60-cycle a-c sources at voltages of from 110 to 240 volts. Operation from batteries, or from a battery and vibrator power supply, is also possible, by using the power plug at the rear of the chassis.

NOTE: In addition to the individual references made throughout section XI, constant reference to the main schematic diagram of the model D receiver (fig. 49) is recommended.

50. BLOCK DIAGRAM OF RADIO RECEIVER (RCA MODEL AR-88(*)).

Radio receiver (RCA model AR-88(*)) is shown in block diagram form in figure 32. The signal picked up by the antenna is fed into two r-f amplifier stages. The three tuned circuits in these stages provide gain as well as good image-frequency rejection. After amplification, the signal is fed into the mixer stage. Here the signal is mixed with the high-frequency (h-f) oscillator output. The difference in frequency between the incoming signal and the h-f oscillator is maintained at 455 kc. This difference frequency is developed in the resonant output circuit of the mixer. The 455-kc signal is fed into the crystal filter network which provides three degrees of selectivity using the crystal and two degrees of selectivity without the crystal. These selections permit various band widths, from broad band pass (high fidelity) to extremely sharp for c-w reception. From the crystal filter, the signal is fed into three stages of i-f amplification. From the output of the mixer to the input of the detector there are twelve tuned circuits, providing ample selectivity. For purposes of c-w reception b-f-o signal is fed into the third i-f amplifier. The amplified i-f signal is fed into the detector, a-v-c, and noise-limiter circuits. The receiver can be operated by switch selection, for signal reception with or without either a-v-c or noise-limiting action. The a-f output is fed into a two-stage audio amplifier. The final output is available at the terminals at the rear of the chassis or at the PHONES jack on the front panel. Three output impedances are available. The power supply circuit includes a voltage regulator tube to maintain a constant potential for those circuits which require a regulated voltage supply.

51. BAND-SWITCHING SYSTEM OF R-F AMPLIFIER AND H-F OSCILLATOR CIRCUITS.

The band-switching system uses a 16-gang switch (S1 through S16) (fig. 43) to make the necessary circuit changes to switch from one band to another.

a. On bands 1 and 2, two sections of the ganged variable tuning capacitors (approximately 500 mmf) are used for each of the three r-f amplifier tuning circuits and for the h-f oscillator tuning circuit. On band 3, one large section of the variable tuning capacitor (approximately 370 mmf) is used for each of the four tuned circuits. On bands 4, 5, and 6, one small section of the variable tuning capacitor (approximately 128 mmf) is used for each of the four tuned circuits.

b. On band 1, the antenna circuit includes a wave trap, L57 and C12 (figs. 34 and 43), which is tuned for maximum rejection at the intermediate frequency (455 kc). The antenna trimmer capacitor is used on all bands. All secondary coils are shorted and grounded when not in use to prevent dead spots in the tuning range.

c. On bands 1, 2, and 3, individual plate coils are coupled to their individual tuned secondaries in the three r-f amplifier circuits. On bands 4, 5, and 6, the plate coils of band 3 are used as r-f chokes and the signal is coupled capacitively to the tuned grid circuit of the following stage. Separate antenna coils are used, however, to couple the antenna to the first r-f stage on **every** band.

d. The input circuits are designed for a 200-ohm transmission line, except for band 1 which is designed for the ordinary single-wire antenna system. On band 1, the antenna is connected to the post marked *A* (antenna), at the rear of the chassis (fig. 8). The center post is connected by a link to the G (ground) post. On all other bands a balanced transmission line may be used. The two transmission line leads connect to the A post and the center post. The G post is grounded and the link is removed.

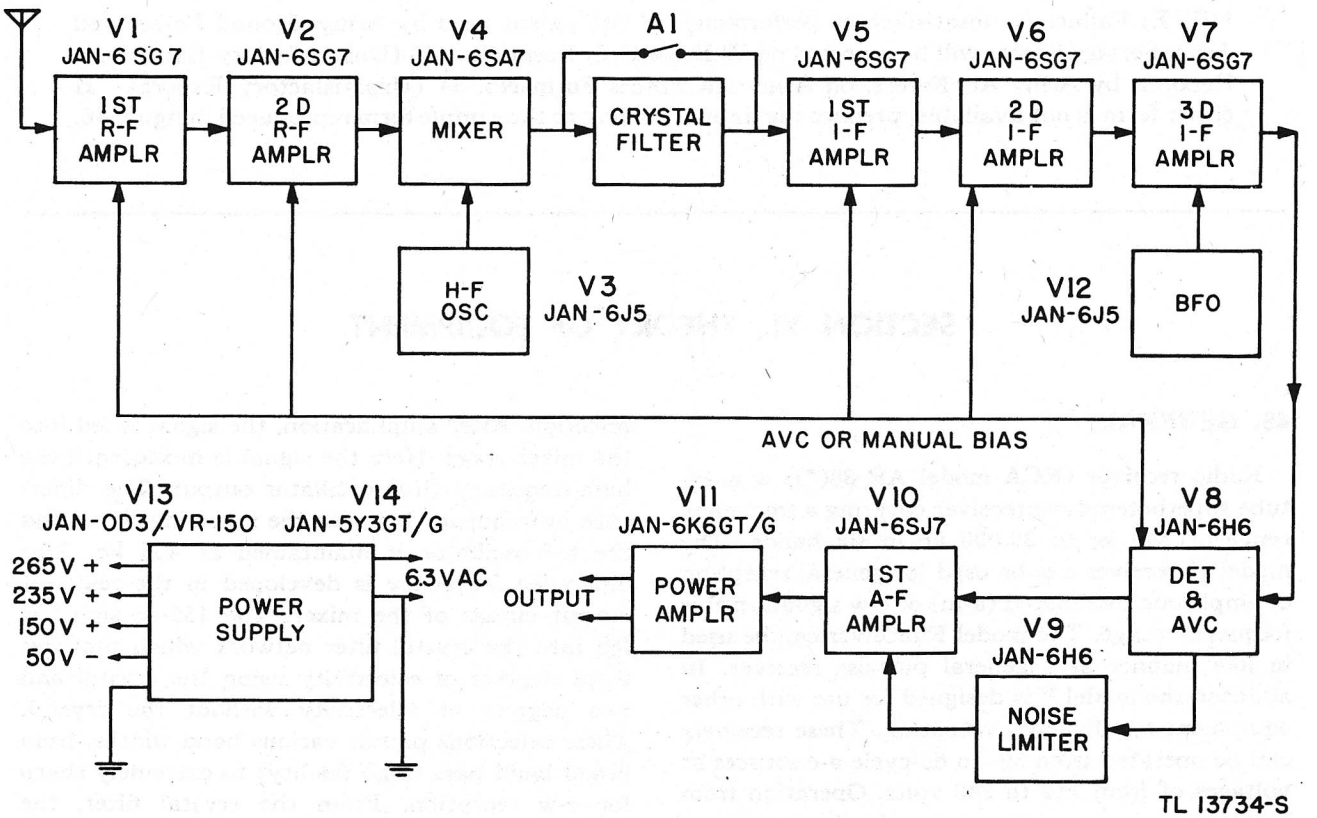


Figure 32. Radio receiver (RCA model AR-88(*)), block diagram.

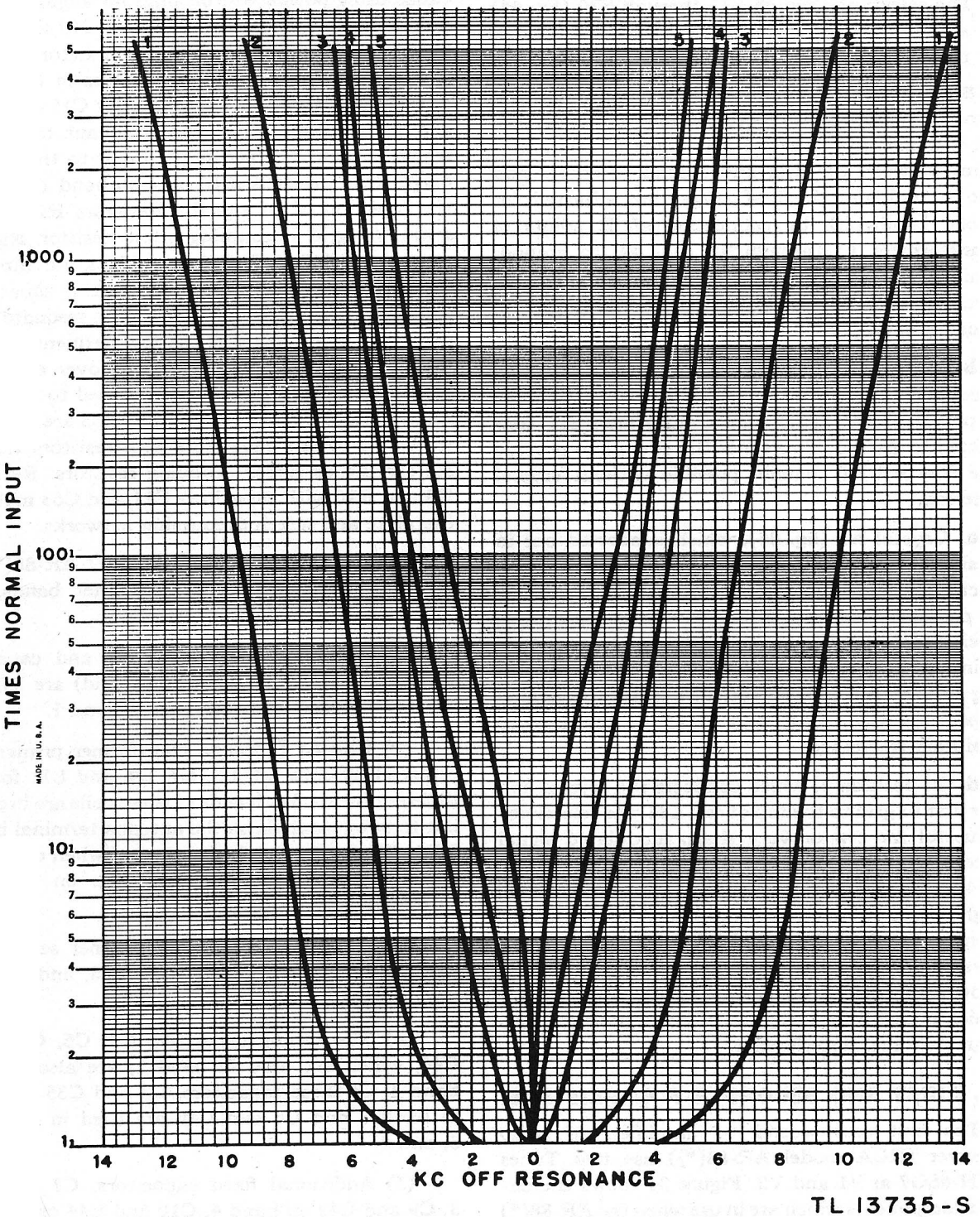


Figure 33. Radio receiver (RCA model AR-88(*)), selectivity curves.

52. SELECTIVITY SWITCHING SYSTEM.

The selectivity switch S17 through S20 (fig. 44) is a four-gang switch with five positions located in the i-f stages.

a. In position 1, the i-f bandwidth is sufficiently broad for high-fidelity reception (curve 1 of fig. 33). In this position, the two interstage coupling systems between the first and second i-f stages and the second and third i-f stages are adjusted for broad bandwidth by connecting all E points of transformers T5 through T8 (fig. 49) to ground. This adds inductance to 4 of the 12 i-f tuned circuits, thereby adjusting the i-f channel for a broader band pass.

b. Position 2 is useful for normal voice or tone reception (curve 2 of fig. 33). In this position, all B-points of the same four transformers are connected to ground. This tunes the circuits to provide the sharpest i-f channel possible without crystal filtering.

c. Crystal A1 (fig. 36), which is shorted out in positions 1 and 2, is used in a bridge circuit connected to the first i-f amplifier for crystal filtering in positions 3, 4, and 5. Selectivity in these three positions is varied by changing the impedance which is in series with the crystal. This is done by switching to different taps on coil L34 and by switching capacitors C80, C81, and C123 as required to maintain resonance.

d. In position 3, which connects the crystal and the first i-f grid to the top of coil L34, the selectivity is useful for c-w or very sharp modulated signal reception (curve 3 of fig. 33). In position 4, coil L34 is tapped down to point D (fig. 49) and a high degree of selectivity is provided for c-w reception (curve 4 of fig. 33). Position 5 connects the crystal and grid to tap F on coil L34, thereby providing extreme selectivity (curve 5 of fig. 33) which is useful for reception of c-w signals through extremely high interference.

53. FIRST AND SECOND R-F AMPLIFIERS.

The first and second r-f amplifiers of radio receiver (RCA model AR-88(*)) use two Tubes JAN-6SG7 as V1 and V2. Figure 34 shows the circuit components which are in use when the AR-88(*) is set at band 1.

a. Coils L1 and L2 provide coupling of the antenna to the first r-f amplifier, while coils L13 and L14 couple between the first and second r-f amplifiers and coils L23 and L24 couple to the mixer. All coils in the r-f stages are permeability-tuned using powdered-iron slugs for alignment purposes. Capacitors C3, C6, C35, and C40 are ganged variable tuning capacitors and capacitors C2 and C37 are variable trimmer capacitors in the tuned grid circuits. Coil L57 and capacitor C12 comprises a series resonant wave trap (resonant to 455 kc) which is connected across the input to the first r-f stage. This circuit is used only on band 1 to aid in the rejection of i-f signals. Resistors R2 and R5 serve for grid decoupling while resistor R9 and capacitors C47 and C48 provide a-v-c filtering. Capacitors C4 and C34 are d-c blocking capacitors. Capacitors C36 and C58 are used to resonate their respective plate loads at the low-frequency end of the band to help sustain the gain over the entire band. Resistors R7 and R59 are used to eliminate regeneration. Capacitors C31 and C33 are the usual screen r-f bypass capacitors with resistors R1 and R6 serving as screen-dropping resistors. Resistors R3 and R10 with capacitors C11 and C63 make up the plate and screen decoupling networks.

b. As radio receiver (RCA model AR-88(*)) is switched from band 1 to the other bands, the following changes take place.

(*1*) The wave trap (coil L57 and capacitor C12) and resistor R7 (second r-f grid) are left out of the circuit on all bands except band 1.

(*2*) Coil L1 (antenna transformer primary) is replaced by coils L3, L5, L7, L9, and L11 for the different bands. Both ends of these coils are brought out to two terminals on the antenna terminal board TB1. These two terminals are used when operating from a 200-ohm transmission line on bands 2 through 6 (par. 10d(2)).

(*3*) Coil L2 (antenna transformer secondary) is replaced by coils L4, L6, L8, L10, and L12 for the different bands.

(*4*) The tuning capacitors C3, C6, C35, and C40, which are used in band 1, are also used in band 2. Of these capacitors, C3 and C35 are used in band 3 and C6 and C40 are used in bands 4, 5, and 6.

(*5*) Additional fixed capacitors, C7 on band 3, C9 and C42 on band 4, C10 and C44 on band 5, and C46 and C120 on band 6, are placed across the grid circuits.

(*6*) Coil L13 and capacitor C36 (first r-f output) are replaced by coil L15 in parallel with resistor R8 on band 2 and by coil L18 on band 3.

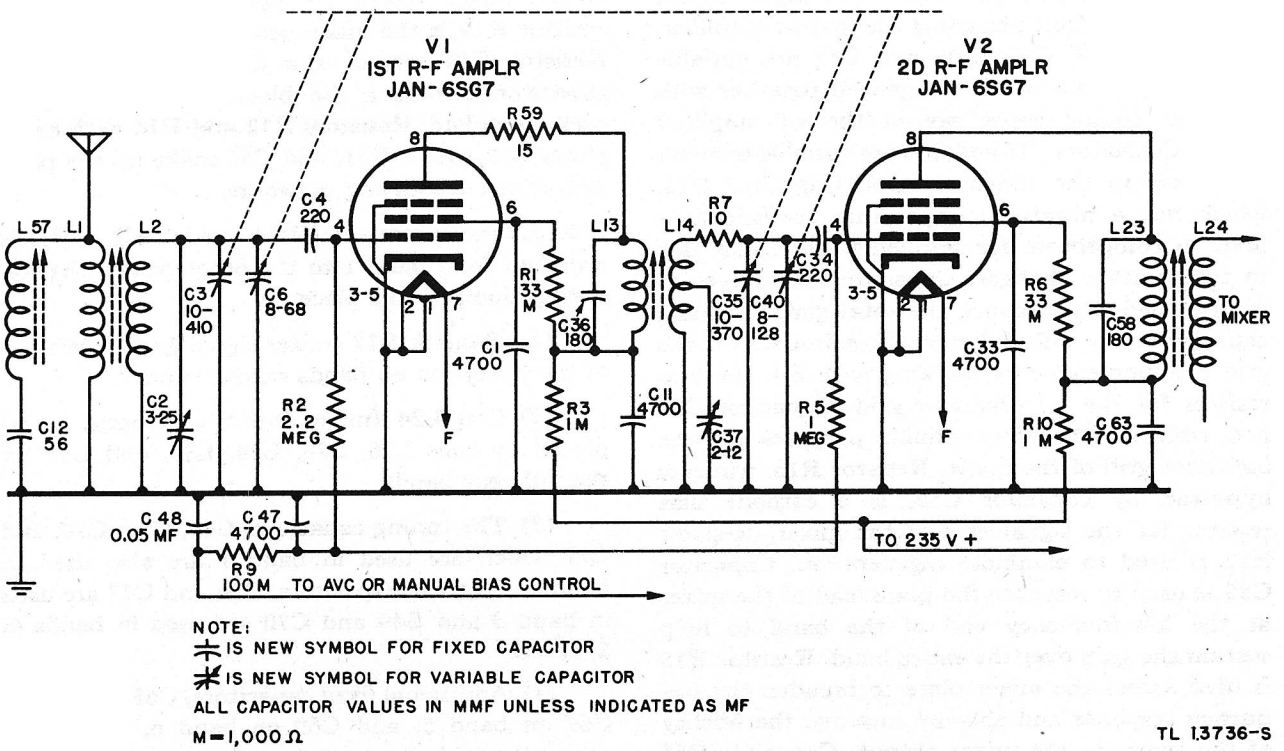


Figure 34. Radio receiver (RCA model AR-88(*)), first and second r-f amplifiers.

(*7*) Coil L14 (second r-f input) is replaced by coils L16, L18, L19, L20, and L21 for the different bands.

(*8*) The coupling system used between the first and second r-f amplifiers is transformer coupling on bands 1, 2, and 3, and direct coupling on bands 4, 5, and 6. On bands 4 and 5 the coupling is through capacitors C8, C5, and C34, while on band 6 the coupling is through capacitors C5 and C34.

(*9*) Capacitor C37 (second r-f input trimmer) is replaced by capacitors C38, C39, C41, C43, and C45 for the different bands.

(*10*) Coil L23 and capacitor C58 (second r-f output) are replaced by coil L25 in parallel with resistor R18 on band 2, and by coil L27 on band 3.

(*11*) The coupling system used between the second r-f amplifier and mixer is transformer coupling on bands 1, 2, and 3, and capacitive coupling on bands 4, 5, and 6. On band 4 the coupling is through capacitors C61 and C57, while on bands 5 and 6 the coupling is through capacitor C57.

(*12*) When coils L2, L4, L6, L8, L10, L12, L14, L16, L18, L20, and L21 (first and second r-f inputs) are not in use, they are shorted to ground.

(*13*) When coils L13, L15, L18, L23, L25, and L27 (first and second r-f outputs) are not in use, they are shorted out of the circuit.

c. The circuits of the first and second r-f amplifiers in the model F receiver are the same as those in the model D receiver with one exception: in the model F receiver (fig. 50) a 1-megohm resistor R70 is connected on the antenna terminal board from the center terminal to ground to provide a leakage path for static charges when transmission line input is used.

54. H-F OSCILLATOR AND MIXER.

The h-f oscillator of radio receiver (RCA model AR-88(*)) uses Tube JAN-6J5 as V3. The mixer uses Tube JAN-6SA7 as V4. Figure 35 shows the circuit components which are in use when the AR-88(*) is set at band 1.

a. Coil L51 provides coupling between grid and plate circuits of the modified Hartley oscillator circuit in the h-f oscillator, the output of which is coupled through capacitor C53 to the oscillator grid of the mixer. Coils L23 and L24 provide coupling of the second r-f amplifier output to the signal grid of the mixer, and coils L32 and L33

provide coupling of the resultant i-f signal to the crystal-filter circuit preceding the first i-f amplifier. Capacitors C49, C50, C70, and C77 are variable tuning capacitors which are ganged together with the four tuning capacitors in the r-f amplifier stages. Capacitors C16 and C59 are variable trimmer capacitors in the tuned circuits. Capacitor C15, which has a negative temperature coefficient, is used to compensate for frequency variations due to temperature changes. Capacitor C17 serves as a series padder to reduce the total ganged tuning capacity of the h-f oscillator. Capacitor C13 is the grid blocking capacitor working with R4, the bias resistor for the h-f oscillator grid. Capacitor C53 and resistor R14 serve similar purposes for the oscillator grid of the mixer. Resistor R13, which is bypassed by capacitor C52, is a cathode bias resistor for the signal grid of the mixer. Resistor R17 is used to eliminate regeneration. Capacitor C55 is used to resonate the plate load of the mixer at the low-frequency end of the band to help sustain the gain over the entire band. Resistor R15 is used across the mixer plate to broaden the frequency response and thereby improve the fidelity of the signal in the mixer output. Capacitor C54 is the mixer screen r-f bypass capacitor while resistor R19 is the mixer screen dropping resistor. Resistor R11 serves as a dropping resistor and capacitor C14 as a d-c block for the shunt-fed oscillator plate. Resistors R12 and R16 with capacitors C71, C121, C51, and C56 make up the plate and screen decoupling networks.

b. As radio receiver (RCA model AR-88(*)) is switched from band 1 to the other bands, the following changes take place.

(*1*) Resistor R17 (mixer signal grid) is left out of the circuit on all bands except band 1.

(*2*) Coil L24 (mixer input secondary) is replaced by coils L26, L28, L29, L30, and L31 for the different bands.

(*3*) The tuning capacitors C49, C50, C70, and C77 which are used in band 1 are also used in band 2. Of these capacitors, C50 and C77 are used in band 3 and C49 and C70 are used in bands 4, 5, and 6.

(*4*) Additional fixed capacitors, C65 on band 4, C67 on band 5, and C69 on band 6, are placed across the grid circuit of the mixer.

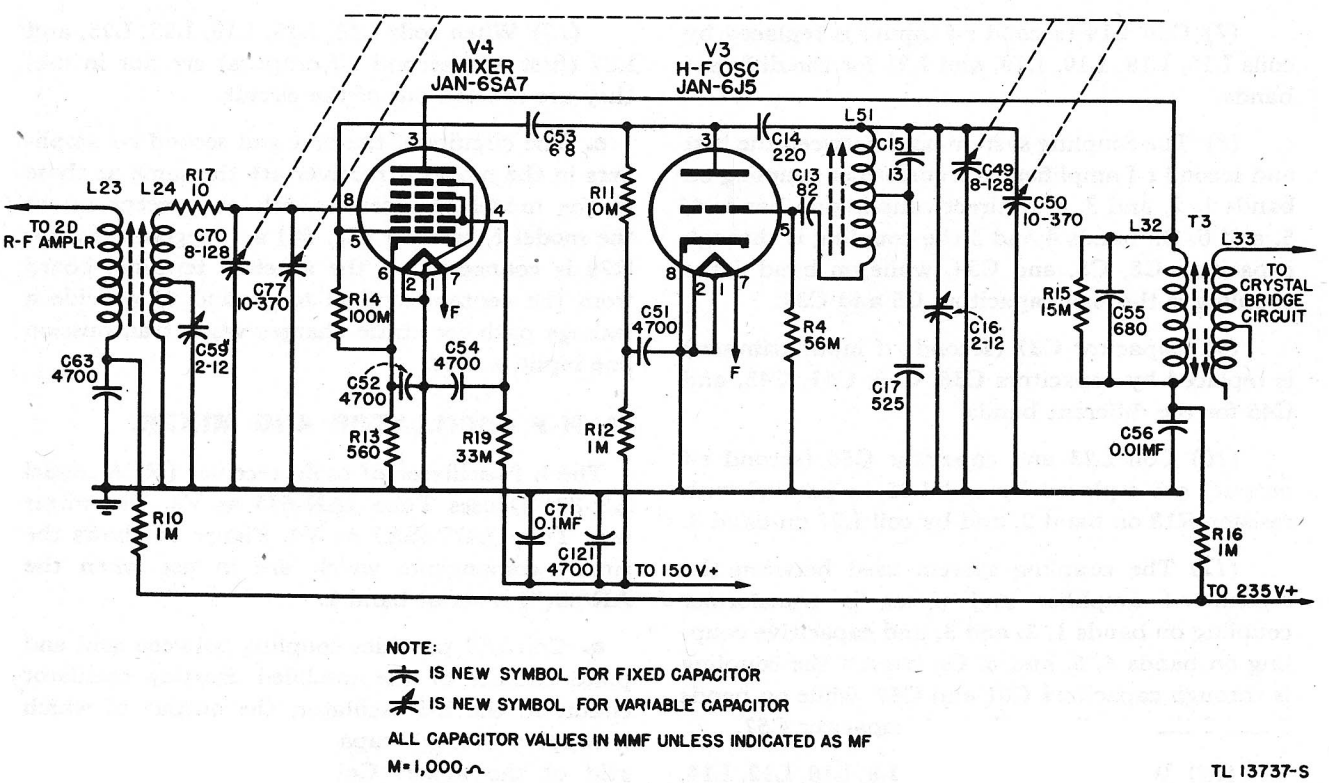


Figure 35. Radio receiver (RCA model AR-88(*)), mixer and h-f oscillator.

(*5*) Additional fixed capacitors, C26 on band 4, C29 on band 5, and C31 on band 6, are placed across the tuned circuit of the oscillator.

(*6*) Coil L51 (oscillator coupling) is replaced by coils L52 through L56, successively.

(*7*) Capacitor C15 (oscillator temperature compensating) is replaced by capacitor C18 on band 2 and C21 on band 3. No temperature compensating capacitor is used on bands 4, 5, and 6.

(*8*) Capacitor C17 (oscillator padding) is replaced by capacitors C20, C23, C24, C28, and C30, successively.

(*9*) Capacitors C16 (oscillator trimmer) and C59 (mixer trimmer) are replaced by capacitors C19, C22, C25, C27, and C32 for the oscillator and by capacitors C60, C62, C64, C66, and C68 for the mixer.

(*10*) When coils L51 through L56 (oscillator coupling) are not in use, either one end or the other or both ends of the coils are shorted to ground.

(*11*) When coils L24, L26, L28, L29, L30, and L31 (mixer input) are not in use, they are shorted to ground.

c. The circuits of the mixer and h-f oscillator in the model F receiver are the same as those of the model D in every respect.

55. CRYSTAL FILTER AND FIRST I-F AMPLIFIER.

The first i-f amplifier of radio receiver (RCA model AR-88(*)) uses Tube JAN-6SG7 as V5. Figure 36 shows the circuits of the crystal filter and first i-f amplifier of the model D receiver. The crystal filter and first i-f amplifier circuits of the model F receiver are slightly different from those of the model D receiver. (Refer to paragraph 57 for these differences.)

a. The i-f signal from the plate circuit of the mixer is transformer coupled through coils L32 and L33 to the input circuit of the first i-f amplifier. This i-f signal is coupled *directly* to the grid of the first i-f amplifier when operating at the two least selective types of operation (positions 1 and 2 of SELECTIVITY switch). When operating at the three most selective types of operation (positions 3, 4, and 5 of SELECTIVITY switch), the i-f signal is coupled to the first i-f amplifier through a crystal filter bridge circuit.

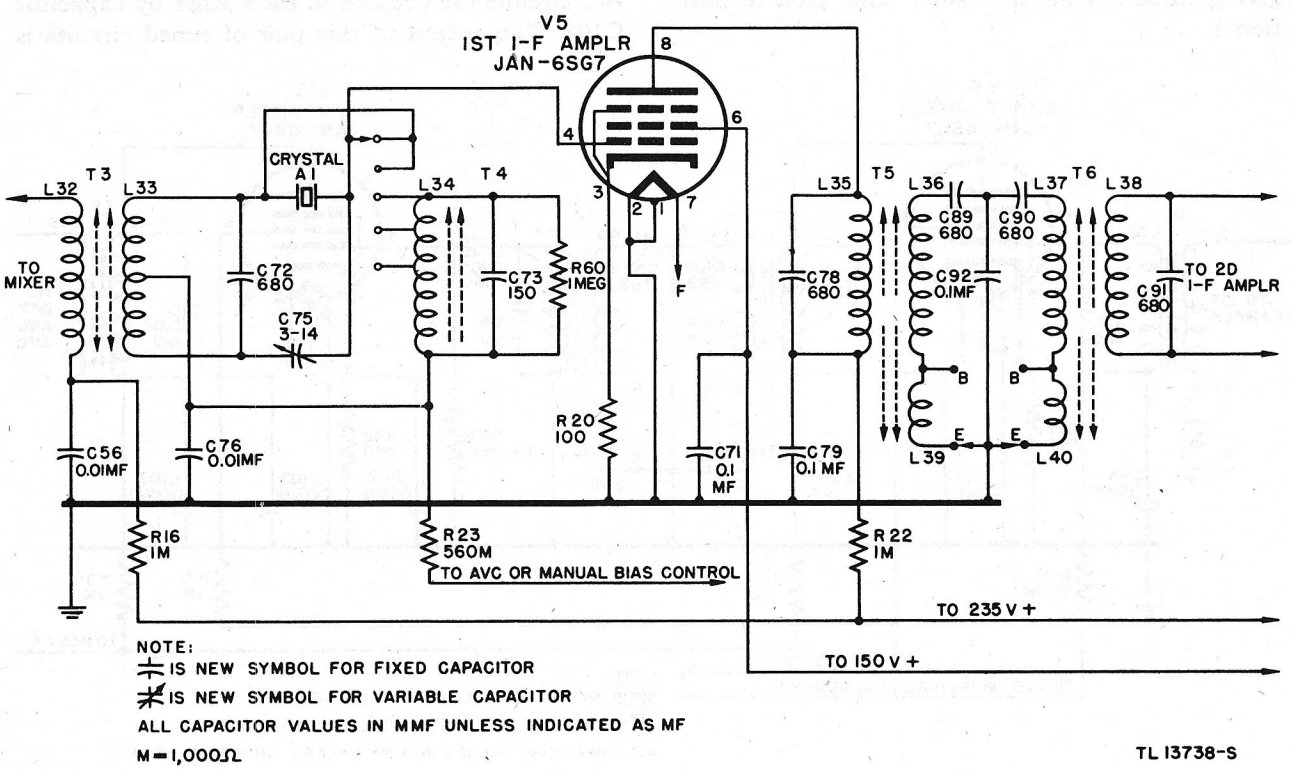


Figure 36. Radio receiver (RCA model AR-88D), crystal filter and first i-f amplifier.

b. For the three most selective types of operation, the crystal filter circuit is connected in series with a tapped tuned circuit, peaked at the intermediate frequency (455 kc). This tuned circuit consists of coil L34 and capacitor C73 shunted by a broadening resistor R60. Connecting the crystal to various taps on coil L34 presents varying load impedances to the crystal, thereby varying its selectivity. Tapping full across the coil presents the greatest load impedance and thereby provides the least selective operation of the three crystal positions. Capacitor C75 is used to balance out the crystal holder capacity which might otherwise offer low reactance to high frequencies.

c. The output of the first i-f amplifier is transformer-coupled through coils L35 and L36 to a pair of tuned circuits which are coupled to each other capacitively by capacitor C92. This capacitor presents a very small common reactance. The output of this pair of tuned circuits is transformer-coupled to the input of the second i-f amplifier through coils L37 and L38. In position 1 of the SELECTIVITY switch (least selective), high-fidelity reception is obtained by adjustment of two of the tuned circuits in this stage. Coil L39 is added to coil L36 and coil L40 is added to coil L37 giving these circuits a broader band pass in position 1.

d. Capacitors C72, C73, C78, C89, C90, and C91 are fixed capacitors used to tune their respective circuits to the intermediate frequency. Resistor R20 is a cathode bias resistor and resistor R23 is a decoupling resistor working with bypass capacitor C76 to decouple the grid from the a-v-c circuit. Capacitor C71 is the usual screen bypass capacitor and capacitor C79 and resistor R22 make up the plate decoupling network.

56. SECOND AND THIRD I-F AMPLIFIER.

The second and third i-f amplifiers of radio receiver (RCA model AR-88(*)) use Tube JAN-6SG7 as V6 and V7. Figure 37 shows the circuits of the second and third i-f amplifiers of the model D receiver. The second and third i-f amplifier circuits of the model F are slightly different from those of the model D. (Refer to paragraph 57 for these differences.)

a. The output signal from the first i-f amplifier tuned circuits is transformer-coupled through coils L37 and L38 to the input circuit of the second i-f amplifier. The output of the second i-f amplifier is transformer-coupled through coils L41 and L42 to another pair of tuned circuits similar to those connecting the first and second i-f amplifiers. These two circuits are coupled to each other by capacitor C102. The output of this pair of tuned circuits is

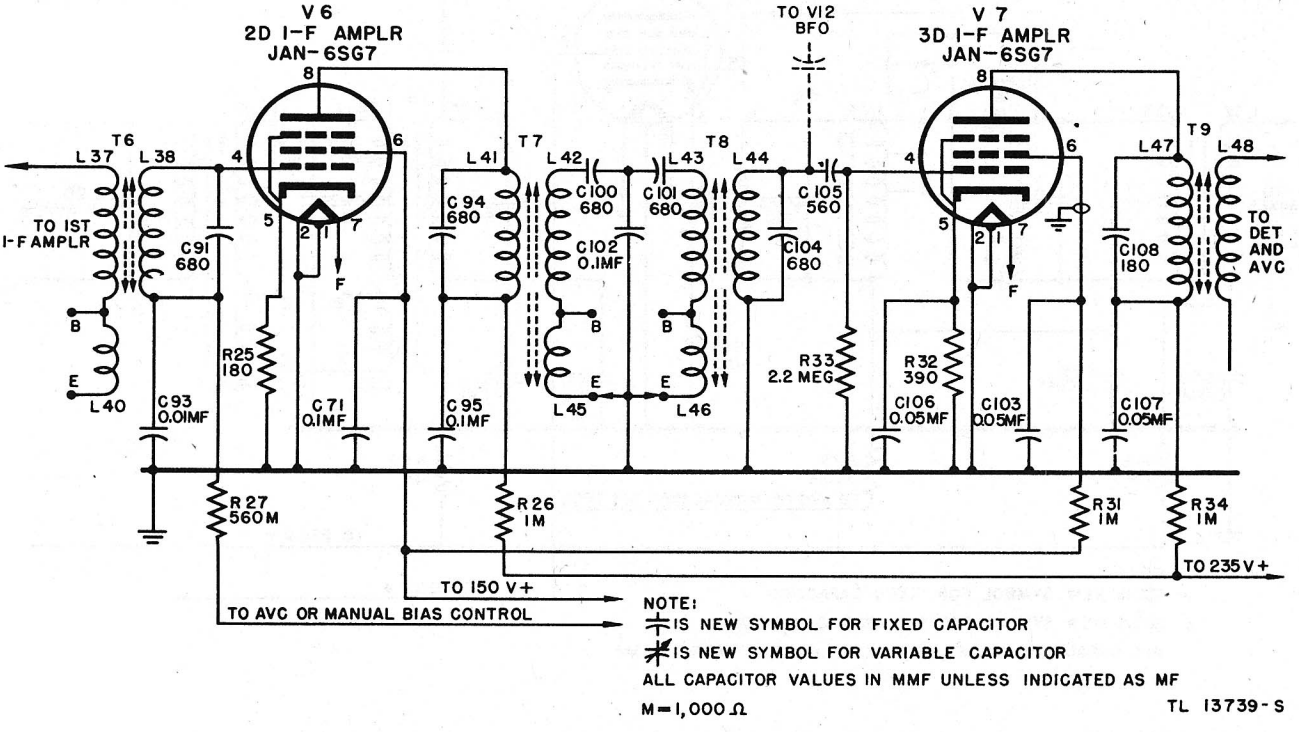
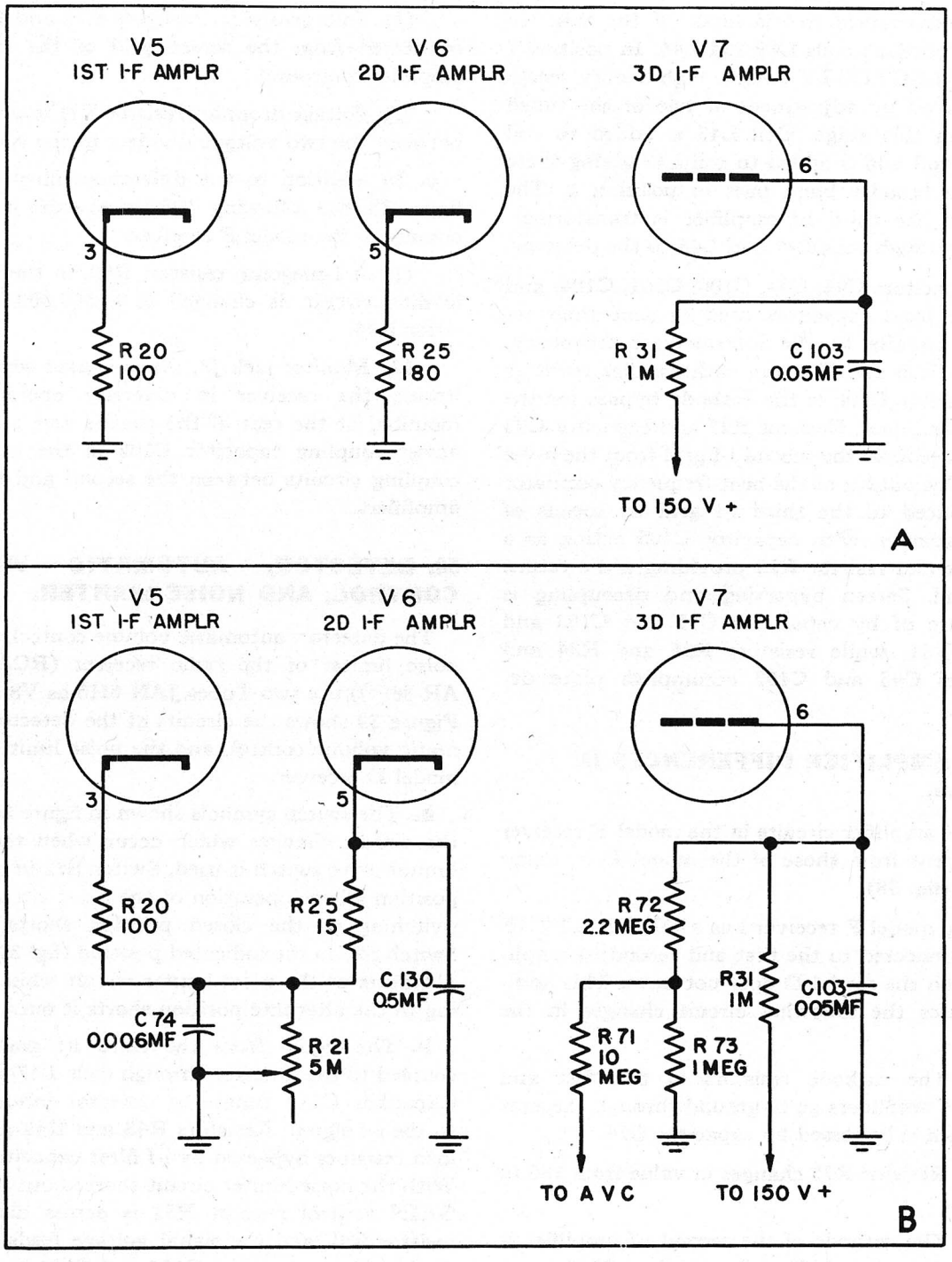


Figure 37. Radio receiver (RCA model AR-88D), second and third i-f amplifiers.



NOTE:

⫩ IS NEW SYMBOL FOR FIXED CAPACITOR

⫩ IS NEW SYMBOL FOR VARIABLE CAPACITOR

ALL CAPACITOR VALUES IN MMF UNLESS INDICATED AS MF

M = 1,000 Ω

TL 13740-S

A. Radio receiver (RCA model AR-88D). *B. Radio receiver (RCA model AR-88F).*

Figure 38. I-f amplifier differences.

transformer-coupled to the input of the third i-f amplifier through coils L43 and L44. In position 1 of the SELECTIVITY switch, high-fidelity reception is aided by adjustment of two of the tuned circuits in this stage. Coil L45 is added to coil L42 and coil L46 is added to coil L43 giving these circuits a broader band pass in position 1. The output of the third i-f amplifier is transformer-coupled through coils L47 and L48 to the detector.

b. Capacitors C91, C94, C100, C101, C104, and C108 are fixed capacitors used to tune their respective circuits to the intermediate frequency. Resistors R25 and R32 are cathode bias resistors and capacitor C106 is the cathode bypass for the third i-f amplifier. Resistor R27 and capacitor C93 serve to decouple the second i-f grid from the a-v-c circuit. The output of the beat-frequency oscillator is introduced to the third i-f grid by means of wiring capacity, with capacitor C105 acting as a d-c block and resistor R23 providing a d-c return to ground. Screen bypassing and decoupling is taken care of by capacitors C71 and C103 and resistor R31, while resistors R26 and R34 and capacitors C95 and C107 accomplish plate decoupling.

57. I-F AMPLIFIER DIFFERENCES IN MODELS.

The i-f amplifier circuits in the model F receiver are different from those of the model D in many respects (fig. 38).

a. The model F receiver has a DIVERSITY IF GAIN connected to the first and second i-f amplifiers which the model D does not have. This addition causes the following circuit changes in the model F.

(*1*) The cathode resistors of the first and second i-f amplifiers go to ground through rheostat R21 which is bypassed by capacitor C74.

(*2*) Resistor R25 changes in value from 180 to 15 ohms.

(*3*) The cathode of the second i-f amplifier is connected to ground through capacitor C130.

b. In the model F receiver, a resistance network is connected between the 150-volt d-c source and the a-v-c line. This network provides a positive voltage for the a-v-c line, adjusting the delay voltage for automatic volume control to the proper level for diversity operation. This addition causes the following circuit changes in the model F receiver.

(*1*) Voltage-divider resistors R72 and R73 are connected from the screen grid of the third i-f amplifier to ground.

(*2*) Voltage dropping resistor R71 is connected between the two voltage dividers to the a-v-c line.

c. In addition to the differences illustrated in figure 38, the following differences exist in the i-f circuits of the model F receiver.

(*1*) A 1-megohm resistor, R60, in the crystal-loading circuit, is changed to a 560,000-ohm resistor R74.

(*2*) Monitor jack J3, which is used when monitoring the receiver in diversity operation, is mounted at the rear of the chassis and connected across coupling capacitor C102 in the interstage coupling circuits between the second and third i-f amplifiers.

58. DETECTOR, AUTOMATIC VOLUME CONTROL, AND NOISE LIMITER.

The detector, automatic volume control, and the noise limiter of the radio receiver (RCA model AR-88(*)) use two Tubes JAN-6H6 as V8 and V9. Figure 39 shows the circuits of the detector, automatic volume control, and the noise limiter of the model D receiver.

a. The switch symbols shown in figure 39 reflect the circuit changes which occur when the noise-limiter a-v-c switch is used. Switch S22 in the open position allows operation of the a-v-c circuit while switching to the closed position shorts it out. Switch S21 in the indicated position (fig. 39) allows operation of the noise-limiter circuit while switching to the alternate position shorts it out.

b. The signal from the third i-f amplifier is coupled to the detector through coils L47 and L48. Capacitor C114 tunes the detector input circuit to the i-f signal. Resistors R48 and R49 are diode load resistors bypassed by i-f filter capacitor C115. With the noise-limiter circuit shorted out, the A.F. GAIN control resistor R51 is across diode load resistor R49 and the signal voltage feeds through d-c blocking capacitors C116 and C111 to the first a-f amplifier. The audio output across resistors R48 and R49 is brought out to a terminal on terminal board TB2 at the rear of the chassis for the purpose of connecting two or more of these receivers in diversity.

c. When operating on automatic volume control and when the audio component of the detecting diode is sufficiently strong to overcome the a-v-c

delay voltage, resistors R48 and R49 act as the a-v-c load, the second section (pins 3 and 4) of tube V8 is not conducting, and resistor R47 acts as an a-v-c filter. Potentiometer R46 and resistor R55, which are connected in series between a negative potential and ground, serve to regulate the gain of the two r-f and first and second i-f amplifiers during manual operation. In addition, potentiometer R46 and resistor R55 provide delay voltage for a-v-c operation. When the audio strength is at a level below the delay voltage, the second section (pins 3 and 4) of tube V8 conducts, developing delay voltage across resistors R47, R48, and R49, and the a-v-c voltage remains constant at the delay voltage level. Since resistors R48 and R49 are much smaller than resistor R47, the delay voltage does not interfere with the detection of weak signals. Resistor R42 is a filter resistor.

d. With the noise limiter in operation, A.F. GAIN control R51 is connected to the cathode of the second section (pin 4) of tube V9. The plate of the second section (pin 3) of tube V9 is connected to a point between the diode load resistor R49 and the NOISE LIMITER control R48. When no noise peaks are present, the second section (pins 3 and 4) of tube V9 conducts and the signal is taken from the cathode (pin 4). On a sudden noise peak, while the plate (pin 3) is driven negative, the cathode (pin 4) tends to remain at its previous voltage because of the long time constant filter circuit consisting of resistors R35 and R50 and capacitors C109 and C110. This causes the tube to cut off momentarily and the peak voltage is not passed on to the a-f amplifiers. Noise peaks of longer duration than the filter circuit time constant will get through. With the NOISE LIMITER control in the full clockwise position, all modulation of the carrier up to 100 percent is passed. As the control is rotated in a counterclockwise direction, more and more of the carrier modulation is attenuated.

e. The detector and a-v-c circuit, and the noise-limiter circuit of the model F receiver are different from those of the model D receiver in the following ways.

(1) In place of a single diversity terminal for direct connection of two or more receivers in diversity, the model F receiver has two terminals

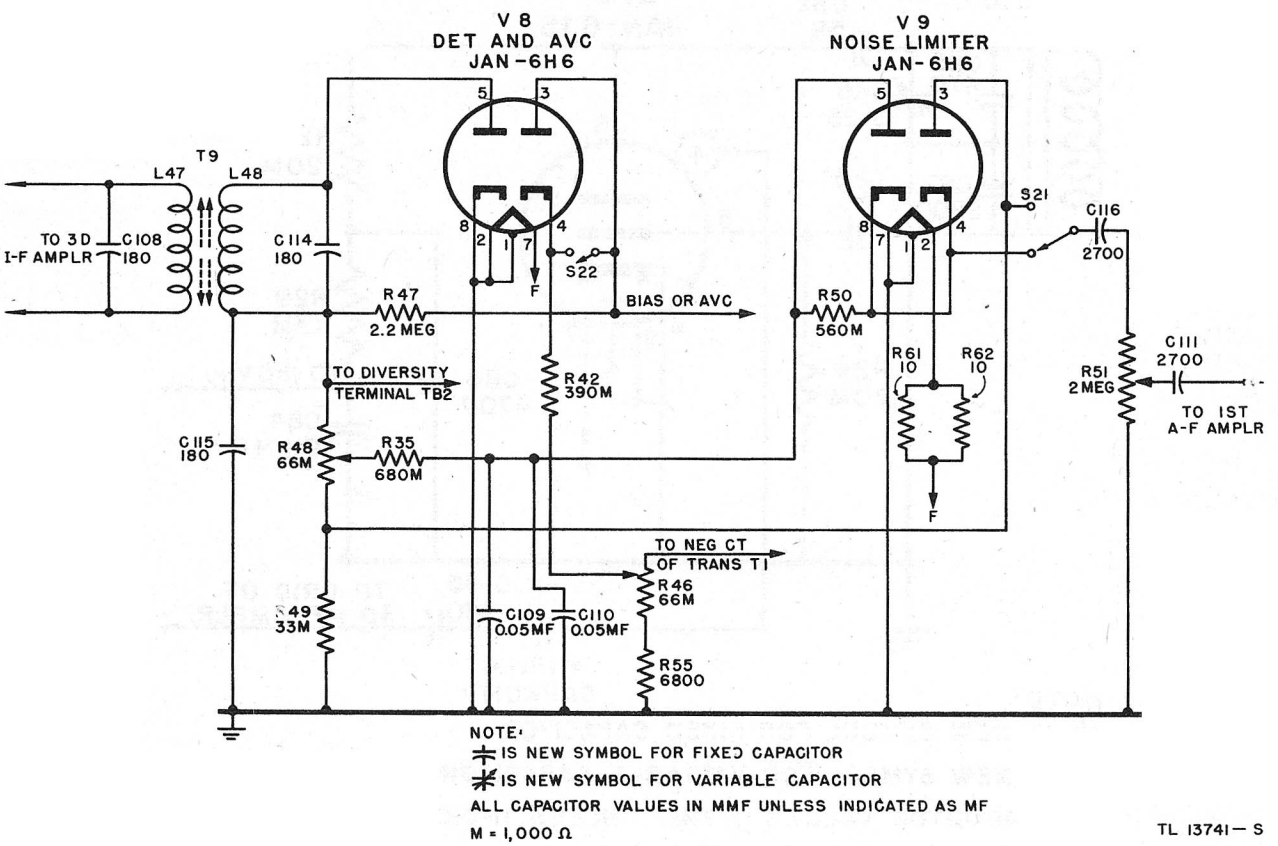


Figure 39. Radio receiver (RCA model AR-88D), detector, automatic volume control, and noise limiter.

on terminal board TB2 marked DIODE LOAD and DIODE RETURN. The model F receiver has been designed for operation with other components of the diversity receiving equipment (RCA model DR-89). The two diode terminals make it possible to connect each of the three receivers of the diversity receiving equipment to a common load which exists in another unit (tone keyer) of the diversity receiving equipment.

(*2*) In the model F receiver, the a-v-c line is connected to a terminal on terminal board TB2 to provide a-v-c voltage to another unit of the diversity receiving equipment.

(*3*) In the model F receiver, resistor R55 changes from 6,800 ohms to 5,600 ohms. This resistor provides a minimum delay voltage for automatic volume control and a minimum bias on manual operation.

59. BEAT-FREQUENCY OSCILLATOR.

The beat-frequency oscillator of radio receiver (RCA model AR-88(*)) (fig. 40) uses Tube JAN-6J5 as V12. No differences in this circuit exist between models D and F.

a. This oscillator makes use of the conventional Colpitts circuit with capacitor C85 and C87 providing the common plate to grid coupling. Coil L22 completes the resonant circuit with variable capacitor C86, which provides for adjustment of the beat-note frequency to a desirable tone. This capacitor is the B.F.O. ADJ. control on the front panel.

b. D-c blocking capacitor C88 functions together with grid bias resistor R24 to provide bias for the grid. Capacitor C82 is the d-c block for the shunt-fed plate. Resistors R28 and R29 and capacitors C83 and C84 are for purposes of plate dropping and decoupling.

c. The output of the beat-frequency oscillator is coupled to the grid of the third i-f amplifier by means of wiring capacity of a lead which runs close to the third i-f input and connects to pin 4 of the b-f-o tube.

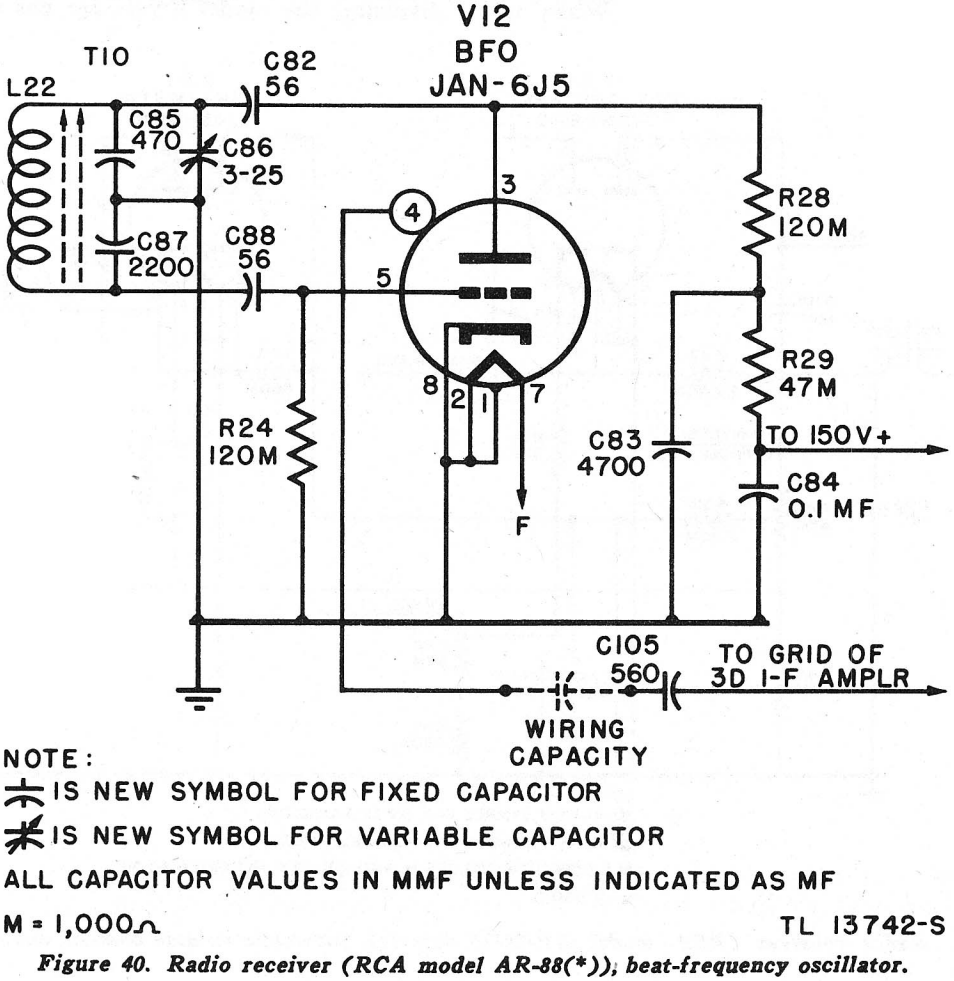


Figure 40. Radio receiver (RCA model AR-88(*)), beat-frequency oscillator.

60. FIRST A-F AND POWER AMPLIFIERS.

The first a-f amplifier of radio receiver (RCA model AR-88(*)) uses Tube JAN-6SG7 as V10. The power amplifier uses Tube JAN-6K6GT/G as V11. Figure 41 shows the circuits of the first a-f and power amplifiers of radio receiver (RCA model AR-88(*)). No differences in these circuits exist between models D and F.

a. The audio signal from the detector is fed through blocking capacitor C116 to the A.F. GAIN control R51. The desired signal strength is fed to the grid of the first a-f amplifier through blocking capacitor C111. The output of the first a-f amplifier is developed across plate load resistor R40 and fed through blocking capacitors C118 and C122 to the grid of the power amplifier. The power amplifier plate connects to transformer T2, which provides power at three different values of output impedance. The output impedances available are: a 2.5-ohm tap for speaker connection, a 50-ohm coil for headset connection, and a 600-ohm coil for connection to a transmission line.

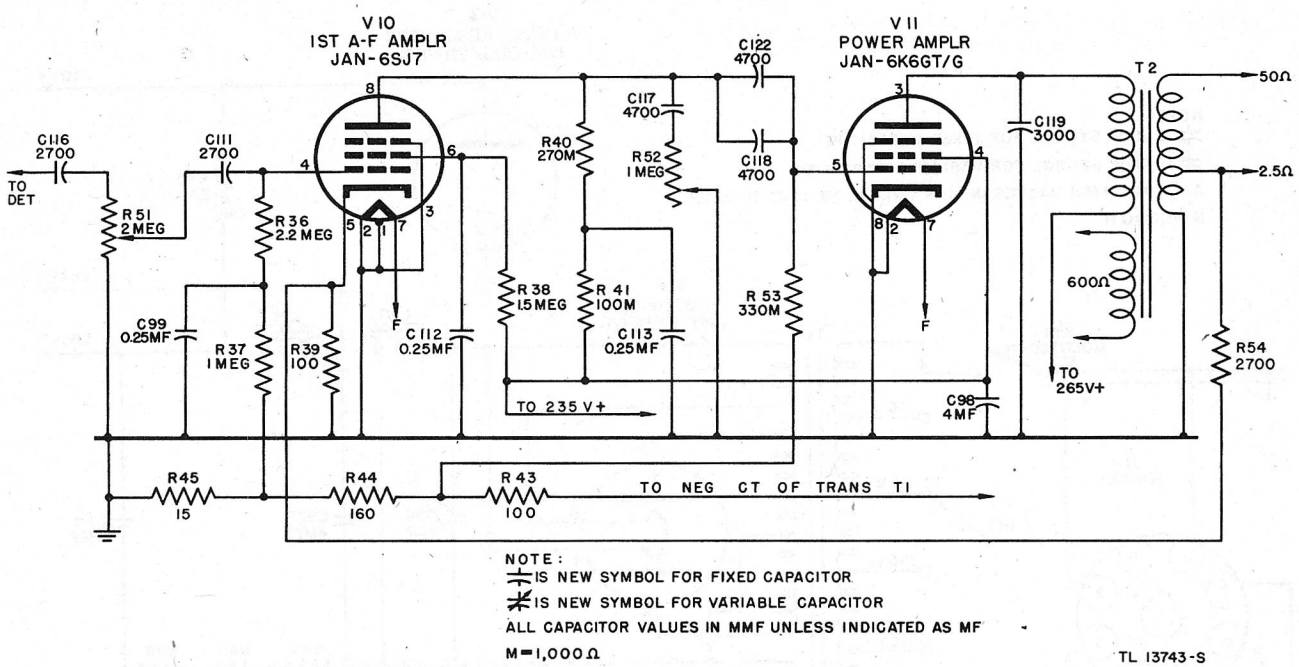


Figure 41. Radio receiver (RCA model AR-88(*)), first a-f and power amplifiers.

b. Bias for these two amplifiers is obtained from a voltage divider network consisting of resistors R43, R44, and R45 connected from the negative center tap of power transformer T1 to ground. Additional bias for the first a-f amplifier is developed across cathode bias resistor R39. Resistors R36, R37, and R53 are grid return resistors with resistors R37 and capacitor C99 acting as a grid decoupling circuit. Capacitor C117 and resistor R52 serve for a tone control in the first a-f amplifier. Capacitors C112 and C98 are the screen bypass capacitors, while resistors R38 and R41 are screen and plate dropping resistors. Capacitor C113 functions with resistor R41 for plate decoupling. Capacitor C119 is across the plate of the power amplifier to bypass undesirable high frequencies. Some inverse feedback is obtained from the 2.5-ohm tap of the output transformer and applied to the cathode of the first a-f amplifier to balance out any objectionable harmonic distortion.

61. POWER SUPPLY.

The rectifier of radio receiver (RCA model AR-88(*)) uses Tube JAN-5Y3GT/G as V14, and a voltage-regulator circuit which is provided uses Tube JAN-OD3/VR-150 as V13. Figure 42 shows the circuits of the rectifier and voltage regulator of radio receiver (RCA model AR-88(*)). No differences in these circuits exist between models D and F.

a. The power supply circuit has been designed for operation of these receivers on a-c power, battery power, or from a vibrator power supply (not supplied) energized by a 6-volt storage battery. For a discussion of these alternate power supplies refer to paragraph 10a, b, and c. When operating on a-c power, a plug is inserted in socket J1 which links pins 1 and 2 and also pins 3 and 4. This

linking plug is removed when operating on batteries or vibrator power supply.

b. For a-c power operation, switch S24 which is mounted on power switch S23 opens and closes the primary of power transformer T1. Switch S25, which is mounted at the rear left of the chassis, selects the proper voltage tap on the power transformer primary for operation at a-c voltages from 110 to 240 volts. Three secondary windings are provided which supply 5 volts for the rectifier filament, 345 volts for each plate of the rectifier, and 6.3 volts for the heater and pilot-lamp circuits. The heaters of all tubes in these receivers require 6.3 volts with the exception of the power-supply tubes and V9, the noise limiter (fig. 39). The operation of the noise limiter Tube JAN-6H6 requires that very little current be drawn as a result of contact potential. This is accomplished by the use of two parallel 10-ohm resistors R61 and R62 in the heater circuit of tube V9 to slightly reduce the heater voltage.

c. The rectified output of tube V14 is filtered by capacitors C96, C97, and C98 and chokes L49 and L50. Resistors R43, R44, and R45 provide negative bias voltages for the first a-f and power amplifiers. A 265-volt d-c potential is taken from a point between the two chokes to supply the power-amplifier plate voltage. The plates of the two oscillators and the screens of the three i-f amplifiers and the mixer are connected through dropping and decoupling resistors to a regulated 150-volt supply. This voltage is made available by the use of tube V13 in series with resistor R30 connected across output capacitor C98. All other plate and screen voltages are supplied by the 235-volt d-c potential across capacitor C98.

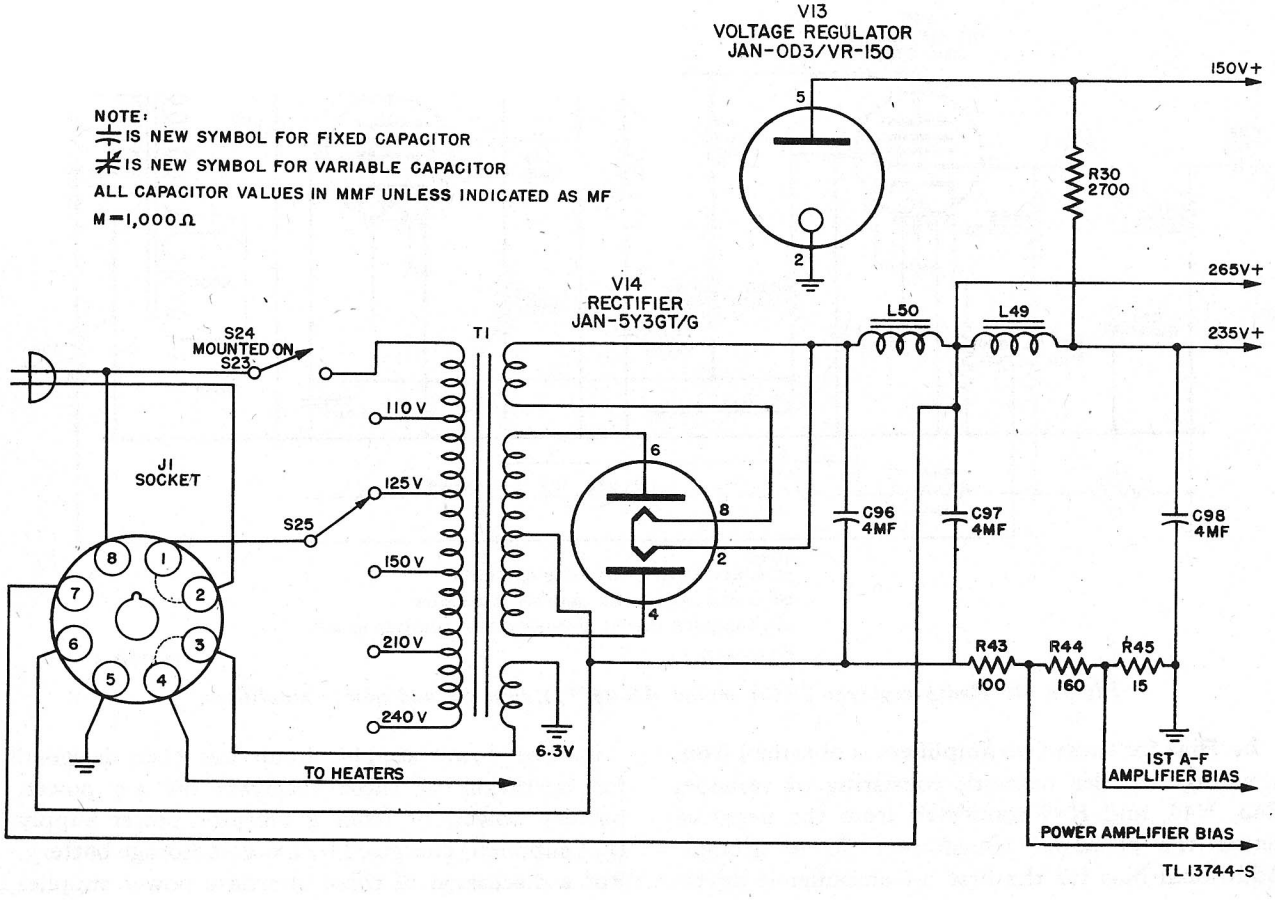


Figure 42. Radio receiver (RCA model AR-88(*)), rectifier and voltage regulator

SECTION XII. TROUBLE SHOOTING

62. GENERAL TROUBLE-SHOOTING INFORMATION.

No matter how well equipment is designed and manufactured, faults occur in service. When such faults occur, the repairman must locate and correct them as rapidly as possible. This section contains general information to aid personnel engaged in this highly important duty of trouble shooting.

a. Trouble-shooting Data. Take advantage of the material supplied in this manual. It will help in the rapid location of faults. Consult the following trouble-shooting data:

(*1*) Block diagram of radio receiver (RCA model AR-88(*)) (fig. 32).

(*2*) Complete schematic diagrams (figs. 49 and 50).

(*3*) Simplified and partial schematic diagrams. These diagrams are particularly useful in trouble shooting, because the repairman can follow the electrical functioning of the circuits more quickly than on the regular schematics, thus speeding trouble location.

(*4*) Voltage and resistance data for all socket connections (figs. 51 and 52).

(*5*) Illustrations of components. Rear, top, and bottom views which aid in locating and identifying parts (figs. 12, 43, 44, and 45).

(*6*) Pin connections. Pin connections on sockets, plugs, and receptacles are numbered on the various diagrams.

(*a*) Seen from the bottom, pin connections are numbered in a *clockwise* direction around the sockets. On octal sockets, the first pin clockwise from the keyway is the No. 1 pin.

(*b*) Plugs and receptacles are numbered on the side to which the associated connector is attached. To avoid confusion, some individual pins are identified by letters appearing directly on the connector.

b. Trouble-shooting Steps. The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to the component or *circuit* responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective *part* responsible for the abnormal condition. Some faults such as burned-out resistors, r-f arcing, and shorted transformers can often be located by sight, smell, and hearing. The majority of faults, however, must be located by checking voltage and resistance.

c. Sectionalization. Careful observation of the performance of the radio set, while turning the equipment on, often sectionalizes the fault to the transmitter or the receiver, and careful observation of the meter on the transmitter front panel often determinines the stage or circuit at fault. Additional sectionalizing of the fault will be discussed in paragraph 63.

d. Localization. Paragraph 64 describes the method of localizing faults within the individual components. This paragraph is accompanied by trouble-shooting charts which list abnormal symptoms and their probable causes. These charts also give procedure for determining *which* of the probable locations of the fault is the exact one. In addition, there are a number of drawings which show the resistance and voltage at each socket pin connection.

e. Voltage Measurements. Voltage measurements are an almost indispensable aid, for most troubles either *result* from abnormal voltages or *produce* abnormal voltage. Voltage measurements are taken easily, because they are always made between two points in a circuit. The circuit need not be interrupted.

(*1*) Unless otherwise specified, voltages listed on the voltage charts are measured between the indicated points and ground.

(*2*) Always begin by setting the voltmeter on the *highest* range so that the voltmeter will not be overloaded. Then, if it is necessary to obtain increased accuracy, set the voltmeter to a lower range.

(*3*) When checking cathode voltage, remember that a reading can be obtained when the cathode resistor is actually open as the resistance of the meter may act as a cathode resistor. Thus, the cathode voltage may be approximately normal only

as long as the voltmeter is connected between cathode and ground. Before cathode voltage is measured, first make a resistance check with the power off to determine whether the cathode resistor is normal.

f. Precautions Against High Voltage. Certain precautions *must* be followed when measuring voltages above a few hundred volts. High voltages are dangerous and can be fatal. When it is necessary to measure high voltages, observe the following rules:

(*1*) Connect the ground lead to the voltmeter.

(*2*) Place one hand in your pocket. This will eliminate the possibility of making accidental contact with another part of the circuit thus causing the electricity to travel from one hand to the other through the body.

(*3*) If the voltage is less than 300 volts, connect the test lead to the hot terminal (which may be either positive or negative with respect to ground).

(*4*) If the voltage is greater than 300 volts, shut off the power, connect the hot lead, step away from the voltmeter, turn on the power, and note the reading on the voltmeter. Do not touch any part of the voltmeter, particularly when it is necessary to measure the voltage between two points which are above ground.

g. Voltmeter Loading. Voltmeter resistance must be at least 10 times as large as the resistance of the circuit across which the voltage is measured. If the voltmeter resistance is nearly equal to the circuit resistance, the voltmeter will indicate a voltage *lower* than the actual voltage present when the voltmeter is removed from the circuit.

(*1*) The resistance of a voltmeter on any range can be calculated by this simple rule: Resistance of the voltmeter equals the ohms per volt multiplied by the full-scale range in volts. For example: The resistance of a 1,000 ohm-per-volt meter on the 300-volt range is 300,000 ohms (R = 1,000 ohms per volt times 300 volts = 300,000 ohms).

(*2*) To minimize voltmeter loading in high-resistance circuits, use the highest voltmeter range. Although only a small deflection will be obtained (possibly only 5 divisions on a 100-division scale), the electrical accuracy of the voltage measurement will be increased. The decreased loading of the voltmeter will more than compensate for the visual inaccuracy which results from reading only a small deflection on the voltmeter scale.

(*3*) Close observation of the meter when switching voltage ranges will show if the voltmeter is loading the circuit under test.

(*a*) *Extremely heavy loading* is indicated when the deflection of the pointer on the meter (not the voltage reading) is nearly the same for different ranges.

(*b*) *Appreciable loading* is indicated when the voltage readings (not the deflection) for different ranges do not agree.

(*c*) *Négligible loading* is indicated when the voltage readings (not the deflection) for different ranges do agree.

(*4*) The ohm-per-volt sensitivity of the voltmeter used to obtain the readings recorded on the voltage and resistance charts in this manual is printed on each chart. Use a meter having the same ohm-per-volt sensitivity. Otherwise it may be necessary to consider the effect of loading.

63. SECTIONALIZING TROUBLE IN RADIO RECEIVER (RCA MODEL AR-88(*)).

a. General. The equipment performance check list (par. 21) should be used as the first step in sectionalization. While using this check list remember that many components are common to a single stage. For example, an r-f amplifier stage which operates satisfactorily on one band will operate satisfactorily on all bands unless the band switch or the components of an individual band are defective. If the stage is operating normally on all bands, the band switching section can be considered normal. In this sectionalizing process, a step-by-step procedure will be used, beginning with the a-f amplifiers and proceeding stage by stage toward the antenna circuits. Throughout this procedure, have the RANGE switch in position 1, the N.L. A.V.C. switch in the MAN. position, and the power switch in the REC. MOD. position.

b. Preliminary Inspection. A visual inspection of the equipment should precede any attempt at trouble shooting. Carefully examine the chassis for loose or broken connections, broken or loose tubes, damaged parts, or any other abnormal condition. Particular attention should be given to the switches for dirty or loose connections and contacts. Repair or replace any faulty components before turning on the equipment.

c. Reference Data. The use of voltage and resistance readings (figs. 51 and 52) combined with a knowledge of the normal operation of the receiver will permit rapid sectionalization of the trouble.

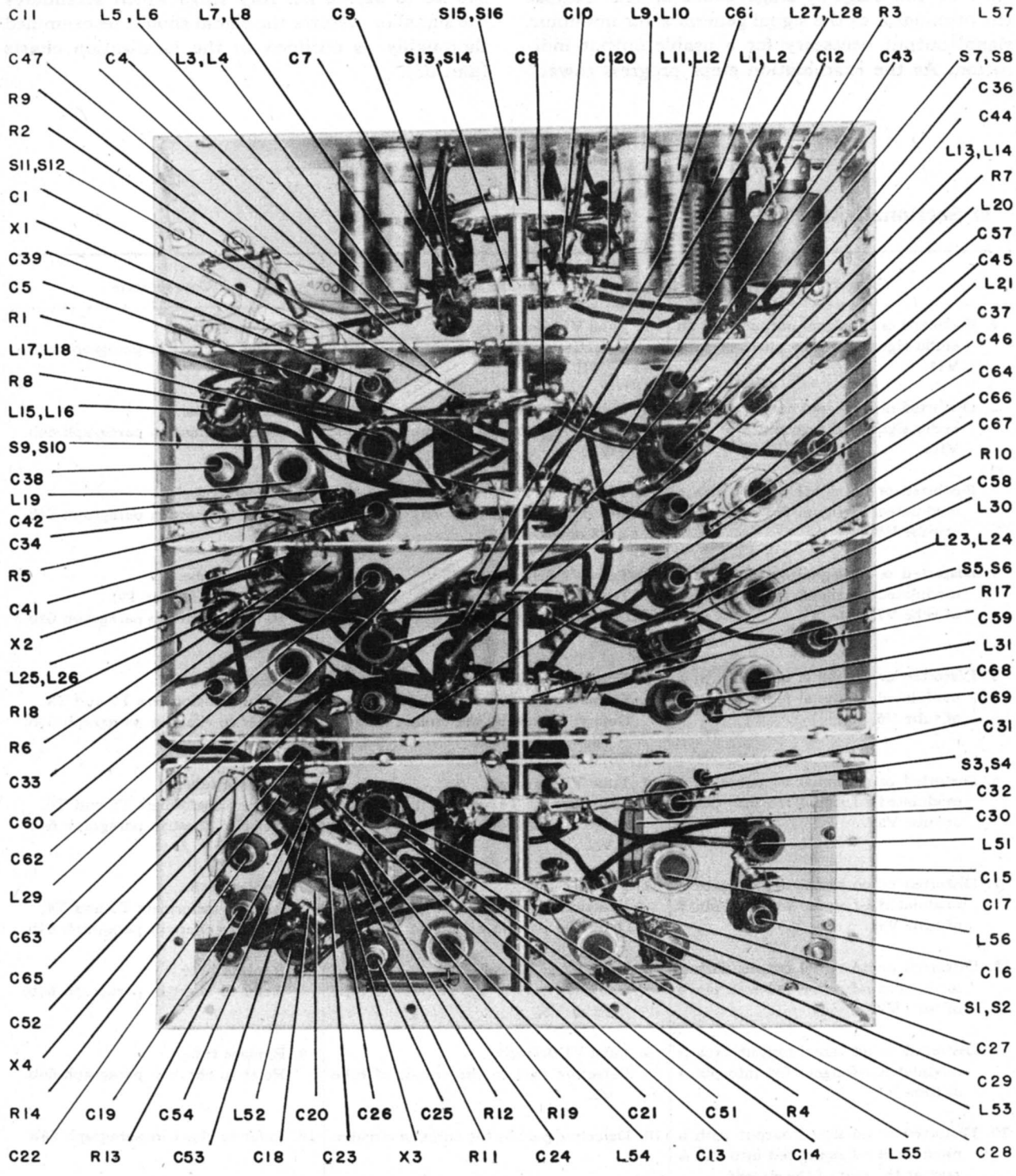
d. Equipment Requirements. The most effective sectionalization process requires the use of a signal generator and an output meter. Connect the output meter to the 600-ohm output terminals at the rear of the chassis, and select a usable range at each of the stage-by-stage examinations. Adjust the attenuator of the signal generator for minimum signal output necessary for a usable output indication. As the examination steps progress toward the antenna circuits, less and less signal will be necessary for the same output indication. The signal generator must be capable of furnishing an audio signal to check the audio stages, a modulated i-f signal (455 kc), and modulated signals from 540 kc to 32,000 kc. Any stage which attenuates the signal or distorts the signal should be examined thoroughly as outlined in the localization charts (par. 65).

e. Sectionalizing Procedure.

Symptoms	*Probable trouble*	*Corrections*
1. Distorted or no signal output with an audio signal fed into pin 5 of tube V11.	1. Tube V11 defective. Defective part in the circuit of tube V11.	1. Replace tube. Refer to chart in paragraph 64b.
2. Distorted or no signal output with an audio signal fed into pin 4 of tube V10.	2. Tube V10 defective. Defective part in the circuit of tube V10.	2. Replace tube. Refer to chart in paragraph 64b.
3. Distorted or no signal output with a modulated i-f signal fed into pin 5 of tube V8.	3. Tube V8 or V9 defective. Defective part in the circuits of tube V8 or V9.	3. Replace tube. Refer to chart in paragraph 64b.
4. Distorted or no signal output with a modulated i-f signal fed into pin 4 of tube V7.	4. Tube V7 defective. Transformer T9 misaligned. Defective part in the circuit of tube V7.	4. Replace tube. Align transformer T9. Refer to chart in paragraph 64b.
5. Distorted or no signal output with a modulated i-f signal fed into pin 4 of tube V6.	5. Tube V6 defective. Transformers T7 and T8 misaligned. Defective part in the circuit of tube V6.	5. Replace tube. Align transformers T7 and T8. Refer to chart in paragraph 64b.
6. Distorted or no signal output with a modulated i-f signal fed into pin 4 of tube V5.	6. Tube V5 defective. Transformers T5 and T6 misaligned. Defective part in the circuit of tube V5.	6. Replace tube. Align transformers T5 and T6. Refer to chart in paragraph 64b.
7. Distorted or no signal output with a modulated i-f signal fed into pin 8 of tube V4.	7. Tube V4 defective. Transformers T3 and T4 misaligned. Defective part in circuit of tube V4.	7. Replace tube. Align transformers T3 and T4. Refer to chart in paragraph 64b.
8. Distorted or no signal output with a modulated r-f signal fed into pin 4 of tube V2.	8. Tube V2 or V3 defective. Defective part in the circuits of tube V2 or V3.	8. Replace tube. Refer to chart in paragraph 64b.
9. Distorted or no signal output with a modulated r-f signal fed into pin 4 of tube V1.	9. Tube V1 defective. Defective part in the circuit of tube V1.	9. Replace tube. Refer to chart in paragraph 64b.
10. Distorted or no signal output with a modulated r-f signal fed into the A post at the rear of the chassis.	10. Defective part in the antenna circuits.	10. Refer to chart in paragraph 64b.

64. LOCALIZING TROUBLE IN RADIO RECEIVER (RCA MODEL AR-88(*)).

a. General. After sectionalizing the trouble, use the procedure in the following charts to localize the trouble to the defective part. These charts are equally useful for trouble shooting in the model D or model F receiver provided reference is made to paragraph 7 and to the correct schematic diagram (fig. 49 or 50). When making voltage and resistance



TL13745-S

Figure 43. Radio receiver (RCA model AR-88(*)), r-f unit parts, bottom.

measurements, refer to figures 51 and 52. Small deviations from the voltage and resistance values in the chart are usually due to the tolerances in tubes and parts. Readings are given for both 1,000 ohm-per-volt and 20,000 ohm-per-volt meters. To further localize the fault to the particular part, use figures 12, 43, 44, and 45, which show the physical location of all parts. These illustrations serve to show the location of parts in the model D receiver as well as in the model F. Reference should also be made to the technical manuals on the test equipment used in the tests.

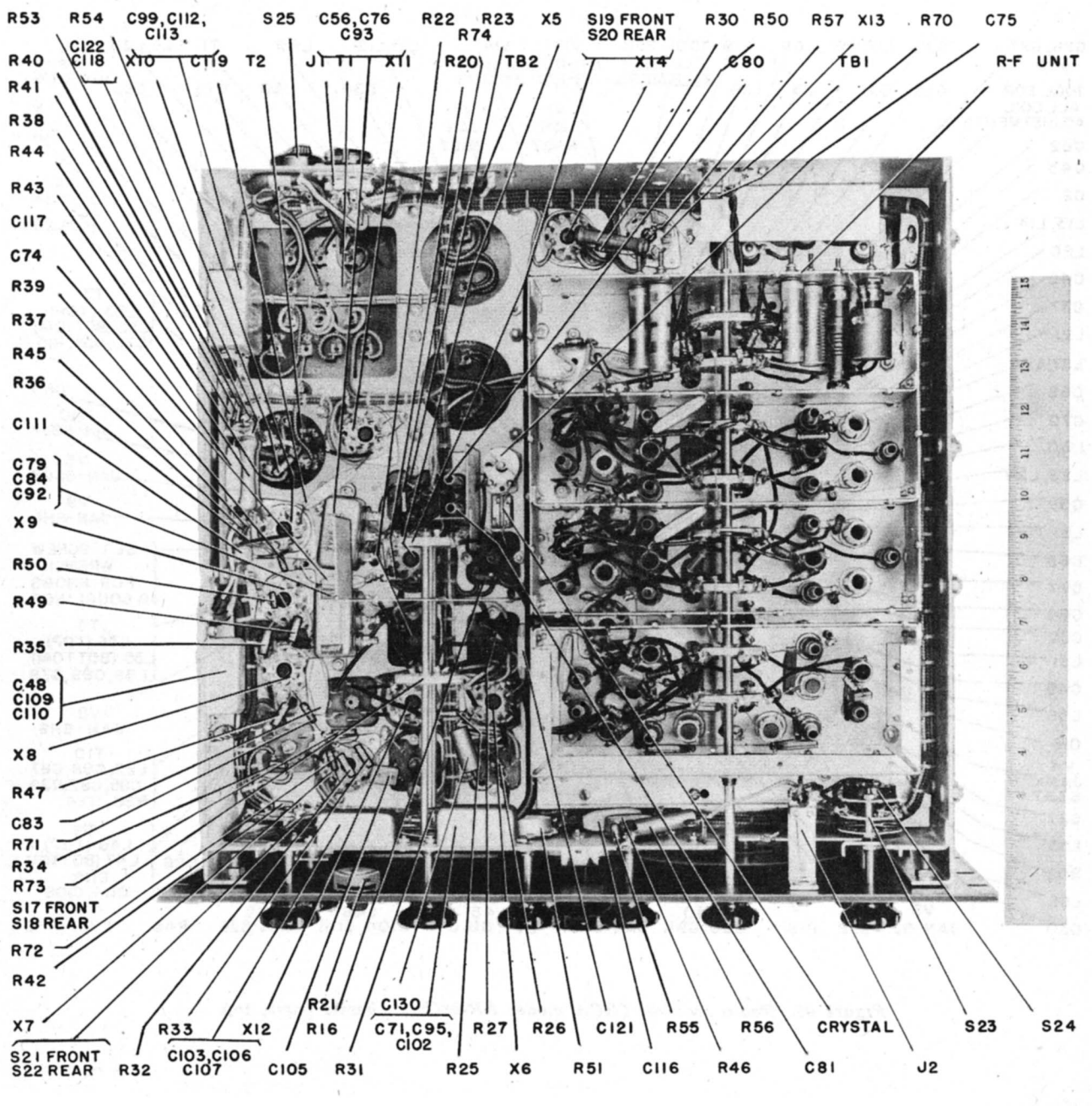


Figure 44. Radio receiver (RCA model AR-88(*)), chassis parts, bottom.

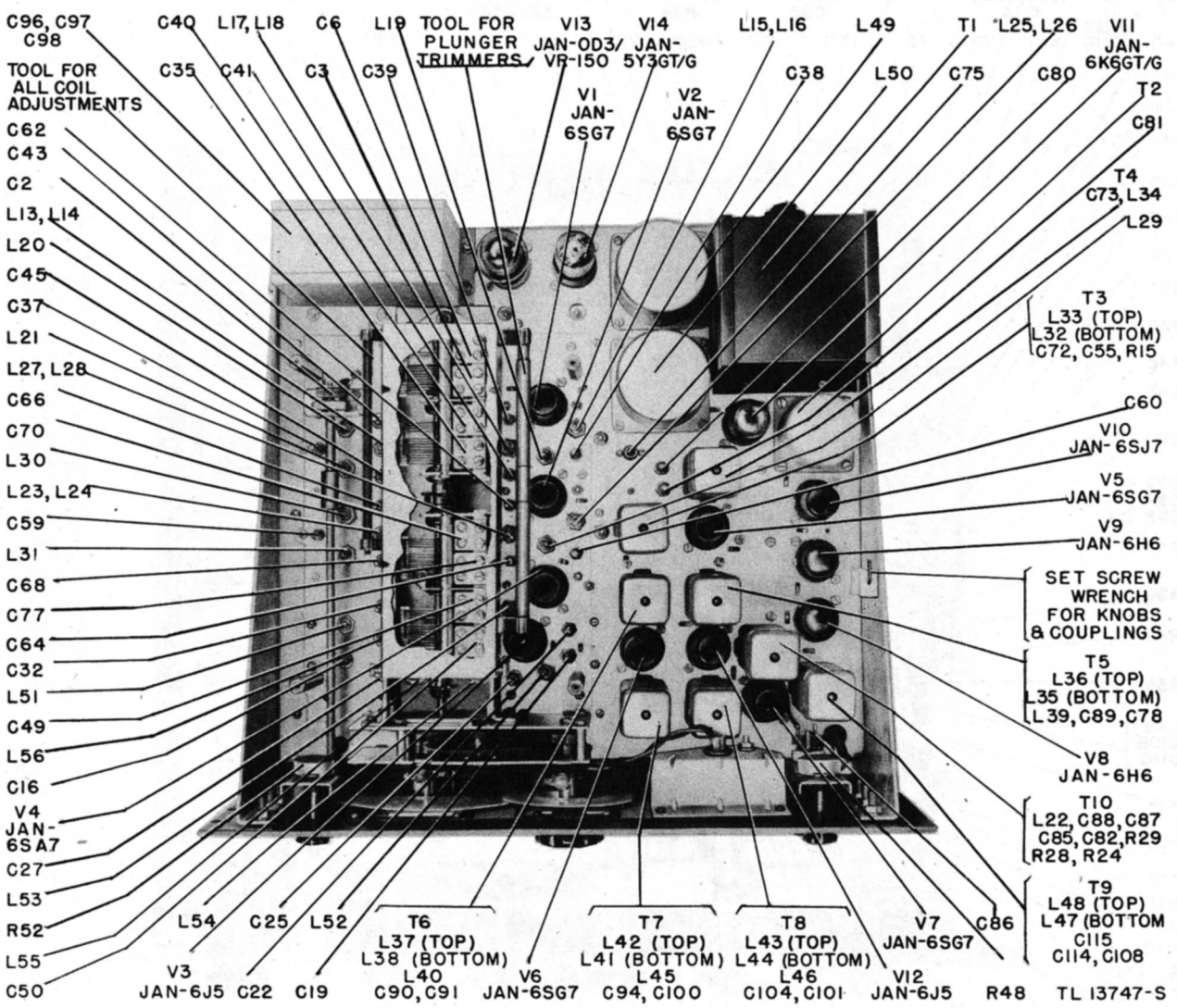


Figure 45. Radio receiver (RCA model AR-88(*)), chassis parts, top.

b. Localizing Procedure.

Symptoms	*Probable trouble*	*Corrections*
1. Very low or no voltage at pin 2 of tube V14.	Tube V14 defective. Capacitor C96, C97, or C98 shorted. Resistor R43, R44, or R45 open. Transformer T1 defective.	Replace tube. Replace capacitor. Replace resistor. Replace transformer T1.
2. More or less than 150 volts at pin 5 of tube V13.	Tube V13 defective.	Replace tube.
3. No voltage at pin 3 of tube V12.	Resistor R28 or R29 open. Capacitor C83 or C84 shorted.	Replace resistor. Replace capacitor.
4. Tube V11.		
a. No voltage at pin 3.	*a.* Transformer T2 defective.	*a.* Replace transformer T2.
b. Abnormal voltage at pin 5.	*b.* Capacitor C122, or C118 defective.	*b.* Replace capacitor.
5. Tube V10.		
a. Low or no voltage at pin 8.	*a.* Capacitor C113 or C117 defective. Resistor R40 or R41 defective.	*a.* Replace capacitor. Replace resistor.
b. No voltage at pin 6.	*b.* Capacitor C112 shorted. Resistor R38 open.	*b.* Replace capacitor. Replace resistor.
c. Low or no voltage at pin 4.	*c.* Capacitor C99 or C111 shorted. Resistor R36 or R37 defective.	*c.* Replace capacitor. Replace resistor.
6. Voltage measurements on tube V9 and V8 must be made with a VTVM to be useful.	Resistor R47, R48, R49, or R50 defective. Capacitor C114, C115, or C116 defective.	Replace resistor. Replace capacitor.
7. Tube V7.		
a. Abnormal voltage at pin 8.	*a.* Capacitor C107 defective. Coil L47 or resistor R34 defective.	*a.* Replace capacitor. Replace coil or resistor.
b. No voltage at pin 6.	*b.* Resistor R31 open. Capacitor C103 shorted.	*b.* Replace resistor. Replace capacitor.
c. No voltage at pin 5.	*c.* Resistor R32 open. Capacitor C106 shorted.	*c.* Replace resistor. Replace capacitor.
8. Tube 6.		
a. Abnormal voltage at pin 8.	*a.* Coil L41 or resistor R26 defective. Capacitor C95 defective.	*a.* Replace coil or resistor. Replace capacitor.
b. No voltage at pin 6.	*b.* Resistor R31 open. Capacitor C71 shorted.	*b.* Replace resistor. Replace capacitor.
c. No voltage at pin 5. Abnormal voltage at pin 4.	*c.* Resistor R25 open. Resistor R27 or coil L38 defective.	*c.* Replace resistor. Replace resistor or coil.
9. Tube 5.		
a. Abnormal voltage at pin 8.	*a.* Resistor R22, coil L35, or capacitor C79 defective.	*a.* Replace resistor, coil, or capacitor.
b. No voltage at pin 6.	*b.* Capacitor C71 shorted.	*b.* Replace capacitor.
c. Vo voltage at pin 5. Abnormal voltage at pin 4.	*c.* Resistor R20 open. Coil L34, resistor R23, capacitor C76, or C73 defective.	*c.* Replace resistor. Replace coil, resistor, or capacitor.
10. Tube V4.		
a. Abnormal voltage at pin 3.	*a.* Resistor R16, capacitor C56, or coil L32 defective.	*a.* Replace resistor, capacitor, or coil.
b. No voltage at pin 4.	*b.* Resistor R19 open. Capacitor C54 shorted.	*b.* Replace resistor. Replace capacitor.
c. No voltage at pin 6.	*c.* Resistor R13 open. Capacitor C52 shorted.	*c.* Replace resistor. Replace capacitor.
11. No voltage at pin 3 of tube V3.	Resistor R11 or R12 open. Capacitor C51 or C121 shorted.	Replace resistor. Replace capacitor.

b. Localizing Procedure (contd).

Symptoms	*Probable trouble*	*Corrections*
12. Tube V2.		
a. No voltage at pin 8.	*a.* Resistor R10 open. Capacitor C63 shorted.	*a.* Replace resistor. Replace capacitor.
b. No voltage at pin 6.	*b.* Resistor R10 or R6 open. Capacitor C63 or C33 shorted.	*b.* Replace resistor. Replace capacitor.
13. Tube V1.		
a. Abnormal voltage at pin 8.	*a.* Resistor R3 open. Capacitor C11 shorted.	*a.* Replace resistor. Replace capacitor.
b. No voltage at pin 6.	*b.* Resistor R1 or R3 open. Capacitor C1 or C11 shorted.	*b.* Replace resistor. Replace capacitor.

65. VOLTAGE AND RESISTANCE MEASUREMENTS.

a. The voltage readings shown in figures 51 and 52 will aid in trouble shooting in the receiver. For most of the more obvious troubles, a 1,000 ohm-per-volt voltmeter will give satisfactory indications of normal conditions or defective parts. Since the voltmeter loading of the circuit under test will not, in most cases, give the true reading, always use the highest scale which gives a usable reading. This will reduce the loading effect of the meter. Voltage readings within 10 percent of the stated voltages are usually satisfactory. Normal manufacturing tolerances for parts and tubes are about 10 percent. Voltages in the high-resistance circuits, when read with a 1,000 ohm-per-volt voltmeter, will not be the true operating voltages and are given as samples of the readings to be expected when the receiver is operating normally. Typical examples of such high-resistance circuits are the a-v-c circuits and the circuits of resistance-coupled amplifiers. Readings are given, for that reason, using both 1,000 ohm-per-volt and 20,000 ohm-per-volt voltmeters. The 20,000 ohm-per-volt voltmeter draws very little current from the circuit under test and will give readings which are closer to the true operating voltages.

b. Resistance measurements for the receiver are also shown in figures 51 and 52. Here, as in the voltage measurements, readings which are within 10 percent of the stated values will usually prove satisfactory. Be sure to have the receiver power turned off when taking resistance measurements. Resistor readings will vary with different settings of the controls and switches. Be certain to take all readings with the controls and switches in the stated positions.

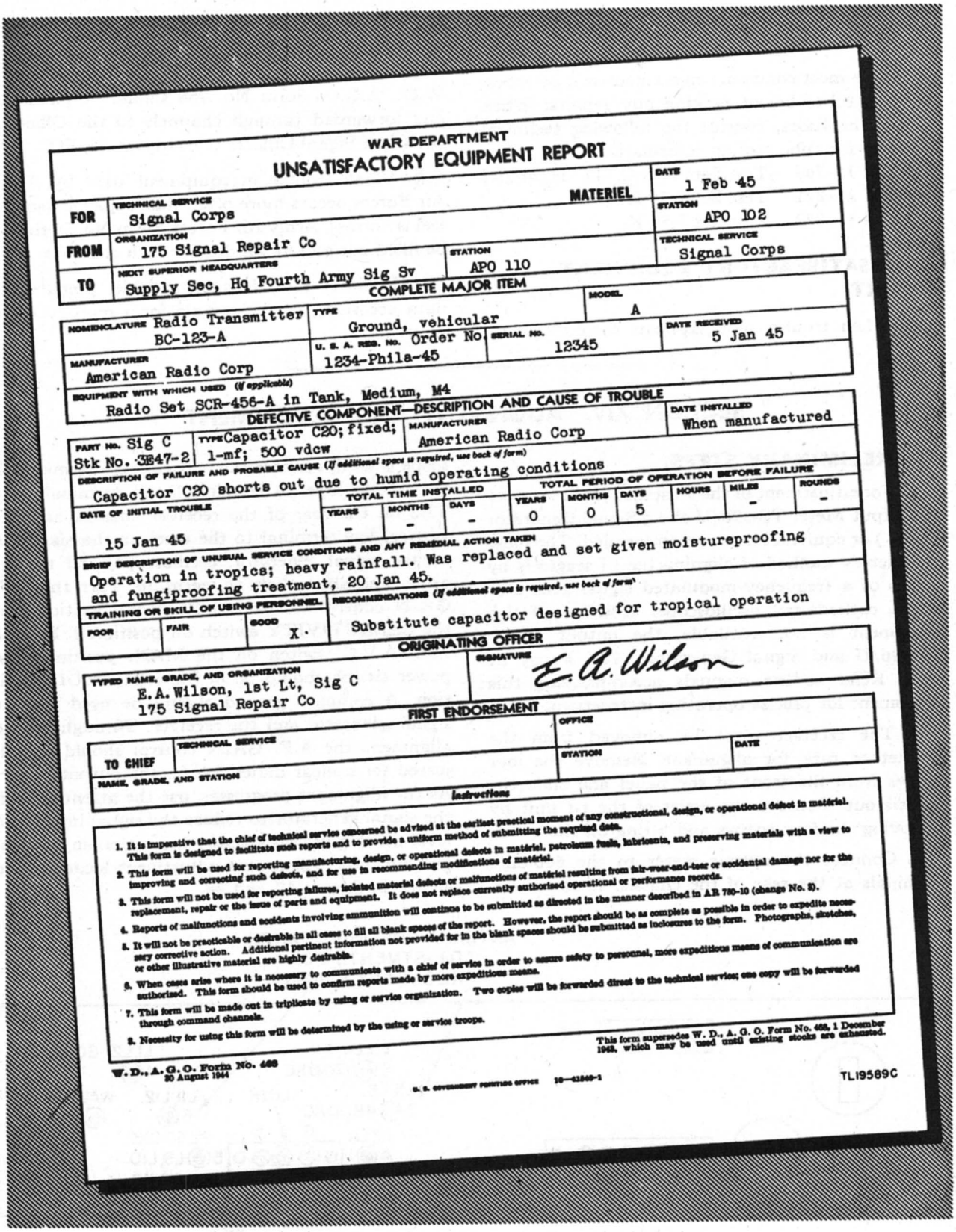
SECTION XIII. REPAIRS

66. GENERAL REPAIR INFORMATION.

a. Only competent personnel supplied with adequate tools and instruments are authorized to service and repair this equipment. An inexperienced operator attempting to make repairs may damage the equipment to such an extent that major repairs are necessary rather than the original minor repair. Most repairs and tests on this equipment require the use of special test equipment and a knowledge of the use of this equipment.

b. The removal and replacement of defective parts or circuit elements in this receiver are difficult; great care should be taken to avoid further damage to the receiver. Before attempting repairs, make sure that the proper tools and test equipment are available.

c. It may be necessary to remove other circuit elements and parts to remove and replace a defective part. Make a careful record of the connections to each part removed and of its position in the receiver. Clip all leads as short as possible and avoid using more solder than necessary to make a secure connection. A stray bit of solder dropped in the receiver can cause short circuits. Before removing any part, make sure that the part is defec-



WAR DEPARTMENT

UNSATISFACTORY EQUIPMENT REPORT

FOR	TECHNICAL SERVICE: Signal Corps — MATERIEL		DATE: 1 Feb 45
FROM	ORGANIZATION: 175 Signal Repair Co		STATION: APO 102
TO	NEXT SUPERIOR HEADQUARTERS: Supply Sec, Hq Fourth Army Sig Sv	STATION: APO 110	TECHNICAL SERVICE: Signal Corps

COMPLETE MAJOR ITEM

NOMENCLATURE: Radio Transmitter BC-123-A	TYPE: Ground, vehicular		MODEL: A
MANUFACTURER: American Radio Corp	U. S. A. REG. No.: Order No. 1234-Phila-45	SERIAL No.: 12345	DATE RECEIVED: 5 Jan 45

EQUIPMENT WITH WHICH USED (If applicable): Radio Set SCR-456-A in Tank, Medium, M4

DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE

PART No.: Sig C Stk No. 3E47-2	TYPE: Capacitor C20; fixed; 1-mf; 500 vdcw	MANUFACTURER: American Radio Corp	DATE INSTALLED: When manufactured

DESCRIPTION OF FAILURE AND PROBABLE CAUSE (If additional space is required, use back of form): Capacitor C20 shorts out due to humid operating conditions

DATE OF INITIAL TROUBLE	TOTAL TIME INSTALLED			TOTAL PERIOD OF OPERATION BEFORE FAILURE					
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
15 Jan 45	-	-	-	0	0	5		-	-

BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN: Operation in tropics; heavy rainfall. Was replaced and set given moistureproofing and fungiproofing treatment, 20 Jan 45.

TRAINING OR SKILL OF USING PERSONNEL: POOR | FAIR | GOOD X.

RECOMMENDATIONS (If additional space is required, use back of form): Substitute capacitor designed for tropical operation

ORIGINATING OFFICER

TYPED NAME, GRADE, AND ORGANIZATION: E.A. Wilson, 1st Lt, Sig C, 175 Signal Repair Co

SIGNATURE: E.A. Wilson

FIRST ENDORSEMENT

TO CHIEF — TECHNICAL SERVICE — OFFICE — STATION — DATE

NAME, GRADE, AND STATION

Instructions

1. It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design, or operational defects in matériel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of matériel.
3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (change No. 2).
5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.
6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
7. This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.
8. Necessity for using this form will be determined by the using or service troops.

This form supersedes W. D., A. G. O. Form No. 468, 1 December 1943, which may be used until existing stocks are exhausted.

W. D., A. G. O. Form No. 468
30 August 1944

U. S. GOVERNMENT PRINTING OFFICE 16—42560-1

TL19589C

Figure 46. W.D., A.G.O. Form No. 468, with sample entries.

tive. Replace all bolts and nuts and tighten them securely.

d. The most common replacement will be tubes. Test all tubes before making any repairs. When testing the tubes, consult the following technical manuals for tube testing information:

TM 11–303	Test Sets I-56-C, -D, -H, and -J
TM 11–321	Test Set I-56-E
TM 11–322	Test Set I-56-K

67. UNSATISFACTORY EQUIPMENT REPORT.

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Equipment Report, W.D., A.G.O. Form No. 468 should be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D.C.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form No. 54 should be filled out and forwarded through channels.

c. If either form is not available, prepare the data according to the sample form reproduced in figure 46.

SECTION XIV. ALIGNMENT AND ADJUSTMENT

68. PRELIMINARY STEPS.

a. For adjustment of the r-f stages of the receiver an Output Meter TS-396/U and a Signal Generator I-72-( ) or equivalents are recommended. The most satisfactory method of aligning the i-f stages is by means of a frequency-modulated signal generator and a cathode-ray oscilloscope. However, if this equipment is not available, the output Meter TS-396/U and Signal Generator I-72-( ) may be used. Refer to the manuals accompanying this equipment for precise operating instructions.

b. The receiver must be removed from the cabinet or rack for alignment. Remove the four screws from the front of the panel and slide the chassis out. Remove the cover of the r-f unit by removing the four screws and lifting off the cover.

c. Connect the output meter to the 600-ohm terminals at the rear of the chassis. If an oscilloscope is used, connect the vertical high terminal on the oscilloscope to terminal 5 on terminal strip TB2 on the rear of the receiver chassis, and the vertical low terminal to the receiver chassis. Turn on the signal generator, oscilloscope, and the receiver and allow them to warm up. Turn the R.F. GAIN control to the full clockwise position. Set the SELECTIVITY switch on position 2. Set the N.L. A.V.C. switch on the MAN. position. The power switch should be in the REC. MOD. position. A common ground should be used for the signal generator and the receiver. Throughout the alignment the A.F. GAIN control should be adjusted for a clear indication on the output meter. As the alignment progresses, use the attenuator on the signal generator to reduce the signal input to a level which gives satisfactory indication on the output indicator. Alignment adjustment locations are shown in figures 47 and 48.

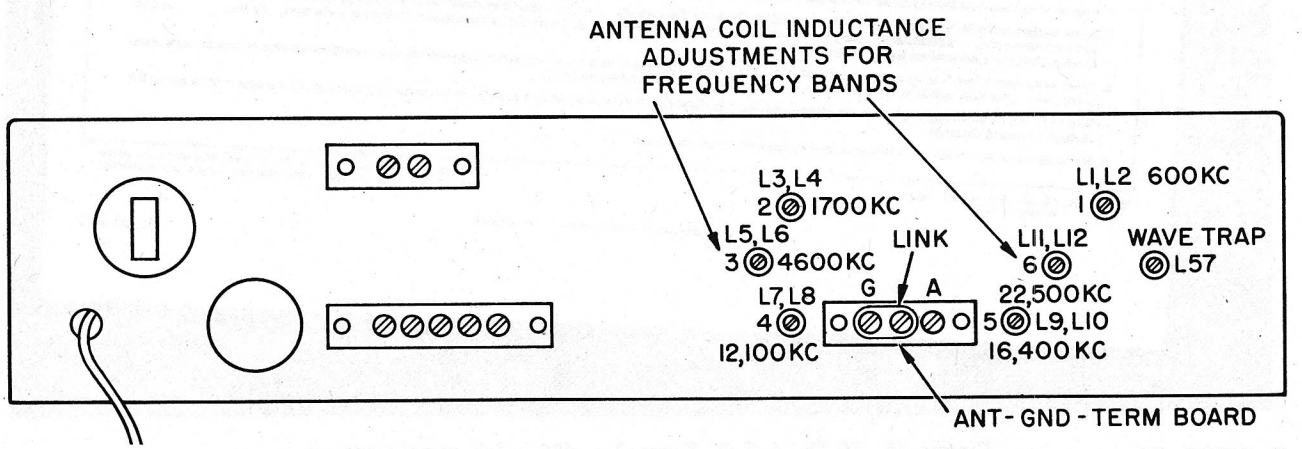
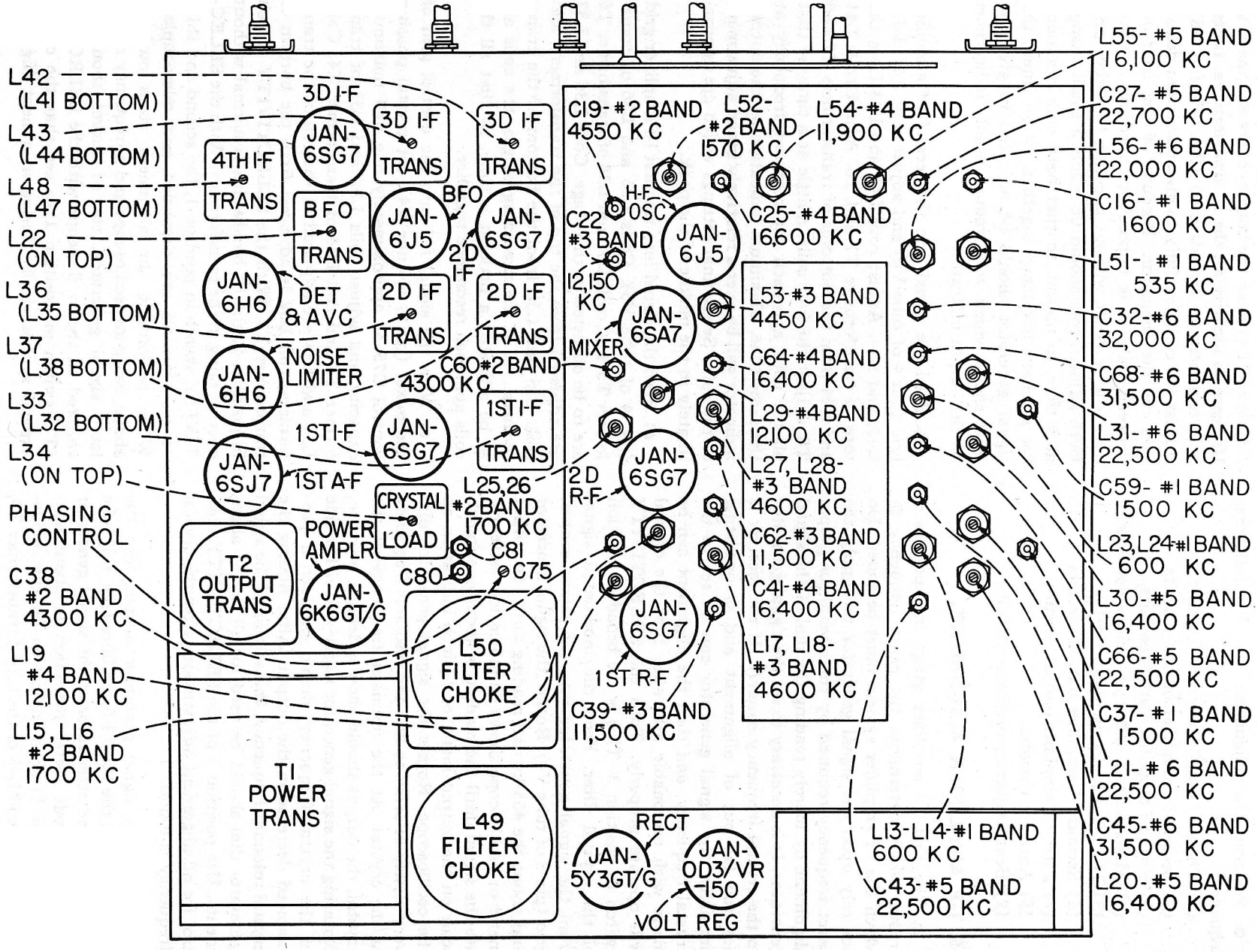


Figure 47. Radio receiver (RCA model AR-88(*)), alignment, rear of chassis.



TL 13749-S

Figure 46. Radio Receiver (RCA model AR-88(*)), alignment, top of chassis.

d. Perform the alignment in the following sequence:

(*1*) Third i-f amplifier output circuits.
(*2*) Second i-f amplifier output circuits.
(*3*) First i-f amplifier output circuits.
(*4*) Mixer output and crystal filter network.
(*5*) High-frequency oscillator circuit.
(*6*) Second r-f amplifier output circuits.
(*7*) First r-f amplifier output circuits.
(*8*) Antenna circuits.
(*9*) Beat-frequency-oscillator circuit.

69. I-F AMPLIFIER ALIGNMENT.

a. The first i-f amplifier stage incorporates a crystal which determines the exact frequency to which the i-f amplifier system must be tuned. Do not rely upon the signal generator to supply the exact frequency required by the crystal for proper alignment by merely reading the dial of the signal generator. It is necessary to set the signal generator to the crystal frequency *exactly*. If the receiver is not too far out of alignment and is operating normally, the signal generator can be set to the crystal frequency, and then the alignment can be made with reasonable assurance that the crystal will operate properly. Turn the SELECTIVITY switch to position 3. This is the broadest position of the crystal filter. Feed the modulated signal from the signal generator into the mixer control grid (pin 8 of tube V4). Rotate the signal generator dial about the 455-kc dial reading until the output meter or oscilloscope shows an indication. Attenuate the signal until the reading is about one-fourth scale on the output meter or ¼ inch indication on the oscilloscope. Rotate the signal generator dial very slowly in order to find the resonant frequency of the crystal. At the resonant frequency of the crystal, the output should show a definite increase. Rotating the signal generator slightly to either side of the crystal frequency should produce a pronounced decrease in the output. After finding the crystal resonant frequency, this setting of the signal generator dial should be used for all the i-f alignments. Use position 2 of the SELECTIVITY control for all alignment adjustments after the crystal frequency is found.

b. Feed the signal generator output into the control grid of the third i-f amplifier (pin 4 of tube V7). Adjust the attenuator of the signal generator until the output meter deflection is about one-fourth scale or ¼ inch indication on the oscilloscope. Adjust coil L48 at the top of transformer T9, using the shorter of the two alignment tools. Adjust coil L47 from the bottom of transformer T9. Use care to identify all the i-f transformers, tubes, and trimmers to be adjusted (figs. 47 and 48). Adjust the coils carefully to give maximum deflection on the indicator. Because of the coupling between coils, it is impossible to adjust one coil over a wide range without affecting the other coil. Both adjustments should be made, a small change at a time, in unison, so that both coils approach the resonant frequency together. At all times, the signal generator should be adjusted to give the least signal which will produce usable indications on the output indicator.

c. Feed the signal into the second i-f amplifier grid (pin 4 of tube V6) and adjust coils L41, L42, L43, and L44. Adjust coils L42 and L43 from the tops of transformers T7 and T8. Adjust coils L41 and L44 from the bottoms of transformers T7 and T8. Adjust the four coils, a little at a time, so that all the coils approach the resonant frequency at the same time. Maximum indication on the output indicator will be over a relatively broad adjustment of the coils. Select final settings which are approximately in the middle of the peak.

d. Feed the signal into the first i-f amplifier grid (pin 4 of tube V5). Coils L35 and L36 of transformer T5, and coils L37 and L38 of transformer T6 are to be adjusted in this stage. Coils L36 and L37 are adjusted from the top of the transformers, and coils L35 and L38 from the bottom of the transformers. As in the preceding stages, the coils are to be adjusted a little at a time, so that all the coils approach resonance together.

e. With the signal fed into the control grid of the mixer (pin 8 of tube V4), set crystal phasing control C75 at approximately one half maximum capacity and adjust coils L32 and L33 of transformer T3 and coil L34 of transformer T4. Coils L33 and L34 are adjusted at the top of the transformers; coil L32 is adjusted from the bottom of transformer T3. With the SELECTIVITY switch in position 2, the i-f bandwidth is normal without overcoupling in the transformers. With the SELECTIVITY switch in position 1, the second and third i-f transformers are expanded and overcoupled. When performing the alignment steps outlined above, using an oscilloscope and a frequency modulated signal generator, the i-f curves should be checked on the oscilloscope with the SELECTIVITY switch in position 1 to see that the curves expand symmetrically during alignment (fig. 33).

f. To adjust the crystal phasing control C75,

connect the signal generator to the grid of the mixer (pin 8 of tube V4), set the SELECTIVITY switch to position 3 and tune the signal generator to about 7 kc off the i-f frequency. Adjust the crystal phasing control C75 for minimum indication on the output indicator.

g. To adjust the crystal load circuit, connect the equipment as in subparagraph f, and rock the signal generator back and forth across the i-f frequency and adjust the crystal load circuit trimmer L34 for a symmetrical round-topped curve on the oscilloscope. Repeat the operations with the SELECTIVITY switch in positions 4 and 5, while adjusting trimmers C81 and C80 respectively. Do not attempt to make this adjustment without an f-m signal generator and an oscilloscope.

h. To test operation of the SELECTIVITY switch, set the signal generator approximately 2 kc away from the crystal frequency. Continue to feed the signal into the control grid of the mixer (pin 8 of tube V4). Rotate the SELECTIVITY control through its entire range. The largest output should be shown with the control on position 1, the smallest output on position 5. After alignment at 455 kc, the i-f bandwidth at two times normal input (twice the input required to produce a 1.9-volt output at 455 kc) should be within the limits given below for various settings of the SELECTIVITY switch. Measurements are to be made across diode load resistors R48 and R49 at a reference level of 1.9 volts.

SELECTIVITY switch setting	*Bandwidth in kc at two times input*
1	11.0 to 16.0
2	6.0 to 9.5
3	1.7 to 4.0
4	0.7 to 1.7
5	0.15 to 0.5

70. R-F AMPLIFIER AND H-F OSCILLATOR ALIGNMENT.

a. Preliminary Instructions. The r-f alignment requires the use of a signal generator capable of furnishing a modulated r-f signal with a frequency range of from 540 to 30,000 kc, and the output meter. Connect the output meter to the 600-ohm output terminals, as during i-f alignment. The same precautions apply here: use the least amount of signal generator output that will furnish usable indications on the output meter. On the higher frequencies be sure the oscillator is aligned for tracking on the high-frequency side of the signal. Use the tables in subparagraph b below in the sequence shown for all operations. The signal generator should be adjusted for modulated output, and the signal fed into the A and G posts at the rear of the receiver chassis. Turn the AUDIO GAIN control and R.F. GAIN control to their full clockwise positions. Leave the N.L. A.V.C. control in the MAN. position. Set the SELECTIVITY switch to position 2 and the power switch to REC. MOD. Settings of the RANGE switch are given in the table. Some of the r-f alignment adjustments are at the rear of the chassis and some are on top of the chassis (figs. 47 and 48).

b. R-f Alignment Procedure. The following table gives the operations to be performed in aligning the r-f stages. Note that band 1 requires a 200-mmf capacitor across the antenna input during alignment. For the remaining bands, a 200-ohm resistor is connected across the antenna input circuit.

Operation No.	*Range switch position*	*Position of dial*	*Generator frequency (kc)*	*Dummy antenna*	*Position of ANT. ADJ.*	*Trimmer adjustments for max peak output (figs. 47 and 48)*	*Trimmer function*
1	1	Extreme low end.	535	200 mmf		L51	Low end osc
2	1	Extreme high end.	1,600	200 mmf		C16	High end osc
3		Repeat 1 and 2 until extreme end frequencies are as indicated.					
4	1	1,500 kc.	1,500	200 mmf	Max output	C37, C59	1st & 2d r-f amplr

b. R-f Alignment Procedure (contd).

Operation No.	*Range switch position*	*Position of dial*	*Generator frequency (kc)*	*Dummy antenna*	*Position of ANT. ADJ.*	*Trimmer adjustments for max peak output (figs. 47 and 48)*	*Trimmer function*
5	1	600 kc.	600	200 mmf	Untouched	L2, L14, L24	Ant & 1st & 2d r-f amplr
6		Repeat 4 and 5 until circuits remain in alignment over the band.					
7	2	Extreme low end.	1,570	200 ohms		L52	Low end osc
8	2	Extreme high end.	4,550	200 ohms		C19	High end osc
9		Repeat 7 and 8 until extreme end frequencies are as indicated.					
10	2	4,300 kc.	4,300	200 ohms	Max output	C38, C60	1st & 2d r-f amplr
11	2	1,700 kc.	1,700	200 ohms	Untouched	L4, L16, L26	Ant & 1st & 2d r-f amplr
12		Repeat 10 and 11 until circuits remain in alignment over the band.					
13	3	Extreme low end.	4,450	200 ohms		L53	Low end osc
14	3	Extreme high end.	12,150	200 ohms		C22	High end osc
15		Repeat 13 and 14 until end frequencies are as indicated.					
16	3	11,500 kc.	11,500	200 ohms	Max output	C39, C62	1st & 2d r-f amplr
17	3	4,600 kc.	4,600	200 ohms	Untouched	L6, L18, L28	Ant & 1st & 2d r-f amplr
18		Repeat 16 and 17 until circuits remain in alignment over the band.					
*19	4	Extreme low end.	11,900	200 ohms		L54	Low end osc
20	4	Extreme high end.	16,600	200 ohms		C25	High end osc
21		Repeat 19 and 20 until extreme end frequencies are as indicated.					
22	4	16,400 kc.	16,400	200 ohms	Max output	C41, C64	1st & 2d r-f amplr
23	4	12,100 kc.	12,100	200 ohms	Untouched	L8, L19, L29	Ant & 1st & 2d r-f amplr
24		Repeat 22 and 23 until circuits remain in alignment over the band.					

b. R-f Alignment Procedure (contd).

Operation No.	*Range switch position*	*Position of dial*	*Generator frequency (kc)*	*Dummy antenna*	*Position of ANT. ADJ.*	*Trimmer adjustments for max peak output (figs. 47 and 48)*	*Trimmer function*
*25	5	Extreme low end.	16,100	200 ohms		L55	Low end osc
26	5	Extreme high end.	22,700	200 ohms		C27	High end osc
27		Repeat 25 and 26 until extreme end frequencies are as indicated.					
28	5	22,500 kc.	22,500	200 ohms	Max output	C43, C66	1st & 2d r-f amplr
29	5	16,400 kc.	16,400	200 ohms	Untouched	L10, L20, L30	Ant & 1st & 2d r-f amplr
30		Repeat 28 and 29 until circuits remain in alignment over the band.					
*31	6	Extreme low end.	22,000	200 ohms		L56	Low end osc
32	6	Extreme high end.	32,000	200 ohms		C32	High end osc
33		Repeat 31 and 32 until extreme end frequencies are as indicated.					
34	6	31,500 kc.	31,500	200 ohms	Max output	C45, C68	1st & 2d r-f amplr
35	6	22,500 kc.	22,500	200 ohms	Untouched	L12, L21, L31	Ant & 1st & 2d r-f amplr
36		Repeat 34 and 35 until circuits remain in alignment over the band.					

*On coils No. 4, 5, and 6, turning the core clockwise decreases the inductance.

NOTE: The oscillator tracks above the signal frequency on all bands. If more than one peak is obtainable on the oscillator, use the higher frequency peak.

NOTE: On all coils, except band oscillator coils No. 4, 5, and 6 (L54, L55, and L56), turning the core clockwise increases the inductance.

c. Wave Trap Adjustment. The wave trap is connected in parallel across the antenna input terminals to increase the rejection of the i-f signal frequencies. With the RANGE control on band 1, feed a modulated signal at the i-f frequency (455 kc) into the antenna input terminals. Adjust the wave trap trimmer on coil L57 for minimum output on the output meter. The antenna circuit of band 1 is affected by this adjustment, so it may be necessary to readjust coil L2 slightly after the wave trap has been aligned.

APPENDIX

SECTION XV. REFERENCES

NOTE: For availability of items listed, check FM 21–6, and ASF Catalog SIG 2. Also see FM 21–6 for applicable technical bulletins, supply bulletins, modification work orders, and Changes.

71. ARMY REGULATIONS.

AR 380–5	Safeguarding Military Information.

72. SUPPLY PUBLICATIONS.

SIG 1	Introduction to ASF Signal Supply Catalog.
SIG 3	List of Items for Troop Issue.
SIG 4–1	Allowances of Expendable Supplies.
SIG 4–2	Allowances of Expendable Supplies for Schools, Training Centers, and Boards.
SIG 5	Stock List of All Items.
SIG 10–318	Diversity Receiving Equipment.
SB 11–10	Signal Corps Kit and Materials for Moisture and Fungi-Resistant Treatment.
SB 11–17	Electron Tube Supply Data.

73. TECHNICAL MANUALS ON TEST EQUIPMENT.

TM 11–300	Frequency Meter Sets SCR-211 ( ).
TM 11–303	Test Sets I-56-C, I-56-D, I-56-H, and I-56-J.
TM 11–307	Signal Generator I-72-( ).
TM 11–321	Test Set I-56-E.
TM 11–322	Test Set I-56-K.
TM 11–472	Repair and Calibration of Electrical Measuring Instruments.
TM 11–2613	VOLTOHMMETER I-166.
TM 11–2626	Test Unit I-176.
TM 11–2627	Tube Tester I-177.
TM 11–2673	Multimeter TS-389/U.

74. PAINTING AND PRESERVING.

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.

75. SHIPPING INSTRUCTIONS.

U. S. Army Spec No. 100–14A	Army-Navy General Specification for Packaging and Packing for Overseas Shipment.

76. DECONTAMINATION.

TM 3–220	Decontamination.

77. DEMOLITION.

FM 5–25	Explosives and Demolitions.

78. CAMOUFLAGE.

FM 5–20	Camouflage, Basic Principles.

79. OTHER PUBLICATIONS.

FM 21–8	Military Training Aids.
FM 21–40	Defense Against Chemical Attacks.
FM 24–11	Combined Operating Signals.
FM 24–18	Radio Communication.
TB SIG 5	Defense Against Radio Jamming.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Ground Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.

TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.
TN 1–455	Electrical Fundamentals.
TM 11–227	Signal Communication Equipment Directory, Radio Communication Equipment.
TM 11–310	Schematic Diagrams for Maintenance of Ground Radio Communication Sets.
TM 11–314	Antennas and Antenna Systems.
TM 11–453	Shop Work.
TM 11–454	The Radio Operator.
TM 11–455	Radio Fundamentals.
TM 11–462	Reference Data.
TM 11–483	Suppression of Radio Noises.
TM 11–499	Radio Propagation.
TM 11–2653	Vacuum Tube Voltmeter (Precision model EV-10-MCP).
TM 11–2654	Vacuum Tube Voltmeter (Hickok model 110-B).
TM 11–2624B	Voltmeter TS-294/U (RCA Voltohmyst type No. 165-A).
TM 37–250	Basic Maintenance Manual.

80. FORMS.

W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report).

81. ABBREVIATIONS.

a-c	alternating-current
ADJ.	adjust
a-f	audio-frequency
a-m	amplitude-modulated
ANT.	antenna
a-v-c	automatic-volume-control
A.V.C.	automatic-volume-control
bfo	beat frequency oscillator
B.F.O.	beat-frequency oscillator
c-w	continuous-wave
C.W.	continuous wave
FCC	Federal Communications Commission
fig.	figure
h-f	high-frequency
i-f	intermediate-frequency
in.	inch
JAN	Joint Army-Navy. (Also prefix designation for electrical components procured under joint Army-Navy specifications.)
kc	kilocycle
lb	pound
M	1,000 ohms
ma	milliamperes
MAN.	manual
max	maximum
mc	megacycles
m-c-w	modulated-continuous-wave
mmf	micromicrofarad
MOD.	modulation
N.L.	noise limiter
No.	number
par.	paragraph
REC.	receive
r-f	radio-frequency
spec	specifications
TRANS.	transmit
VTVM	vacuum tube voltmeter
Ω	ohm

82. CAPACITOR AND RESISTOR COLOR CODES.

a. The identification of resistor values by the use of the RMA and AWS color codes is an aid to the maintenance of this equipment. The four-band system is the most commonly used for composition resistors.

EXAMPLE: A 68,000-ohm resistor with an accuracy of ±5 percent has the following colored bands: The band on the end, indicating the first significant figure (6) is blue. The second band, indicating the second significant figure (8) is gray. The third band, indicating the number of zeros to follow (3) is orange. The fourth band, indicating the accuracy of the resistor (5 percent) is gold. It must be noted that this resistor can be of any value between 71,400 ohms and 64,600 ohms and still be considered satisfactory; therefore, resistance measurements should be accepted when at slight variance with the color coding.

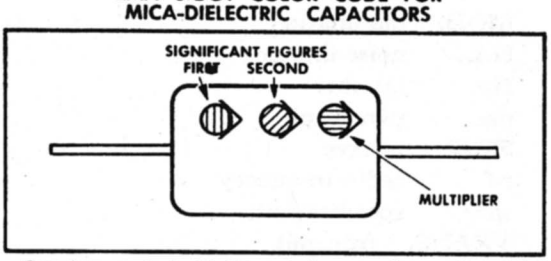
The commonly used 10-percent and 20-percent resistors would have greater deviations from the marked values.

b. The capacitor color codes are very similar to the resistor codes. With the capacitor color codes, be sure that the capacitor is held correctly so that the dots or bands are read in the proper sequence.

c. The capacitor and color-code systems are illustrated in the four following illustrations.

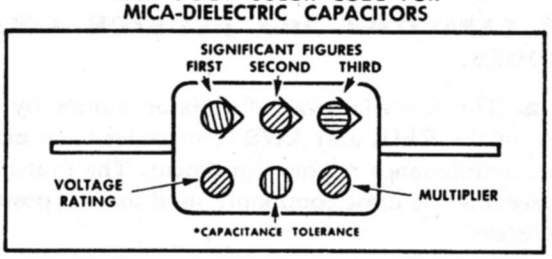
CAPACITOR COLOR CODES

RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

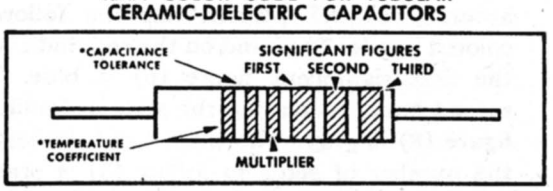


Capacitors marked with this code have a voltage rating of 500 volts

RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



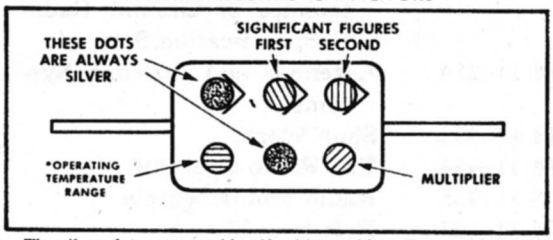
Capacitors marked with this code have a voltage rating of 500 volts.

RMA Radio Manufacturers Association JAN Joint Army-Navy.

Note These color codes give all capacitances in micromicrofarads.

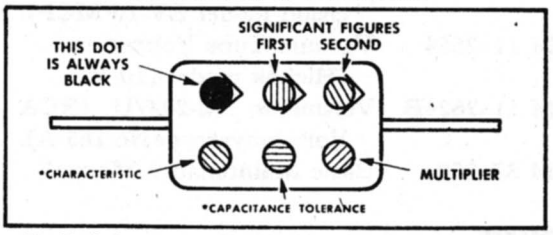
*Items marked with an asterisk are of interest primarily to depot and higher echelon repair personnel

JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



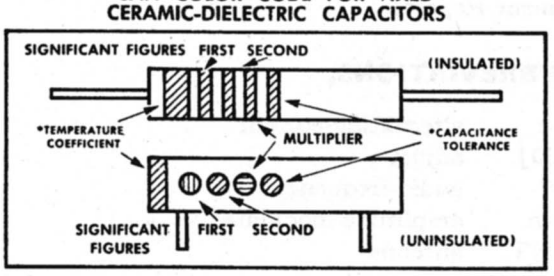
The silver dots serve to identify this marking. For working voltages see JAN type designation code.

JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



The black dot serves to identify this code. For working voltages see JAN type designation code.

JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS



Capacitors marked with this code have a voltage rating of 500 volts. Either the band or dot code may be used.

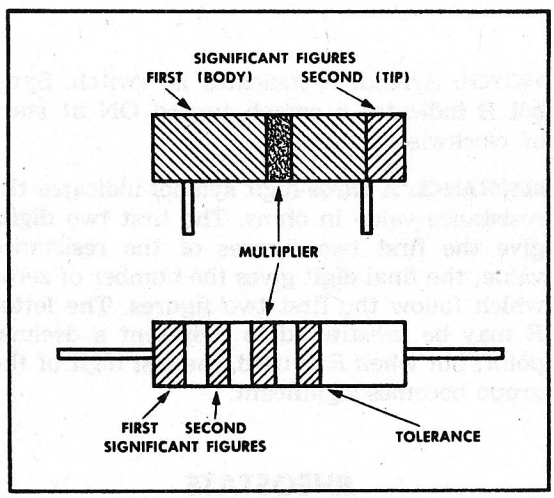
COLOR	SIGNIFICANT FIGURE	MULTIPLIER			RMA VOLTAGE RATING
		RMA MICA-AND CERAMIC-DIELECTRIC	JAN MICA-AND PAPER-DIELECTRIC	JAN CERAMIC-DIELECTRIC	
BLACK	0	1	1	1	
BROWN	1	10	10	10	100
RED	2	100	100	100	200
ORANGE	3	1,000	1,000	1,000	300
YELLOW	4	10,000			400
GREEN	5	100,000			500
BLUE	6	1,000,000			600
VIOLET	7	10,000,000			700
GRAY	8	100,000,000		0.01	800
WHITE	9	1,000,000,000		0.1	900
GOLD		0.1	0.1		1,000
SILVER		0.01	0.01		2,000
NO COLOR					500

TL 13417 A

858–Ft. Mon.–6-6-45–500

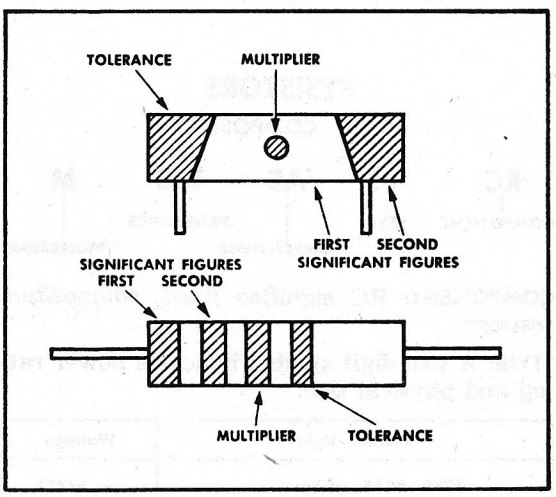
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS



Insulated fixed composition resistors with axial leads are designated by a natural tan background color. Non-insulated fixed composition resistors with axial leads are designated by a black background color.

JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS



Resistors with axial leads are insulated. Resistors with radial leads are uninsulated.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	
RED	2	100	
ORANGE	3	1,000	
YELLOW	4	10,000	
GREEN	5	100,000	
BLUE	6	1,000,000	
VIOLET	7	10,000,000*	
GRAY	8	100,000,000*	
WHITE	9	1,000,000,000*	
GOLD		0.1*	5
SILVER		0.01*	10
NO COLOR			20

*JAN ONLY

Example: A 50,000-ohm resistor with a standard tolerance of 20 percent (no color) would be indicated by a green ring (5), a black ring (0), and an orange ring (000)

RMA: Radio Manufacturers Association
JAN: Joint Army-Navy

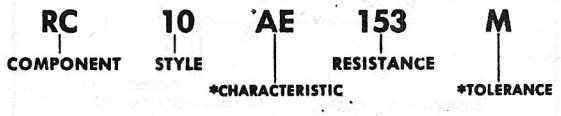
TL 13418 A

JOINT ARMY-NAVY TYPE DESIGNATION CODES FOR ELECTRICAL COMPONENTS

INTRODUCTION: Fixed and variable resistors and fixed capacitors manufactured under JAN specifications may be labeled with a *type designation code* instead of a color code or actual electrical value. For resistors and capacitors marked with the JAN type designation code, electrical values and other data can be determined by consulting the following information.

RESISTORS

FIXED, COMPOSITION



COMPONENT: RC signifies *fixed, composition resistor.*

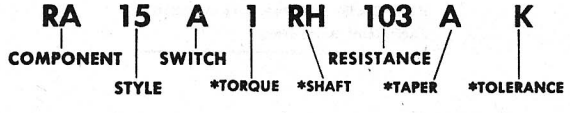
STYLE: A two-digit symbol indicates power rating and physical size.

Resistor style	Wattage
RC10, RC15, RC16	¼ WATT
RC20, RC21, RC25	½ WATT
RC30, RC31, RC35, RC38	1 WATT
RC40, RC41, RC45	2 WATTS
RC65	4 WATTS
RC75, RC76	5 WATTS

RESISTANCE: A three-digit symbol indicates the resistance value in ohms. The first two digits give the first two figures of the resistance value; the third digit gives the number of zeros which follow the first two figures.

RESISTORS

VARIABLE, WIRE-WOUND



COMPONENT: RA signifies *variable, wire-wound resistor.*

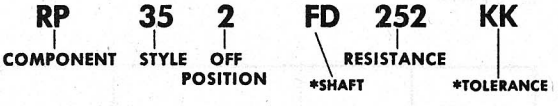
STYLE: A two-digit symbol indicates power rating and physical size and shape.

SWITCH: Symbol A indicates no switch. Symbol B indicates a switch turned ON at start of clockwise rotation.

RESISTANCE: A three-digit symbol indicates the resistance value in ohms. The first two digits give the first two figures of the resistance value; the final digit gives the number of zeros which follow the first two figures. The letter *R* may be substituted to represent a decimal point; but when *R* is used, the last digit of the group becomes significant.

RHEOSTATS

WIRE-WOUND, POWER-TYPE



COMPONENT: RP signifies all *rheostats.*

STYLE: Same as for variable, wire-wound resistors.

OFF POSITION:

Numeral	OFF position
1	None.
2	At end of counterclockwise rotation.
3	At end of clockwise rotation.

RESISTANCE: Same as for variable, wire-wound resistors.

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*Items starred are of interest primarily to depot and higher echelon repair personnel.

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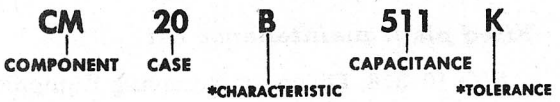
CAPACITORS

FIXED, MICA-DIELECTRIC



COMPONENT: CM signifies *fixed, mica-dielectric capacitor.*

CASE: A two-digit symbol identifies a physical case size and shape.

CAPACITANCE: A three-digit symbol indicates the capacitance value in micromicrofarads. The first two digits give the first two figures of the capacitance value; the final digit gives the number of zeros which follow the first two figures. When more than two significant figures are required, additional digits may be used, the last digit always indicating the number of zeros.

D-C WORKING VOLTAGE FOR CAPACITANCE RANGE

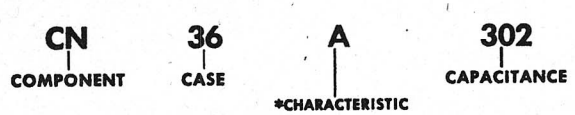
Case	Capacitance range	Vdcw
CM20	5-510 mmf	500
CM25	5-1,000 mmf	500
CM30	470-3,300 mmf	500
CM35	470-6,200 mmf	500
	6,800-10,000 mmf	500
CM40	3,300-8,200 mmf	500
	9,100-10,000 mmf	300

NOTE: Working voltages for capacitors above CM40 are stamped on the case.

The d-c working voltage of a capacitor can be determined from the above table when the case size and value of capacitance are known.

CAPACITORS

FIXED, MOLDED, PAPER-DIELECTRIC†



COMPONENT: CN signifies *fixed, molded, paper-dielectric capacitor.*

CASE: Same as for fixed, mica-dielectric capacitors.

CAPACITANCE: A three-digit symbol indicates the capacitance value in micromicrofarads. The first two digits give the first two figures of the capacitance value; the third digit gives the number of zeros which follow the first two figures.

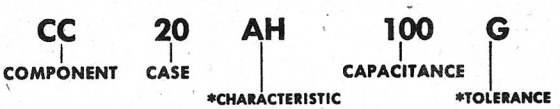
D-C WORKING VOLTAGE FOR CAPACITANCE RANGE

Case	Capacitance	Vdcw
CN35	3,000 mmf	800
	6,000 mmf	600
	10,000 mmf	400
CN36	3,000 mmf	400
	6,000 mmf	400
	10,000 mmf	300
CN40	3,000 mmf	400
	6,000 mmf	300
	10,000 mmf	300
CN41	3,000 mmf	600
	6,000 mmf	600
	10,000 mmf	400

The d-c working voltage of a capacitor can be determined from the above table when the case size and value of capacitance are known.

CAPACITORS

FIXED, CERAMIC-DIELECTRIC



COMPONENT: CC signifies *fixed, ceramic-dielectric capacitor.*

CASE: Same as for fixed, mica-dielectric capacitors.

CAPACITANCE: Same as for fixed, molded, paper-dielectric capacitors.

NOTE: All fixed, ceramic-dielectric capacitors have a working voltage of 500 volts, d-c.

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*Items starred are of interest primarily to depot and higher echelon repair personnel.

†This is not a JAN specification. These capacitors are covered by AWS C75/221.

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SECTION XVI. MAINTENANCE

83. ASF SIGNAL SUPPLY PAMPHLET REFERENCE.

The following information was compiled on 31 July 1945. Maintenance parts are not authorized for radio receiver (RCA Model AR-88-D). The appropriate pamphlet of the ASF Signal Supply Catalog for radio receiver (RCA Model AR-88-F) is:

Fixed plant maintenance list

SIG 10–318, Diversity Receiving Equipment

For an index of available catalog pamphlets, see the latest issue of ASF Signal Supply Catalog SIG 2.

84. MAINTENANCE PARTS FOR RADIO RECEIVER (RCA MODEL AR-88F).

NOTE: Refer to paragraph 83.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Mfr's part and code No.*
		RADIO RECEIVER (RCA MODEL AR-88F)	
	2Z1210.7	BRACKET: friction plate	31M13(M41)
	3E4064–40	CABLE ASSEMBLY, power: 2 cond, 10 ft lg, w/plug	SJ(G8)
C1, 11, 33, 47, 51, 52, 54, 63, 83, 117, 118, 121, 122	3K3547221	CAPACITOR, mica; 0.0047 mf, 500 vdcw	CM35B472K
C2	3D9025V–58	CAPACITOR, variable: 3–25 mmf	8E8(A34)
C3, 6, 35, 40, 49, 50, 70, 77	3D9402V–1	CAPACITOR, variable: 8 sect, 11 to 402 mmf	800040 (R1)
C4, 5, 14, 34, 57	810N (C4)	CAPACITOR, ceramic: 0.00022 mf, 500 vdcw	810N (C4)
C7	3D9018	CAPACITOR, ceramic: 0.000018 mf, 500 vdcw	813N (C4)
C8	3D9033–7	CAPACITOR, ceramic: 0.000033 mf, 500 vdcw	813N (C4)
C9, 10	3D9022–10	CAPACITOR, ceramic: 0.000022 mf, 500 vdcw	813N (C4)
C12	3D9056–7	CAPACITOR, ceramic: 0.000056 mf, 500 vdcw	813N (C4)
C13, 26, 29, 42, 65, 67, 69, 14	3D9082–6	CAPACITOR, ceramic: 0.000082 mf, 500 vdcw	810N (C4)
C15, 18, 21	3D9013–1	CAPACITOR, ceramic: 0.000013 mf, 500 vdcw	813N (C4)
C16, 19, 22, 37, 59	3D9012V–12	CAPACITOR, variable: trimmer, 2–12 mmf	32–6003 (G22)
C17	3D9525–1	CAPACITOR, silver mica: 0.000525 mf, 500 vdcw	MWS (S5)
C20	3DA1.550	CAPACITOR, silver mica: 0.00155 mf ±2.5%, 500 vdcw	MWS (S5)
C23, 28	3K3030232	CAPACITOR, mica: 0.003 mf, 500 vdcw	CM30C302J
C24	3DA2.700–4	CAPACITOR, silver mica: 0.0027 mf, 500 vdcw	MWS (S5)
C25, 27, 32, 41, 43, 45, 64, 66, 68	3D9020V–35	CAPACITOR, variable: 2–20 mmf	32–6001 (G22)

84. MAINTENANCE PARTS FOR RADIO RECEIVER (RCA MODEL AR-88F) (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Mfr's part and code No.*
C30	3DA3.900–7	CAPACITOR, silver mica: 0.0039 mf, 500 vdcw	MWS (S5)
C31	3D9075–17	CAPACITOR, ceramic: 0.000075 mf, 500 vdcw	810N (C4)
C36, 58	3D9180–4	CAPACITOR, ceramic: 0.00018 mf, 500 vdcw	810N (C4)
C38, 39, 60, 62, 80, 81	3D9020V–34	CAPACITOR, variable: 2–20 mmf	32–6002 (G22)
C44, 46	3D9091–3	CAPACITOR, ceramic: 0.000091 mf, 500 vdcw	810Z (C4)
C48, 103, 106, 107, 109, 110	3DA50–134	CAPACITOR, paper: 3 sect, 0.05–0.05–0.05 mf, 400 vdcw	430 (A1)
C53	3D9006E8–1	CAPACITOR, ceramic: 0.0000068 mf, 500 vdcw	813N (C4)
C55, 72	NSNR	CAPACITOR: p/o transf T3.	
C56, 76, 93	3DA10–245.1	CAPACITOR, paper: 3 sect, 0.01–0.01–0.01 mf, 400 vdcw	430 (A1)
C61, 120	3D9015–32.1	CAPACITOR, ceramic: 0.000015 mf, 500 vdcw	813N (C4)
C71, 79, 84, 92, 95, 102	3DA100–289	CAPACITOR, paper: 3 sect, 0.1–0.1–0.1 mf, 400 vdcw	430 (A1)
C73	NSNR	CAPACITOR: p/o transf T4.	
C74	3DA6–45	CAPACITOR, paper: 0.006 mf, 600 vdcw	340–24 (M2)
C75	3D9014V–6	CAPACITOR, variable: 3–14 mmf	8E12 (A34)
C78, 89	NSNR	CAPACITOR: p/o transf T5.	
C82, 85, 87, 88	NSNR	CAPACITOR: p/o transf T10.	
C86	3D9025V–57	CAPACITOR, variable: 3–25 mmf	8E10 (A34)
C90, 91	NSNR	CAPACITOR: p/o transf T6.	
C94, 100	NSNR	CAPACITOR: p/o transf T7.	
C96, 97, 98	3DB4–138	CAPACITOR, paper: 3 sect, 4–4–4 mf, 500 vdcw	A–7825 (F24)
C99, 112, 113	3DA250–125	CAPACITOR, paper: 3 sect, 0.25–0.25–0.25 mf, 400 vdcw	430 (A1)
C101, 104	NSNR	CAPACITOR: p/o transf T8.	
C105	3K3056131	CAPACITOR, silver mica: 0.00056 mf, 500 vdcw	MWS (S5)

84. MAINTENANCE PARTS FOR RADIO RECEIVER (RCA MODEL AR-88F) (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Mfr's part and code No.*
C108, 114, 115	NSNR	CAPACITOR: p/o transf T9.	
C111, 116	3K3027231	CAPACITOR, silver mica: 0.0027 mf, 500 vdcw	MWS (S5)
C119	3DA3–69	CAPACITOR, paper: 0.003 mf, 1,000 vdcw	1089 (A1)
C123	3D9010–34	CAPACITOR, ceramic: 0.00001 mf, 500 vdcw	D (G15)
C130	3DA500–266	CAPACITOR, paper: 0.5 mf, 120 vdcw	3444 (F24)
L1, 2	2C4519–1/C8	COIL, ant: band #1, 530–1580 kc	3E42 (M41)
L3, 4	3C302L–5	COIL, ant: band #2, 1.6–4.5 mc	3E43 (M41)
L5, 6	3C302L–7	COIL, ant: band #3, 4.5–12 mc	3E44 (M41)
L7, 8	3C302L–4	COIL, ant: band #4, 12–16.3 mc	3E45 (M41)
L9, 10	3C302L–3	COIL, ant: band #5, 16.3–22.5 mc	3E46 (M41)
L11, 12	3C302L–6	COIL, ant: band #6, 22.5–32 mc	3E41 (M41)
L13, 14, 23, 24	2C4519–1/C4	COIL, RF: band #1, 530–1580 kc	3E32 (M41)
L15, 16, 25, 26	2C4519–1/C5	COIL, RF: band #2, 1.4–4.5 mc	3E33 (M41)
L17, 18, 27, 28	2C4519–1/C6	COIL, RF: band #3, 4.4–12.1 mc	3E34 (M41)
L19, 29	2C4519–1/C2	COIL, RF: band #4, 12–16.3 mc	3E29 (M41)
L20, 30	2C4519–1/C3	COIL, RF: band #5, 16.3–22.5 mc	ME30 (M41)
L21, 31	2C4519–1/C1	COIL, RF: band #6, 22.5–32 mc	3E31 (M41)
L22	NSNR	COIL: p/o bfo transf T10.	
L32, 33	NSNR	COIL: p/o i-f transf T3.	
L34	NSNR	COIL: p/o i-f transf T4.	
L35, 36, 39	NSNR	COIL: p/o i-f transf T5.	
L37, 38, 40	NSNR	COIL: p/o i-f transf T6.	
L41, 42, 45	NSNR	COIL: p/o i-f transf T7.	
L43, 44, 46	NSNR	COIL: p/o i-f transf T8.	
L47, 48	NSNR	COIL: p/o i-f transf T9.	

84. MAINTENANCE PARTS FOR RADIO RECEIVER (RCA MODEL AR-88F) (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Mfr's part and code No.*
L49, 50	3C317–35	COIL, choke: filter, 15 h @ 0.09 amp, 400 ohm dc	8430 (C8)
L51	2C4519–1/C7	COIL, osc: band #1, 530–1580 kc	3E38 (M41)
L52	3C1081–22D	COIL, osc: band #2, 1.4–4.5 mc	3E39 (M41)
L53	3C1081–22B	COIL, osc: band #3, 4.4–12.1 mc	3E40 (M41)
L54	3C1081–22E	COIL, osc: band #4, 12–16.3 mc	3E35 (M41)
L55	3C1081–22C	COIL, osc: band #5, 16.3–22.5 mc	3E36 (M41)
L56	3C1081–22A	COIL, osc: band #6, 22.5–32 mc	3E37 (M41)
L57	2C4519–1/C9	COIL, RF: wave trap, peaked @ 455 kc, 3 pie	30–5127 (G22)
	2Z3295–8	COUPLING, flexible: insulated disc, bakelite	6422–008–3 (01)
	2Z3295–7	COUPLING, solid: insulated rod, ¼″ shaft	K–99630–1 (T31)
A1	2X115–455	CRYSTAL UNIT: 455 kc, bakelite case	29E4 (M1)
	2Z3723–12	DIAL ASSEMBLY: vernier, plastic, calibrated 0–100 w/brass hub, 2 setscrews, 2 steel washers.	17M20 (M41)
	2Z3723–13	DIAL ASSEMBLY: tuning, plastic w/brass hub, 2 setscrews, 2 steel washers calibrated in 6 band.	17M19 (M41)
	2Z4870–64	GEAR ASSEMBLY, tuning unit: 103:1 reduction ratio	18M29 (M41)
	2Z4880–57	GLASS, window: dial, 11 21/32″ lg x 3″ wd x 0.060″ thk	G–4360 (C30)
J2	2Z5581–21	JACK, phone: 2 ckt	18E6 (M41)
	2Z5859–171	KNOB, round: bakelite, for ¼″ shaft, 1½″ diam	28M7 (M41)
	2Z5837–19	KNOB, round: bakelite, for ¼″ shaft, 1 1/16″ diam	28M8 (M41)
	2Z5837–20	KNOB, round: bakelite, for ¼″ shaft, 2⅛″ diam	28M6 (M41)
	2Z5840–6	KNOB, round: ¼″ diam shaft, marked w/arrow, i-f gain control	K-866688–3 (R23)
	2Z5927	LAMP, pilot: 6.8 v, 0.25 amp, bayonet base	44 (G8)
	2Z5883–59	LAMP SOCKET, pilot: miniature bayonet	1540 (A14)
	2Z5883–141	LAMP SOCKET, pilot: miniature bayonet	31M14 (M41)
J3	2Z7111.28	PLUG, monitor: prong, single cont	PCIM (A13)
	2Z3028	PLUG, male: 8 prong w/jumper wire	31M15 (M41)
R1, 6, 19, 49	3RC20BE333K	RESISTOR, carbon: 33,000 ohm, ½ w	RC20BE 333K
R2, 33, 36, 47, 72	3RC20BE225K	RESISTOR, carbon: 2.2 meg, ½ w	RC20BE 225K

84. MAINTENANCE PARTS FOR RADIO RECEIVER (RCA MODEL AR-88F) (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Mfr's part and code No.*
R3, 10, 12, 16, 22, 26, 31, 34	3RC20BE102K	RESISTOR, carbon: 1,000 ohm, ½ w	RC20BE102K
R4	3RC20BE563K	RESISTOR, carbon: 56,000 ohm, ½ w	RC20BE563K
R5, 37, 70, 73	3RC20BE105K	RESISTOR, carbon: 1 meg, ½ w (stocked for a total of 16 in equipment).	RC20BE105K
R7, 17, 61, 62	3RC30BE100K	RESISTOR, carbon: 10 ohm, ½ w	RC20BE100K
R8, 18, 55	3RC20BE562K	RESISTOR, carbon: 5,600 ohm, ½ w	RC20BE562K
R9, 14, 41	3RC20BE104K	RESISTOR, carbon: 100,000 ohm, ½ w	RC20BE104K
R11	3RC20BE103K	RESISTOR, carbon: 10,000 ohm, ½ w	RC20BE103K
R13	3RC20BE561K	RESISTOR, carbon: 560 ohm, ½ w	RC20BE561K
R15	NSNR	RESISTOR: p/o transf assem T3.	
R20, 39	3RC20BE101K	RESISTOR, carbon: 100 ohm, ½ w	RC20BE101K
R21	2Z7269	RESISTOR, pot: 5,000 ohm, ½ w A taper	A100017C (B3)
R23, 27, 50, 57, 58, 74	3RC20BE564K	RESISTOR, carbon: 560,000 ohm, ½ w	RC20BE564K
R24, 28, 29	NSNR	RESISTOR: p/o transf T10.	
R25, 45, 59	3RC20BE150K	RESISTOR, carbon: 15 ohm, ½ w	RC20BE150K
R30	3RC20BE272K	RESISTOR, carbon: 2,700 ohm, ½ w	RC20BE272K
R32	3RC20BE391K	RESISTOR, carbon: 390 ohm, ½ w	RC20BE391K
R35	3RC20BE684K	RESISTOR, carbon: 680,000 ohm, ½ w	RC20BE684K
R38	3RC20BE155K	RESISTOR, carbon: 1.5 meg, ½ w	RC20BE155K
R40	3RC20BE274K	RESISTOR, carbon: 270,000 ohm, ½ w	RC20BE272K
R42	3RC20BE394K	RESISTOR, carbon: 390,000 ohm, ½ w	RC20BE394K
R43	3Z6010–141	RESISTOR, WW: 100 ohm, 5 w	WC5 (C14)
R44	3Z6016–11	RESISTOR, WW: 160 ohm, 5 w	WC5 (C14)
R46, 48	2Z7271–110	RESISTOR, pot: carbon, 66,000 ohm, ½ w, linear taper	13E8 (M41)

84. MAINTENANCE PARTS FOR RADIO RECEIVER (RCA MODEL AR-88F) (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Mfr's part and code No.*
R51	2Z7274–33	RESISTOR, pot: carbon, 2 meg, ½ w, taper A, no sw	13E9 (M41)
R52	2Z7274–32	RESISTOR, pot: carbon, 1 meg, ½ w, taper A, no sw	14E2 (M41)
R53	3RC20BE334K	RESISTOR, carbon: 330,000 ohm, ½ w	RC20BE334K
R54	3RC20BE272K	RESISTOR, carbon: 2,700 ohm, ½ w	RC20BE272K
R56	3Z5995–40	RESISTOR, WW: 5 ohm, 5 w	WC5 (C14)
R71	3RC20BE106K	RESISTOR, carbon: 10 meg, ½ w	RC20BE106K
	6L5306–10S	SCREW, dial lock: 6–32 x ⅝", oval point	11M83 (M41)
X1 THRU 14, J1	2Z8678.139	SOCKET, tube: steatite, octal	CPH–49375 (A13)
S1 THRU 16	3Z9825–102.5	SWITCH, rotary: 16 pole, 6 position, 2 pole per sect, 8 sect	DH (01)
S17, 18, 19, 20	3Z9825–102.4	SWITCH, rotary: 4 pole, 5 position, 2 sect	DH (01)
S21, 22	3Z9825–102.3	SWITCH, rotary: 3 pole, 4 position, single sect	DH (01)
S23, 24	3Z9825–102.6	SWITCH, rotary: 3 pole, 4 position, single sect w/snap sw on rear SPST.	DH (01)
S25	3Z9825–102.2	SWITCH, rotary: SP 5 position, single sect	36–1 (A13)
TB1	2Z9403.85	TERMINAL STRIP: 3 screw term, bakelite	24E15 (M41)
TB2	2Z9405.58	TERMINAL STRIP: 5 screw term, bakelite	24E14 (M41)
TB4	2Z9402.134	TERMINAL STRIP: 2 screw term, bakelite	24E16 (M41)
	2Z9415.13	TERMINAL STRIP: 15 term, bakelite	24E17 (M41)
	2Z9402.37	TERMINAL STRIP: 2 term, bakelite	1520 (C6)
	2Z9401	TERMINAL STRIP: 1 term, bakelite	1513 (C6)
	2Z9401.50	TERMINAL STRIP: 1 term, bakelite	1512R (C6)
	2Z9401.6	TERMINAL STRIP: 1 term, bakelite	1512 (C6)
	6R38476	TOOL, alignment: 8" lg x ⅜" diam, insulated handle	M–81059 (M43)
	6R38475	TOOL, trimmer: insulated handle	M–861–501 (R23)
T1	2Z9614–89	TRANSFORMER, power: pri 110/240 v 50/60 cps, secd #1 690 v @ 100 ma CT, #2 6.45 v @ 4.5 amp, #3 5 v @ 2 amp	8420 (C8)
T2	2Z9632.212	TRANSFORMER, output: pri impedance 7500 ohm, secd impedance 600 ohm.	8450 (C8)
T3	2Z9641.134	TRANSFORMER ASSEMBLY, IF: 465 kc, includes C55, 72, L32, 33, R15.	30–5104 (G22)

84. MAINTENANCE PARTS FOR RADIO RECEIVER (RCA MODEL AR-88F) (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*	*Mfr's part and code No.*
T4	2Z9641.133	TRANSFORMER ASSEMBLY, IF: includes L34, C73	30–5108 (G22)
T5	2Z9641.132	TRANSFORMER ASSEMBLY, IF: 455 kc, includes L35, 36, C78, 89.	30–5106 (G22)
T6, 7, 8	2Z9641.132	TRANSFORMER ASSEMBLY, IF: 455 kc, includes coils and capacitors.	30–5106 (G22)
T9	2Z9641.131	TRANSFORMER ASSEMBLY, IF: 455 kc, includes L47, 48, C108, 114, 115.	30–5105 (G22)
T10	2Z9644.24	TRANSFORMER ASSEMBLY: bfo, includes L22, R24, 28, 29, C82, 85, 87, 88.	30–5107 (G22)
V1, 2, 5, 6, 7	2J6SG7	TUBE: type 6SG7	JAN6SG7
V3, 12	2J6J5	TUBE: type 6J5	JAN6J5
V4	2J6SA7	TUBE: type 6SA7	JAN6SA7
V8, 9	2J6H6	TUBE: type 6H6	JAN6H6
V10	2J6SJ7	TUBE: type 6SJ7	JAN6SJ7
V11	2J6K6GT	TUBE: type 6K6GT	JAN6K6GT
V13	2JOD3/VR–150	TUBE: type OD3/VR–150	JANOD3/VR–150
V14	2J5Y3GT	TUBE: type 5Y3GT	JAN5Y3GT
	6R57400	WRENCH, setscrew: offset, $\frac{21}{32}$″ lg x $1\frac{7}{8}$″	AB8 (G3)

85. LIST OF MANUFACTURERS.

CODE	NAME
A1	Aerovox Corporation
A5	Allen-Bradley Co.
A13	American Phenolic Corp.
A14	American Radio Hardware Co.
A34	American Steel Packages Co.
B3	Bendix Aviation Corp.
C4	Globe Union, Inc.
C6	Cinch Mfg. Corp.
C8	Chicago Transformer Co.
C14	Continental Carbon Co.
C15	Cornell-Dubilier Electric Corp.
C30	Crowe Nameplate & Mfg. Co.
E3	Erie Resistor Co.
E8	Eby, Hugh H., Inc.
F24	Fast, John E.
G3	General Electric Co.
G8	General Electric Supply Corp.
G15	Globe Union, Inc.
G22	Guthman, E.I., & Co., Inc.
H4	Harvey Hubble, Inc.
I2	International Resistance Co.
J5	Jones, Howard B.
M1	Mallory, P.R., & Co.
M2	Micamold Radio Corp.
M12	Muter Co., The
M41	Majestic Radio & Telephone Corp.
M43	Metzgier & Son
O1	Oak Mfg. Co.
O2	Ohmite Mfg. Co.
R1	Radio Condenser Corp.
R2	RCA Mfg. Co.
R23	Radiomarine Corp. of America
S5	Solar Mfg. Corp.
T31	Tungstol Corp.
U9	United-Carr Fastener Corp.
W5	Western Electric Co.

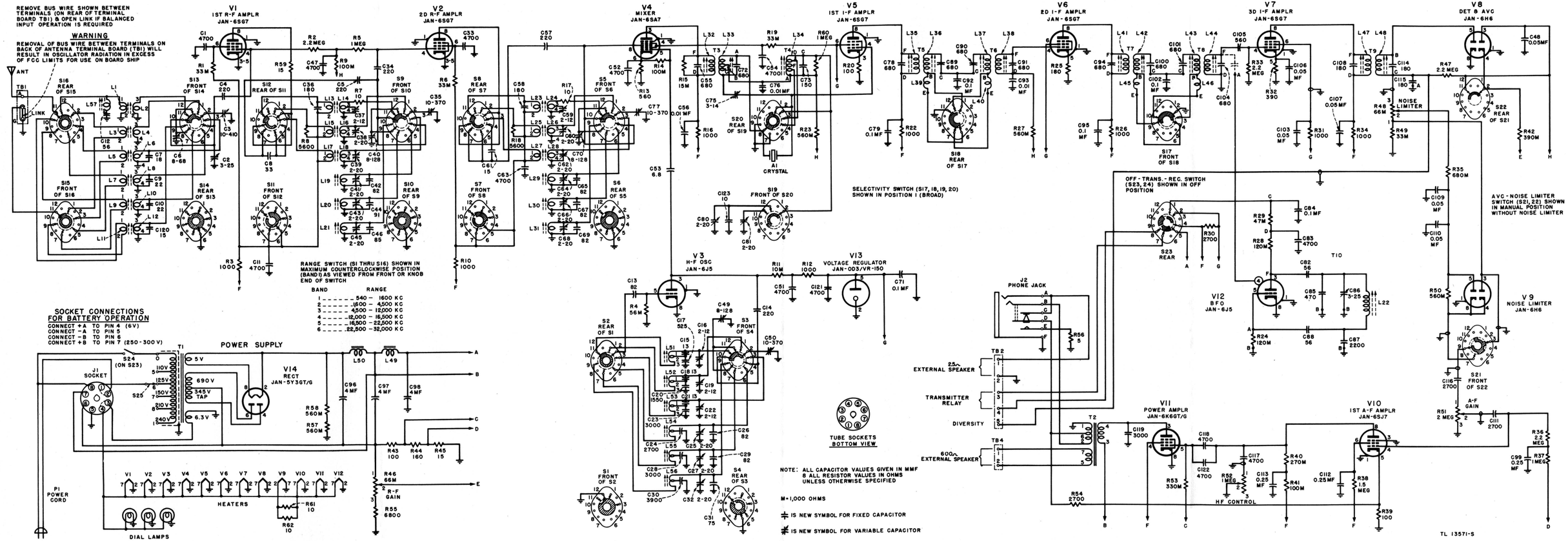

Figure 49. Radio receiver (RCA model AR-88D), schematic diagram.

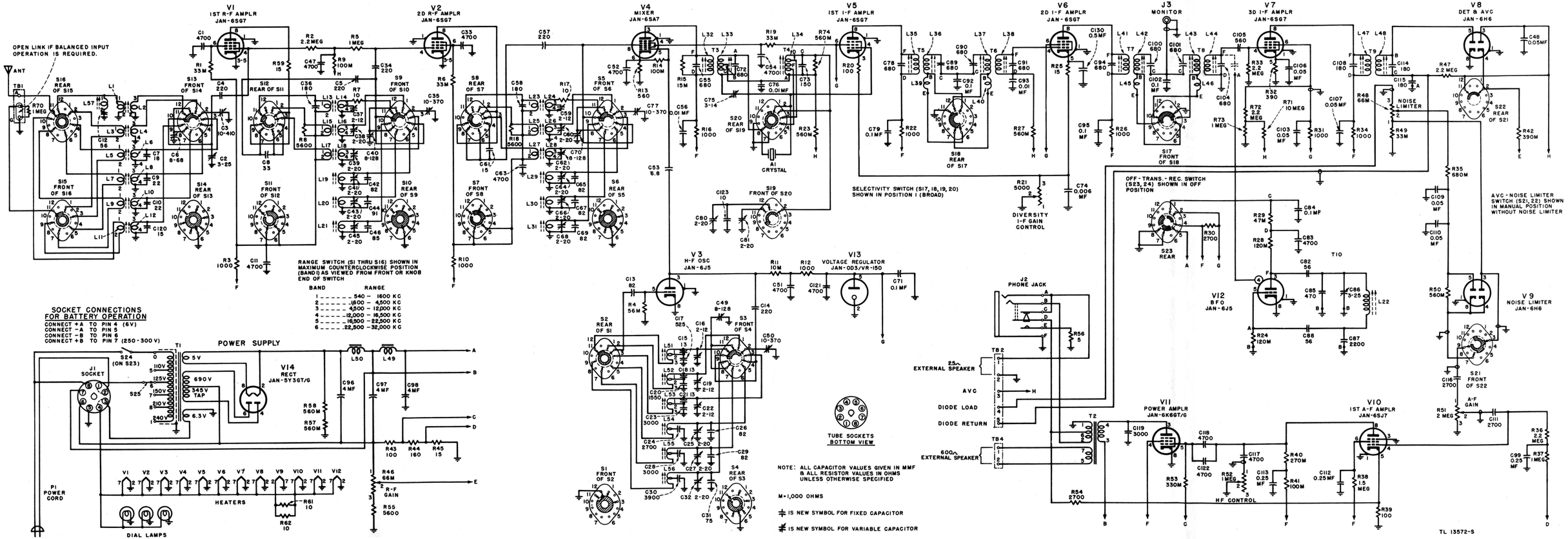

Figure 50. Radio receiver (RCA model AR-88F), schematic diagram.

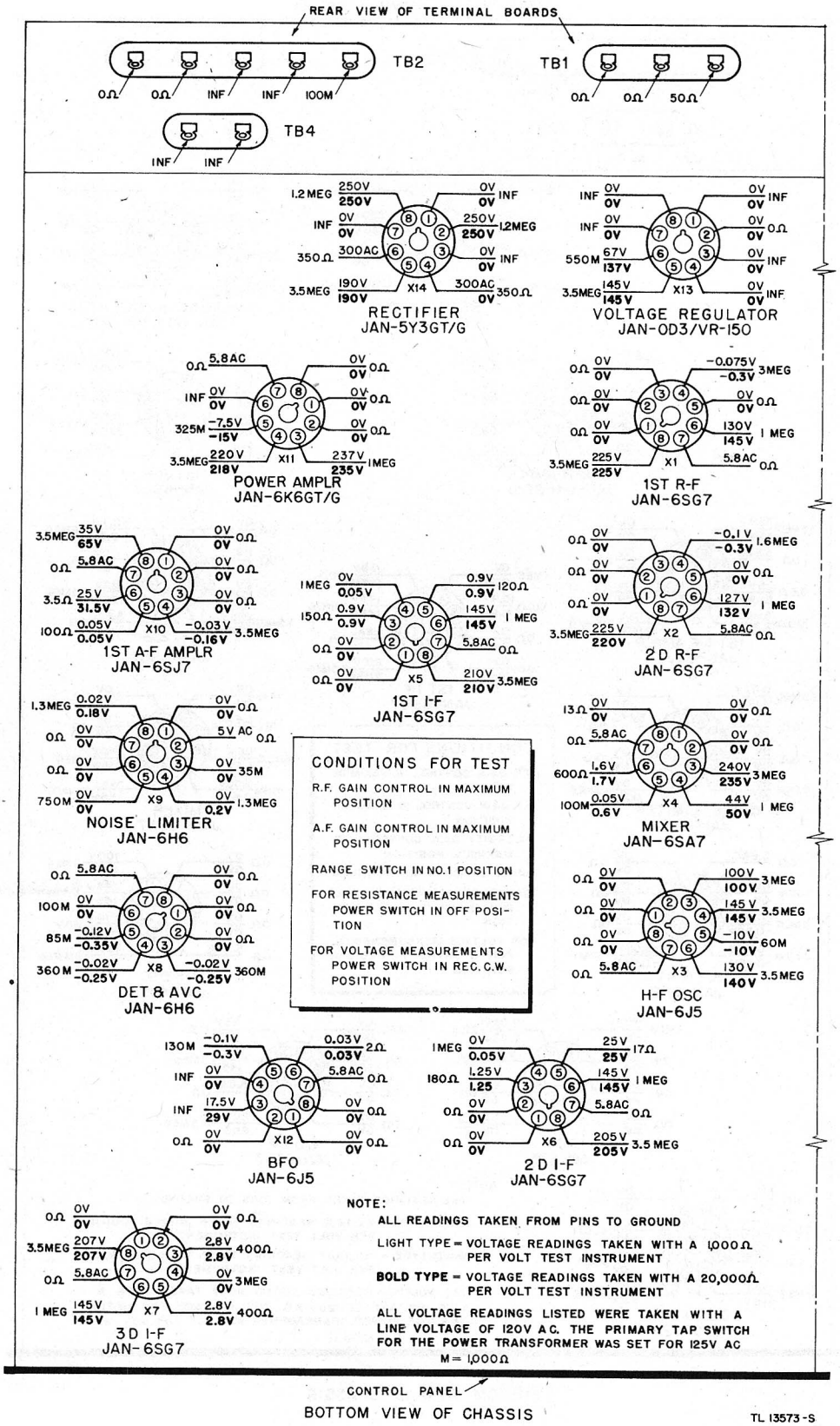

Figure 51. Radio receiver (RCA model AR-88D), voltage and resistance readings.

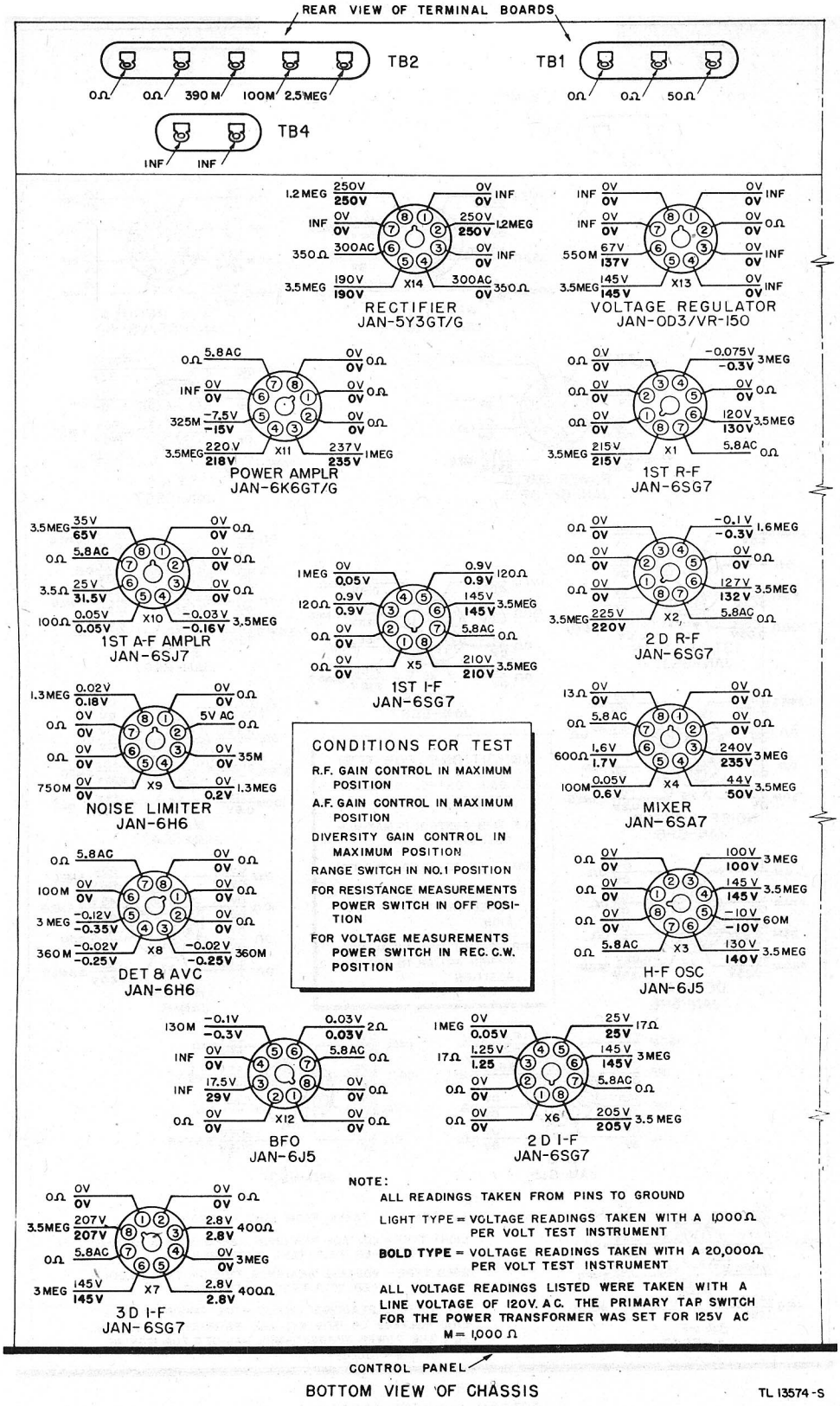

Figure 52. Radio receiver (RCA model AR-88F), voltage and resistance readings.