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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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RADIO RECEIVERS R-203/SR AND R-203A/SR

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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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RADIO RECEIVERS R-203/SR AND R-203A/SR



DEPARTMENT OF THE ARMY *SEPTEMBER 1950*

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WASHINGTON 25, D. C., *8 September 1950*

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BY ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL:

EDWARD F. WITSELL
Major General, USA
The Adjutant General

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Chief of Staff, United States Army

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WARNING

HIGH VOLTAGE

The high voltage that is used in the operation of this equipment may cause a painful shock.

Be careful not to contact the ship's ground and a voltage point in the set during servicing operations.



First Aid for Electric Shock

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:

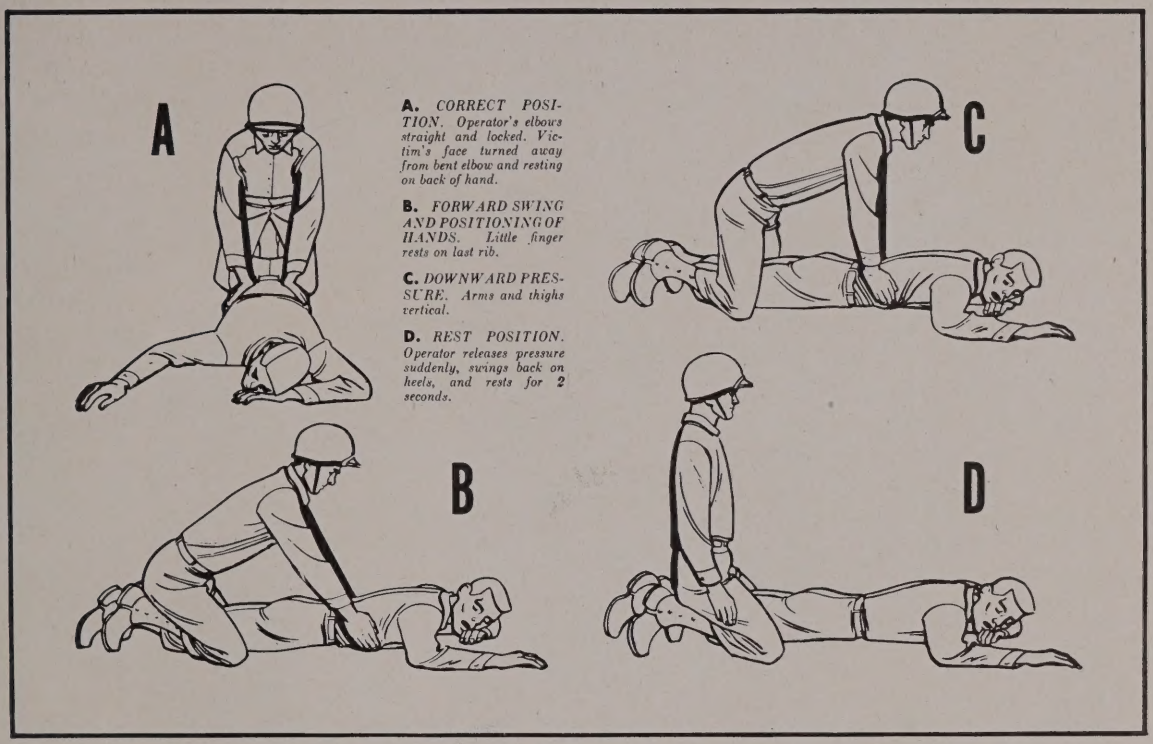
(*1*) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(*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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A. *CORRECT POSITION. Operator's elbows straight and locked. Victim's face turned away from bent elbow and resting on back of hand.*

B. *FORWARD SWING AND POSITIONING OF HANDS. Little finger rests on last rib.*

C. *DOWNWARD PRESSURE. Arms and thighs vertical.*

D. *REST POSITION. Operator releases pressure suddenly, swings back on heels, and rests for 2 seconds.*

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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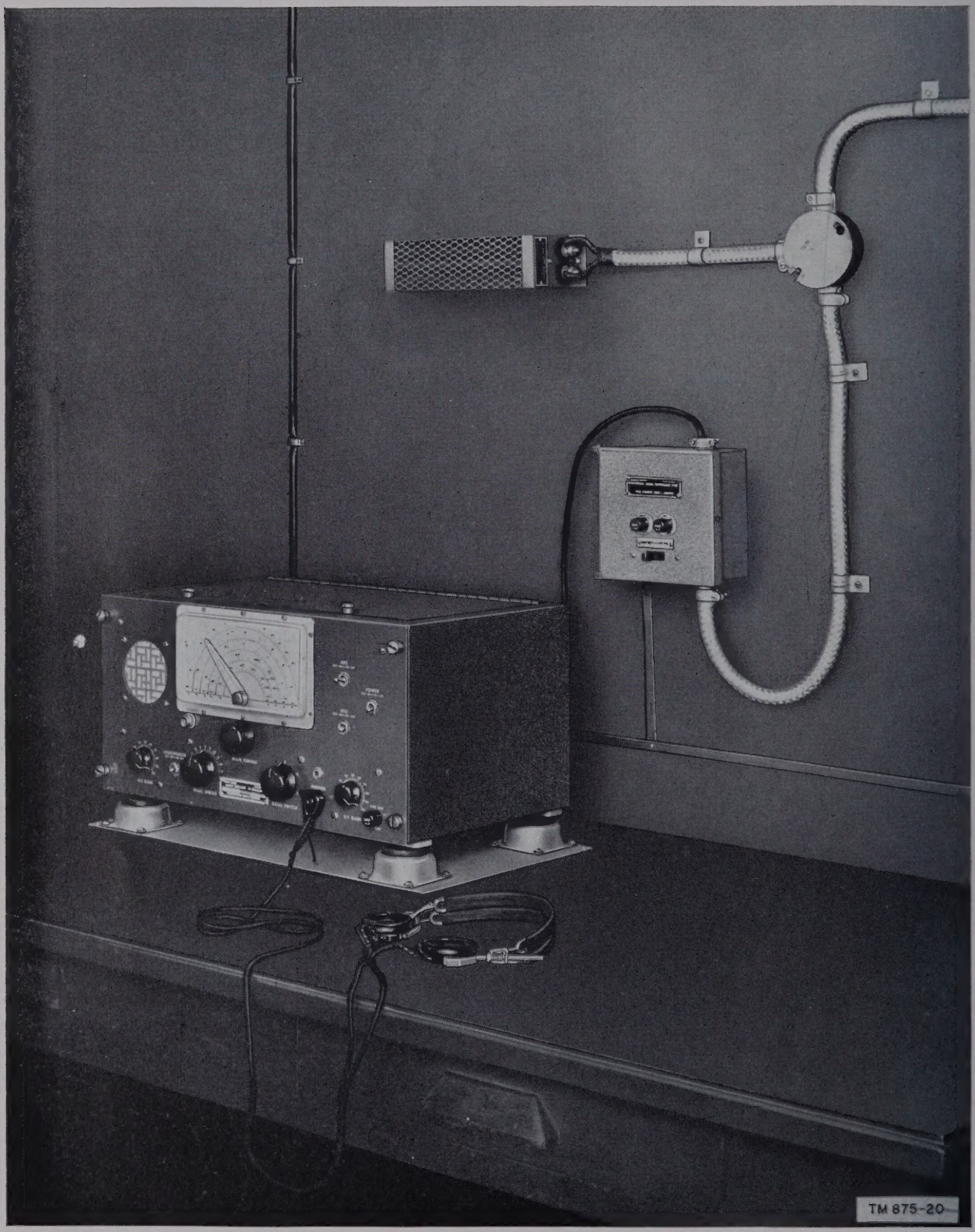


Figure 1. Radio Receiver R–203A/SR, typical installation.

TECHNICAL MANUAL RADIO RECEIVERS

R–203/SR AND R–203A/SR

CHANGE No. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *9 April 1954*

TM 11–875, 8 September 1950, is changed as follows:

8. Accessories and Running Spares

* * * * *

d. Running Spares (fig. 5).

(1) A group of * * * ampere, type 3AG.

(2) (Added) The running spares supplied with Radio Receiver R–203A/SR on Order No. 4702–Phila–52 (serial numbers 71 through 95) are as follows:

1 tube 6SQ7
2 tubes 6SG7
1 tube 6J5
1 tube 25L6GT
1 tube 25Z6
1 lamp, neon, 1 watt, type NE–32
18 fuses, 1 ampere, FU–26

10. Differences in Models

The differences between * * * of the manual.

* * * * *

b. Radio Receiver R–203/SR has * * * the receiver chassis. **The front panel mounting holes on receivers supplied on Order No. 4702–Phila–52 are spaced to permit installation in standard 19-inch racks using No. 12–24 mounting screws.**

c. Radio Receiver R–203/SR includes * * * and E–201, respectively. Resistor Unit **#RM–9** is only 325 ohms, while Fixed Resistor MX–1024/U is 350 ohms.

* * * * *

22.1 Antijamming Procedures

(Added)

When the radio receiver is being jammed by unwanted signals, the immediate superior officer must be notified promptly. However, the operator must not cease operating the equipment under any condition. One or more of the following procedures may be used for obtaining the maximum intelligibility from the desired signals during the jamming process.

a. AM. Signals Jammed by CW, Pulse, or other Noise Signals.

(1) Operate the BANDSPREAD control knob several degrees on either side of the jammed signal. Some separation of the desired signal and the jamming signal may be achieved to permit copy.

(2) Operate the AVC to the OFF position and operate the MAIN TUNING dial knob to both sides of the desired signal frequency. It may be possible to copy the desired signal.

(3) Increase and decrease the rf gain by varying the R. F. GAIN control knob, and operate the AVC to the OFF position. Repeat the instruction in (1) above.

(4) If possible, change the direction, height, and position of the antenna. If it is a vertical installation, change it to horizontal and vice versa. Place the antenna so that a tree, tank, or jeep is between the source of the jamming signal and the antenna. This may deflect the jamming signals.

(5) If the jamming signals make communication impossible, inform the immediate superior officer and use some other method to get the message through. Continue to operate the equipment and make the following requests:

(*a*) Request the use of cw signals if voice signals are being received.

(*b*) Request a change of frequency and call sign.

b. AM Signals Jammed by FM Signals, Bagpipes, or other AM Noise Signals. Repeat the instructions outlined in *a* above.

c. CW Signals Jammed by CW, Pulse, or other Noise Signals. Repeat the instructions in *a* above.

d. CW Signals Jammed by AM, FM Noise, or, Bagpipe Signals, Separately or in Combination. Repeat the instructions in *a* above.

75. Receiver Characteristics

Note.—The test outlined * * * the circuits involved.

* * * * *

e. Fidelity. This is a * * * 50 and 5,000 cycles. The output should not be down **more than 12 db** from the 1,000-cycle value **at 200 or at 2,500 cycles.** A typical fidelity * * * in figure 29.

APPENDIX I

REFERENCES

Rescinded

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Rescinded

[AG 413.44 (19 Mar 54)]

BY ORDER OF THE SECRETARY OF THE ARMY:

M. B. RIDGWAY,
General, United States Army,
Chief of Staff.

OFFICIAL:

WM. E. BERGIN,
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The Adjutant General.

DISTRIBUTION:

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NG: Same as Active Army except one copy to each unit.

USAR: None.

For explanation of distribution formula, see SR 310-90-1.

U. S. GOVERNMENT PRINTING OFFICE: 1954

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This technical manual contains instructions for the installation, operation, maintenance, and repair of Radio Receivers R–203/SR (Radiomarine Corporation Model AR–8506–B) and R–203A/SR (fig. 1). In addition to these instructions there are two appendixes containing a list of references and an identification table of parts.

b. Official nomenclature followed by (*) is used to denote both models of the equipment covered in this manual. Thus Radio Receiver R–203 (*)/SR represents both Radio Receiver R–203/SR and Radio Receiver R–203A/SR. Since the two equipments are similar both mechanically and electrically, text material and illustrations in most cases, are based, on one model (Radio Receiver R–203A/SR) ; where differences are important, they are specifically mentioned. The basic differences between models are noted in paragraph 10.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army matériel and equipment.

a. DD Form 6 (Reports Control Symbol CS GSP–66) (Report of Damaged or Improper Shipment) will be filled out and forwarded as prescribed in SR 745–45–5 or AFR 71–4.

b. DA AGO Form 468 (Reports Control Symbol CS GLD–247) (Unsatisfactory Equipment Report) will be filled out and forwarded to the Office of the Chief Signal Officer as prescribed in SR 700–45–5.

c. AF Form 54 (Unsatisfactory Report) will be filled out and forwarded to Commanding General, Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700–45–5 and AFR 65–26.

d. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Radio Receiver R–203(*)/SR (fig. 1) is an operating radio receiver complete except for antenna and primary power source. It is designed especially for shipborne fixed-station use as a component of the ship's radio installation. It provides reception of c-w (continuous-wave) or a-m (amplitude-modulated) radio signals from shore stations, aircraft, or other ships over a range which depends upon the power and location of the transmitting station. The receiver operates in the frequency range of 85 to 550 kc (kilocycles) and 1.9 to 25 mc (megacycles). Primary power is 115- or 230-volts dc (direct current) or single-phase ac (alternating current), of the same voltage, supplied from an external source, usually the ship's power supply.

b. As indicated in figure 2, Radio Receiver R–203A/SR includes the receiver proper, Electrical Noise Suppressor F–91/U, Fixed Resistor MX–1024/U, and a headset. A simple doublet-type antenna (not supplied) should be used for most efficient operation. (A single wire antenna may be used but the efficiency will be considerably reduced, particularly on the higher frequency bands.) The built-in speaker and/or the headset may be used for aural monitoring. The noise suppressor prevents radio noise on the power line from getting into the receiver. The resistor unit is used when the power source is 230 volts, to reduce the potential applied to the suppressor and receiver to approximately 115 volts.

c. Radio Receiver R–203/SR is essentially the same as Radio Receiver R–203A/SR, but the headset is not supplied and a commercial type noise suppressor and dropping resistor (Radiomarine Corporation Line Filter #RM–8 and Resistor Unit #RM–9) are used.

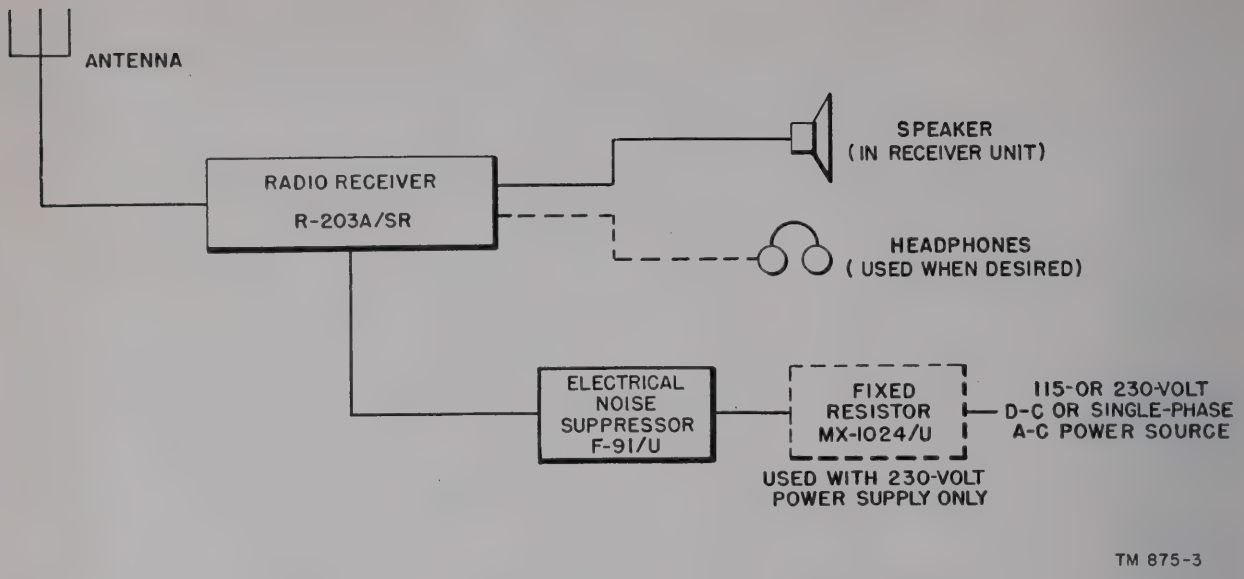


Figure 2. Radio Receiver R–203A/SR, simplified block diagram.

4. Technical Characteristics

Frequency range—

Band 1	85 kc to 220 kc.
Band 2	210 kc to 550 kc.
Band 3	1.9 mc to 5.4 mc.
Band 4	5.2 mc to 12 mc.
Band 5	11.5 mc to 25 mc.

Receiver type	Superheterodyne.
Types of signals which can be received.	C-w, and a-m tone or voice.
Number of tubes	10 (plus voltage regulator).
I. f. (intermediate frequency).	1,700 kc.
Radiation due to h-f (high-frequency) oscillator.	Less than 400 micromicrowatts.
Tuning control	Manual.
Audio output	2 watts maximum, 750 mw (milliwatts) undistorted.
Power input	0.4 ampere at 115 volts (45 watts) or 230 volts (90 watts).
Power supply	115 volts dc or ac, or, using Fixed Resistor MX–1024/U, 230 volts dc or ac.
Antenna (not supplied)	Horizontal doublet, 35 feet each side of center.
Weight	77 pounds.

5. Table of Components

(figs. 1, 3, 4, and 5)

a. The components of Radio Receiver R–203A/SR are shown in the following table.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu. ft.)	Weight (lb.)
Radio Receiver R–203A/SR	1	11¾	13¹⁄₁₆	21	1.87	65
Electrical Noise Suppressor F–91/U	1	3⅝	6⅞	7¼	.11	6
Fixed Resistor MX–1024/U	1	2⅞	2⅝	11⅜	.05	1½
Headset with cord and plug	1					½
Technical Manual	2	10¼	¾	7⅞	.02	2
Running spares	1 set	5	5	7	.10	2
Total					2.15	77

Note.—This list is for general information only; see appropriate supply publications for information pertaining to requisition of spare parts.

b. The dimensions of Radio Receiver R–203/SR, Line Filter #RM–8, and Fixed Resistor #RM–9 are similar to those of the comparable units comprising Radio Receiver R–203A/SR. Running spares are also supplied with the earlier model (par. 7); a headset is not supplied.

6. Packaging Data

Radio Receiver R–203A/SR, complete with accessories and running spares (par. 5), is packed in one wooden container. The over-all dimensions of the container are 36 inches long, 23 inches high,

and 23 inches deep. The gross weight (including contents, packing material, and case) is 145 pounds. For dimensions of items when unpacked, see paragraph 5 and figure 32.

7. Description of Radio Receiver R–203(*)/SR

a. Radio Receiver R–203(*)/SR consists of the radio chassis and front panel assembly mounted in a metal cabinet. All controls, jacks, and switches are mounted on the front panel. The hinged metal top cover of the cabinet permits access to the tubes and the top of the receiver chassis. The cabinet is mounted on four rubber shock-mounts which are attached to a metal base plate. Antenna, ground, and power connections are made at the back of the chassis. Figure 3 shows a front view of Radio Receiver R–203A/SR; the panel of Radio Receiver R–203/SR is essentially the same, except that on some units the POWER OFF-ON switch is included on the R. F. GAIN control.

b. The receiver uses a 10-tube superheterodyne circuit designed for reception of c-w, tone, or voice signals. The receiver full-vision type tuning dial is located on the front panel, just above the manual tuning knob. Band-spread tuning is also provided. The loudspeaker is built-in and jacks are provided for simultaneous or alternate use of a headset. The receiver is of the nonradiating type.

8. Accessories and Running Spares

a. Electrical Noise Suppressor F–91/U (fig. 4). Electrical Noise Suppressor F–91/U is connected in the power supply line to Radio Receiver R–203A/SR, to provide suppression of r-f (radio-frequency) noise on the power line. It consists of a metal box with hinged cover and contains the filter elements and a terminal board for power line connections. A power ON-OFF switch and two extraction-type fuses are mounted on the cover. Line Filter #RM–8 serves a similar purpose for Radio Receiver R–203/SR.



Figure 3. Radio Receiver R–203A/SR, front view.

b. Fixed Resistor MX–1024/U (figs. 1 and 4). Fixed Resistor MX–1024/U is furnished for use with Radio Receiver R–203A/SR when the receiver is operated from a 230-volt d-c or a-c supply. It is connected in series with the line and reduces the voltage applied to the receiver to approximately 115 volts. It consists of a large tubular fixed resistor mounted in an expanded-metal housing or cage. Resistor Unit #RM–9 serves a similar purpose for Radio Receiver R–203/SR.

c. Headset (fig. 4). A high-impedance headset with cord and plug is furnished with Radio Receiver R–203A/SR; no headset is supplied with Radio Receiver R–203/SR. Two jacks are provided on the front panel of both models of the receiver to accommodate a headset.

d. Running Spares (fig. 5). A group of running spares is provided with each receiver. These spares cover the normally expendable plug-in items such as tubes, lamps, and fuses. The running spares supplied with Radio Receiver R–203A/SR are shown in figure 5 and are listed below. In addition to these items, a spare plug-in filter capacitor (C–142 or C–143) is supplied with Radio Receiver R–203/SR.

1 Tube JAN–6SQ7.
5 Tubes JAN–6SG7.
2 Tubes JAN–6J5.
1 Tube JAN–25L6GT/G.
1 Tube JAN–25Z6.
1 lamp, neon, 1 watt, type NE–32.
18 fuses, 1 ampere, type 3AG.



Figure 4. Accessories for Radio Receiver R–203A/SR.

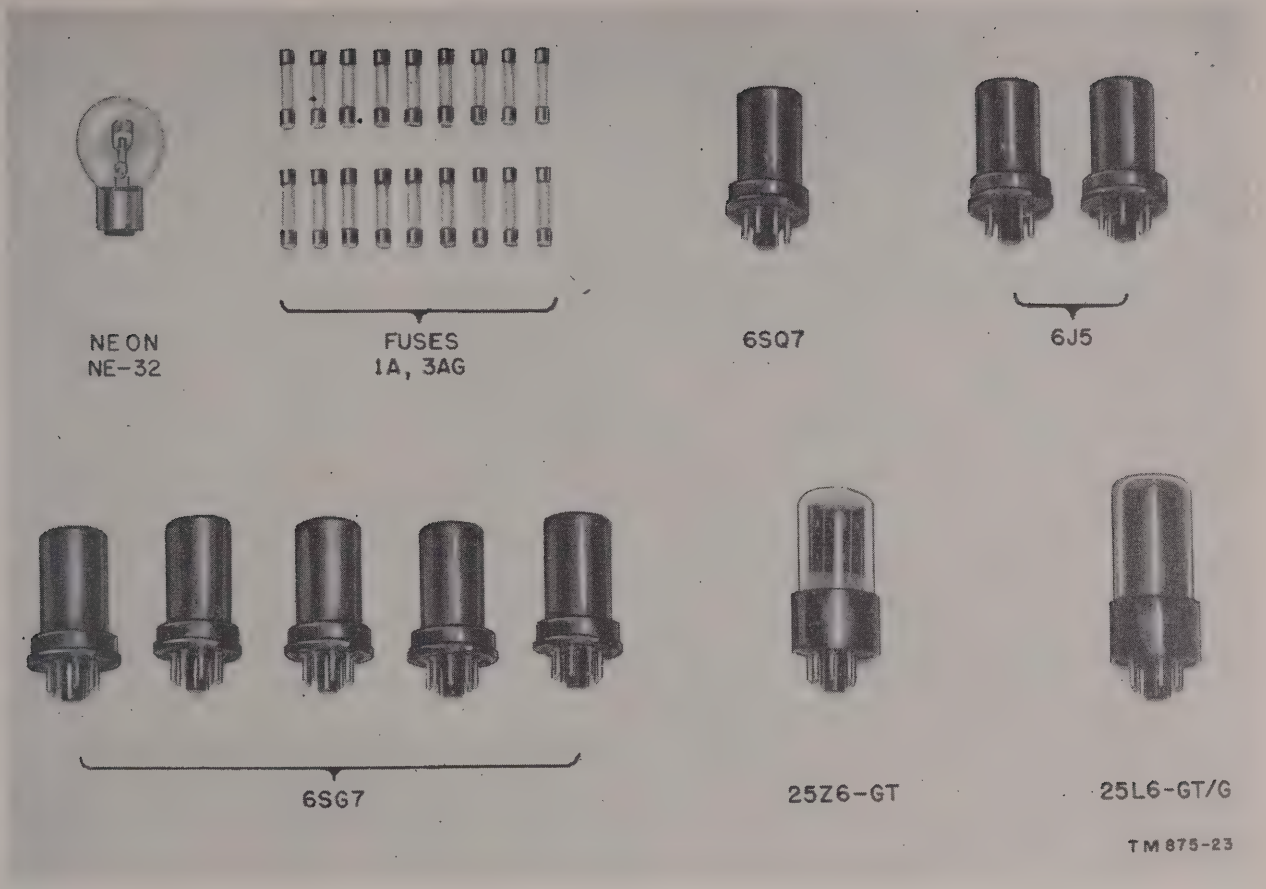


Figure 5. Running spare parts for Radio Receiver R–203A/SR.

9. Additional Equipment Required

The following material is *not* supplied as a part of Radio Receiver R–203(*)/SR but is required for its installation (fig. 33) and operation:

100 feet antenna wire, phosphor bronze, 7 #16 or 7 #18 AWG.
50 feet cable, 2-conductor, shielded, #14 AWG, "Tirex" No. 774, or equal.
6 insulators, porcelain, strain, Sig C stock No. 3G–1850–5450, or equal.
1 thimble, galvanized, ¼-inch.
1 shackle, galvanized, ¼-inch.
5 to 15 feet ribbon, copper, ½-inch x 0.030 inch.
Quantity as required; cable, marine type, 2-conductor #14 AWG shielded and armored.

10. Differences in Models

The differences between Radio Receiver R–203/SR (Radiomarine Corporation Model AR–8506–B) and Radio Receiver R–203A/SR are described in the following paragraphs. So far as these differences affect installation, operation, or maintenance of the equipment, they are re-emphasized in appropriate sections of the manual.

a. The major external difference between the two receivers is the inclusion of a separate POWER OFF-ON switch on Radio Receiver R–203A/SR (fig. 8). Some of the later units of Radio Receiver R–203/SR also have this separate switch, while earlier units include the OFF-ON switch in the R. F. GAIN control. Calibration markings on the two receiver panels are superficially different from each other.

b. Radio Receiver R–203/SR has a single ground stud mounted on the rear of the cabinet for connection to ship's ground. Two studs are provided on Radio Receiver R–203A/SR, one (E–124) on the cabinet, the other (E–125) on the chassis.

Stud E–124 is used when the receiver is left in the cabinet; E–125 is used when the receiver is rack-mounted (par. 15). If Radio Receiver R–203/SR is to be rack-mounted, special provision must be made to ground the receiver chassis.

c. Radio Receiver R–203/SR includes Line Filter #RM–8 and Resistor Unit #RM–9 instead of Electrical Noise Suppressor F–91/U and Fixed Resistor MX–1024/U. The line filter is essentially the same as the noise suppressor; a superficial difference is the designation of the terminal boards in the line filter as H–201 and H–202, while the equivalent terminal boards in the noise suppressor are designated E–202 and E–201, respectively. Resistor Unit #RM–8 is only 325 ohms, while Fixed Resistor MX–1024/U is 350 ohms.

d. The following parts have slightly different values in each receiver: R–102, R–105, R–115, R–118, R–119, R–123, R–124, R–129, and C–117. (Refer to figures 34 and 35.) The differences are superficial only. Fixed trimmer capacitor C–145 is used only in Radio Receiver R–203/SR.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. INSTALLATION OF RADIO RECEIVER R–203A/SR

11. Siting

Select a location in the radio room so that the radio receiver may be conveniently operated. A space on the operating table about 12 inches from the front edge and within easy reach of the operating position is most satisfactory. Do not locate the receiver near hot steam pipes or radiators, and keep it clear of open ports or other places that may result in exposure to rain or spray. Adequate ventilation is necessary. Do not install the receiver inside a locker or other restricted inclosure. Provide sufficient clearance behind the receiver for access in making connections and servicing. Allow sufficient clearance above the cabinet to permit the hinged top to be opened when replacing tubes or making adjustments. Locate the noise suppressor on the bulkhead (wall) within 2 feet of the receiver to allow slack in the power cable, in order that the receiver chassis can be pulled out of the cabinet without disconnecting the cable.

12. Uncrating, Unpacking, and Checking New Equipment

a. General. Radio Receiver R–203(*)/SR is shipped in a domestic packing case. When new equipment is received, select a location where it may be unpacked without exposure to the elements and which is convenient to the permanent installation. Unpack the equipment in accordance with *b* below, and then check it as outlined in *c* below.

Note.—Be careful in uncrating, unpacking, and handling the equipment; it is easily damaged. If it becomes damaged or exposed to the elements, a complete overhaul might be required or the receiver might be rendered useless.

b. Unpacking Procedure (fig. 6). Place the packing case as near the operating position as is convenient, and unpack it in accordance with the instructions in figure 6. (Radio Receiver R–203/SR is packed similarly to Radio Receiver R–203A/SR.) Observe the following precautions:

(1) Do not attempt to pry off the sides or ends of the packing case; the equipment may be damaged.
(2) In removing corrugated paper and paper wrappings, be careful not to mar the finish or break projecting portions of the equipment.

Note.—Save the original packing case. It can be used again when equipment is repacked for storage or shipment to field maintenance repair shops. Remove protruding nails.

c. Checking. After unpacking the equipment, inspect it for possible damage incurred during shipment. Also, check the contents of the packing case against the master packing slip and against the table of components (par. 5).

13. Mounting and Assembling Equipment

Select the exact location for each component of the equipment, keeping in mind the factors mentioned in paragraphs 11 and 14. The over-all and mounting dimensions of all components are shown in figure 33.

a. Place the receiver in position on the operating table and mark the locations of the four mounting holes. Remove the receiver, drill mounting holes, and bolt the receiver firmly to the table.

b. Place Electrical Noise Suppressor F–91/U (Line Filter #RM–8 in Radio Receiver R–203/SR) in position against the bulkhead, and check that power cord W–201 will reach the power receptacle at the back of the receiver chassis with the proper amount of slack. Open the suppressor cover and mark the location of the four mounting holes on the bulkhead. Drill the holes and fasten the noise suppressor to the bulkhead, using bolts or wood screws.

c. If the receiver is operated from a 230-volt d-c or a-c supply, Fixed Resistor MX–1024/U (Resistor Unit #RM–9 in Radio Receiver R–203/SR) will be required. For connection of this unit, a 3-inch connection box will be required. (A 4-inch

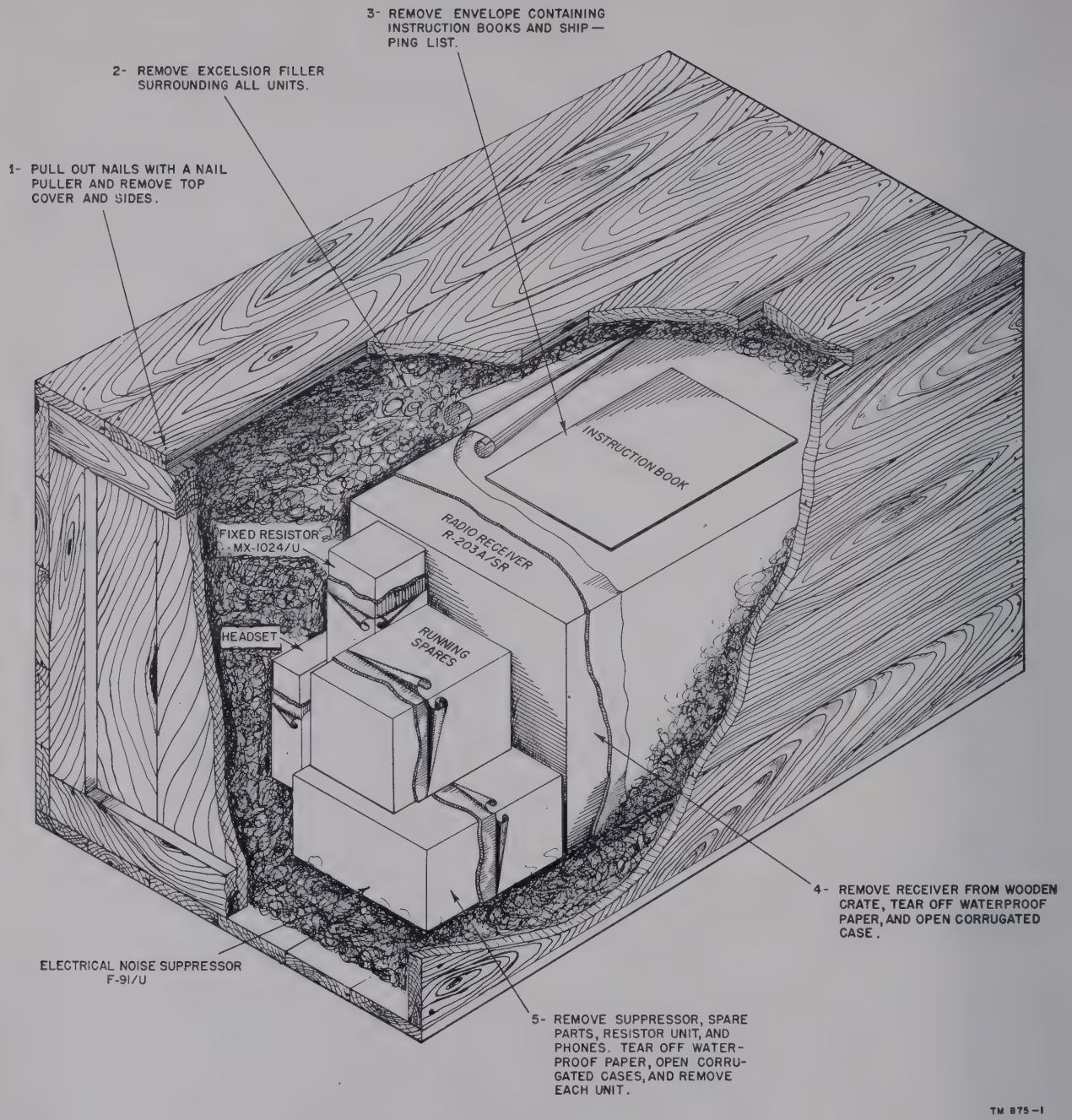


Figure 6. Radio Receiver R–203A/SR, unpacking procedure.

box may be used if a 3-inch box is not available.) This box is not furnished with the equipment. Mount the resistor and the box on the bulkhead in a convenient location for wiring. They need not be mounted near the receiver and noise suppressor. Do not mount the resistor near an item that may be adversely affected by the heat given off by the resistor.

d. If the receiver is to be mounted in a rack, ignore the mounting instructions in *a* above and proceed as follows: Remove the receiver chassis from the cabinet and place it in position in the rack. If the rack is already drilled and tapped for mounting, merely tighten the four thumbscrews holding the panel to the rack. If the latter is not drilled, remove the thumbscrews from the

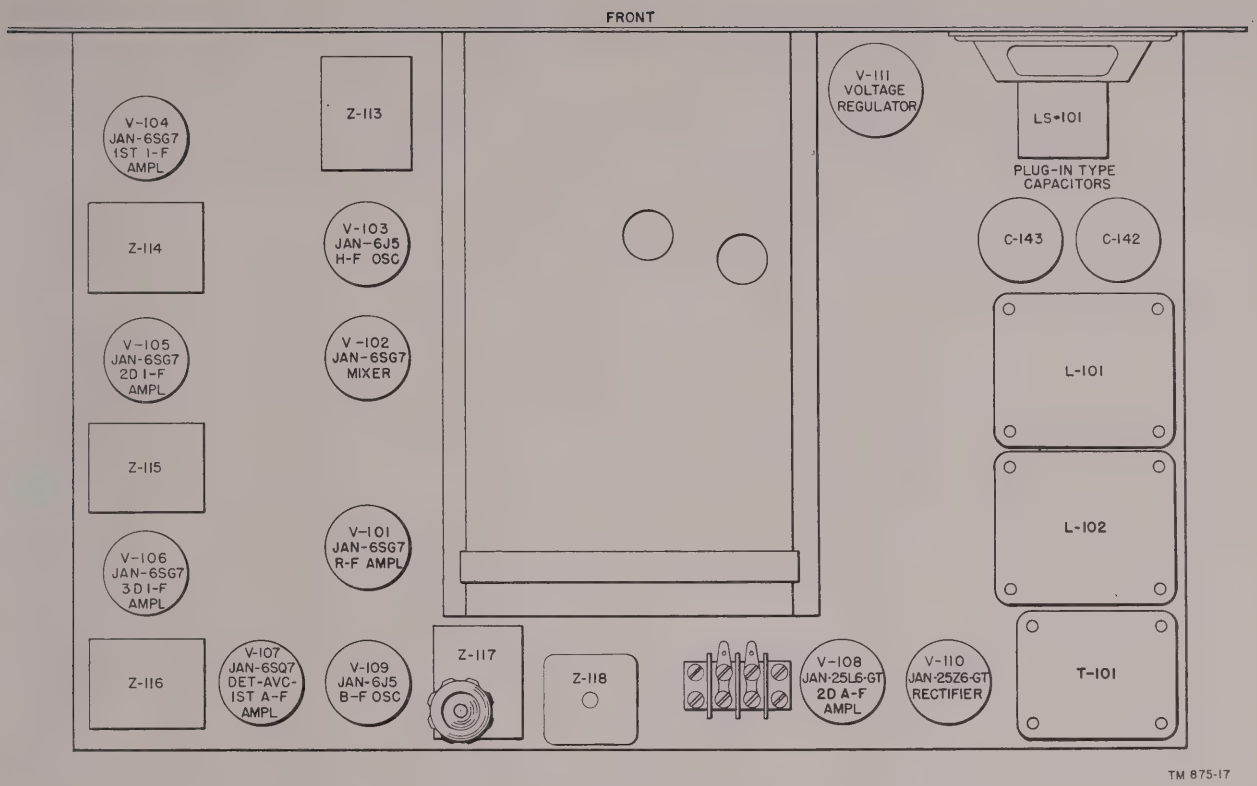


Figure 7. Radio Receiver R–203(*)/SR, location of tubes and filter capacitors.

front panel; mark, drill, and tap the holes in the rack; and reinsert the thumbscrews and tighten them. The receiver cabinet and shock mounting plate are not used.

e. Open the top cover of the receiver and check that all 10 vacuum tubes, the neon voltage regulator, and the 2 plug-in filter capacitors (C–142 and C–143) are firmly seated in their respective sockets. The location of tubes and filter capacitors is shown in figure 7. Tubes and filter capacitors are installed by first orienting the keyed center pin to the keyed center hole in the socket and then pressing down firmly on the tube, or capacitor, until it is seated against the socket. Insert the bayonet-base-type neon voltage regulator bulb into the socket and turn it one-quarter turn clockwise to lock it.

f. Remove the three fuses, one on the receiver front panel and two on the noise suppressor cover (fig. 9), by turning the caps counterclockwise and extracting them from the holders. Check that fuses are good and are held firmly in the clips. Do not reinsert the fuses until wiring is completed.

14. Electrical Connection

The power wiring necessary for installation of Radio Receiver R–203(*)/SR on shipboard is shown in figure 33. All wiring on shipboard *must* be done in accordance with A. I. E. E. "Recommended Practice for Electric Installations on Shipboard"[1] or superseding Department of the Army instructions. Wiring materials are not supplied with the equipment and the exact quantities will vary with the installation.

a. Lay out the power wiring on the bulkhead and estimate the material required. Obtain the necessary material and carefully install the cable or cables in accordance with the instructions referred to above. This work should be performed by technicians familiar with shipboard practice, or under their direction.

b. Fixed Resistor MX–1024/U (Resistor Unit #RM–9 in Radio Receiver R–203/SR) is required only for 230-volt a-c or d-c operation. It is to be connected in series with one side of the power

[1] Published by American Institute of Electrical Engineers, 33 West 39th St., New York 18, N. Y.

supply line (the positive side if 230-volt dc is used). See figure 33 for the actual connections.

c. Connect the power supply source (115 volts or 230 volts with the dropping resistor in series) to the LINE terminals of Electrical Noise Suppressor F–91/U (fig. 12) (Line Filter #RM–8 in Radio Receiver R–203/SR). If the power supply is dc, proper polarity (figs. 12 and 33) must be observed. Insert plug P–201 (fig. 12) into receptacle J–101 (fig. 11) at the back of the receiver chassis, turning the plug slightly to the right so that it locks in position.

Caution: Check if any permanent ground connection exists on the power supply line. This is especially important in the case of a three-wire 115/230-volt d-c power source, where the neutral may have a permanent ground. If this is the case, the noise suppressor must be connected so that the grounded side of the line is *negative*. In the case of a two-wire 115-volt d-c line, which has the usual ship's ground detector lamp system, each side of the line will measure about 57 volts to ground, and no special precautions are necessary other than to maintain correct polarity.

d. Next, install the antenna and ground as outlined in paragraph 15. The three fuses may then be reinserted in the fuse holders on the receiver and noise suppressor. The installation should now be checked for completeness and correct wiring before actual operation.

15. Antenna and Ground Installation

a. Radio Receiver R–203 (*)/SR will operate most efficiently when used with a doublet type of antenna; a single-wire antenna may be used with reduced efficiency. In general, a doublet-type antenna is preferred for shipboard reception, because of its noise-reducing properties. The construction of typical doublet and single-wire antennas on shipboard and material required for their construction are shown in figure 33. The antenna and ground material is not furnished with the receiver. The 35-foot length for each horizontal leg of the doublet is not critical and may be 5 feet less or 10 feet more to suit the space available. A single-wire antenna should be from 50 to 150 feet long. In locating the antenna, remember that it should be as high as feasible, in an area as free as possible of all objects (particularly stays, booms, and funnels), and the lead-in should be short and direct. Connect the single-wire lead-in to antenna terminal A1 (fig. 10) and leave terminal A2 open.

b. A good low-resistance ground connection is essential. Run a piece of one-half inch by one-thirty-second inch, or larger, copper strap between the ground stud on the back of the receiver cabinet to the ship's hull (if steel) or to an exterior ground plate on the hull (if a wooden vessel). When Radio Receiver R–203A/SR is rack-mounted, a ground strap should be run from the ground stud (E–125) on the back of the receiver chassis to ship's ground. In Radio Receiver R–203/SR grounding facilities must be improvised for rack-mounting, since the chassis is not supplied with a special ground stud. A copper strap should also be connected from the ground stud on the noise suppressor (or line filter) box to the ship's ground.

16. Service Upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 12 for uncrating, unpacking, and checking the equipment.

b. Check the used or reconditioned equipment for tags or other indications pertaining to changes in the wiring of the equipment. If any changes in wiring have been made, note the change in this manual, preferably on the schematic diagram. Make all notations on schematic diagrams in such a manner that the original diagram can be followed.

17. Use of Controls and Instruments
(figs. 8, 9, and 10)

The following table lists the controls and instruments of the radio receiver and indicates their function.

a. Receiver Front Panel Controls (fig. 8).

Control	Function
POWER OFF-ON switch (S–106).[1]	In ON position, connects receiver to power source (providing power OFF-ON switch on the suppressor unit is in the ON position).
FUSE, TYPE 3AG, 1 AMP (F–101).	Protects line input circuits.
Pilot light (I–101)	Indicates when the receiver is in operation. The voltage regulator tube (V–111) provides the illumination for this indication.
A. F. GAIN (R–120)	Adjusts the input to the first audio amplifier, controlling output volume.
R. F. GAIN (R–111) [1]	Adjusts the gain of the r-f stage and the first two i-f stages.
BAND SWITCH (S–101 and S–102).	A five-position ganged switch which selects the frequency band on which the receiver operates. It connects the proper coils and capacitors into the r-f and oscillator stages for the desired frequency band. Position 1 85 kc to 220 kc. Position 2 210 kc to 550 kc. Position 3 1.9 mc to 5.4 mc. Position 4 5.2 mc to 12 mc. Position 5 11.5 mc to 25 mc.
MAIN TUNING knob and dial (C–101).	A six-section capacitor which tunes receiver to desired signal frequency. Rotation of knob tunes receiver to frequency indicated on dial for band selected by the BAND SWITCH.
BAND SPREAD knob (C–102).	Provides fine adjustment of operating frequency of receiver especially on higher frequency bands. Rotation of knob varies h-f oscillator frequency over a small range, thus changing receiver operating frequency.
LOUDSPEAKER OFF-ON switch (S–105).	In ON position, connects the loudspeaker to the receiver output circuit.
Loudspeaker (LS–101)	Furnishes audio output.
PHONES jacks (J-102 and J-103).	When headsets are plugged in, connects them to output circuit of receiver.
AVC OFF-ON switch (S–140).	In OFF position, the avc (automatic volume control) circuits of the receiver are inoperative. This position is used when receiving c-w signals.
BFO OFF-ON switch (S–103).	In ON position, the bfo (beat-frequency oscillator) is operative for reception of c-w signals.

[1] Some units of Radio Receiver R–203/SR have the POWER OFF-ON witchi ncluded in the R. F. GAIN control.

b. Other Receiver Controls (fig. 10).

Control	Function
Bfo control (located atop bfo assembly, inside receiver).	Controls beat note with BFO OF-ON switch in ON position. Changes frequency of bfo.

c. Electrical Noise Suppressor F–91/U Controls (fig. 9).

Control	Function
Power OFF–ON switch (S–201).	In ON position, connects receiver to power source.
FUSES, TYPE 3AG, 1 AMP (F–201 and F–202).	Protect line circuits of suppressor and receiver.

Note.—Line Filter #RM–8 has similar fuses and an OFF–ON switch.

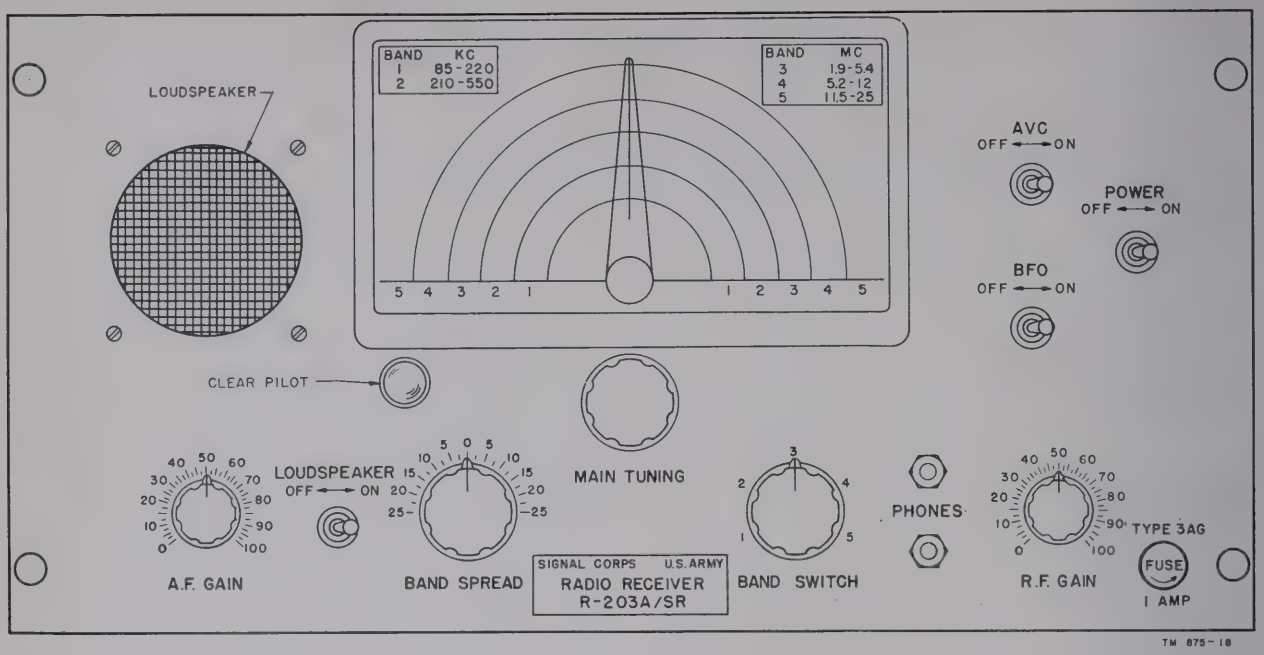


Figure 8. Radio Receiver R–203A/SR, front panel.

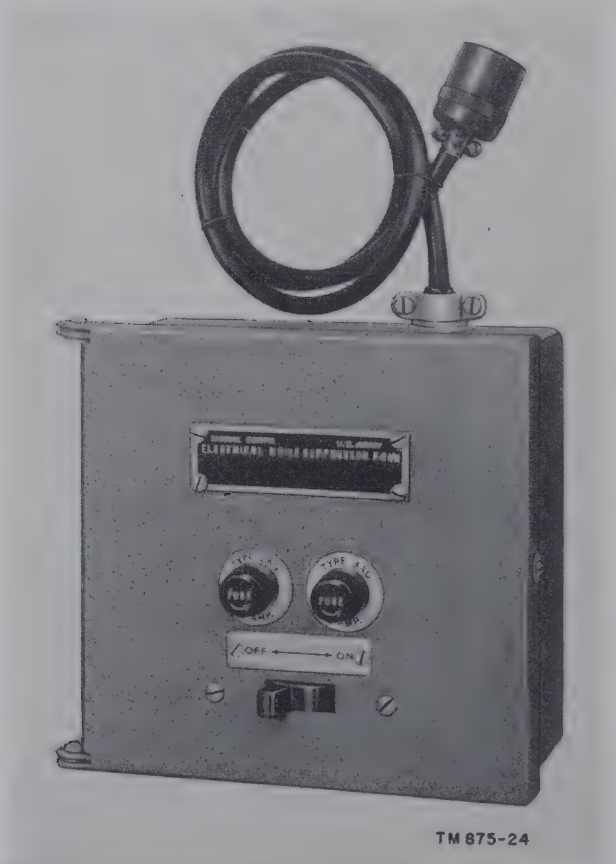


Figure 9. Electrical Noise Suppressor F–91/U.

Section III. OPERATION UNDER USUAL CONDITIONS

18. Starting Procedure

a. PRELIMINARY. Set the front panel controls as follows:

Control	Position
Power OFF-ON switch on Electrical Noise Suppressor F–91/U (on Line Filter #RM–8 for Radio Receiver R–203/SR).	ON. Normally this switch may be left at ON position at all times.
LOUDSPEAKER OFF-ON switch.	ON.
AVC OFF-ON switch	OFF.
BFO OFF-ON switch	OFF.
PHONES jacks	Plug in a headset, if desired.
BAND SPREAD knob	0.
R. F. GAIN	70 to 90 on Radio Receiver R–203A/SR. (4 to 5 on Radio Receivers R–203/SR which have a separate POWER OFF-ON switch; maximum counterclockwise on other Radio Receivers R–203/SR.)

b. STARTING.

(1) Place the POWER OFF-ON switch in the ON position. For Radio Receiver R–203/SR without a separate switch, turn the R. F. GAIN control clockwise and advance between 4 and 5. Allow 15 seconds for tubes to warm up. Pilot light below tuning dial will glow. If not, see paragraph 25.

(2) Turn A. F. GAIN control clockwise until noise or signals are heard from the loudspeaker. If no response, see paragraph 25.

19. Continuous-wave Reception

a. Set the BAND SWITCH in position for the band which covers the frequency of the signal to be received. The five frequency bands are tabulated at the top of the calibrated tuning dial.

b. Place BFO OFF-ON switch in ON position.

c. Carefully adjust MAIN TUNING knob until dial pointer indicates frequency of desired signal. If c-w signal is present, its tone will vary as the exact frequency is approached. Tune for a tone (beat note) that is suitable for easy *reading*.

d. Adjust BAND SPREAD knob for a suitable beat note or to make signal readable above interference from noise or unwanted signals on adjacent frequencies. See paragraph 22*e* and *f*.

e. Readjust A. F. GAIN and R. F. GAIN for suitable volume and best signal-to-noise ratio. See paragraph 22*a*.

20. Tone or Voice Reception

a. Set the BAND SWITCH in position for the band which covers the frequency of the signal to be received. The five frequency bands are tabulated at the top of the calibrated tuning dial.

b. Place AVC OFF-ON switch in ON position.

c. Carefully adjust MAIN TUNING knob until dial pointer indicates frequency of desired signal. If a tone or voice signal is present, tune for loudest or least distorted signal.

d. Adjust BAND SPREAD knob for louder or better signal or to minimize any noise or unwanted signals on adjacent frequencies. See paragraph 22*f*.

e. Readjust A. F. GAIN and R. F. GAIN for suitable gain and best signal-to-noise ratio. See paragraph 22*a* and *b*.

21. Monitor Operation

When standing by to receive signals or when monitoring a specific frequency channel, set the panel controls as shown in the table below.

Control	Setting
BAND SWITCH	On band covering desired frequency.
MAIN TUNING knob and dial.	On desired frequency.
BAND SPREAD knob	0 (or at exact setting, if known, for desired frequency).
AVC OFF-ON switch	ON.
R. F. GAIN control	70 to 90 (4 to 5 on Radio Receiver R–203/SR) as determined by prevailing noise.
A. F. GAIN control	60 to 90 (to produce a moderate noise output).

With these adjustments, strong incoming signals will be received without *blocking* and, at the same time, fairly weak signals, only slightly above the prevailing noise level, also will be heard.

22. Operating Precautions and Notes

The following notes will aid the operator in securing maximum performance from the receiving equipment:

a. In general, for reception of keyed c-w or mcw signals (code), set the A. F. GAIN at or near 100, AVC switch OFF, and use the R. F. GAIN as a volume control to adjust the audio output level in the headset or loudspeaker.

b. For best reception of weak keyed signals (code) through noise picked up on the antenna or generated in the receiver, set the R. F. GAIN to a higher number and reduce the setting of the A. F. GAIN to give the desired audio output level in the headset or loudspeaker.

c. Badly fading keyed signals (code) may be made more readable by putting the AVC OFF-ON switch in the ON position and setting the R. F. GAIN only as high as is necessary. This expedient is not recommended for reception of rapidly keyed signals.

d. For reception of phone (voice) signals, regardless of signal strength, fading conditions, or noise level, place the AVC OFF-ON switch in the ON position and the R. F. GAIN at 100 (5 in the case of Radio Receiver R–203/SR).

Note.—Reduce the R. F. GAIN setting as necessary, depending on noise picked up by the antenna. Use the A. F. GAIN as a volume control to adjust the audio output level in the headset or loudspeaker. The exact setting of the R. F. GAIN control, for best reception of weak and/or fading signals through noise, will be found by *trial and error.*

e. When receiving a c-w signal, the pitch of the beat note may be controlled by a slight adjustment of the MAIN TUNING control, or, the BAND SPREAD control may be used.

f. To change the audio beat note for all c-w signals, tune a strong c-w signal to zero beat when the BAND SPREAD control is on 0, open the top of the cabinet, and rotate the knob on top of the bfo assembly until the desired pitch is obtained.

g. The BAND SPREAD control is most effective at the high end of each frequency band. It is most useful for tuning on bands 4 and 5 (5.2 to 25 mc) and has little effect in the three lower bands.

Note.—Main dial calibration is correct only when BAND SPREAD knob is set at 0 (center position).

h. The loudspeaker frequently will be used for reception. However, either a low- or a high-impedance headset may be plugged into one of the PHONES jacks and the loudspeaker turned off (LOUDSPEAKER OFF-ON switch in OFF position). Simultaneous use of the speaker and the headset is also possible because the LOUDSPEAKER OFF-ON switch does not affect the headset connections.

i. When Radio Receiver R–203(*)/SR is installed as a component of a complete transport or cargo ship station, band 2 may be used to monitor the intermediate-band in lieu of the ship's regular low- and intermediate-frequency receiver. This practice will result in a considerable increase in life of the B batteries usually used with the low- and intermediate-frequency receiver. Also, bands 1 and 2 provide *duplicate* facilities in case the ship's normal low- and intermediate-frequency receiver is being used or is out of order.

23. Stopping Procedure

a. To turn off the receiver, place the POWER OFF-ON switch in the OFF position (turn R. F. GAIN control to maximum counterclockwise position on Radio Receivers R–203/SR without a separate power switch).

b. For an extended shut-down, also place the power OFF-ON switch on Electrical Noise Suppressor F–91/U (Line Filter #RM–8 in Radio Receiver R–203/SR) in the OFF position.

24. Purpose and Use of Equipment Performance Checklist

a. General. The equipment performance checklist (par. 25) will help the operator determine whether the receiver is functioning properly. The list gives the item to be checked, the conditions under which the item is checked, the normal indications and tolerance of correct operation, and the corrective measures the operator can take.

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 action that must be taken to check the normal indication given in the normal indications column.

c. Normal Indications. The normal indications listed include the visible and audible signs that the operator should 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 in the equipment for repairs. When reference is made in the table to chapter 5, 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 and 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 through 11. Items 1 through 11 should be checked each time the equipment is put into operation.

f. Items 12 through 21. The operator should familiarize himself with the operation of the equipment 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 R. F. GAIN and A. F. GAIN controls. This will aid in an approximate determination of the sensitivity and amplification of the receiver. Item 21 may be performed when a change of beat note is desired.

g. Items 22 and 23. Item 22 is checked whenever the receiver is taken out of operation. Item 23 is checked when the receiver is shut down for an extended period. Any abnormal indications at this time are probably caused by trouble in the receiver and should be corrected before the next expected period of operation.

25. Equipment Performance Checklist

	Item No.	Item	Action or condition	Normal indications	Corrective measures
P	1	Antenna	Doublet lead-in cable connected to terminals A1 and A2; single-wire antenna connected to terminal A1 (A2 open).		
R					
E					
	2	Line cord	Line cord plug inserted into socket at rear of receiver.		
L					
I	3	Power OFF-ON switch on noise suppressor (or line filter).	Place in ON position.		
M					
	4	LOUDSPEAKER OFF-ON switch.	Place in ON position.		
I					
	5	AVC OFF-ON switch	Set in OFF position.		
N	6	BFO OFF-ON switch	Set in OFF position.		
	7	R. F. GAIN control	Rotate to 70 (4 in the case of Radio Receiver R–203/SR with a separate POWER OFF-ON switch; leave at maximum counterclockwise position if power switch is ganged to control.)		
A					
R					
Y					
	8	BANDSPREAD knob	Rotate to 0.		
S	9	POWER OFF-ON switch.	Place in ON position. (Advance R. F. GAIN control to 4 if the power switch and gain control are ganged.)	After about 15 seconds, pilot light will glow.	Check fuse F–101 on front panel. Check line cord. Check fuses F–201 and F–202 on noise suppressor or line filter. If fuses blow again, see chapter 5.
T					
A					
R					

	Item No.	Item	Action or condition	Normal indications	Corrective measures
S T A R T	10	A. F. GAIN control	Rotate clockwise to 80	Rushing noise or signals are heard in loudspeaker.	Check tubes. All tube filaments are in series; therefore, any one failure will extinguish all. Replace tubes one at a time.
	11	Pilot light		Glows	If no noise in speaker when operating on d-c power, reverse polarity of power line leads at noise suppressor or line filter. If noise is heard, replace neon voltage regulator tube.
E Q U I P M E N T	12	MAIN TUNING control.	Set BAND SWITCH at any desired position. Tune across entire band by rotating MAIN TUNING control.	Signals heard in loudspeaker.	Check tubes. If signals are weak, check antenna and ground connections. Clean antenna insulators, if necessary. If hum is heard at all dial positions, check plug-in filter capacitors. *Note.*—In emergency, the set will operate using only one filter capacitor plugged into the left-hand socket directly behind the loudspeaker.
P E R F O R M A N C E	13	BAND SWITCH	Check each of the tuning ranges. Use procedure in step 12 above.	Same as normal indications in step 12 above.	Check as in step 12. In addition, check BAND SWITCH in faulty position.
	14	BAND SPREAD knob	Rotate BAND SWITCH to position 4 or 5, tune in a signal, and rotate BAND SPREAD from 0 to 100, left and right.	Turning knob should detune the signal.	Check capacitor C–102 for shorted plates or broken connections.
	15	PHONES jacks	Insert plug on headset into jack.	Signals heard in loudspeaker are also audible in headset.	Check headset cord and plug. Also check each jack.
	16	LOUDSPEAKER switch.	Place in OFF position (return to ON position when check is completed).	Signals not heard in loudspeaker but are heard in headset.	Refer to chapter 5.
	17	R. F. GAIN control	Tune to any station by rotating MAIN TUNING knob, then rotate R. F. GAIN in either direction.	Strength of increases or decreases.	Refer to chapter 5.
	18	A. F. GAIN control	Rotate control in either direction.	Strength of signal increases or decreases.	Refer to chapter 5.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
EQUIPPER	19	AVC OFF-ON switch____	Tune in very strong signal by rotating MAIN TUNING control then place AVC OFF-ON switch in ON position.	Signal should decrease and distortion should be less on an a-m signal.	Refer to chapter 5.
	20	BFO OFF-ON switch____	Place switch in ON position and tune in a c-w carrier on one of the h-f bands.	Beat-frequency (audio) signal is heard in loudspeaker.	Check bfo tube V–109.
	21	Beat-frequency oscillator_	With signal tuned in as in step 20 above, rotate bfo control inside cabinet in either direction.	Audio beat note varies in pitch.	Refer to chapter 5.
STOPPED	22	POWER OFF-ON switch (R. F. GAIN control on some Radio Receivers R–203/SR).	Place in OFF position (turn counterclockwise).	Pilot light goes out, no noise or signals are heard in loudspeaker.	Refer to chapter 5.
	23	POWER OFF-ON switch or noise suppressor or line filter.	Place in OFF position. Place POWER OFF-ON switch on receiver first in ON position then return to OFF position (turn R. F. GAIN control clockwise and counterclockwise if switch and control are ganged).	No indication. Pilot light will not light unless both power switches are in ON position.	

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

Note.—Radio Receiver R–203(*)/SR normally is installed in the radio room of a ship or small craft and, therefore, is protected from the weather. However, when the vessel is operated in regions where extreme cold, heat, or humidity and moisture prevail, special precautions should be taken to insure continued satisfactory operation of the receiver.

26. Operation in Arctic Climates

Subzero temperatures will only affect the operation of the receiver after a period of idleness. As long as the equipment is energized, the heat from the tubes, resistors, and other components is sufficient to keep the equipment in operating condition. When the receiver is turned off, the electrolytic capacitors may freeze, the dial and switches may become stiff to operate, and some components may change in electrical value. This is not dangerous to the equipment provided it is allowed to warm up for approximately one-half hour before actual use. A simple remedy is to place a lighted electric bulb within the receiver cabinet during periods of nonuse.

27. Operation in Tropical Climates

When a vessel is operated in tropical waters, particularly near land, excessive humidity may cause condensation of moisture on the radio-receiver components whenever the temperature of the equipment becomes lower than that of the ambient air. To minimize this action, place a lighted electric bulb within the cabinet of the receiver whenever the receiver is turned off.

Note.—Paragraph 59 outlines certain conditions under which a defective receiver may be maintained in operation by emergency measures. Refer to these instructions and use them only when absolutely necessary.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. ORGANIZATIONAL TOOLS AND PREVENTIVE MAINTENANCE SERVICES

28. Tools and Material Issued for Use With Radio Received R–203(*)/SR

No tools or materials for maintenance purposes are supplied with the radio receiver. However, each ship's radio operator may draw maintenance materials, such as cleaning cloth, carbon tetrachloride, etc., from ship's supply. A marine operator's tool kit for minor repair and maintenance may be issued at the Port of Embarkation Signal Supply Shop. Ordinarily, only plug-in items, such as tubes and filter capacitors, are changed by the using organization.

Note.—Refer to the emergency trouble-shooting procedures in paragraph 59.

29. Preventive Maintenance Services

a. Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in such good working order that break-downs and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to eliminate certain troubles before they occur.

Note.—Operations described in this section are organizational maintenance (see TM 38–650).

b. The preventive maintenance checklists which follow (par. 30) show the operator how to maintain the equipment so that trouble shooting and repair will be reduced to a minimum. They indicate what to check, when to check, how to check, and the precautions which should be taken before, during, and after checking the equipment. The checklists are, in most cases, self-explanatory, and the operations and techniques do not require lengthy explanations.

Note.—Gasoline will not be used as a cleaning fluid for any purpose.

30. Preventive Maintenance Checklist for Radio Receiver R–203(*)/SR

a. Exterior of Radio Receiver (fig. 3).

Item No.	What to check	When to check*	How to check	Precautions
1	Cabinet	D	Inspect outside and inside of receiver cabinet. Check panel and mounting screws, control knobs, and switches for loose mountings. Check all connections. Clean cabinet, with dry clean cloth. Use dry compressed air to blow out accumulated dust and dirt. Repaint scratches, rusted, or chipped surfaces. Clean dial cover with a damp cloth. Tighten loose mounting bolts, screws, knobs, and connections.	
2	Jacks and plugs	D	Examine jacks and plugs for loose mounting nuts, dirty contacts, and improper spring tension. To remove corrosion, use crocus cloth and then a clean cloth. Increase spring tension, when necessary, then try the action of the jack after each adjustment. Keep soldered connections intact. Clean dirty or corroded headset plugs with polish, metal (Sig C stock No. 6G1516). After cleaning plugs, use carbon tetrachloride to remove all traces of polish. Finish with a clean dry cloth.	
3	Fuse	D	Inspect fuse cap for evidence of burning, charring, and corrosion; inspect fuse clips for accumulation of dirt and loss of tension. Increase the tension of fuse clips (when necessary) by pressing sides close together. Use pliers, if necessary. Clean fuse ends and clips with emery cloth. Wipe with clean cloth. Throw away all blown fuses.	Turn power off before removing fuses.

*D—Daily.

b. Interior of Radio Receiver (figs. 10 and fig. 11).

Note.—Components of Radio Receiver R–203/SR are located similarly to those shown for Radio Receiver R–203A/SR in figures 10 and 11.

Item No.	What to check	When to check*	How to check	Precautions
1	Capacitors	M	Inspect fixed capacitors for signs of discoloration, leaks, bulges, dirt, corrosion, loose mountings, and loose connections.	Remove all power.
			Remove r-f shield (fig. 10) and inspect plates of variable capacitors for dirt, dust, or lint. Examine the movable set of plates for signs of damage or misalinement that would cause them to touch the fixed plates during tuning.	
			Tighten loose terminals, mountings, and connections on capacitors, when necessary.	Be careful not to break the bushing or damage the gasket.
			Clean cases of fixed capacitors, contact pins on electrolytic capacitors, insulated bushings, and dirty or corroded connections. The cases and bushings can usually be cleaned with a dry cloth. If deposits of dirt are hard to remove, moisten cloth in Solvent, dry-cleaning (SD). Clean plates of variable capacitors with a small brush or pipe cleaner. Remove all dust and lint.	Dust, if present, may cause arcing.
			Lubricate as instructed in paragraph 31.	
2	Resistors	M	Examine the bodies of all types of resistors for blistering, discoloration, or other signs of overheating. Inspect leads and all other connections for corrosion, dirt, dust, looseness, or broken strands in connecting wires. Check security of all mountings.	Do not attempt to move resistors with pigtail connections. The connections may break at the point where they enter the body of the resistor. Such defects cannot be repaired.
			Tighten resistor connections and mountings, if necessary.	If resistors remain loose, vibration may break the connection or damage the body.
			Clean carbon resistors with a small brush. Resistors with discolored bodies cannot be cleaned. Extreme discoloration indicates trouble due to overloading and overheating. See paragraphs 56 and 58 on trouble shooting.	
3	Tubes and sockets (including capacitor sockets).	M	Inspect glass and metal enevlopes and connector clips for accumulation of dirt and corrosion. Replace tubes which have loose envelopes. Check conditions of wires soldered to spring clips. Inspect firmness of tubes in sockets. Inspect tube sockets when tubes are removed.	Never work on tubes immediately after shut-down; severe burns may result.
				Do not jiggle tubes or partially withdraw them; such movements tend to weaken tube pins and spread the contacts in sockets. Be careful when removing tubes from their sockets. Never jar a warm tube.
			Tighten loose connections to sockets. Clean dirty and corroded connections before tightening.	Do not apply too much pressure when tightening locknuts that that hold sockets to insulated bushing. Too much pressure will crack bushings.
			Clean the tubes, when necessary. Use a clean, lint-free, dry cloth to remove dust and dirt from glass or metal envelopes. If sockets and contacts are accessible. use fine sandpaper to remove corrosion, oxidation, and dirt. Wipe off moisture with a clean dry cloth.	Do not use excessive pressure.

*M—Monthly.

c. Electrical Noise Suppressor F–91/U (fig. 12) or Line Filter #RM–8.

Note.—Components in Line Filter #RM–8 are located similarly to those shown for Electrical Noise Suppressor F–91/U in figure 12.

Item No.	What to check	When to check[1]	How to check	Precautions
1	Housing	M	See item 1 of *a* above	Turn power OFF before opening cover of suppressor.
2	Fuses	M	See item 3 of *a* above	Turn power OFF before removing fuses.
3	Capacitors	Q	See item 1 of *b* above	

[1] M—Monthly. Q—Quarterly.

d. Fixed Resistor MX–1024/U (fig. 13) or Resistor Unit #RM–9.

Item No.	What to check	When to check*	How to check	Precautions
1	Housing	M	See item 1 of *a* above	
2	Resistor	M	Inspect coating of resistor for signs of cracks and chipping, especially at ends. Examine body of resistor for blistering, discoloration, or other signs of overheating. Inspect leads for corrosion, dirt, dust, looseness, and broken strands. Check security of mounting. Tighten resistor mounting and connections, if necessary. Clean resistor with a dry cloth. Dampen cloth with solvent (SD) if deposits of dirt are unusually hard to remove. Resistors with discolored bodies cannot be cleaned. Extreme discoloration indicates trouble, probably caused by overloading and overheating. See paragraphs 56 and 58 on trouble shooting.	

*M—Monthly.

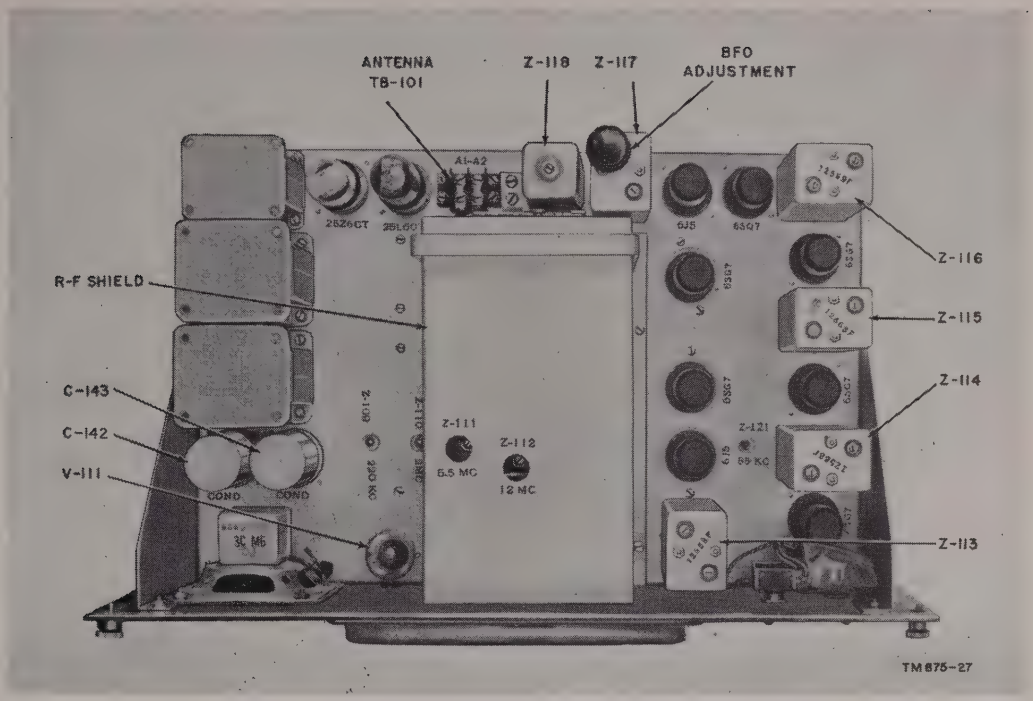


Figure 10. Radio Receiver R–203A/SR, top view of chassis.

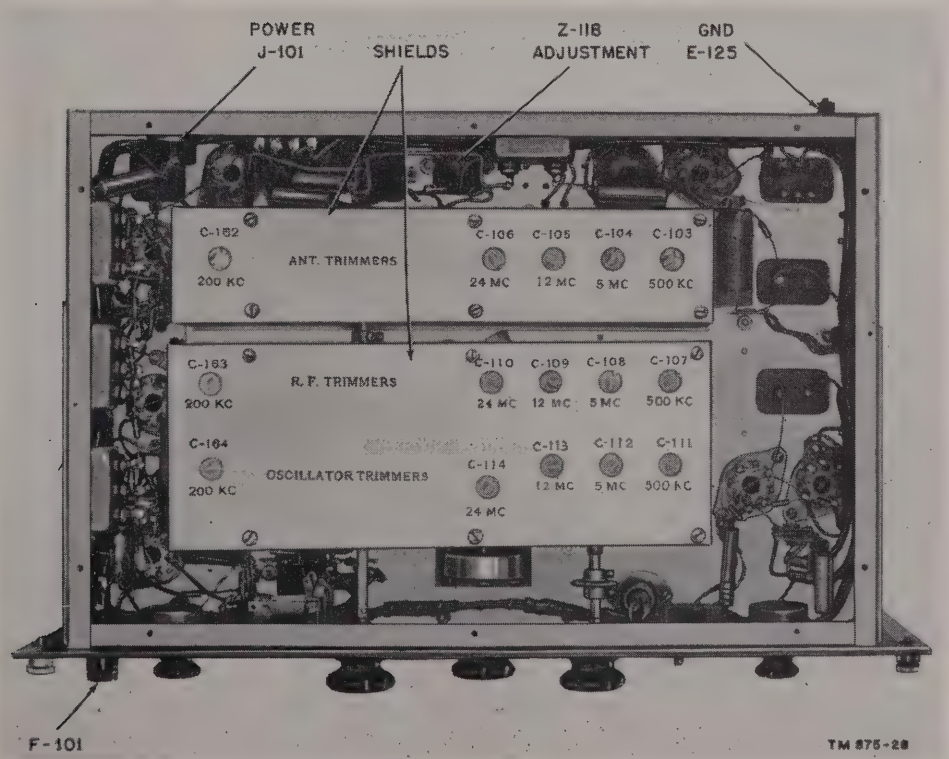


Figure 11. Radio Receiver R–203A/SR, bottom view of chassis with cover plate removed.

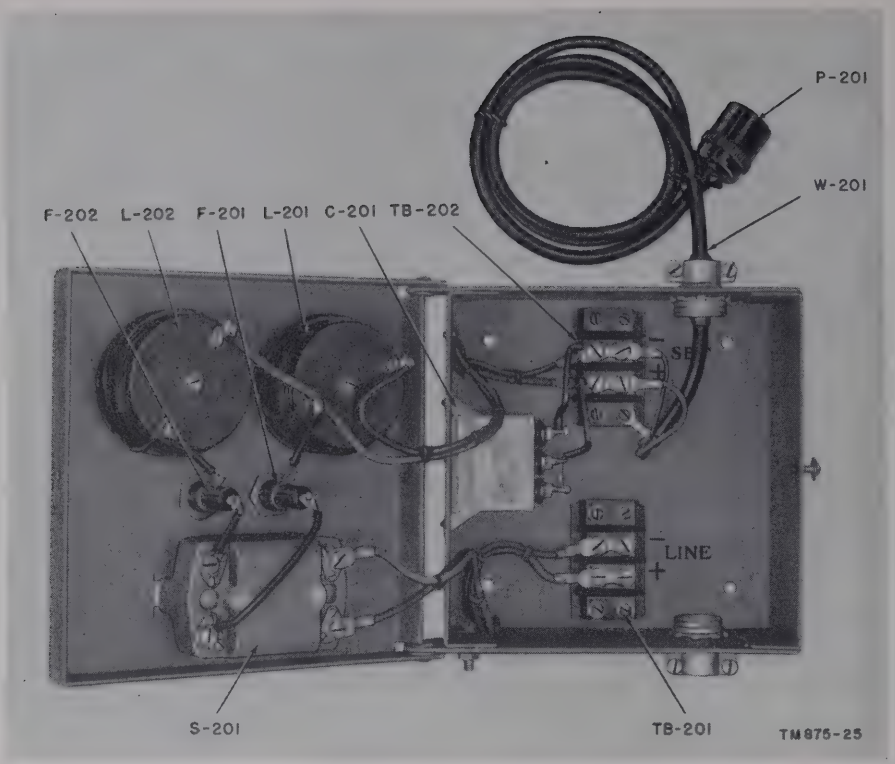


Figure 12. Electrical Noise Suppressor F–91/U, with case open.

Section II. LUBRICATION

31. Detailed Lubrication Instructions

a. General.

(1) No Department of the Army Lubrication Order has been issued for Radio Receiver R–203(*)/SR. The type of lubricant to be used, the interval, and specific instructions for each part requiring lubrication are shown in figures 14 and 15.

Note.—Intervals given are maximum for normal 8-hour day operation. For abnormal conditions or activities, intervals should be shortened to compensate.

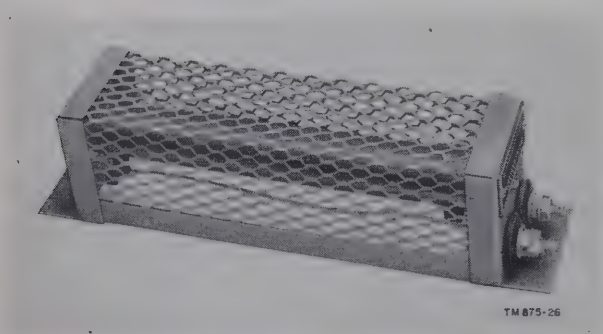


Figure 13. Fixed Resistor MX–1024/U.

(2) Lubricants and points to be lubricated must be clean and free from sand, grit, or dirt. Gasoline will not be used as a cleaning fluid for any purpose. Generally, parts should be cleaned with solvent (SD). Carbon tetrachloride will be used as a cleaning fluid only in the following cases: on electrical equipment where inflammable solvents cannot be used because of fire hazard, and for cleaning electrical contacts including switch contacts, plugs, sockets, etc.

(3) Apply Oil, lubricating, preservative, special (PL–Special) sparingly to springs, and to loops of helical springs, to prevent wear and rust.

b. Dial Mechanism. Remove the receiver from the cabinet or rack. Then remove the r-f shield cover from the variable capacitor (fig. 10). Wipe the gear teeth of the mechanism clean with a lint-free cloth moistened with solvent (SD); then wipe

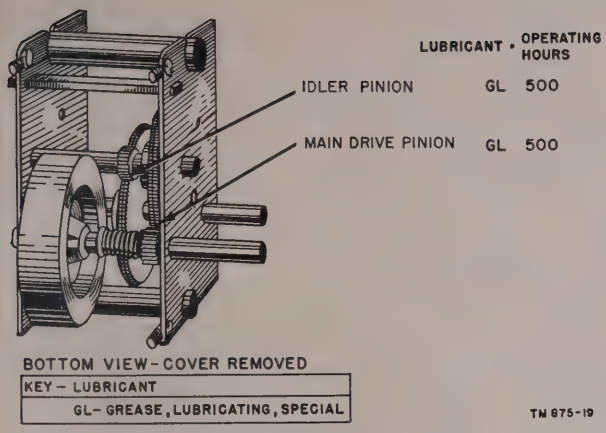


Figure 14. Dial mechanism lubrication.

with a dry cloth and lubricate as indicated in figure 14.

c. Switch and Capacitor Shafts. Remove the receiver from the cabinet or rack; remove the bottom cover plate and then remove the shield covers from the antenna trimmers and the r-f and oscillator trimmers (fig. 11). Wipe the band switch and band spread capacitor shafts and bearings with a lint-free cloth moistened with solvent (SD); then wipe with a dry cloth and lubricate as indicated in figure 15.

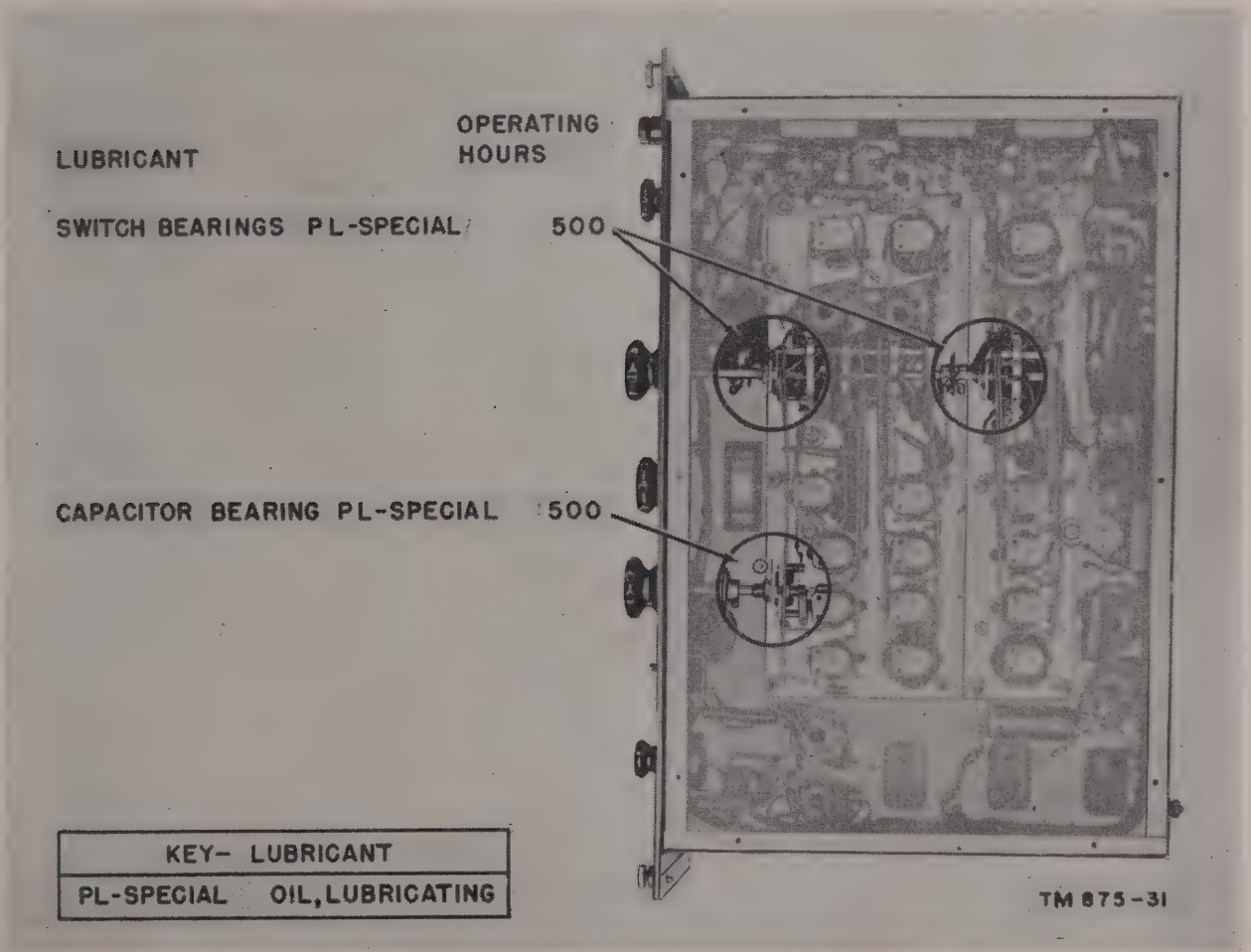


Figure 15. Switch and shaft lubrication.

32. Parts Lubricated by Manufacturer

The following table lists the parts of Radio Receiver R–203(*)/SR which have been lubricated by the manufacturer prior to delivery of the equipment. The subsequent lubrication of these parts is covered in paragraph 31.

Component	Parts lubricated
Radio Receiver R–203(*)/SR.	Dial mechanism gears. Band switch shaft bearings. Band spread capacitor shaft bearing.

Section III. WEATHERPROOFING

33. Weatherproofing

a. General. Signal Corps Equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. Tropical Maintenance. A special moisture-proofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained in TB SIG 13 and TB SIG 72.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66.

d. Desert Maintenance. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained in TB SIG 75.

e. Lubrication. The effects of extreme cold and heat on materials and lubricants are explained in TB SIG 69. Observe all precautions outlined in TB SIG 69 and pay strict attention to all lubrication orders when operating equipment under conditions of extreme cold or heat. Refer to section II of this chapter for detailed instructions.

34. Rustproofing and Painting

a. When the finish on the case has been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces. Use No. 00 or No. 000 sandpaper to clean the surface down to the bare metal. Obtain a bright smooth finish.

Caution: Do not use steel wool. Minute particles frequently enter the case and cause harmful internal shorting or grounding of circuits.

b. When a touch-up job is necessary, apply paint with a small brush. When numerous scars and scratches warrant complete repainting, remove the radio set chassis and spray paint over the entire case. Remove rust from the case by cleaning corroded metal with solvent (SD). In severe cases, it may be necessary to use solvent (SD) to soften the rust, and sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations. See TM 9–2851.

CHAPTER 4

THEORY OF RADIO RECEIVER R–203(*)/SR

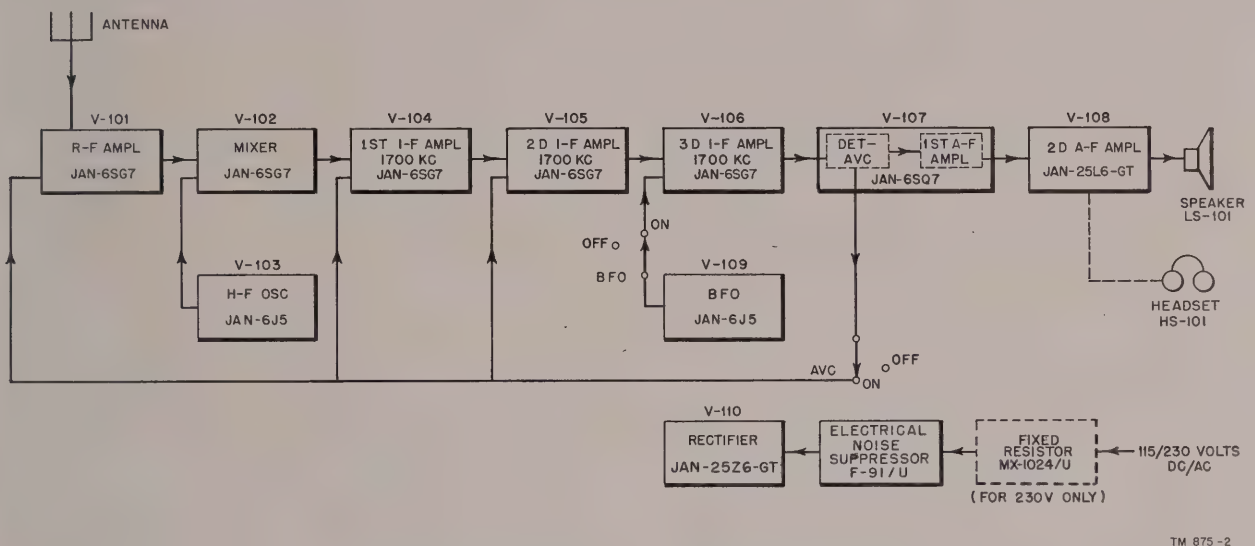


Figure 16. Radio Receiver R–203A/SR, block diagram.

Note.—Complete schematic diagrams of Radio Receivers R–203A/SR and R–203/SR are shown in figures 34 and 35, respectively.

35. Block Diagram
(fig. 16)

The receiver uses a superheterodyne circuit for the reception of c-w or a-m signals in the frequency ranges of 85 to 550 kc and 1.9 to 25 mc. It has five manually tuned frequency bands. The signal path is shown in figure 16.

a. The signal voltage induced in the antenna is amplified by r-f amplifier tube V–101 and fed into the mixer tube, V–102. The r-f amplifier and mixer input circuits are manually tuned to the signal radio frequency. A generated signal, 1,700 kc above or below the received signal, is also fed to the mixer stage from the h-f oscillator tube, V–103. The output circuit of the mixer, V–102, is tuned to the difference frequency (1,700 kc) and this component of the signal is fed to the first i-f amplifier tube, V–104.

b. The i-f amplifier consists of three stages, fixed-tuned to 1,700 kc. The i-f signal is amplified successively in first i-f amplifier tube V–104, second i-f amplifier tube V–105, and third i-f amplifier tube V–106. The output of V–106 is fed, at the intermediate frequency, to the diode portion of detector-avc-first a-f (audio-frequency) amplifier tube V–107.

c. The signal is rectified in the diode section of detector-avc-first a-f amplifier tube V–107 and coupled, through the a-f gain control, to the triode section of V–107 where the audio component is amplified. The audio output of V–107 is then further amplified in second a-f amplifier tube V–108, and fed to loudspeaker LS–101, or to the headset HS–101. (The headset is not supplied in Radio Receiver R–203/SR.)

d. Voltage for avc is developed across a portion of the diode load resistor in the circuit of V–107 (fig. 20). This voltage, fed through the AVC OFF-ON switch in the ON position, controls the amplification of r-f amplifier tube V–101 and i-f amplifier tubes V–104 and V–105.

e. For reception of continuous waves, bfo tube V–109 functions as a c-w generator at a frequency of 1,700 kc plus or minus approximately 1 kc. With the BFO OFF–ON switch in the ON position, the output from V–109 is coupled to the grid

of the third i-f amplifier tube, V–106, so as to mix with the intermediate frequency in that stage and produce an audio tone in the output.

f. Power from the 115- or 230-volt, a-c or d-c source is passed through Electrical Noise Suppressor F–91/U (Line Filter #RN–8 in Radio Receiver R–203/SR) to remove r-f noise which may be on the power line. For 230-volt operation, the line voltage is first dropped to approximately 115 volts by inserting Fixed Resistor MX–1024/U (Resistor Unit #RM–9 in Radio Receiver R–203/SR) in the line. Filaments of all tubes are connected in series with a resistor and across the 115-volt line (fig. 34). When a-c supply is used, tube V–110 rectifies the ac for the plate and screen circuits of the receiver. When the power supply is dc, V–110 remains in the circuit and merely conducts the current for the plate and screen circuit.

36. R-f Amplifier
(fig. 17)

a. When a doublet antenna is used, it is connected through antenna terminals A1 and A2 to i-f filter Z–118. This filter is series-tuned to 1,700 kc, the receiver intermediate frequency, by a combination of adjustable iron-core inductance variation and selection of proper fixed capacitors, to provide high i-f rejection. The signal is fed through resistor R–130 and the band switch, S–101, to the primary of the antenna r-f transformer. Resistor R–130 assists in keeping radiation from the h-f oscillator to the antenna at a minimum. Section 2, front and rear, of the band switch, S–101, selects the primary of the antenna r-f transformer, Z–119, Z–101, Z–102, Z–103, or Z–104 (fig. 34) for the desired frequency band. On bands 1 and 2, the l-f (low-frequency) bands, the doublet leads are connected together by the band switch and the antenna is used as a T type instead of a doublet. When a single-wire antenna is used,, it is connected to antenna terminal A1, and terminal A2 is left open.

b. The chassis of this receiver is not directly grounded to the power-supply system. B minus (B−) circuits are grounded through capacitors to the chassis. In Radio Receiver R–203A/SR, the chassis is to be connected to the ship's ground at terminal E–125 for a rack-mounted set, or through a spring contact and terminal E–124 on the cabinet (fig. 34) when the cabinet is used. (The ground stud on Radio Receiver R–203/SR does not have a reference symbol; refer to paragraph 15 for grounding instructions.)

c. The secondary of the antenna r-f transformer is tuned to the signal frequency by the antenna portion of capacitor C–101. This capacitor consists of three 10 to 218 uuf (micromicrofarad) sections and three 9 to 187 uuf sections all driven by the MAIN TUNING knob. The antenna section (furthest from the panel in figure 25), consists of one 218-uuf (front section) and one 187-uuf (rear) section which serve to tune the r-f transformer, Z–119, Z–101, Z–102, Z–103, or Z–104 as selected for the proper band by band switch S–101, section 1, front (fig. 34). This switch section also connects the two tuning-capacitor sections in parallel for tuning the three lower bands, and the 10- to 218-uuf section alone for tuning the two upper frequency bands. Section 1, rear, of band switch S–101 (fig. 34) shorts all unused r-f transformer secondaries to ground. Trimmer capacitors C–162, C–103, C–104, C–105, and C–106 (fig. 34) are used to aline the r-f transformers at the high end of the respective bands. On band 5, an additional fixed capacitor, C–153, is used for trimming. Fixed capacitor C–151 is a series padder used to aline the highest band, where the h-f oscillator is tuned 1,700 kc below the radio frequency (par. 38).

d. The r-f signal voltage is fed through C–123, the bias-blocking capacitor, to the control grid (pin 4) of the r-f amplifier, V–101, a Tube JAN–6SG7. Grid bias is furnished through grid resister R–101, which is connected to the avc circuit or to B− (zero volts) by the AVC switch. Cathode bias and, therefore, the gain of this stage (as well as that of the first two i-f stages) is controlled by R. F. GAIN potentiometer R–111. The potentiometer is bypassed to r-f and i-f by capacitor C–156, and r-f choke L–103 also acts to keep high frequencies out of this circuit. Capacitor C–124 bypasses the cathode to ground. Resistor R–102 furnishes a minimum bias for this stage.

e. Plate and screen voltages for this stage are fed from the +92-volt supply through the decoupling filter consisting of resistor R–103 and capacitor C–125, directly to the screen at pin 6 of V–101 and to the plate (pin 8) through the primary of the r-f interstage transformer and the band switch. Section 4, front, of band switch S–102 selects the primary of the proper r-f interstage transformer (Z–120, Z–105, Z–106, Z–107, or Z–108), and switch section 4, rear, shorts out the primaries not being used (fig. 34).

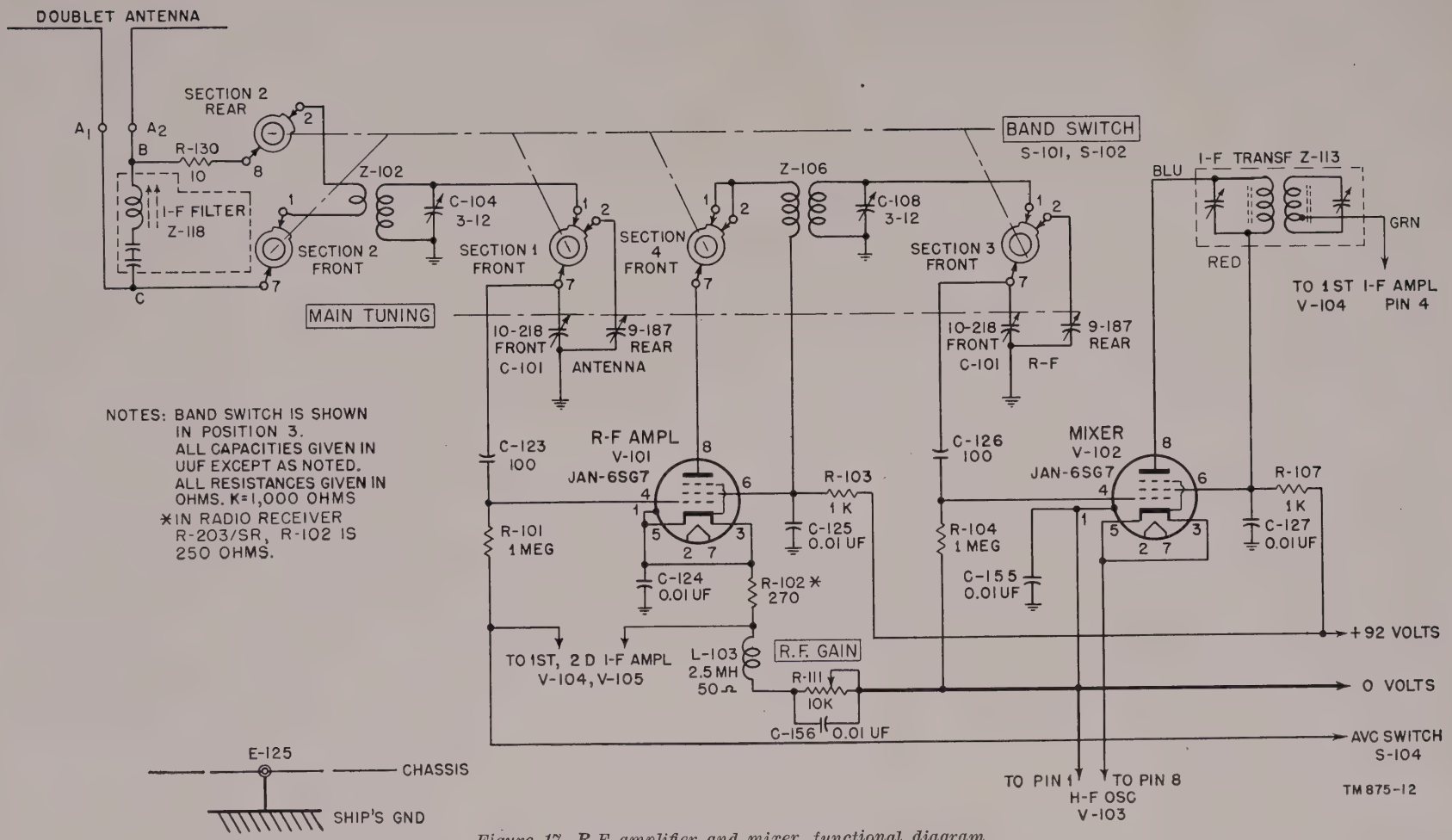


Figure 17. R-F amplifier and mixer, functional diagram.

37. Mixer
(fig. 17)

a. The signal is inductively coupled to the secondary of the r-f interstage transformer in the grid circuit of the mixer, V–102, a Tube JAN–6SG7. The proper r-f transformer secondary and proper section of tuning capacitor C–101 (r-f portion) are selected by section 3, front, of band switch S–101 (fig. 34), while switch section 3, rear, grounds out the secondaries of the transformers not being used. Trimmer capacitors C–163, C–107, C–108, C–109, and C–110 are used to aline the r-f transformer secondaries at the high end of the respective bands. On band 5, an additional fixed capacitor, C–152, is used, to give proper trimmer range. Padder capacitor C–118 allows the h-f band (5) to be alined 1,700 kc above the h-f oscillator frequency (par. 38).

b. Signal voltage from the r-f interstage transformer secondaries is fed through bias-blocking capacitor C–126, to the control grid (pin 4) of the mixer tube, V–102. Grid-leak bias is developed across grid resistor R–104 which is returned directly to the B− lead. Cathode bias is developed across resistor R–105 in the common cathode circuit of the mixer and the h-f oscillator (fig. 18, par. 38). Capacitor C–119 bypasses R–105.

c. R-f voltage from the h-f oscillator (par. 38) is injected at the cathode, pins 5 and 3, of V–102. Capacitor C–119 (fig. 18) provides a return for the radio frequency. The r-f signal from V–101 and the injected voltage from the h-f oscillator are combined internally in mixer tube V–102, the output of which is tuned to the difference (intermediate) frequency, 1,700 kc. Output is developed across the tuned (1,700 kc) i-f interstage transformer, Z–113, which in turn feeds the grid of the first i-f amplifier tube, V–104. Plate and screen voltages for mixer V–102 are supplied from the +92-volt supply through the decoupling filter consisting of resistor R–107 and capacitor C–127.

38. H-f Oscillator
(fig. 18)

a. The h-f oscillator, V–103, uses a Hartley circuit with the plate of Tube JAN–6J5 grounded to rf. Injection of oscillator voltage into the mixer circuit is by means of the common cathode connection of tubes V–102 and V–103. The oscillator operates 1,700 kc above the signal frequency on bands 1, 2, 3, and 4 and 1,700 kc below the signal frequency on band 5.

b. Sections 1 and 2 of the band switch, S–102, select the proper coil and capacitor combination for the various frequency bands. Both the 218-uuf and the 187-uuf sections of MAIN TUNING capacitor C–101, oscillator portion, are connected for band 3, while the 218-uuf section alone is selected for bands 1, 2, 4, and 5 by section 1, front, of S–102. This same switch section also selects the proper oscillator coil (Z–121, Z–109, Z–110, Z–111, or Z–112) (fig. 34) for the band. Capacitors C–161, C–115, C–116, and C–117 are connected as series padders on bands 1, 2, 3, and 4, respectively. Band switch section 1, rear, shorts out the coils not being used.

c. The BAND SPREAD capacitor, C–102, is in parallel with the 218-uuf oscillator section of C–101 for all bands, although it has little effect on the three lower bands. It is used to vary the oscillator frequency slightly; thus giving finer tuning adjustment on the h-f bands. This capacitor may also be used for beat-note adjustment of c-w signals. It should normally be set at 0 when tuning in a signal and used for close tuning only after adjustment of the MAIN TUNING dial has been completed.

d. The oscillator coils are provided with individual iron cores, adjustable for alinement of the oscillator at the low ends of the bands, and trimmer capacitors (C–164, C–111, C–112, C–113, and C–114) (fig. 34), for alinement at the high ends of the bands. Additional fixed trimmers, C–159, C–150, and C–154, are used on bands 1, 2, and 3; in Radio Receiver R–203/SR, C–145 is used on band 4 (fig. 35). The variable trimmers are of the zero-temperature-coefficient type, while the fixed trimmers and smaller fixed padder capacitors are of the negative-temperature-coefficient type. Thus, particularly on the higher frequency bands, the oscillator is *temperature stabilized* because the negative-temperature-coefficient capacitors compensate for the normally expected expansion of other components so as to minimize oscillator frequency drift. This feature, in combination with voltage regulation as covered in *f* below, insures that the oscillator frequency (hence dial tuning) will remain substantially fixed after a short initial warm-up period.

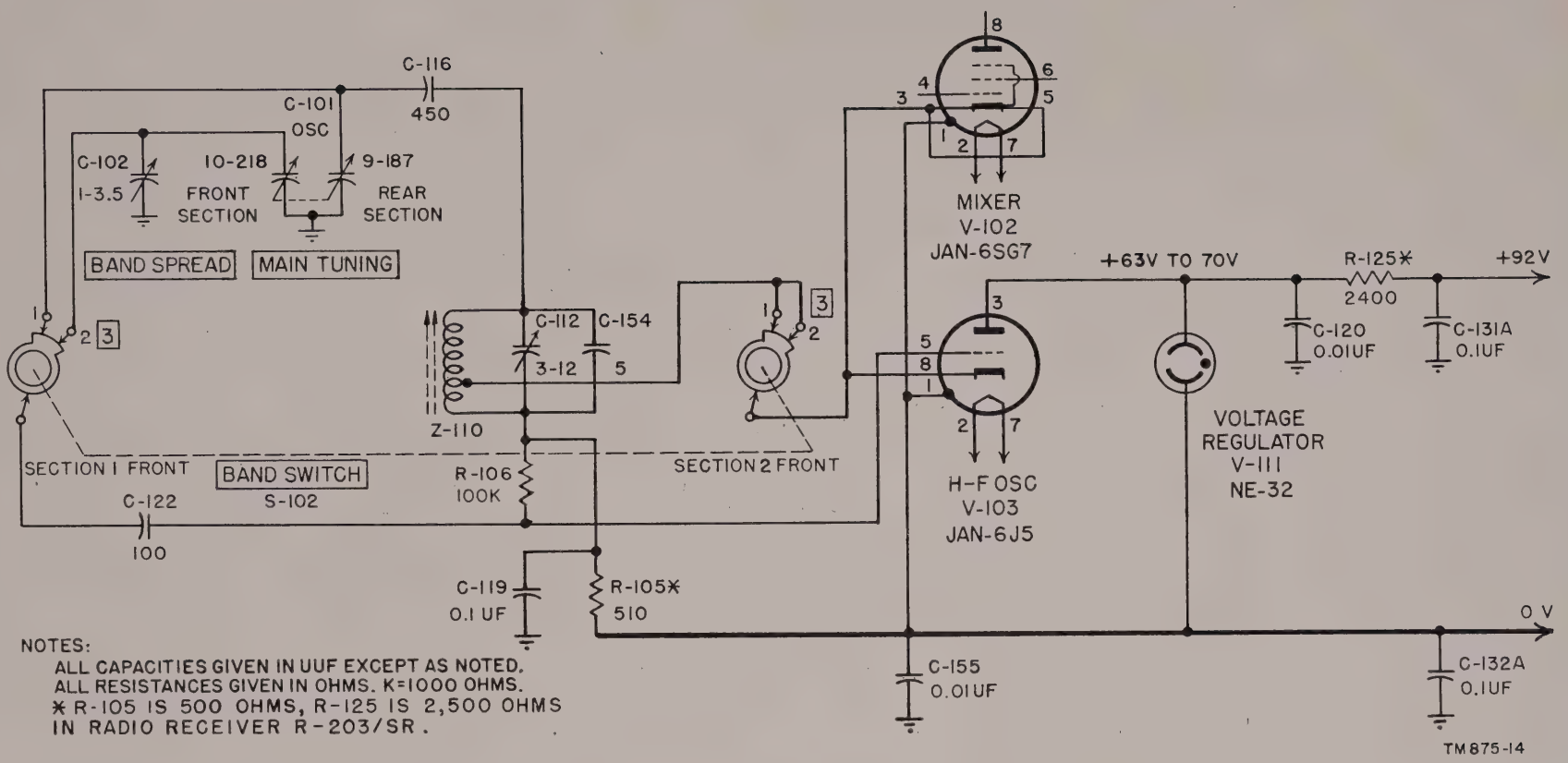


Figure 18. H–f oscillator, functional diagram.

e. Section 2, front, of band switch S–102 connects the tap on the proper oscillator coil to the cathode of h-f oscillator V–103. Section 2, rear, of band switch S–102 (fig. 34) grounds the taps not being used through capacitor C–119. Resistor R–105 provides cathode bias, and resistor R–106 is the grid-leak resistor. Capacitor C–122, in conjunction with R–106, maintains the grid-leak bias and also blocks the dc from the tuned r-f circuits. The shell of h-f oscillator tube V–103, as well as that of the mixer, V–102, is grounded to rf by capacitor C–155, which also helps to prevent radiation from the oscillator circuits from getting back to the antenna.

f. The plate of the h-f oscillator receives power from the +92-volt supply through decoupling and voltage-dropping resistor R–125. Capacitor C–120 grounds the plate to rf and assists in decoupling, thus preventing radiation as well. Voltage regulator, V–111, a neon lamp, is connected directly between the plate of V–103 and the B− lead of the power supply. This neon lamp, by drawing current sufficient to maintain a constant voltage across it, maintains the plate voltage of the h-f oscillator at a substantially constant value (approximately 67 volts) for wide variations in supply voltage. This close regulation of the plate voltage contributes greatly toward maintaining oscillator frequency stability. One section each of capacitors C–131 and C–132 keeps rf out of the power supply by placing both sides of the line at r-f ground.

39. I-f Amplifier
(fig. 19)

a. The i-f amplifier consists of three similar stages, V–104, V–105, and V–106, using Tubes JAN–6SG7. The i-f transformers are fixed-tuned to a frequency of 1,700 kc. Use of this intermediate frequency insures good image rejection, particularly in the lower frequency bands.

b. The signal is supplied at the intermediate frequency from the plate of the mixer tube, V–102, through the i-f interstage transformer, Z–113, to the grid (pin 4) of the first i-f amplifier tube, V–104. The primary and secondary of Z–113 are individually tuned to 1,700 kc by adjustable trimmer capacitors within the i-f shield. The grid connection is provided by a tap on the transformer secondary. This results in less loading on V–102 and gives a closer impedance match to the grid of V–104. Capacitor C–128 and resistor R–108 decouple the grid circuit from the avc bus, with capacitor C–128 providing an r-f return to cathode. Resistor R–108 returns the grid to the B− side of the power supply either through the avc circuit when AVC OFF–ON switch S–104 (fig. 34) is in the ON position, or directly when the AVC OFF-ON switch is in the OFF position. Bias from the avc circuit (S–104 in the ON position) supplements the cathode bias developed across resistor R–109 and the R. F. GAIN control. As explained in paragraph 36d, the r-f gain circuit includes R. F. GAIN control R–111, in series with r-f choke L–103 and bypassed by capacitor C–156. One section of capacitor C–129 bypasses L–103 to ground the r-f gain line; a second section of C–129 bypasses the minimum bias resistor, R–109. The r-f gain circuit controls the bias and, therefore, the amplification (sensitivity) of the r-f amplifier and the second i-f amplifier as well as that of the first i-f amplifier, V–104.

c. The amplified i-f signal output of V–104 is fed from the plate (pin 8) of the tube to the primary of the second i-f interstage transformer, Z–114. Plate and screen voltages are supplied from the positive 92-volt source through the decoupling filter consisting of resistor R–110 and capacitor C–129. The screen (pin 6) voltage is applied directly, and the plate is fed through the primary of transformer Z–114.

d. The second i-f stage, using tube V–105, is identical to the first i-f stage. The secondary of tuned i-f transformer Z–114 feeds i-f voltage to the grid (pin 4) of V–105. Resistor R–112, bypassed by capacitor C–130 and connected to the avc circuit, furnishes avc voltage. Resistor R–113, bypassed to ground by one section of capacitor C–131 and connected to the r-f gain circuit, furnishes cathode bias. Output from the plate (pin 8) of V–105 is fed through the primary of the third i-f interstage transformer, Z–115, to the grid of the following amplifier, V–106. The plate and screen decoupling filter consists of resistor R–114 and another section of capacitor C–131.

e. The third i-f stage, using tube V–106, is similar to the first two, but differs in that avc is not applied and provision is made for injecting the bfo voltage. I-f interstage transformer Z–115 (identical to Z–113 and Z–114) feeds i-f signal voltage to the grid (pin 4) of the third i-f amplifier, V–106. No grid resistor is used. Resistor

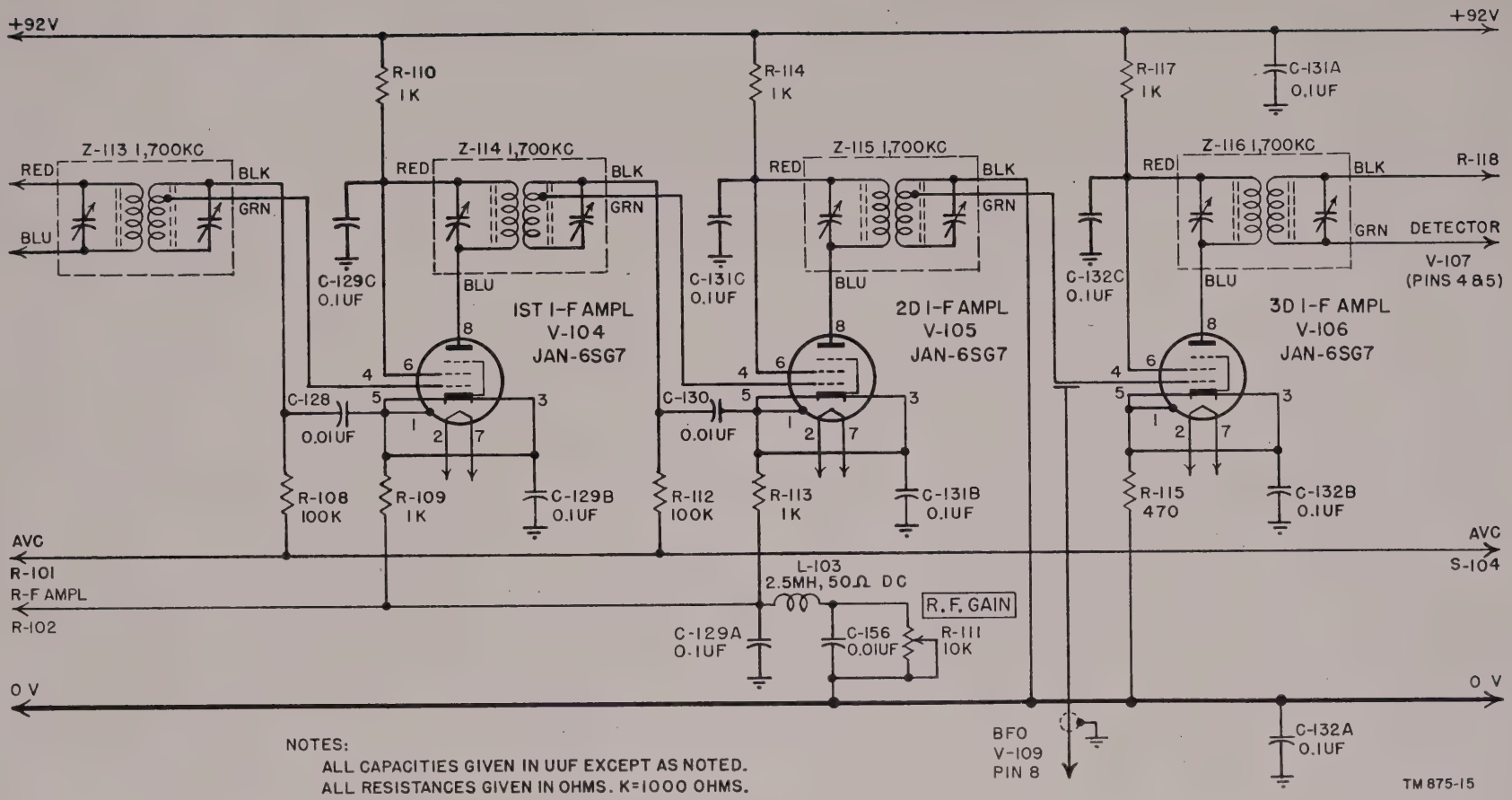


Figure 19. I-f amplifier, functional diagram.

R–115, bypassed to ground by one section of capacitor C–132, develops cathode bias and is connected directly to the B− side of the power supply. The bfo voltage is capacitively coupled through a shielded wire from pin 8 of the bfo tube, V–109, to the grid lead of V–106. This capacitive coupling is very small and actually consists of a solder lug strung over the insulated grid lead of V–106 and soldered to the end of the shielded wire.

f. The output of V–106 is fed from pin 8 through the diode input transformer, Z–116, to the detector, V–107. This transformer is similar to the i-f interstage transformers, Z–113, Z–114, and Z–115, but has no tap on the secondary. It is double-tuned to 1,700 kc by adjustable capacitors within the coil shield, the same as the other i-f transformers. Plate and screen voltages for V–106 are fed through decoupling resistor R–117, bypassed at the plate and by another section of capacitor C–132. The third sections of capacitors C–132 and C–131 are used to bypass the negative and positive sides, respectively, of the power supply to ground.

40. Detector, Avc, and First A-f Amplifier
(fig. 20)

a. Rectification of the i-f signal is performed in the diode section of detector-avc-first a-f amplifier tube V–107, a Tube JAN–6SQ7. The i-f signal is fed from the secondary of diode-input transformer Z–116 to the diodes (pins 4 and 5) of V–107. The diode load consists of resistors R–118 and R–119 in series. Capacitor C–134 bypasses the i-f back to the cathode. Capacitor C–135 further bypasses resistor R–119 to insure that no radio frequency gets into the avc circuit. The part of the audio voltage which is developed across the resistor R–119 is used to supply audio signal to the first a-f amplifier part of V–107.

b. The voltage developed across R–119 is also fed to the avc filter consisting of resistor R–116 and capacitor C–133. The filter removes the audio component, leaving a d-c voltage which is used for avc action. The avc voltage is then fed through AVC OFF-ON switch S–104 (when in the ON position) to the grid resistor of r-f amplifier V–101, first i-f amplifier V–104, and second i-f amplifier V–105.

c. The audio component of the voltage across resistor R–119 is coupled through capacitor C–136 to the A. F. GAIN potentiometer, R–120, and then through the bias-blocking capacitor, C–137, to the grid (pin 2) of the triode amplifier section of V–107. Leads to potentiometer R–120 are shielded and the shields are grounded to the negative side of the power supply. R–121 is the grid resistor for the amplifier section of V–107. Amplified audio output from V–107 is fed from the plate (pin 6) through coupling capacitor C–139 to the grid of the second a-f amplifier, V–108. Plate voltage for the detector-avc-first a-f amplifier tube, V–107, is fed from the +92-volt supply through the plate load resistor, R–122, to the plate (pin 6) of the amplifier section of V–107. Capacitor C–138 acts as an i-f bypass across the plate load. A section of capacitor C–131 and a section of C–132 bypass the positive and negative sides of d-c supply to ground (par. 39).

41. Second A-f Amplifier and Output
(fig. 21)

a. Detector-avc-first a-f amplifier V–107 is resistance-capacitance coupled to the second a-f amplifier, V–108, a Tube JAN–25L6–GT. From pin 6 of V–107 the audio signal is fed through coupling capacitor C–139 to the grid (pin 5) of V–108. The grid resistor for V–108 is R–123. Seven volts bias for the grid of the second a-f amplifier, V–108, is obtained from the negative side of the supply line ahead of the rectifier filter (par. 43). Resistor R–126 and electrolytic capacitor C–140 filter the bias supply. The cathode of V–108 is connected directly to the B− side of the power supply after the filter.

b. Audio output from the plate (pin 3) of V–108 is fed to the output transformer, T–101. The primary is shunted by capacitor C–141, which bypasses higher audio frequencies which would add to the noise output without increasing intelligibility. Plate and screen voltage for V–108 is furnished from the +92-volt supply, directly to the screen, pin 4, and through the primary of T–101 to the plate, pin 3.

c. Output transformer T–101 has two secondaries: a 500-ohm secondary for the headset, and a 4-ohm secondary for the speaker. The two telephone jacks, J–102 and J–103, are grounded on one side and connected in parallel to the 500-ohm secondary of T–101. A headset (HS–101 in Radio Receiver R–203A/SR) may be plugged into either of these jacks. (No headset is supplied with Radio Receiver R–203/SR.) Permanent-magnet loudspeaker LS–101 is connected to the 4-ohm second-

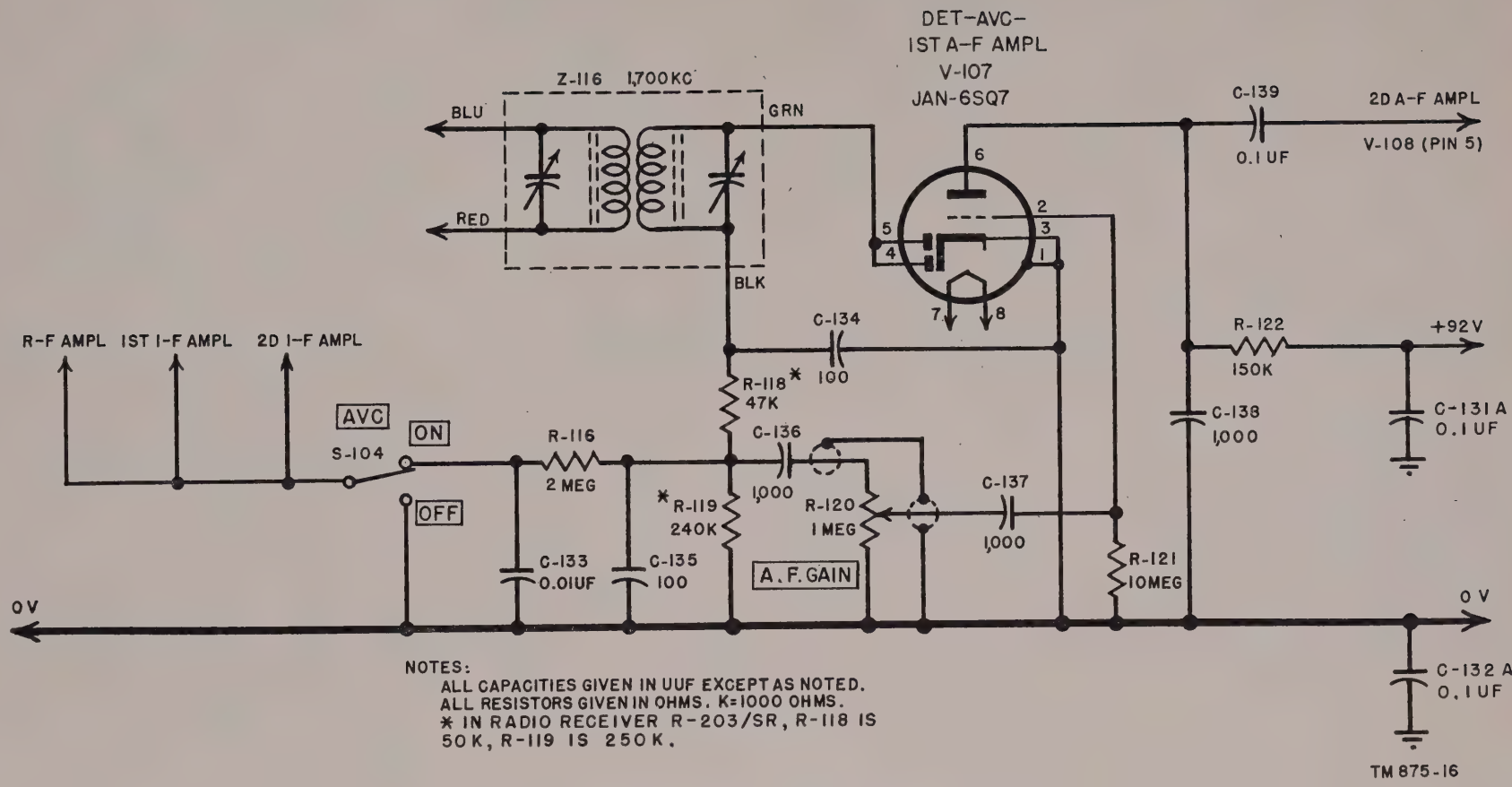


Figure 20. Detector, avc, and first a-f amplifier, functional diagram.

ary of transformer T–101 through the LOUDSPEAKER OFF-ON switch S–105, in the ON position. In the OFF position, switch S–105 places resistor R–128 across the 4-ohm secondary of transformer T–101, in order to maintain proper loading when the speaker is not being used.

42. Beat-frequency Oscillator

(fig. 22)

a. When c-w signals are being received, a bfo is used to generate a local signal which differs from the intermediate frequency by approximately 800 cps (cycles per second). This local signal is injected into the grid of the third i-f amplifier and, by beating with the intermediate frequency, gives an audio difference frequency which can be heard in the loudspeaker or headset. Bfo V–109 uses Tube JAN–6J5 in a grounded-plate Hartley circuit. The bfo assembly, Z–117, consists of a coil, tunable with trimmer capacitors, and a grid-leak resistor with shunt capacitor to produce bias. One end of the bfo coil connects to r-f ground at the shell (pin 1) of V–109, and the other end connects, through the grid-leak resistor and capacitor, to the grid (pin 5). A tap on the coil connects to the cathode (pin 8) of V–109. Output is taken from this point and is fed through a shielded lead (shield grounded at bfo end) to the third i-f amplifier, V–106. The bfo voltage is capacitively coupled to the grid of V–106 as described in paragraph 39*e*.

b. One of the bfo assembly (Z–117) trimmer capacitors may be screw-driver adjusted to tune the assembly to 1,700 kc plus or minus approximately 800 cps. The bfo tuning, and hence the beat note, may be varied over a limited range by adjusting the knob on the top of the bfo assembly (fig. 7). This knob controls the second trimmer capacitor.

c. The plate of V–109 is returned to the B– bus by capacitor C–121 which has low impedance for radio frequencies. Plate voltage is supplied through dropping and isolating resistor R–124 when the BFO OFF-ON switch, S–103, is in the ON position. In the OFF position, S–103 disconnects the +92-volt supply, making the bfo inoperative. Positive and negative voltage supply lines are grounded to rf and af through capacitors C–131 and C–132 (par. 39).

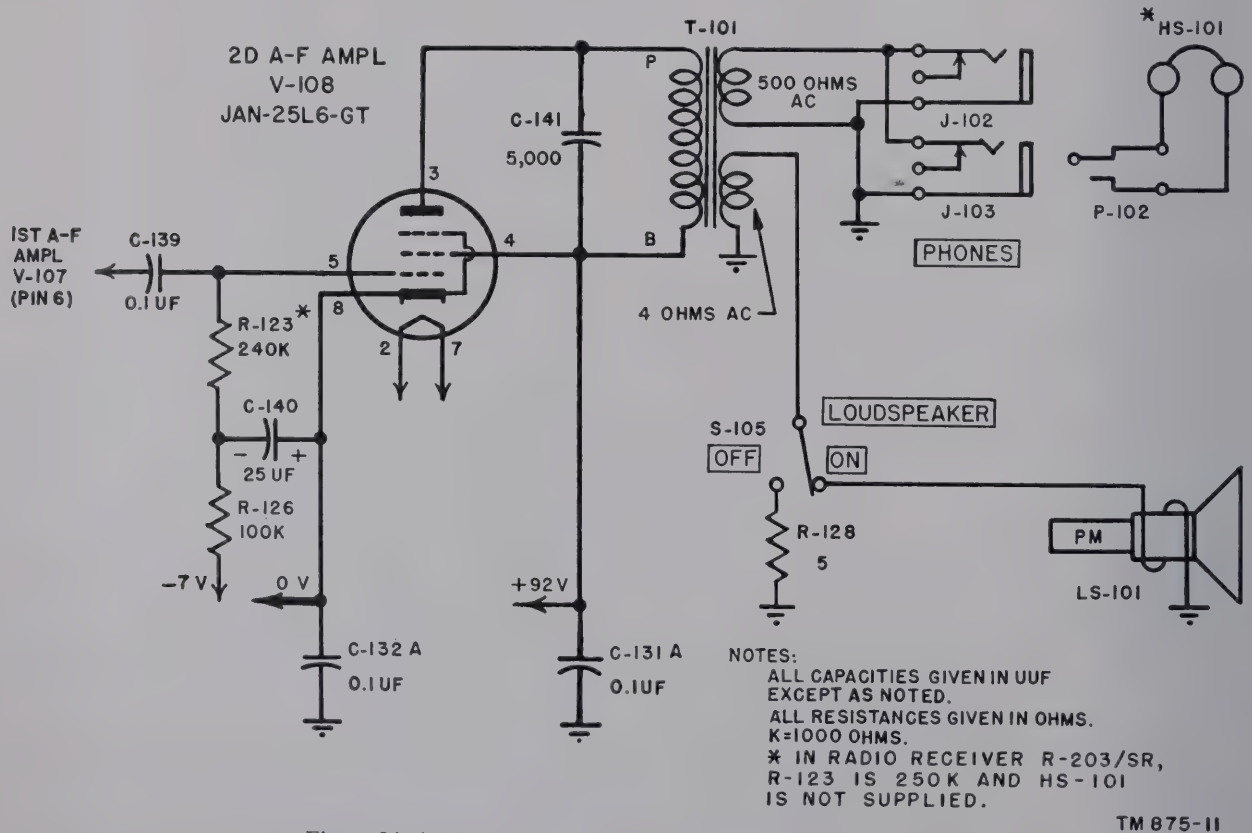


Figure 21. Audio output circuits, functional schematic diagram.

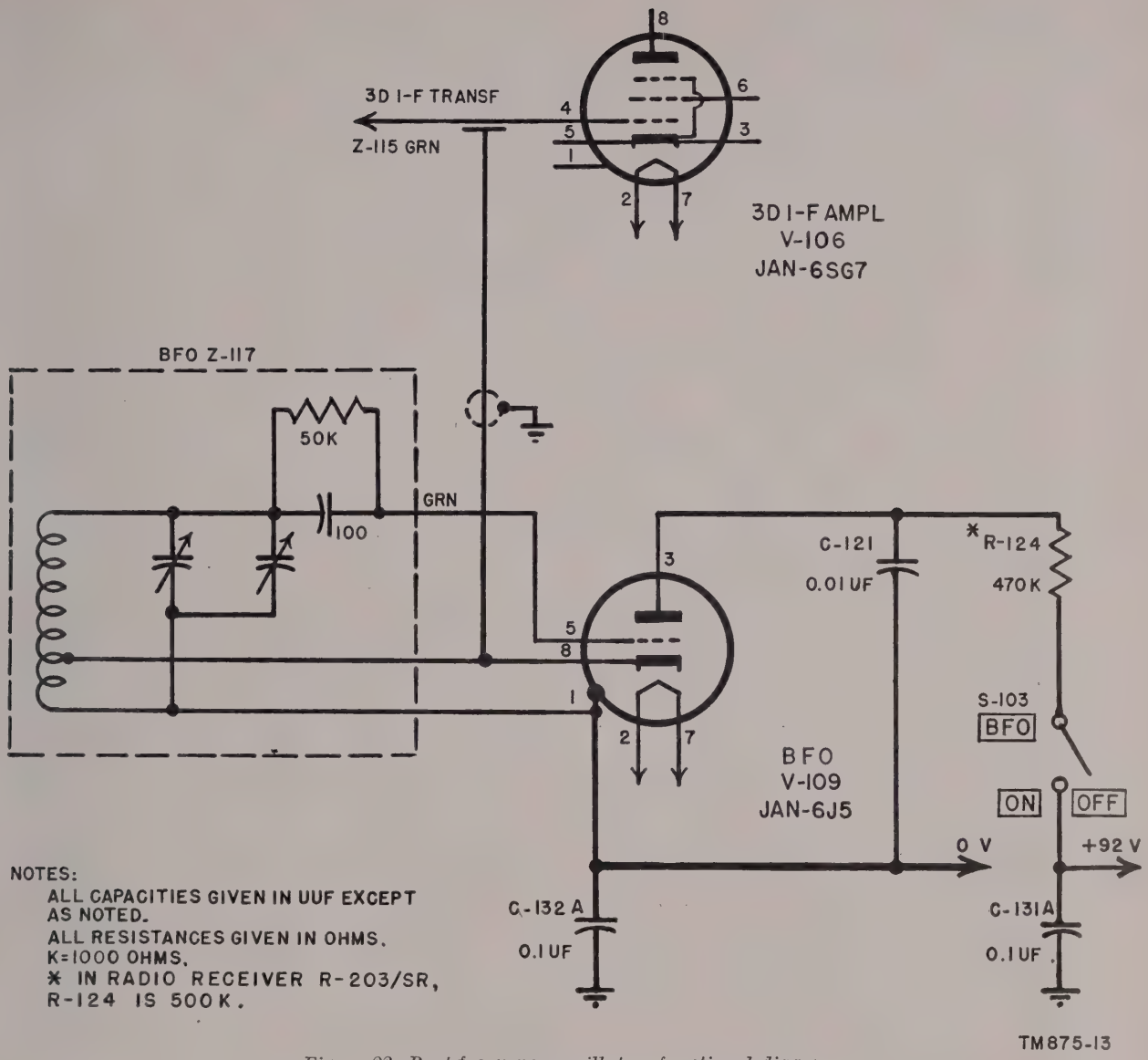


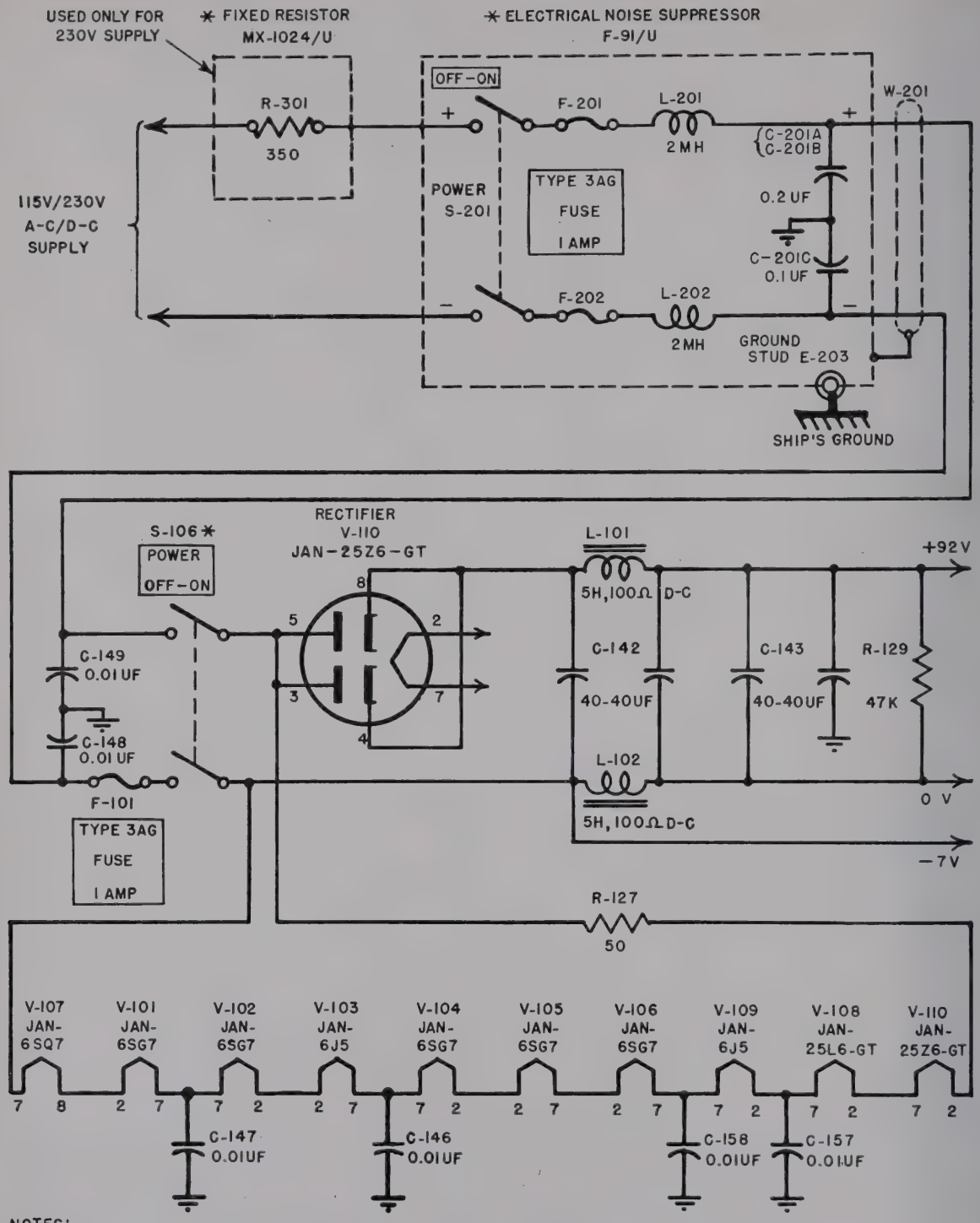
Figure 22. Beat-frequency oscillator, functional diagram.

43. Rectifier and Power Circuits

(fig. 23)

a. The power supply circuits for Radio Receiver R–203A/SR include Fixed Resistor MX–1024/U, Electrical Noise Suppressor F–91/U, the rectifier and filter, and the vacuum-tube filament circuits. (In Radio Receiver R–203/SR, Line Filter #RM–8 and Resistor Unit #RM–9 are used in place of the noise suppressor and fixed resistor.) The receiver operates on either d-c or a-c. Power may be supplied from the ship's power line at 230 or 115 volts. For a 230-volt source, resistor R–301 (350 ohms in Radio Receiver R–203A/SR, 375 ohms in Radio Receiver R–203/SR) is connected into one side of the power line (the positive side when d-c is used). The resistor drops the voltage applied to Electrical Noise Suppressor F–91/U (or Line Filter #RM–8) to approximately 115 volts. For a 115-volt source, the line voltage is applied directly to the input terminals of the noise suppressor (or line filter), the fixed resistor not being used.

b. Electrical Noise Suppressor F–91/U is a separate unit containing the line power OFF-ON switch and the r-f coils and capacitors used to filter out any r-f noise which may be on the power supply line. Power at 115 volts is applied to input



NOTES:

ALL RESISTOR VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
ALL CAPACITOR VALUES IN UUF UNLESS OTHERWISE SPECIFIED.
*IN RADIO RECEIVER R-203/SR LINE FILTER UNIT RM-8 AND RESISTOR UNIT RM-9(325 OHMS) ARE USED; IN SOME UNITS S-106 IS GANGED TO RF GAIN CONTROL R-111.
K=1,000 OHMS.

TM 875-10

Figure 23. Rectifier and power circuits.

terminals on terminal board TB–201 (fig. 34) and, when d-c power is used, polarized as marked on the diagram. After passing through the power switch, S–201, in the ON position, and the fuses, F–201 and F–202, the power is fed to r-f filter chokes L–201 and L–202, one in each side of the line. Filter capacitor C–201, consisting of three 0.1-uf (microfarad) sections, has two sections connected from one side of the line (the positive side for d-c) to ground and one section from the negative side of the line to ground to act as the r-f bypass for the filter. Shielded power cable W–201 is attached to the output terminals on terminal board TB–202 (fig. 34) and connects to receptacle J–101 at the back of the receiver, through polarized plug P–201 attached to the other end of the cable.

Note.—Line Filter #RM–8 is essentially the same as Electrical Noise Suppressor F–91/U. The terminal boards are designated H–201 and H–202 instead of TB–202 and TB–201, respectively.

c. Additional line noise suppression is provided in the receiver unit by capacitors C–148 and C–149, each connected from one side of the line to ground at polarized receptacle J–101. Fuse, F–101 in the negative side of the line protects against overloads, and POWER OFF-ON switch S–106 provides OFF-ON control of filament and plate power for the receiver.

d. When an a-c supply is used, rectifier V–110, a Tube JAN–25Z6–GT, connected in one side of the line, acts as a half-wave rectifier producing d-c voltage for the plates and screens of the receiver tubes. The two plates (pins 3 and 5) of V–110 are connected in parallel to one contact of the power switch, S–106, and d-c power is taken from the two cathodes connected in parallel. A capacitance-input filter reduces the ripple voltages in the d-c supply to a minimum. One section of plug-in type capacitor C–142 is connected across the d-c input. The other section of this capacitor is connected across the output of the filter chokes, L–101 and L–102, one of which is in each side of the d-c line. A second plug-in filter capacitor, C–143, having one section connected across the d-c supply and the other connected from the plus (high) side of the line to ground, further assists in reducing the ripple. The d-c output from the filter (about 92-volts dc) provides plate and screen power for tubes V–101 through V–109. Resistor R–129 acts as a bleeder on the plate supply. A tap is taken off ahead of the filter choke, L–102, in the negative side of the line to provide 7 volts negative bias for the second a-f amplifier, V–108 (par. 41). When the receiver is used with a d-c power supply, rectifier V–110 functions as a conductor and the d-c supply is filtered in the same manner.

e. The heaters (filaments) of all 10 vacuum tubes, V–101 through V–110, are connected in series; through voltage-dropping resistor R–127 and across the 115-volt line at power switch S–106. Capacitors C–146, C–147, C–157, and C–158 provide filtering for the heater circuits and are placed at points in the circuit where they assist in preventing radiation from the h-f oscillator.

CHAPTER 5

FIELD MAINTENANCE INSTRUCTIONS

Note.—This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available and by the skill of the repairman.

Section I. PREREPAIR PROCEDURES

44. Tools, Materials, and Test Equipment

Tools, materials, and test equipment needed for performing the prerepair procedures are listed below:

Tool Equipment TE–113: (Individual Radio and Radar Repairman's Tool Equipment) or equal.

Cleaning fluid (SD): Solvent, dry-cleaning; Federal spec. P–S–661a.

Tube Tester I–177.

Voltohmmeter TS–294/U: Portable; electronic; 5 a-c v ranges, 6 d-c v ranges; 6 steps 0.1 to 1,000 meg; sensitivity, 1,000 ohms per v on a-c ranges; power supply 110–120 v, 50–60 cyc ac.

45. Removal of Pluck-Out Parts

a. Removing Tubes.

(1) Loosen the two thumbscrews at the front of the top cover and lift the cover.

(2) Make sure the tubes have cooled sufficiently; then pull all the tubes from their sockets (fig. 7). Do not rock or jiggle a tube in its socket if it can be extracted by a direct upward pull. Rock it *gently* if it does not release easily. Jiggling a tube during removal spreads the socket contacts. Label each tube as soon as it is removed so that it can be replaced later in its proper socket.

b. Removing Electrolytic Capacitors. With the cover open, remove the plug-in type capacitors from the two sockets located just behind the loudspeaker (fig. 7). Follow the same instructions as given for removal of tubes in *a* (2) above.

c. Removing Fuses. There are three fuses labeled FUSE; one located on the front panel of the receiver (fig. 8), and two on the front cover of the noise suppressor (fig. 9), or line filter. Turn the fuse-holder caps one-half turn counterclockwise and extract the fuses and holders. Remove the fuses from their holding sleeves and replace the caps in the fuse-holder sockets.

d. Removing Neon Lamp Voltage Regulator. With the cover open, remove the neon lamp voltage regulator (fig. 7) by pushing it down and rotating it one-quarter turn counterclockwise.

46. Cleaning

After the pluck-out parts are removed from the receiver, clean the receiver and the removed parts. Refer to paragraphs 28 and 29 for cleaning materials, tools, and instructions.

47. Testing

a. Test all moving parts for ease of motion. Binding and scraping may be eased by a light application of No. 0000 sandpaper. Corrosion or dirt will interfere with electrical continuity and mechanical efficiency by shorting or insulating circuits, or by jamming moving parts. Switches must work easily with no searching for contacts. Examine and clean the following parts before operating the receiver:

(1) Tube sockets.

(2) Switches; mountings, shafts, and bearing.

(3) Dial assembly and dial drive.

(4) Variable capacitors and trimmers.

(5) Variable controls and shafts.

(6) Lamp and electrolytic–capacitor sockets.

(7) Phone jacks.

(8) Knurled thumbscrews for fastening cover and front panel.

b. Resolder leads known to be loose or broken. Replace all items that appear broken upon inspection.

c. If the main tuning dial gearing or pointer does not operate properly, refer to paragraph 60 for adjustment instructions.

d. Test all items removed, in accordance with instructions in paragraph 45, as follows:

(1) Inspect and/or check the fuses and vacuum-tube filaments for electrical continuity, using Voltohmmeter TS–294/U, or an equivalent meter. Test all tubes, using Tube Tester I–177 or an equally reliable tester.

(2) Inspect the electrolytic capacitors for possible leakage of electrolyte or corrosion of the cases. Connect each section of these dual capacitors in turn to the voltohmmeter and, after the first swing of the meter needle (caused by charging of the capacitor), read the leakage resistance. With meter scale set at RX10,000 the meter should not read less than 5 (50,000 ohms) for a good capacitor.

Note.—Connect pin 1 or pin 3 on the capacitors to the plus (+) side of the voltohmmeter when making the above measurements.

48. Lubrication

Field maintenance personnel will perform the following lubrication operations:

a. Dial Mechanism. See paragraph 31.

b. Switch and Capacitor Shafts. See paragraph 31*c*.

49. Reassembling Receiver

Replace the tubes, fuses, electrolytic capacitors, and the voltage regulator, which were removed in accordance with instructions given in paragraph 45. Be sure that the tubes are put back in the correct sockets (fig. 7).

Section II. TROUBLE LOCATION

50. Trouble-Shooting Procedure

The first step in servicing a defective radio receiver is to sectionalize the fault. Sectionalization means tracing the fault to the *major component or circuit* responsible for the abnormal operation of the receiver. 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. However, the majority of faults must be localized by *checking voltage and resistance.*

a. Sectionalization. Careful observation of the performance of the radio receiver on the various bands and while operating the various controls may sectionalize the fault to a particular stage or circuit. For normal operating indications, refer to paragraph 25. For additional sectionalizing of the fault, refer to paragraphs 54 and 58.

b. Localization. Paragraphs 55 through 61 describe the method of localizing faults within the individual stages or circuits. These paragraphs are accompanied by a trouble-shooting chart which lists abnormal symptoms and their probable causes. The chart also gives the procedure for determining which of the probable locations is the exact one. In addition, figure 24 shows the normal resistance and voltage at each socket pin connection.

51. 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:

Fig. No.	Description
12	Electrical Noise Suppressor F–91/U, case open.
24	Radio Receiver R–203(*)/SR, tube socket voltage and resistance diagram.
25	Radio Receiver R–203A/SR, top view of chassis with shield removed.
26	Radio Receiver R–203A/SR, bottom view of chassis with shields removed.
34	Radio Receiver R–203A/SR, schematic diagram.
35	Radio Receiver R–203/SR, schematic diagram.

52. Test Equipment Required for Trouble Shooting

The test equipment required for trouble shooting Radio Receiver R–203(*)/SR follows.

Test equipment	Description	Use
Signal Generator TS–588/U	R-f signal generator; 9.5 kc to 30 mc; 110-v, 60-cyc operation.	Alinement of r-f and i-f circuits; signal tracing.
Audio Oscillator TS–382/U	A-f signal generator; 110-v, 60-cyc operation	Audio circuit checks.
Output Meter TS–585/U	Output meter; 0.1 to 500 mw; −10 to +17 dbm; impedance 2.5 to 20,000 ohms, adjustable in 40 steps.	Measure receiver output.
Voltohmmeter TS–294/U	Multimeter; electronic; 5 a-c v ranges, 6 d-c v ranges, 6 steps 0.1 OHM to 1,000 megohms; sensitivity, 1,000 ohms per v on a-c ranges; power supply 110–120 v, 50–60 cyc ac.	Voltage and resistance measurements.
Dummy load	Resistor, wire and plug; comp resistor, 600 ohms ±5% 2 w; twisted pair, 2 #14 AWG cond, rubber and cotton braid ins; Plug PL–55, telephone type.	Dummy load when output meter is used.
Capacitors	Capacitor, mica, 0.01 uf ±20%, 400 v. Capacitor, mica, 200 uuf ±10%, 600 v.	Isolate signal generator.

53. General Precautions

Whenever the receiver is to be serviced, observe the following precautions:

a. When making measurements with d-c power on, be careful not to touch the incoming power terminals.

Warning: Severe electric shock may be caused by d-c voltages as low as 100 volts if conditions are such that current flow is great.

b. Before touching any part in the set after power has been removed, discharge the 40-uf section of capacitor C–143, between pin 7 and the chassis.

c. Careless replacement of parts often makes new faults inevitable. Note the following points:

(1) Before a part is unsoldered, note the position of the leads. If the part, such as an r-f transformer, has a number of connections, tag each of the leads to it.

(2) Be careful not to damage other leads by pulling or pushing them out of the way.

(3) Do not allow drops of solder to fall into the set; they may cause short circuits. If solder does drop into the set, remove the solder immediately, as it is very often forgotten.

(4) Keep the hot soldering iron away from other parts; excessive heat may damage them.

(5) A carelessly soldered connection may create a new fault. It is very important to make a well-soldered joint; a poorly soldered joint is one of the most difficult faults to find.

(6) When a part is replaced in r-f or i-f circuits, place it in exactly the same position as the original one. A part which has the same electrical value but different physical size may cause trouble in h-f circuits. Give particular attention to grounding when replacing a part. Use the same ground point as in the original wiring. Failure to observe these precautions may result in decreased gain, oscillation of the circuit, or increase in the radiation of the h-f oscillator.

54. Sectionalization of Trouble

Before a defective part can be exactly located in the radio receiver, the stage or circuit in which the fault occurs must be isolated. The first step is to operate the equipment as described in the equipment performance checklist (par. 25). Note any deviations from the normal indications and take remedial action as suggested in the checklist. If the fault is not found or identified, proceed with the checks as outlined in the trouble-shooting chart (par. 58*a* items 1 through 9). If the tubes do not light, make a power supply check as described in paragraph 57.

55. Localization of Trouble

All of the tests in this section will aid in isolating the source of trouble. To be effective, follow the procedure in the order given. Remember that servicing should cause no further injury to the receiver. After the trouble has been isolated in a stage or circuit, as described in paragraph 54, the

exact location of the faulty part or circuit is found by the following service procedure:

a. Visual Inspection. The purpose of visual inspection (par. 56) is to locate any visible trouble. Through this inspection alone, the repairman may frequently discover the trouble, or determine the circuit in which the trouble exists. This inspection is valuable in avoiding additional damage to the receiver which might occur through improper servicing methods and in forestalling future failures.

b. Power Supply Test. The power supply test (par. 57) prevents further damage to the receiver from possible short circuits and checks that filaments of vacuum tubes are intact. Since this test gives an indication of the operation of the power control and noise suppressor circuits, its function is more than preventive.

c. Operational Test. The operational test is basically useful for sectionalizing trouble, but should also aid in localization of certain types of trouble. Operate the equipment in accordance with the equipment performance checklist (par. 25). In order to fully utilize the information obtained in this test, all symptoms must be interpreted in relation to each other.

d. Trouble-Shooting Chart. The trouble symptoms in items 1 through 7 in this chart (par. 58*b*) will aid greatly in localizing trouble.

e. Signal Substitution. The principal advantage of the signal substitution or signal tracing method (par. 60) is that it usually enables the repairman to localize a trouble accurately and quickly to a given stage when the general location of the trouble is not immediately evident from the above tests.

f. Stage Gain Chart. These charts (par. 61) can be used to localize obscure, hard-to-find troubles.

g. Intermittents. In all these tests, do not overlook the possibility of intermittents. If present, this type of trouble often may be made to appear by tapping or jarring the set. It is possible that the trouble is not in the receiver itself but in the installation (mounting, antenna system, or ship's electrical equipment), or possibly the trouble is due to external conditions. In this event, test the installation, if possible.

56. Visual Inspection

When a receiver is brought in from the field for check or repair, remove the cabinet and bottom cover and inspect the receiver as follows:

a. Examine for burned insulation and resistors. Examine for wax leakage and any discoloration of apparatus and wire.

b. Inspect for broken connections to tube sockets, plugs, and other apparatus as well as for defective soldered connections. Examine for bare wires touching the chassis or other wires.

c. Be sure that the labels on the tubes in the various sockets correspond to the correct tube numbers for these positions as given in the manual. Replace or interchange any tubes which have the wrong numbers. Inspect for loose tube sockets.

d. Inspect the fuses. Check carefully for short circuits whenever a receiver with a blown fuse is found.

e. Inspect the dial mechanism for loose or bent parts. Be sure that the dial turns smoothly and the controls operate satisfactorily.

f. Inspect the power plug and replace or repair it if there are any bent or broken prongs.

g. Inspect for loose or missing screws, especially those which fasten the tube sockets in place.

57. Power Supply Test

The power supply test prevents further damage to the receiver from possible short circuits, and it checks the filaments of the tubes. The test requires Voltohmmeter TS–294/U or an equivalent a-c, d-c voltohmmeter of at least 1,000 ohms-per-volt with a range of about 150 volts. Remove the receiver from the cabinet, place it on one end, and remove the bottom dust cover. Place all switches in the OFF position.

Warning: When using dc, do not touch the line terminals because severe electric shock may result.

a. With 115 volts dc or ac connected to the input terminals of Electrical Noise Suppressor F–91/U (or Line Filter #RM–8) place the power switch on the suppressor in the ON position and check the d-c or a-c voltage across the line at receptacle J–101 in the receiver. If dc, check that polarity is correct by comparing with the schematic diagram (fig. 34). If no voltage appears at J–101, turn the power off and check the noise suppressor connections, fuse, and switch. Also check cable W–201 and plug P–201. If the trouble is not located, check the noise suppressor coils for continuity and the capacitors for shorts, using an ohmmeter.

b. If voltage at J–101 reads approximately 115 volts, turn the POWER OFF-ON switch ON and

check that the tube filaments are all lighted. This may be done visually or by feeling each tube after about a minute warm-up period. Since all filaments are connected in series, an open in one will extinguish all the others. To locate a defective tube, replace each of the 10 tubes, *one at a time*, with a spare tube of the correct type. Turn the POWER OFF-ON switch to OFF each time a tube is removed and replaced. Be careful in handling hot tubes. If tubes do not light after changing all 10, check resistor R–127 for an open and check socket connections to all filaments.

c. With the voltmeter set on the 150-volt d-c scale, check the voltage between pin 4 and pin 8 on rectifier tube V–110, and the negative side of the line at fuse F–101 or receptacle J–101. The voltage should be approximately 98 volts. If there is no voltage (or very low voltage), check rectifier tube V–110, and plug-in capacitors C–142 and C–143 for short circuits. If there is low voltage, check that capacitors C–142 and C–143 are not open.

d. Check the voltage across filter reactor (choke) L–102, using the 150-volt d-c scale. If the voltmeter reads approximately 115 volts, the reactor is open; if the voltmeter reads much less than 6 volts, reactor turns are shorted.

e. Check the voltage between pins 3 and 1 on capacitor C–143. If there is no voltage, filter reactor L–101 is open or capacitor C–143 or C–142 is shorted. If L–101 is not open, check, as in *d* above, that it is not shorted.

58. Trouble-Shooting Charts

The following charts are supplied as an aid in locating trouble in the radio receiver. These charts list the symptoms which the operator or serviceman may observe, either visually or audibly, while making a few simple tests. The charts also indicate how to sectionalize trouble quickly to the audio, i-f, or r-f stages of the receiver. The signal substitution tests outlined in paragraph 60 can then be used to supplement this procedure and to determine the defective circuit. A tube check and voltage and resistance measurements of this circuit should ordinarily be sufficient to isolate the defective part.

a. Sectionalizing Trouble.

Symptom	Probable trouble	Correction
1. POWER OFF-ON switch in ON position. Receiver inoperative. Pilot light out.	1. Open fuse F–101, F–201, or F–202.	1. Replace fuse. If it blows again, check filter capacitors C–142 and C–143.
	When operating on d-c supply, polarity may be wrong.	Reverse polarity of input to the noise suppressor.
	Connecting leads to fuse holders or switches broken.	Repair leads.
	Defective part in noise suppressor or power supply circuits.	Make power supply test as in paragraph 57.
		Repair or replace defective parts.
2. No receiver output	2. Defective tube filament	2. Replace tube.
Pilot lamp lighted.		See par. 57*b*.
Tube filaments not lighted	Defective filament wiring	Check connections to all sockets and repair.
	Defective resistor R–127	Replace resistor.
3. No receiver output. Pilot lamp lighted.	3. Defective stage	3. Determine which stage is defective by checking items 5 through 9 and correct it.
4. Receiver operative but excessive hum in loudspeaker.	4. When operated on ac, a ground on positive (high) side of line.	4. Reverse polarity of input to noise suppressor to put ground on low side of line.
		Note.—This receiver should be operated with the line ungrounded if possible; therefore, remove any accidental line grounds as soon as discovered.
	Defective filter	Check and repair as described in par. 57 *c*, *d*, and *e*.
	Defective speaker	Check by comparing with hum in headset with LOUDSPEAKER OFF-ON switch OFF. Replace speaker if defective.

Symptom	Probable trouble	Correction
5. No click in loudspeaker when pin 2 of V–107 is shorted to chassis.	5. Defective a-f stage	5. Use a headset with 0.01-uf capacitor in series with one lead, across grid circuits of V–107 and V–108 in turn, to localize defective stage. Proceed per *b* below. An alternate method is to use signal substitution in the audio stages (par. 60).
6. With 1,700-kc modulated signal from signal generator coupled to pin 4 of V–102 through 200-uuf capacitor, BFO switch OFF, and audio stages checked, no signal output in loudspeaker.	6. Faulty i-f or detector stage	6. Localize to particular stage and correct as in *b* below. Alternately use signal substitution (par. 60) in i-f stages.
7. No voltage reading on Voltohmmeter TS–294/U connected across h-f oscillator grid resistor R–106.	7. Defective h-f oscillator stage.	7. Check tube and replace if defective. Use signal substitution (par. 60) to locate defective part or wiring and replace.
8. With r-f signal from signal generator connected through 200-uuf capacitor, across antenna terminals A1 and A2, no output in loudspeaker after a-f, i-f, and h-f oscillator stages have checked as satisfactory.	8. Defect in antenna, r-f amplifier, or mixer.	8. Localize trouble as in subparagraph *b* below and then use signal substitution, if necessary to locate defective part.
9. Receiver output satisfactory with signal generator connected to antenna terminals, but output weak on received signals, using antenna.	9. Open or loosen antenna lead Faulty antenna connection or leakage across antenna installation.	9. Repair antenna lead. Check and repair connections and clean antenna insulators, if necessary.

b. Localizing Trouble.

Symptom	Probable trouble	Correction
1. Signal weak when fed to input of a stage but strong when fed in at plate of same stage.	1. Defective tube Open decoupling or voltage-dropping resistor. Tube socket voltages incorrect because of resistor or capacitor failure. Shorted plates on variable capacitor or trimmer capacitor.	1. Test and replace tube, if necessary. Replace defective resistor. Locate fault by signal tracing and replace faulty part. Separate plates or replace capacitor.
2. Signal strong when fed at grid of one stage but weak when fed to plate of preceding stage.	2. Defective interstage coupling (r-f or i-f transformers open, shorted, or misalined). Open band switch contacts (in r-f stages).	2. Replace or realine coupling transformer. Repair or replace defective section.
3. Reception weak With absence of signal, roaring noise is not heard with A. F. GAIN and R. F. GAIN at maximum.	3. Weak tubes Low plate or screen voltage caused by shorted capacitor in the screen or plate circuit.	3. Replace tubes. Check voltages and replace parts, if necessary.
4. Reception distorted	4. Open grid resistor or leaky capacitor in audio circuits.	4. Use signal tracing to check grid circuits and measure resistances to locate faulty component. Replace faulty component.
5. Noisy or fading reception	5. Faulty gain control Faulty antenna Line noise—faulty noise suppressor.	5. Check slider contact on A. F. GAIN and R. F. GAIN controls. Check antenna installation for poor connections and leakage to ground. Check filter capacitors and coil connections in Electrical Noise Suppressor F–91/U.

Symptom	Probable trouble	Correction
6. Objectionable hum in output	6. Leaky or open filter capacitors in power supply circuit.	6. Check each capacitor by disconnecting the positive lead from each section and charging each section individually, then discharging by shorting to chassis, using insulated-handle screw driver. Capacitors not giving sizeable spark should be replaced.
7. Intermittent noise	7. Defective tube, resistor, or capacitor.	7. With an insulated prod, gently tap and slightly move all tubes, resistors, capacitors, and soldered connections to locate loose elements or loose connections.
8. Oscillation (indicated by whistle or howl).	8. Defective tube, poor shielding, interstage coupling, or high-resistance soldered chassis return.	8. Check tubes and shunt bypass capacitors with capacitors of equal value.

Note.—Shorted bypass and filter capacitors give various indications, depending upon the ground system used. Refer to the emergency trouble-shooting information (par. 59) for the various symptoms.

59. Emergency Trouble-Shooting Information

Note.—The following instructions are for emergency use aboard ship only.

a. Procedures. The symptoms for various shorted capacitors are described in *b* below. If symptoms indicate that one of these capacitors is defective, and time or lack of replacement makes it impossible to replace the defective component, disconnecting the receiver chassis from ship's ground will often allow the receiver to operate. Normally the ship's ground connection should be maintained and any defective capacitor replaced.

Note.—If the receiver is rack-mounted, disconnecting the ship's ground connection from the receiver will have no effect unless the rack is also insulated from ground. In the cabinet-mounted receiver, the rubber shock mounts provide the insulation.

b. Symptoms and Defects.

(1) When the positive side of the supply line is grounded external to the receiver, a reversed polarity of approximately 15 volts appears across pins 5 and 7 of capacitor C–143. This causes no particular immediate harm and the receiver will operate, but ultimately that section of the capacitor will lose its capacity and act as a high d-c resistance. Every effort should be made to remove the positive ground.

(2) If either capacitor C–146 or C–147 is short-circuited, and the negative side of the ship's line is grounded, the receiver will not operate. A shorted capacitor C–146 will extinguish the filaments of V–101, V–102, V–103, and, on all but early models of Radio Receiver R–203/SR, V–107. A shorted capacitor C–147 will extinguish the filament of V–101 and, on all but early models of Radio Receiver R–203/SR, the filament of V–107. The other tubes will receive excessive filament voltage. On ships where there is a midpoint ground (ground detector lamps used) a shorted C–146 or C–147 will extinguish one of the ground detector lamps, cause higher filament voltage on the tubes mentioned above, and cause lower filament voltage on the remaining tubes. The receiver will still operate under these conditions, but the defective capacitor obviously should be replaced.

(3) If either capacitor C–157 or C–158 shorts, and the negative side of the ship's line and the receiver chassis are grounded, the 25-volt tubes (V–108 and V–110) will probably burn out. If the positive line is grounded, the 25-volt filaments will be extinguished and the remaining tubes will receive excessive filament voltage and possibly burn out. With a midpoint ship's ground, the receiver will still operate.

(4) If capacitor C–120 is shorted and the negative side of the ship's line is grounded, resistor R–125 in the oscillator

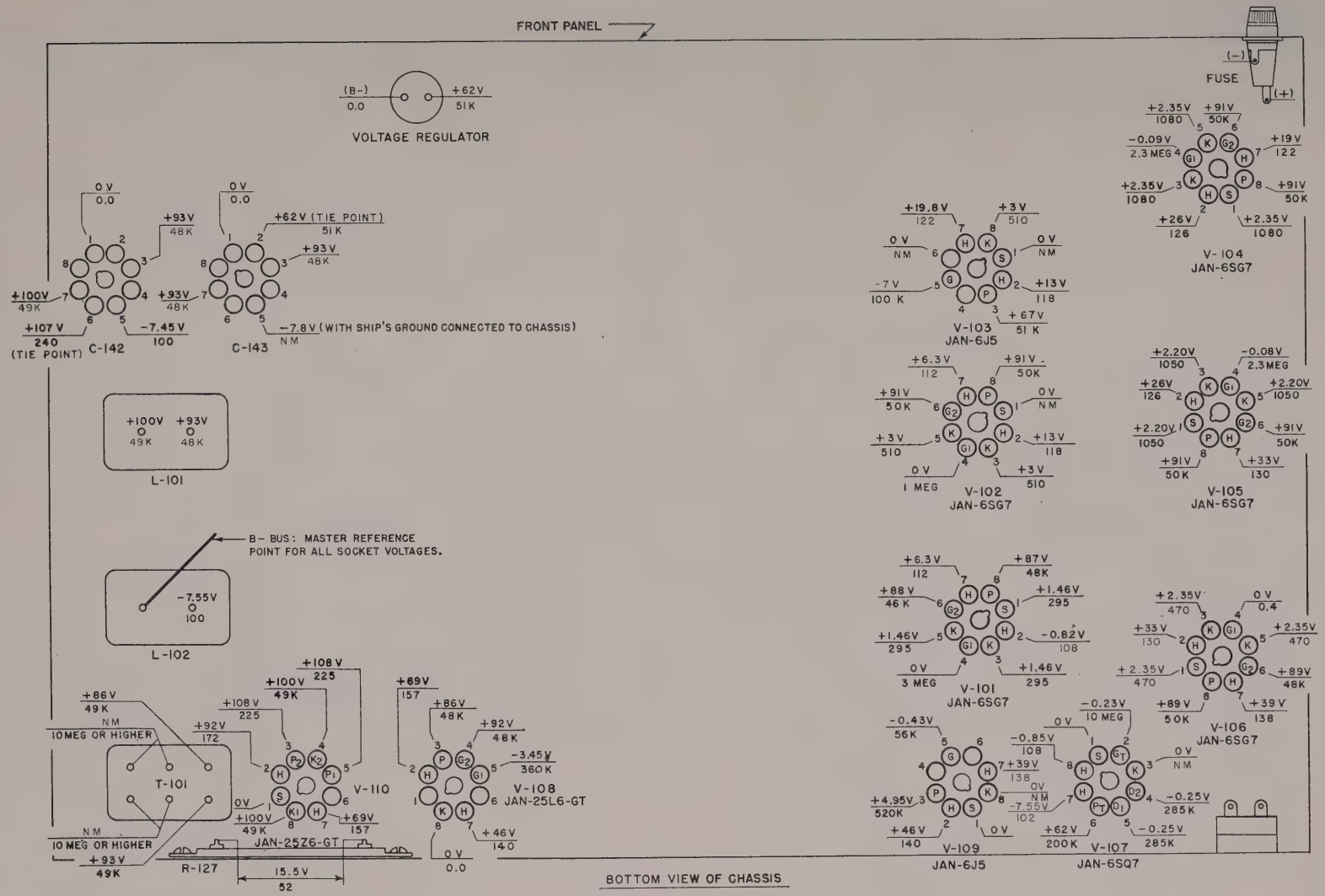


Figure 24. Radio Receiver R-203(*)/SR, tube socket voltage and resistance diagram.

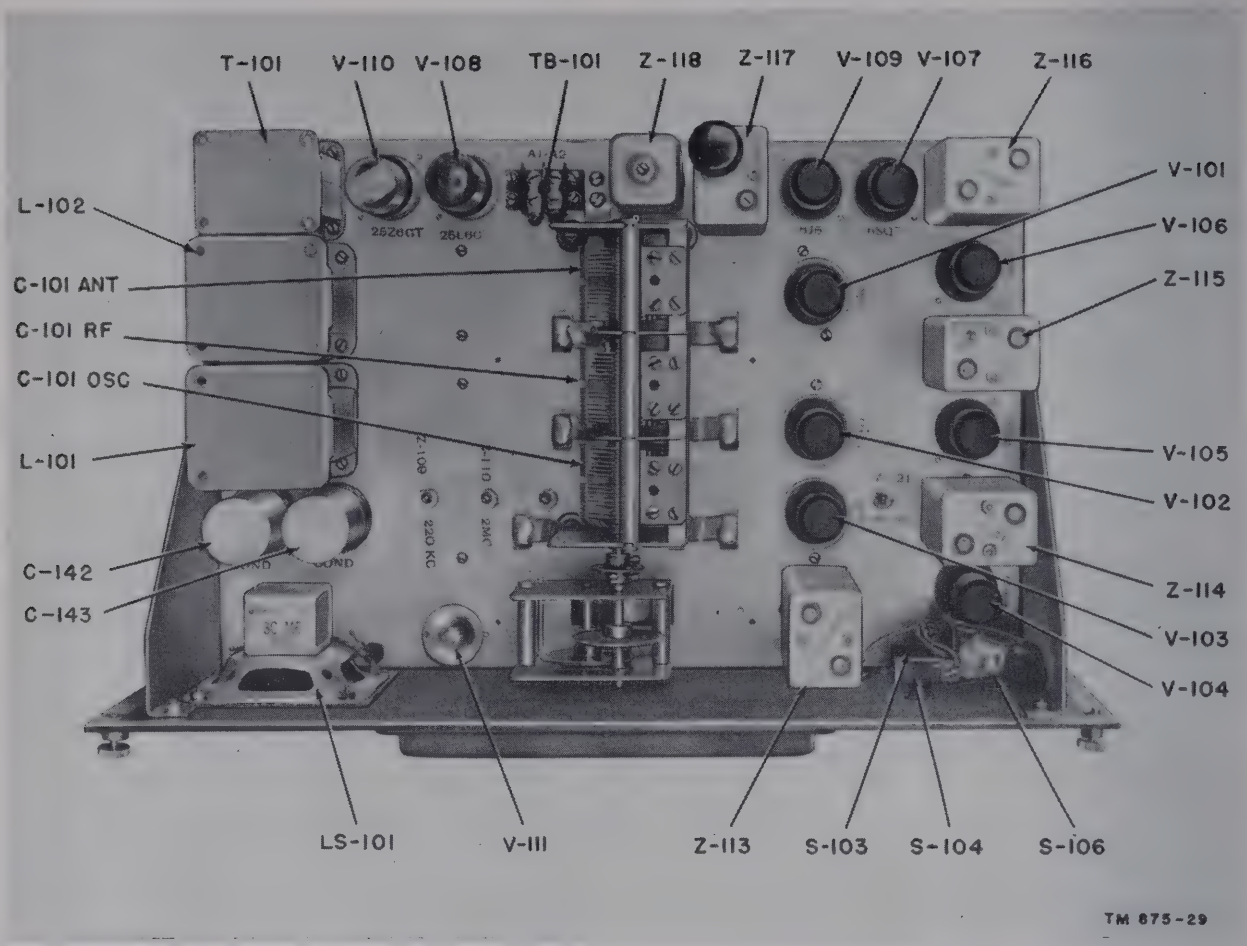


Figure 25. Radio Receiver R–203A/SR, top view of chassis with shield removed.

plate circuit will be overloaded, and possibly damaged, and the receiver will be inoperative. If the positive side of the ship's line is grounded, the receiver may operate but the voltage regulator (V–111) will probably burn out. With the midpoint grounded, the set will not operate and V–111 will be extinguished.

60. Signal Tracing

a. General Notes.

(1) Signal tracing or signal substitution requires a source of audio, i-f, and r-f signals. The standard signal generator specified in paragraph 52 is suitable for this purpose. A headset may also be required. Use the voltohmmeter to make voltage and resistance checks. A tube tester will be of assistance in checking tubes but, if not available, a spare set of tubes for substitution will suffice.

(2) In tests where the signal generator is used, connect the ground side of the signal generator to the chassis of the receiver, ground the receiver and noise suppressor unit, and connect the other side of the signal generator through a capacitor (about 200 uuf for rf and 0.01 uf for af) to the receiver point as directed.

(3) Note the volume, and listen for serious distortion from the loudspeaker or headset at the various points in the signal tracing procedure. When the output meter is used, connect a 600-ohm, 2-watt resistor across its terminals and connect it to the receiver through 3½ feet of twisted-pair wire and Plug PL–55 or other phone plug inserted into one of the PHONES jacks. Where possible, compare operation with a receiver known to be in good condition.

(4) Check the wiring and soldering in each stage during the procedure.

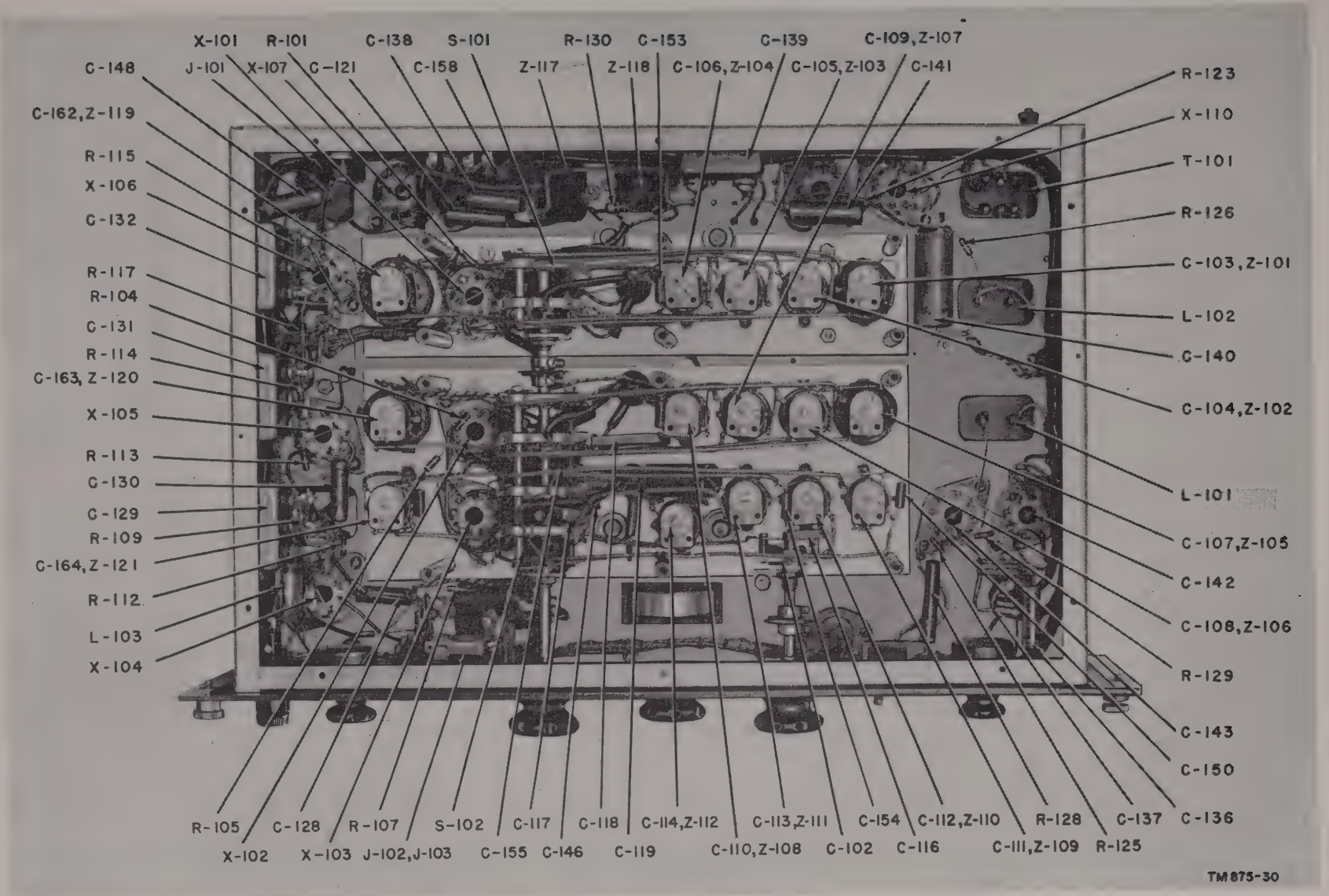


Figure 26. Radio Receiver R-203A/SR, bottom view of chassis with shields removed.

Note.—Do not remove r-f and i-f shields from the chassis or shield cans from tuned units until the trouble has been traced definitely to the particular unit. Do not damage wiring by pushing it back and forth during inspection. Be careful not to damage the receiver in any other way.

(5) Misalinement of one or more stages of the receiver will cause reduced output. Misalinement of the h-f oscillator may prevent any output.

(6) When trouble is localized in a given stage, test the tube, measure the voltage, and measure the resistance at the tube socket of that stage.

(7) Trouble in a circuit or stage may not cause changes in voltages and resistance measurements at the tube socket. The notes included in this paragraph are merely a guide and should suggest other procedures, such as voltage and resistance measurements on individual parts.

(8) Remove only *one* tube at a time when testing. Check the number of the tube, test the tube, and, if it is not defective, return it to its proper socket before another tube is removed.

(9) Each step presupposes the satisfactory completion of all previous steps. Isolate and clear any trouble located before proceeding with any succeeding steps.

b. A-F Tests.

(1) *Terminal 3 of tube V–108 (plate of second a-f amplifier).* Apply a 1,000-cycle audio signal through a series capacitor (approximately 0.01 uf) to terminal 3 of V–108 and listen for a low-volume signal in both speaker and headset. This will check the speaker, headset, output transformer, jacks, and speaker switch. If there is no signal, examine these components and associated wiring.

(2) *Terminal 5 of V–108 (second a-f amplifier grid).* Place the audio signal on terminal 5 of V–108. Listen for an increased output (relative to the test in (1) above) in the headset or speaker. If the output is weak, check the tube. If no signal is heard, check resistor R–123. Also check plate voltage for V–108.

(3) *Terminal 6 of V–107 (first a-f amplifier plate).* Introduce the audio signal at terminal 6 of V–107 and listen for the signal in the headset or speaker. If there is no signal, check capacitor C–139.

(4) *Terminal 2 of V–107 (first a-f amplifier grid).* Feed an audio signal in at terminal 2 of V–107 and listen for increased output (relative to the test in (3) above) in the speaker or headset. If the signal is weak, check the plate voltage at V–107, terminal 6. If there is no signal, check wiring and socket voltages at V–107. If the signal is distorted, check that coupling capacitor C–137 is not shorted.

c. I-F Tests. Set the receiver controls as follows:

Control	Setting
AVC OFF-ON	ON.
BFO OFF-ON	OFF.
A. F. GAIN	Maximum.
R. F. GAIN	Maximum.

Adjust the signal generator to 1,700 kc with 400-cycle modulation applied.

Feed this signal into the set at the points listed below, in turn, and listen for the signal in the speaker or headset.

(1) *Terminal 5 of V–107 (detector anode).* If there is no signal, check resistors R–118 and R–120. Also check that capacitors C–134, C–135, and C–136 are not open or that capacitors C–134 and C–135 are not shorted. If there is still no signal, secondary of Z–116 may be open or the trimmer capacitor may be misalined, shorted, or open.

(2) *Terminal 8 of V–106 (third i-f amplifier plate).* If there is no signal, the primary of Z–116 may be open or misalined, or capacitor C–132 may be shorted.

(3) *Terminal 4 of V–106 (third i-f amplifier grid).* If there is no signal, or a weak signal, check R–115, R–117, and socket voltages at V–106. Also check for an open or misalined secondary on i-f transformer Z–115.

(4) *Terminal 8 of V–105 (second i-f amplifier plate).* If there is no signal, check corresponding components for this stage, as in (2) above.

(5) *Terminal 4 of V–105 (second i-f amplifier grid).* If there is no signal, check

corresponding components and socket voltages for this stage as in (3) above. If the signal is weak, check for an open capacitor C–130.

(6) *Terminal 8 of V–104 (first i-f amplifier plate).* If there is no signal, check corresponding components for this stage, as in (2) above.

(7) *Terminal 4 of V–104 (first i-f amplifier grid).* If there is no signal, check corresponding components and socket voltages for this stage, as in (3) above. If the signal is weak, check for an open capacitor C–128.

(8) *Terminal 8 of V–120 (mixer plate).* If there is no signal, check components for this stage, as in (2) above.

d. Beat-Frequency Oscillator Test. Feed an unmodulated 1,700-kc signal from the signal generator into terminal 8 of V–102 (mixer plate) and place the BFO OFF-ON switch in the ON position. An 800- to 1,000-cycle signal should be heard in the headset or speaker if the bfo (V–109) is operating. If not, check resistor R–124 and the BFO OFF-ON switch and connections. Check the socket voltages at V–109. Also, the bfo coil assembly may be open, shorted, or misalined.

e. R-F Tests. Apply a modulated r-f signal through a 200-uuf capacitor to the various points in the r-f stages of the receiver as listed below. Set the receiver to the frequency of the r-f signal and tune for output in the headset of speaker. If the modulation is not heard, components are defective, the h-f oscillator is not operating, or the r-f stages are misalined. Check at the following points in turn:

(1) *Terminal 4 of V–102 (mixer grid.)* If there is no signal, either the mixer, V–102, or the h-f oscillator, V–103, may be at fault. Check the tubes and tube socket voltages and resistances. Check resistors R–104, R–105, R–106, R–107, and R–125. Also check capacitors C–120 and C–155 for opens or shorts. With the receiver on and the h-f oscillator functioning, d-c voltage can be read across resistor R–106 by means of the voltohmmeter. If the neon voltage regulator V–111 is not lighted, check plate voltage on the plate of V–103. Replace V–111 if voltage is not correct, and check if this corrects the voltage. The band-switch contacts may be open or the oscillator coils or trimmer capacitors defective. Also check the oscillator sections of variable capacitors C–101 and C–102 for shorted plates.

Note.—The receiver should not normally be operated with the r-f capacitor shield removed. Replace it as soon as variable capacitor C–101 has been checked.

(2) *Terminal 8 of V–101 (r-f amplifier plate).* If there is no signal, check resistor R–103 and plate voltage at V–101. Lack of plate voltage at V–101 indicates an open primary coil in the r-f transformer or an open band-switch contact. Lack of signal may also be due to the r-f transformers being out of alinement or the r-f section of the variable capacitors, C–101, having shorted plates.

(3) *Terminal 4 of V–101 (r-f amplifier grid).* If there is no signal, check tube V–101 and the socket voltages at V–101. An open in section 1 of the band switch, S–101, or an open or misalined secondary of the antenna transformer might cause a weak signal.

(4) *Antenna terminal A1.* If there is no signal, check band switch S–101 and antenna transformers for opens. Also check the antenna section of capacitors C–101 for shorted plates. The antenna transformer may be misalined, trimmer capacitors may be open or shorted, or coupling capacitor C–123 may be open.

Note.—When checking bands 3, 4, and 5, ground antenna terminal A2 to the receiver chassis.

(5) Repeat the above tests ((1), (2), (3), and (4)) for an r-f signal in each of the other four bands so as to obtain a complete check of the circuits for all bands.

61. Stage Gain Charts

The stage gain charts in this paragraph list the minimum and maximum input voltage required at each of the r-f and i-f stages of the receiver, to produce a signal output of 12 mw (equivalent to 2.7 volts across an output load resistance of 600 ohms). Use these charts as standards when trouble shooting, to check the over-all gain of the receiver and the gain of each r-f or i-f stage, or group of stages. When the receiver output is low, localize the defective stage by checking the signal-voltage

level of each stage against the chart while using either the signal-tracing method of trouble shooting or by measuring the individual stage gain.

a. Receiver Controls. Set the receiver controls as follows:

Control	Setting
AVC OFF-ON switch	OFF.
BFO OFF-ON switch	OFF.
LOUDSPEAKER OFF-ON switch	OFF.
R. F. GAIN	Maximum.
BAND SPREAD	0.

b. Signal Generator. The signal generator should be connected to the receiver through short, heavy, well-shielded leads to minimize radiation and stray coupling, particularly at the higher frequencies. Ground the signal generator to the receiver chassis but *do not attach an external ground* to either one. Feed the r-f or i-f signal, modulated 30 percent at 400 cycles, through a 0.01-uf blocking capacitor to the points specified in the charts and use the output meter across a 600-ohm load plugged into one of the PHONES jacks.

c. Signal-Plus-Noise to Noise Ratio. A 20-db signal-plus-noise to noise ratio is specified for some of the r-f gain measurements listed in *d* below. To obtain the required ratio, perform the following steps:

(1) Set the A. F. GAIN control to maximum.
(2) Connect the signal generator to antenna terminal A1 through a 200-uuf capacitor. Adjust the generator output to produce a reading on the output meter.
(3) Turn off the signal generator modulation and turn the A. F. GAIN control until the output meter reads 0.27 volt (0.12 mw or −9.2 dbm).
(4) If the meter reads 0.27 volt (0.12 mw or +0.8 dbm) or less with the A. F. GAIN control at maximum and the signal generator modulation off, leave the control at maximum.
(5) Turn the generator modulation on and readjust the generator output level to produce an output of 2.7 volts (12 mw or +10.8 dbm).

d. R-F Stage Gain. The receiver output for all the measurements tabulated below should be constant at 2.7 volts (12 mw or +10.8 dbm).

Signal generator output connection	Band and frequency	Signal generator output (microvolts)	Special conditions
Antenna terminal A1 through 200-uuf capacitor. Do not ground A2.	Band 1 200 kc	12 to 27	A. F. GAIN set for a 20 db signal-plus-noise to noise ratio. (See *c* above.)
	Band 2 500 kc	10 to 25	
Antenna terminal A2 through a 400-ohm resistor.	Band 3 5,000 kc	4 to 10	
	Band 4 12,000 kc	7 to 18	
	Band 5 24,000 kc	1 to 3	
Control grid (pin 4) of r-f stage V–101 through 200-uuf capacitor.	Band 1 200 kc	2 (maximum)	A. F. GAIN at maximum; antenna shield off; r-f and oscillator shield on (fig. 11).
	Band 2 500 kc	1 to 3	
	Band 3 5,000 kc	2 to 6	
	Band 4 12,000 kc	7 to 15	
	Band 5 24,000 kc	1.5 to 4	

Signal generator output connection	Band and frequency	Signal generator output (microvolts)	Special conditions
Control grid (pin 4) of mixer stage V–102 through 200-uuf capacitor.	Band 1 200 kc Band 2 500 kc Band 3 5,000 kc Band 4 12,000 kc Band 5 24,000 kc	5 to 10 7 to 15 10 to 20 9 to 19 4 to 8	Antenna terminal A2 grounded; antenna shield on; r-f and oscillator shield off (fig. 11). Tune in signal by rocking MAIN TUNING dial, since removing the shield detunes the oscillator.

e. I-F Stage Gain. With receiver controls set as in *a* above, set additional controls as follows:

Control	Setting
BAND SWITCH	Position 3.
MAIN TUNING dial	1,900 kc (maximum capacity).
A. F. GAIN	Maximum clockwise.

Also, remove the r-f and oscillator trimmer shield. The gain of the i-f stages is as follows:

Signal generator frequency	Signal generator output connection	Signal generator output (microvolts)		Output meter reading
		Minimum	Maximum	
1,700 kc	Mixer control grid (pin 4 of V–102)	4. 0	8. 0	2.7 volts (12 mw of +10.8 dbm).
	1st i-f stage control grid (pin 4 of V–104)	30	60	
	2d i-f stage control grid (pin 4 of V–105)	220	340	
	3d i-f stage control grid (pin 4 of V–106)	2, 100	2, 700	

Section III. REPAIRS

62. Replacement of Parts

a. Most of the parts in Radio Receiver R–203(*)/SR are readily accessible and easily replaceable, if found to be faulty. When the band switch (S–101 and S–102) requires replacement, uncouple the two sections, and tag all wires connected to the switch, to avoid misconnection when the new switch is installed. Follow this practice whenever replacement requires the disconnection of numerous wires.

b. To replace an adjustable iron core of one of the h-f oscillator coils, first remove the coil, marking the connecting wires with tags. Then unscrew the core from the bushing in the coil assembly plate and replace it with a new cove.

63. Refinishing

Instructions for rustproofing and touch-up painting are given in paragraph 34. Instruction for refinishing badly marred panels or exterior cabinets are given in TM 9–2851. After the panel of Radio Receiver R–203(*)/SR has been refinished, clean the paint from the engraved markings with a pointed tool, and fill the markings with white engravers' wax.

64. Adjustment of Main Tuning Dial and Band Spread Knob

a. Main Tuning Dial Setting. If the main tuning dial drive becomes loose, or is replaced, it

is necessary to reset the dial pointer to the proper position. Loosen the flexible coupling between capacitor C–101 (fig. 25) and the dial gearbox. Rotate the capacitor by hand until the plates are fully meshed. Rotate the dial pointer counterclockwise by means of the MAIN TUNING knob until the pointer is at the extreme left end of its travel. Tighten the screws of the flexible coupling, locking the dial to the capacitor shaft.

b. Band Spread Knob Setting. Loosen the setscrews holding the BAND SPREAD knob to its shaft and set the pointer at zero. Rotate the band spread capacitor, C–102 (fig. 26), until the plates are halfway out of mesh. Tighten the knob setscrew.

Section IV. ALINEMENT PROCEDURES

65. Test Instruments Required for Alinement

a. Signal Generator. The signal generator should be an accurately calibrated instrument producing modulated and unmodulated r-f signals, such as Signal Generator TS–588/U. The frequency range must extend from 85 kc to 25 mc. The alinement frequencies are shown in paragraph 70. If necessary, the second harmonic can generally be used when the fundamental is not available. The generator should have an output of at least 5,000 microvolts for best results in alining the r-f, h-f oscillator, and i-f circuits. Frequency calibration of the signal generator is extremely important to insure that the receiver dial calibration will be correct.

b. Output Meter. The output meter should respond to audio frequencies and should provide at least half-scale deflection for 2.5 volts (approximately 10.42 mw or +10 dbm). Its resistance should be greater than 600 ohms. Use Output Meter TS–585/U (or an equivalent meter) with a 600-ohm resistor across the terminals.

c. Frequency Meter. When a highly accurate signal generator is not available, a frequency meter is used to check the accuracy of the generator. Frequency Meter Set SCR–211 is suitable.

d. Headset or Permanent-Magnet Loudspeaker. The integrally mounted loudspeaker or the high-impedance headset is used for rough alinement.

e. Alinement Tool. A suitable alinement tool or an insulated screw driver is required.

66. Calibration of Signal Generator

Accurate alinement of the h-f oscillator in the receiver requires the use of the frequency meter to check the signal generator setting, as follows: Place the generator and frequency meter near each other. Turn on both equipments and allow them to warm up for at least 15 minutes. Calibrate the frequency meter according to the instructions furnished with that unit. Attach a piece of wire to the signal generator output connection and place the wire near the frequency meter antenna. Set the meter to the exact frequency at which the generator is to be used. While listening to the headset connected to the frequency meter, tune the generator to zero beat with the meter. The signal generator is now set for the frequency desired. Turn off the frequency meter and remove the wire attached to the signal generator output connection. This procedure is used only when the signal generator calibration is not acceptable.

67. I-f Alinement Procedure

a. Connect a 600-ohm resistor and the output meter across a phone plug and insert it in the receiver PHONES jack. Plug the headset into the other jack for listening purposes.

b. Set the signal generator to 1,700 kc, modulated, and connect its output through a 100-uuf, or larger, blocking capacitor to the grid of the third i-f amplifier tube (pin 4 of V–106).

c. Set the receiver panel controls as follows:

Control	Setting
A. F. GAIN	50.
LOUDSPEAKER OFF-ON	OFF.
BAND SPREAD	0.
MAIN TUNING	24 MC.
BAND SWITCH	5.
R. F. GAIN	100.
BFO OFF-ON	OFF.
AVC OFF-ON	OFF.
POWER OFF-ON	ON.

d. Allow the receiver to warm up for about 5 minutes before making any adjustments. Be certain that no local station signal is coming in

through the antenna circuit. Refer to figure 10 for location of i-f transformers.

e. Adjust both trimmer capacitors on the diode i-f transformer, Z–116, for maximum output indication.

f. Connect the signal generator lead to the second i-f grid (pin 4 of V–105) and adjust the trimmers on the third i-f transformer, Z–115, lowering the signal input as each tuned circuit is peaked. Repeat at the first i-f grid (pin 4 of V–104), being careful to avoid short circuiting nearby power supply leads, and tune both trimmers on the second i-f transformer, Z–114.

g. To aline the first i-f transformer, use one of the following methods: The mixer grid may be reached by removing the oscillator coil shield beneath the chassis or by looping a piece of insulated wire around the wire to the grid (pin 4) of the mixer tube, V–102. The first i-f transformer may also be adjusted by introducing a stronger signal at antenna terminal A1 with terminal A2 grounded and with the band switch on position 3, 4, and 5. Following either of these methods of feeding in a signal, the first i-f transformer (Z–113) trimmers are adjusted for maximum output indication. Peaking of all i-f transformers should be rechecked at this point to overcome any slight regeneration that may be present.

68. I-f Suppression Filter Alinement

With the 1,700-kc modulated signal present on antenna terminal A1, adjust the iron core of the i-f suppression filter, Z–118, for minimum output on the intermediate frequency. Figure 11 shows the location of the adjusting screw for Z–118.

69. Beat-Frequency Oscillator Adjustment

Remove the modulation from the signal. Turn the BFO OFF-ON switch to ON, and adjust the tuning knob on bfo assembly Z–117 (fig. 10) for a suitable beat note. If no note is heard, adjust the auxiliary trimmer capacitor (screw-driver control) on the bfo assembly until a beat note is heard. Continue the adjustment to give a beat note of about 800 cycles. Rotate the tuning knob to see if the two beats are close together. If they are, readjust the auxiliary capacitor to give about 180° separation of beat notes on the tuning knob.

70. R-f Alinement

The step-by-step procedure for r-f alinement is indicated in the chart in *e* below.

a. Panel Controls. Set the panel controls as follows:

Control	Setting
A. F. GAIN	50.
LOUDSPEAKER OFF-ON	OFF.
BAND SPREAD	0.
R. F. GAIN	100.
BFO OFF-ON	OFF.
AVC OFF-ON	OFF.
POWER OFF-ON	ON.

b. Dial Pointer Check. Before proceeding with the alinement, check that the dial pointer coincides with the horizontal line at the i-f end of the dial. If it is necessary to correct this setting slightly, remove the dial cover and readjust the pointer hub. Also see paragraph 64*a*.

c. Trimmer Locations. All antenna r-f and oscillator trimmer adjustments are beneath the chassis. The screw driver slots are reached through holes in the shield covers. The covers are marked as shown in figure 11, to indicate the frequency and the component being tuned. The oscillator core adjustments are on top of the chassis (fig. 10).

d. Calibration Accuracy Dependence. The accuracy of the MAIN TUNING calibration depends largely on the h-f oscillator operating frequency, which is continuously set at 1,700 kc above or below the operating frequency. Although the frequency of this oscillator can be measured directly, it is simpler to use the system indicated in the chart, where the MAIN TUNING dial is ad-

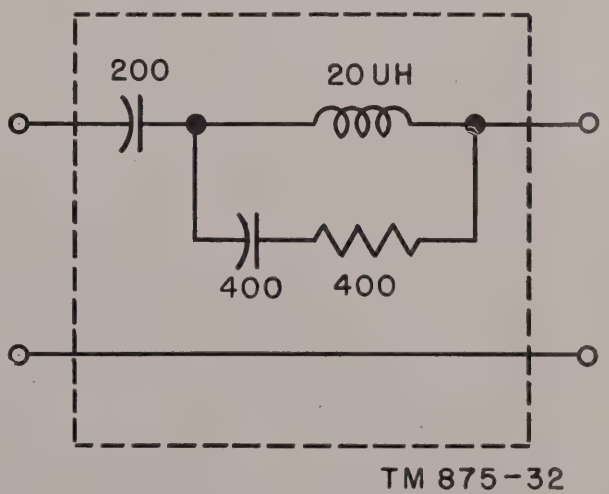


Figure 27. Standard dummy antenna.

justed to the operating frequency and then the trimmers are used to peak the signal. Because of this dependence on the h-f oscillator, the oscillator coils are provided with both iron core and trimmer capacitor adjustment to provide two points in each band at which tracking of the oscillator and r-f frequencies may be set accurately.

e. R-F Alinement Chart.

Step	Connect test oscillator to—	Tune signal generator	Set receiver dial on—	Adjust the following
1	A1 through 400 ohms or standard dummy antenna (fig. 27). Ground terminal A2.	24.0 mc	24 mc—band 5	C–114 oscillator. C–110 rf (rock gang). C–106 antenna.
2	Same as step 1	12.0 mc	12.0 mc—band 5	Core adjustment Z–112.
3	Repeat step 1			
4	Same as step 1	12.0 mc	12.0 mc—band 4	C–113 oscillator. C–109 rf (rock gang). C–105 antenna.
5	Same as step 1	5.5 mc	5.5 mc—band 4	Core adjustment Z–111.
6	Repeat step 4			
7	Same as step 1	5.0 mc	5.0 mc—band 3	C–112 oscillator. C–108 rf. C–104 antenna.
8	Same as step 1	2.0 mc	2.0 mc—band 3	Core adjustment Z–110.
9	Repeat step 7			
10	A1 through 200-uuf or standard dummy antenna. *Do not ground terminal A2.*	500 kc	500 kc—band 2	C–111 oscillator. C–107 rf. C–103 antenna.
11	Same as step 10	220 kc	220 kc—band 2	Core adjustment Z–109.
12	Repeat steps 10 and 11 several times, if necessary, until *interlocking* is negligible.			
13	Same as step 10	200 kc	200 kc—band 1	C–164 oscillator. C–163 rf. C–162 antenna.
14	Same as step 10	85 kc	85 kc—band 1	Core adjustment Z–121.
15	Repeat steps 13 and 14 several times, if necessary, until *interlocking* is negligible.			

Section V. FINAL TESTING

71. General

This section is intended as a guide in determining the quality of a repaired Radio Receiver R–203(*)/SR. The minimum test requirements outlined in paragraphs 73 through 75 may be performed by maintenance personnel with adequate test equipment and the necessary skills. Repaired equipment meeting these requirements will furnish uniformly satisfactory operation. All of the following tests are to be performed while operating the receiver on a d-c supply. Check the supply voltage occasionally during a test and maintain it at 115 volts across the noise suppressor input terminals, or make allowance in the test values for any difference in supply voltage. Allow the receiver to warm up for a few minutes before making any measurements.

72. Test Equipment Required

The instruments needed for testing the repaired equipment are listed in paragraph 52.

73. Voltage Checks

Before testing the receiver further, make the following voltage checks:

a. Measure the d-c voltage between the positive 92-volt plate supply (pin 7 on capacitor C–143) and the negative lead (pin 1 on C–143). This is nominally +92 volts.

b. Check the h-f oscillator plate voltage. The voltage between pin 3 and pin 1 of tube V–103 should be approximately 67 volts.

c. Measure the voltage drop across resistor R–127. The filaments of tubes will be properly energized when this drop is 15 volts.

d. Check the voltage across negative line choke L–102. Tube V–108 is biased properly when this voltage is approximately 7 volts.

e. Energize the receiver from a 115-volt, 60-cycle a-c source and determine that it operates satisfactorily. Repeat checks in *a*, *b*, and *c* above, if necessary.

74. Operation of Controls

A complete check of the operation of the receiver controls should be made in accordance with the equipment performance checklist (par. 25). If there is reason for suspecting improper operation of the circuits, also check as follows:

a. Main Tuning Calibration. Using signal input from the calibrated signal generator, check the frequency calibration of the receiver tuning dial at points near each end of each frequency band. Set the signal generator to the desired frequency and tune in the signal on the receiver. Note that the receiver tuning dial reads correctly within one-half of a scale division. If not, see paragraphs 64*a* and 70*b*.

b. BFO Operation. Turn signal-generator modulation off and receiver BFO OFF-ON switch to ON. Adjust the bfo tuning knob on the bfo assembly inside the receiver to give a beat note of about 800 cycles.

c. AVC Operation. With modulated signal input from the signal generator and the output meter connected, turn the receiver AVC OFF-ON switch to OFF. Increase the signal input to approximately 30 microvolts or just sufficient to give an output meter reading of 2 volts (6.66 mw). Turn the AVC OFF-ON switch to ON. The reading on the output meter should drop to between 0.5 and 1.0 volt (0.42 to 1.6 mw). The complete avc characteristic for a typical receiver is shown in figure 30.

75. Receiver Characteristics

Note.—The tests outlined in *b*, *c*, *d*, and *e* below normally need not be made unless there is reason to suspect improper operation or a new component has been inserted in the circuits involved.

a. Sensitivity, Modulated Signals. A complete m-c-w sensitivity test of the receiver should include measurements at the frequencies shown in the table below. The AVC OFF-ON, BFO OFF-ON, and LOUDSPEAKER OFF-ON switches should be OFF, and the R. F. GAIN control should be fully clockwise during this test. Sensitivity should be checked at a signal-plus-noise to noise ratio of 20 db. See paragraph 61*c*. Values of signal input measured should be equal to or less than those shown in the table. Output should be 2.7 volts (12 mw or +10.8 dbm).

Frequency band	Minimum sensitivity (microvolts input)	Test frequencies
1	35	85, 120, 200 kc
2	20	220, 350, 500 kc
3	15	2, 3.5, 5 mc
4	15	5.5, 8, 12 mc
5	15	12, 18, 24 mc

b. Sensitivity, C-W Signals. It is advisable to check the c-w sensitivity at one point in the lower frequency bands, such as at 350 kc. Turn signal-generator modulation off and receiver BFO OFF-ON switch to ON. Turn signal generator off, and adjust the A. F. GAIN control for 0.27-volt output (0.2 mw or −9.8 dbm) on the output meter. Turn the signal generator on and adjust it to give 2.7 volts (12 mw or +10.8 dbm) on the output meter. Switch the signal generator off to check noise reading at 0.27-volt output and readjust A. F. GAIN control, if necessary. The value of c-w sensitivity (in microvolts) should be somewhat lower than m-c-w sensitivity obtained at the same frequency.

c. Selectivity. This test should be carried out at 200 kc and at 2 mc. Set the signal generator, modulated 30 percent at 400 cycles, at one of the above frequencies, tune the receiver exactly to it, and adjust the signal input to give a reading of 1.9 volts (6 mw or +8 dbm) on the output meter. Detune the signal generator, first on one side, and then on the other side of resonance, and increase the signal input to give 1.9 volts on the output meter. Repeat observations for ratios of input voltage off resonance to voltage at resonance of 10, 100, and 1,000. Bandwidths should be within the limits in the following table. Figure 28 shows a typical selectivity curve for this receiver. The db scales shown cannot be interpolated.

Ratio of input voltage off reasonance to voltage at resonance	Total maximum bandwidth (kc)
10 (20 db)	12
100 (40 db)	18
1,000 (60 db)	25

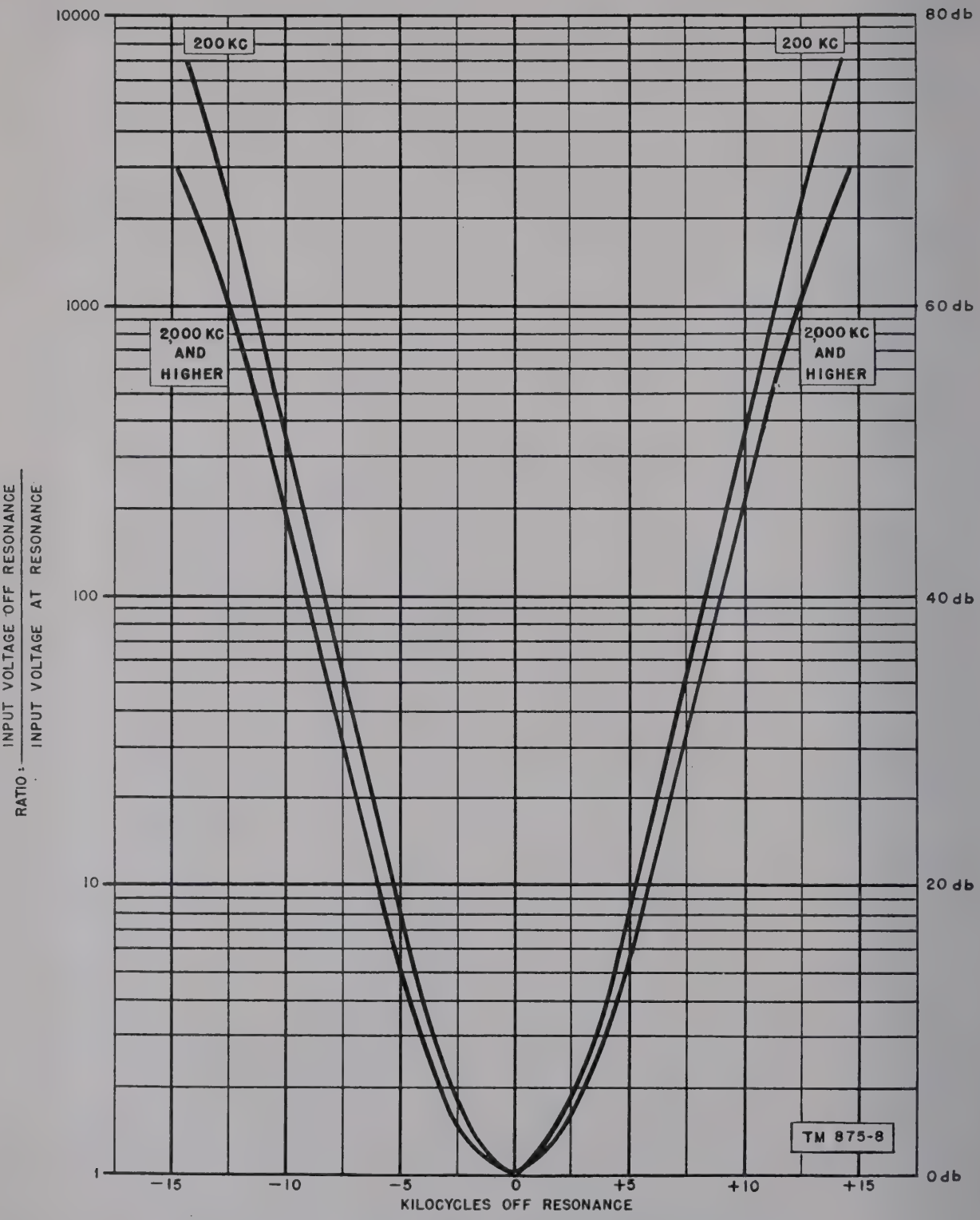


Figure 28. Radio Receiver R–203(*)/SR, typical selectivity characteristic.

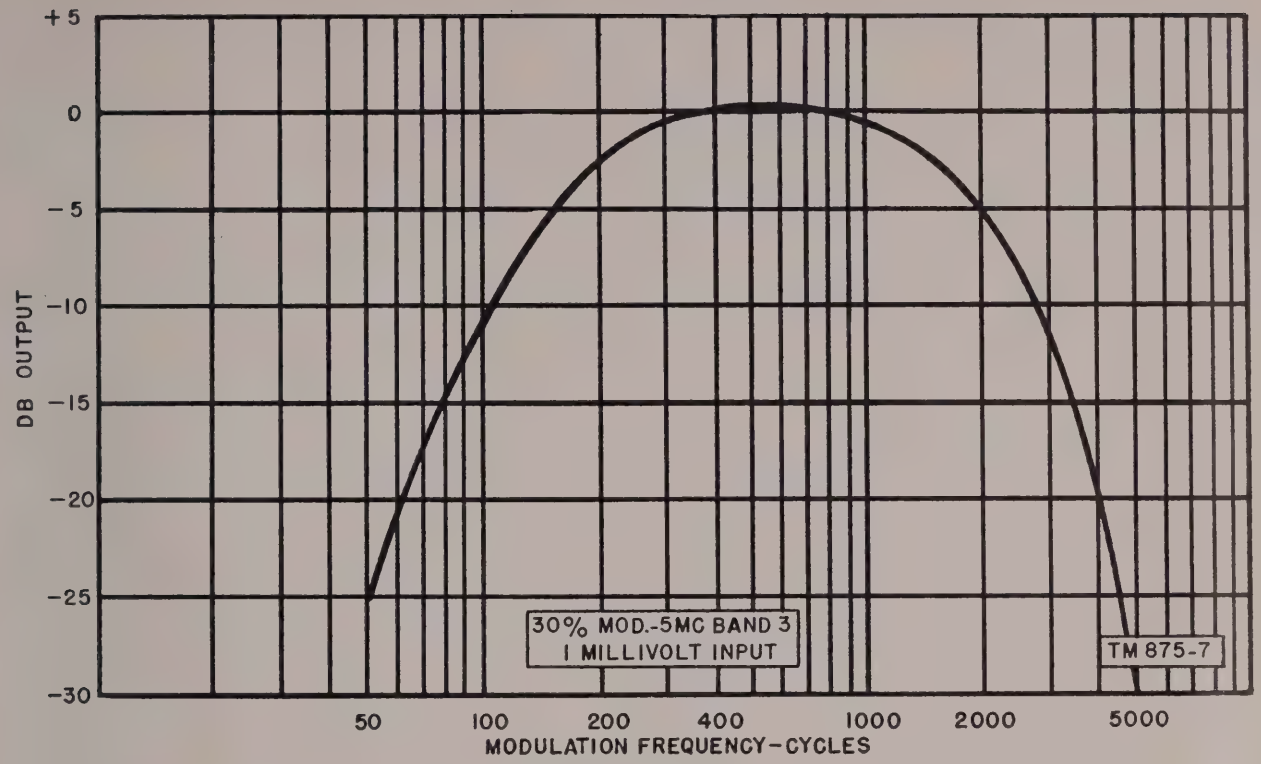


Figure 29. Radio Receiver R–203(*)/SR, typical fidelity characteristic.

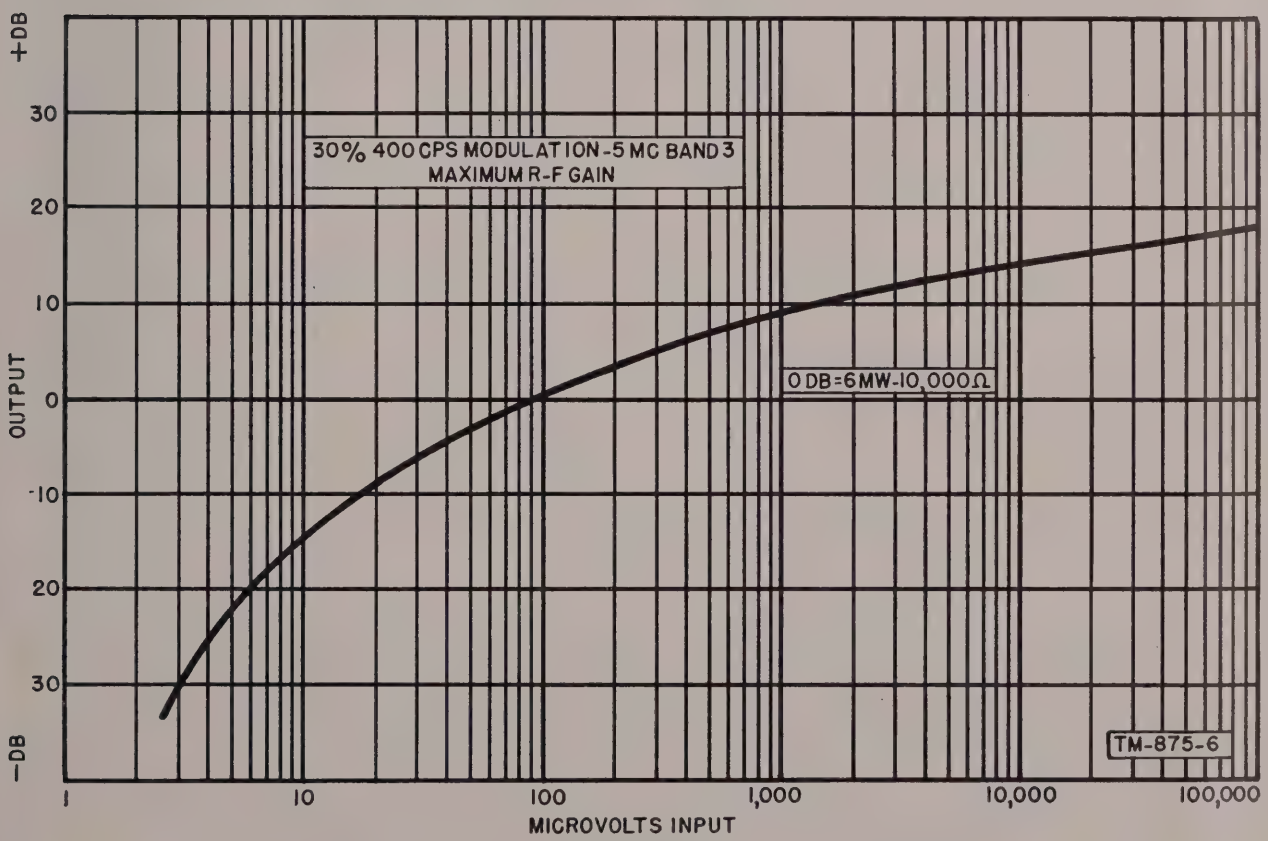


Figure 30. Radio Receiver R–203(*)/SR, typical avc characteristic.

d. Image-Rejection Ratio. This test should be carried out in conjunction with the sensitivity test given in *a* above. The test is carried out by measuring the sensitivity of the receiver at a frequency equal to the signal frequency *plus* twice the intermediate frequency (2×1,700 kc or 3,400 kc) for bands 1, 2, 3, and 4 or *minus* twice the intermediate frequency for band 5. This figure of sensitivity divided by the sensitivity at signal frequency should give a ratio equal to or higher than those shown in the following table.

Frequency band	Signal frequency	Image-rejection ratio
1	150 kc	25, 000
2	300 kc	15, 000
3	3 mc	8, 000
4	8 mc	2, 000
5	18 mc	600
5	24 mc	300

e. Fidelity. This is a test of the over-all a-f response of the receiver. Set the signal generator to 5 mc and tune the receiver to the signal. Modulate the signal generator output 30 percent, using the internal variable frequency audio oscillator or an external calibrated audio oscillator. Using 1 millivolt of signal input, measure the output of the receiver on the output meter at various frequencies in the audio range between 50 and 5,000 cycles. The output should not be down from the 1,000-cycle value more than 12 db at 100 or at 3,000 cycles. A typical fidelity curve for Radio Receiver R–203(*)/SR is shown in figure 29.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

76. Disassembly

The circumstances involved in shipment and storage vary, therefore no definite procedure for repacking can be given. The following instructions are recommended as a guide for preparing the radio receiver for transportation and storage. To disassemble the equipment, reverse the procedure for setting up the unit (sec. I, ch. 2).

a. Turn off the power switches on the receiver and noise suppressor and open the main line power switch.

b. Remove power input leads from the noise suppressor and carefully tape the ends of the wires to prevent shorting.

c. Remove power plug P–201 from the back of the receiver chassis. Disconnect antenna and ground from the receiver and remove the ground from the suppressor. Remove the headset plug from the receiver phone jack.

d. Remove the mounting bolts that hold the receiver, noise suppressor, and line resistor (if used) to the table or bulkhead.

77. Repacking for Shipment or Limited Storage

a. The exact procedure in repacking for shipment or limited storage depends on the material available and the conditions under which the equipment is to be shipped or stored. Refer to paragraph 12 and figure 6, and follow, in reverse order, the instructions given.

b. Whenever practicable, place a dehydrating agent such as silica gel inside the receiver. Box or package the headset. Wrap each unit in corrugated paper and protect each package with a waterproof barrier. Seal the seams of the paper barrier with a waterproof sealing compound or tape. Pack the protected components in a wooden case, providing at least 3 inches of excelsior padding or other similar material between the paper barrier and the packing case.

Section II. DEMOLITION OF MATÉRIEL TO PREVENT ENEMY USE

78. General

The demolition procedures outlined in paragraphs 79 and 80 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished *only* upon order of the commander.

79. Methods of Destruction

a. Smash. Use sledges, axes, handaxes, pickaxes, hammers, crowbars, and heavy tools.

b. Cut. Use axes, handaxes, and machetes.

c. Burn. Use gasoline, kerosene, oil, flame throwers, and incendiary grenades.

d. Explosives. Use firearms, grenades, and TNT.

e. Other. Use anything immediately available for destruction of this equipment.

f. Disposals. Bury in slit trenches, fox holes, and other holes. Throw in streams. Scatter.

80. Destruction of Components

a. Smash controls, tubes, coils, switches, capacitors, and headsets.

b. Cut cords, headsets, and wiring.

c. Burn technical manuals, cords, resistors, capacitors, coils, and wiring.

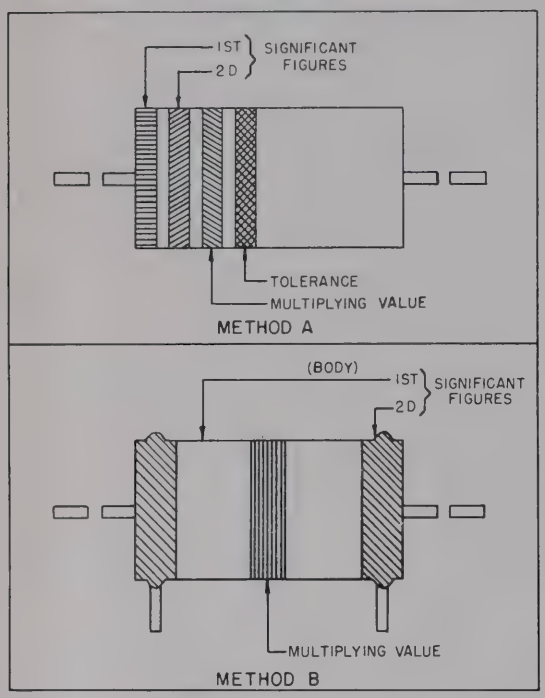
d. Bend panels, cabinet and chassis.

e. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them in streams.

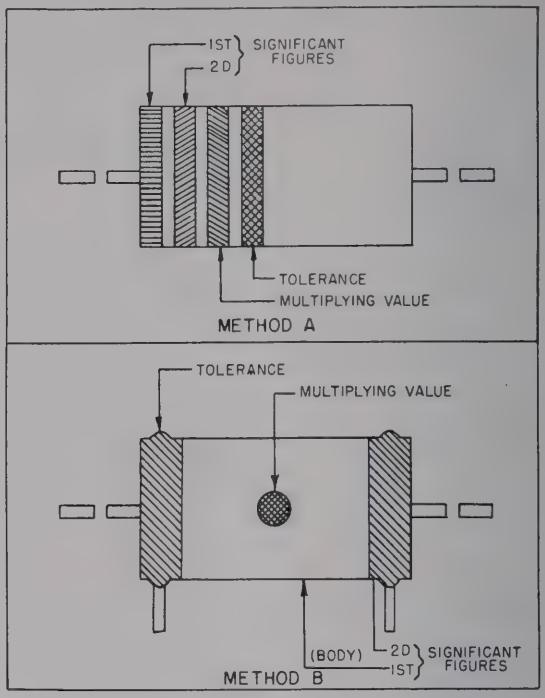
f. DESTROY EVERYTHING.

RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS*



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS†



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

NOTES

* 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.

† RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.

RMA: RADIO MANUFACTURERS ASSOCIATION

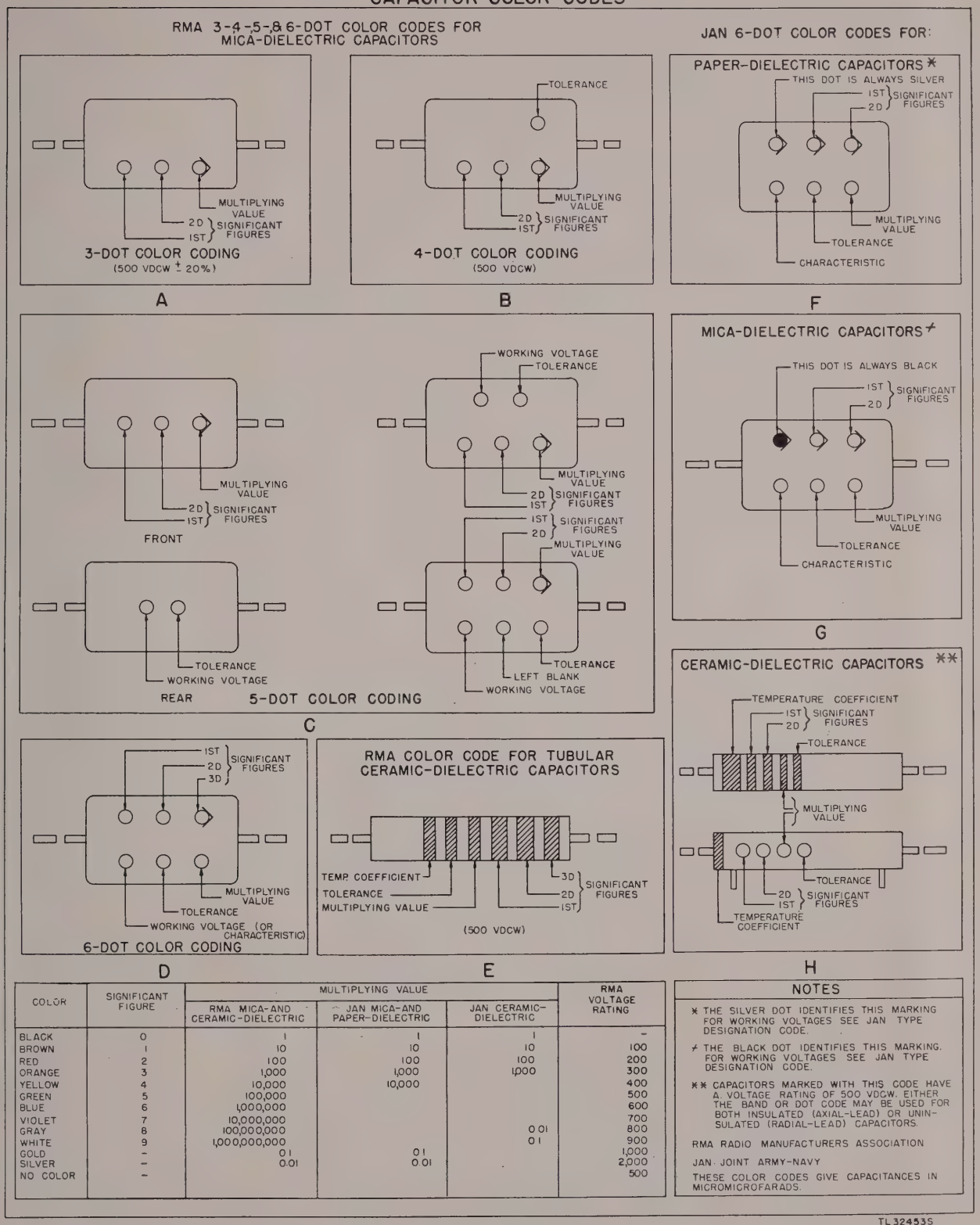
JAN: JOINT ARMY–NAVY

THESE COLOR CODES GIVE ALL RESISTANCE VALUES IN OHMS

TL 32454S

Figure 31. Resistor color codes.

CAPACITOR COLOR CODES



COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE			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	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

NOTES

* THE SILVER DOT IDENTIFIES THIS MARKING FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

≠ THE BLACK DOT IDENTIFIES THIS MARKING. FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

** CAPACITORS MARKED WITH THIS CODE HAVE A VOLTAGE RATING OF 500 VDCW. EITHER THE BAND OR DOT CODE MAY BE USED FOR BOTH INSULATED (AXIAL-LEAD) OR UNINSULATED (RADIAL-LEAD) CAPACITORS.

RMA RADIO MANUFACTURERS ASSOCIATION

JAN JOINT ARMY-NAVY

THESE COLOR CODES GIVE CAPACITANCES IN MICROMICROFARADS.

TL 32453S

Figure 32. Capacitor color codes.

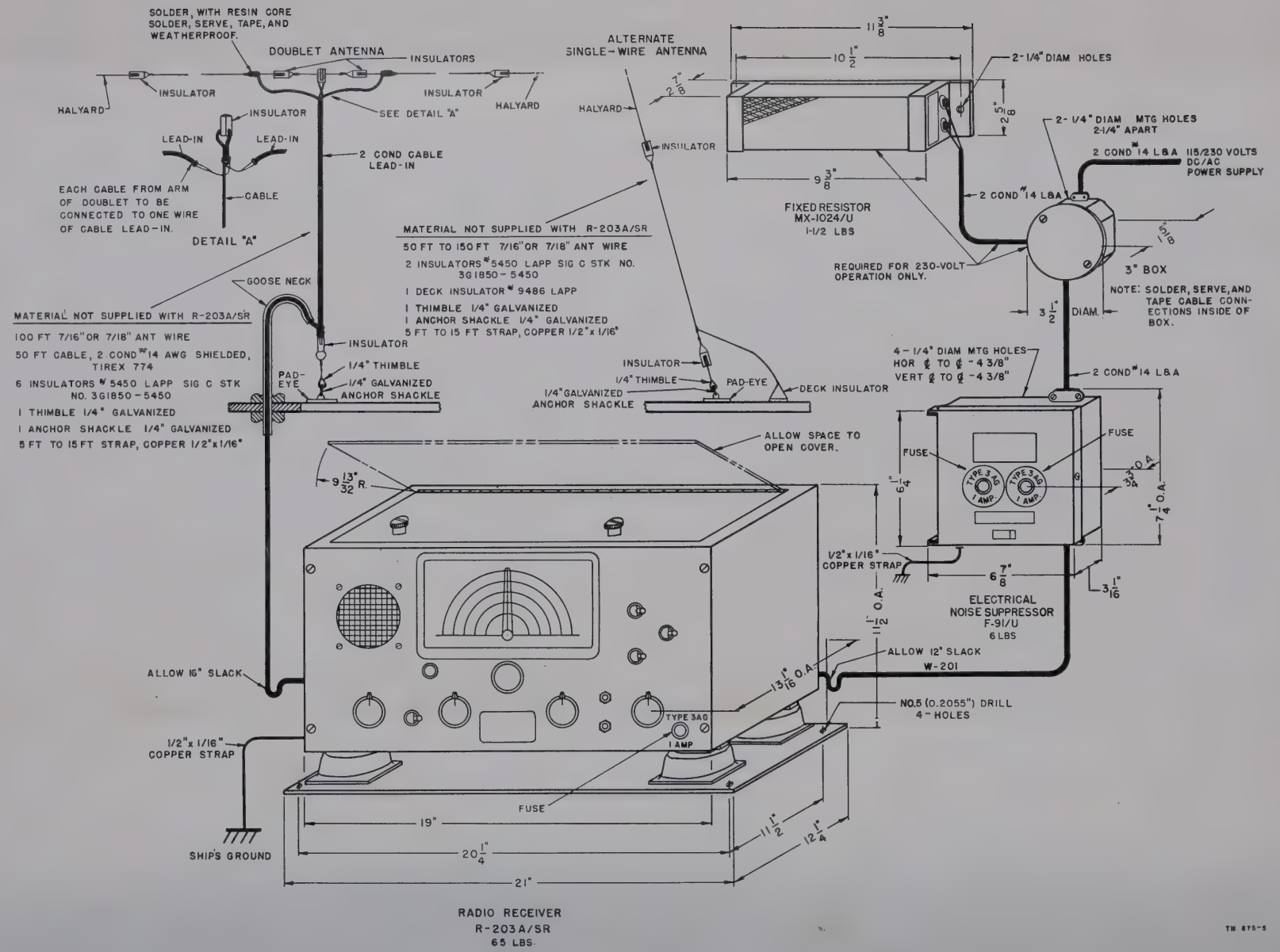
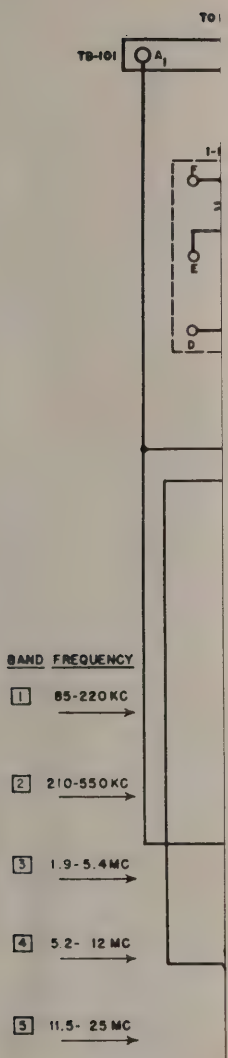


Figure 33. Radio Receiver R-203(*)/SR, typical installation plan.


TO
TB-101
A1
E
E
D
BAND FREQUENCY
1 85-220 KC
2 210-550 KC
3 1.9-5.4 MC
4 5.2- 12 MC
5 11.5- 25 MC

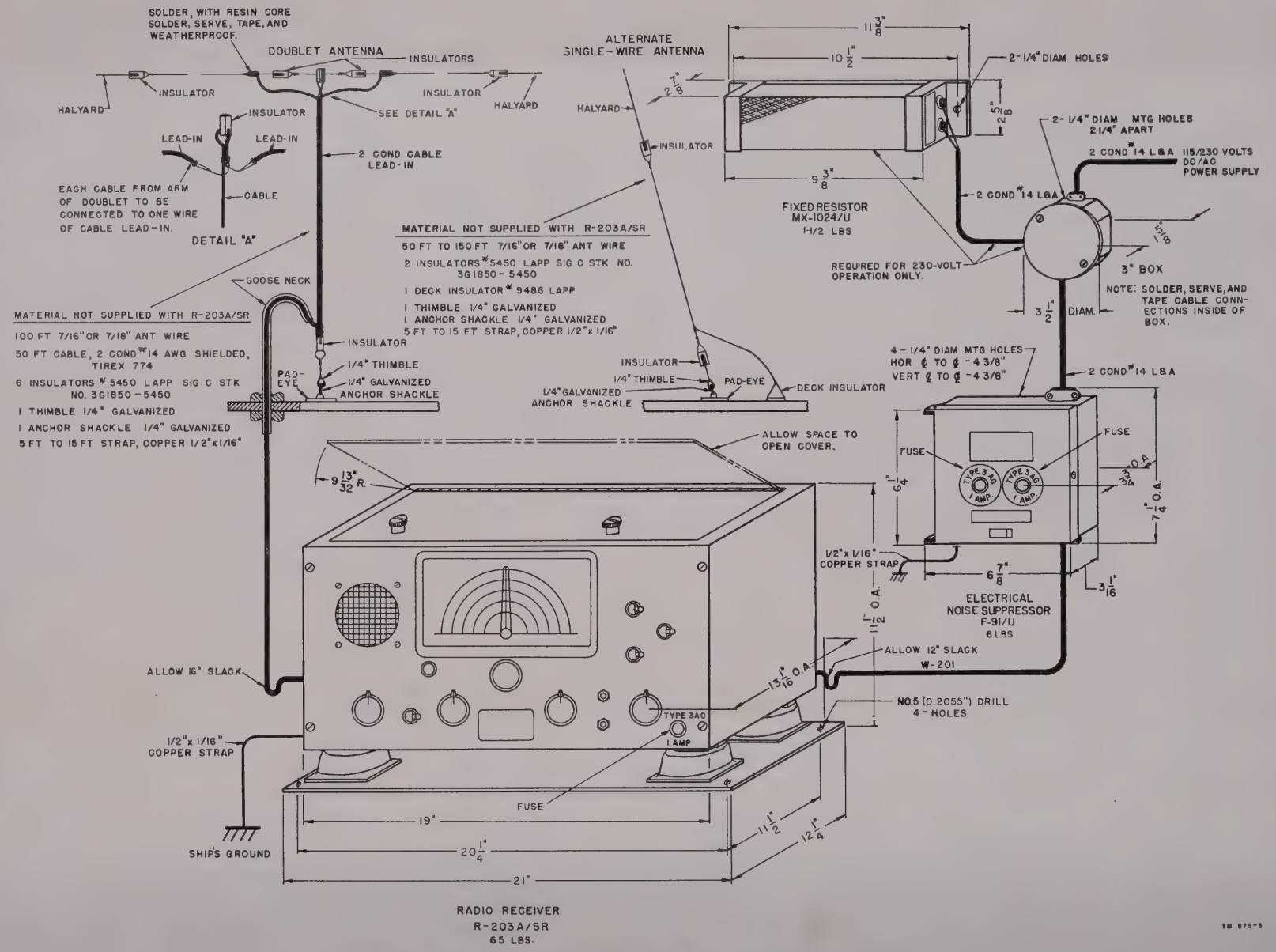


Figure 33. Radio Receiver R-203(*)/SR, typical installation plan.

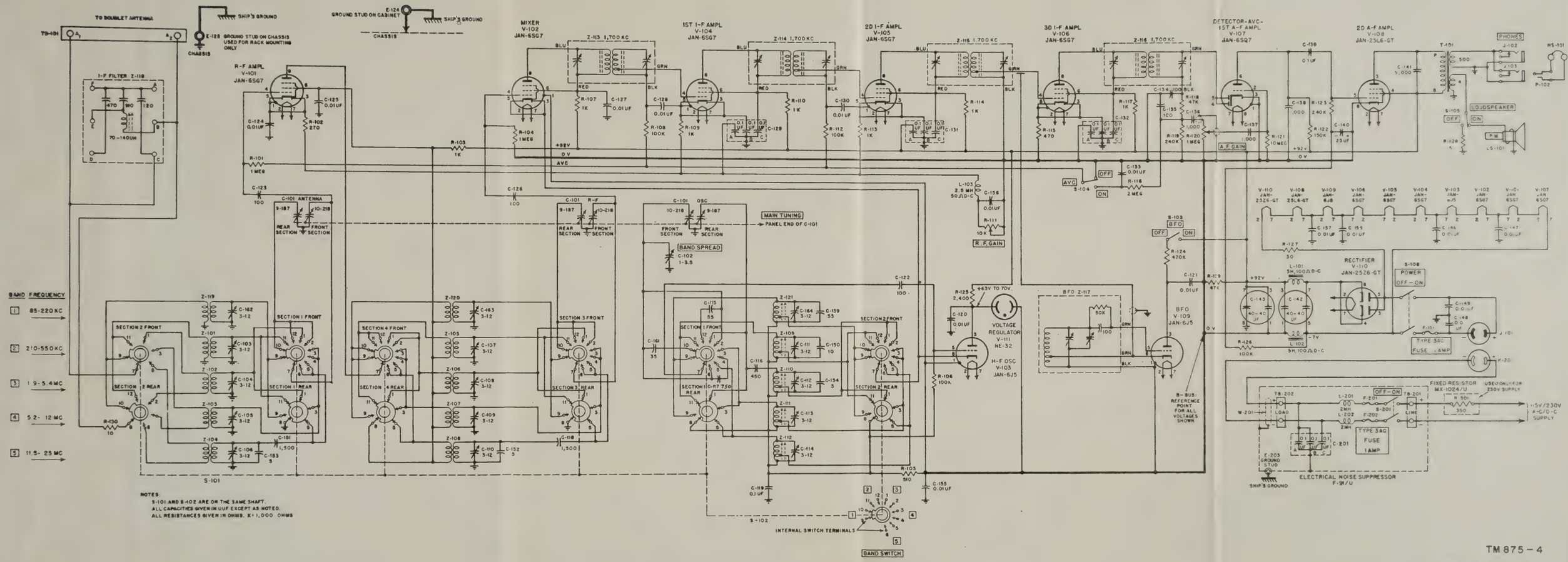


Figure 34. Radio Receiver R-203A/SR, schematic diagram.

TM 875-4

893615—50 (Faces p. 62)

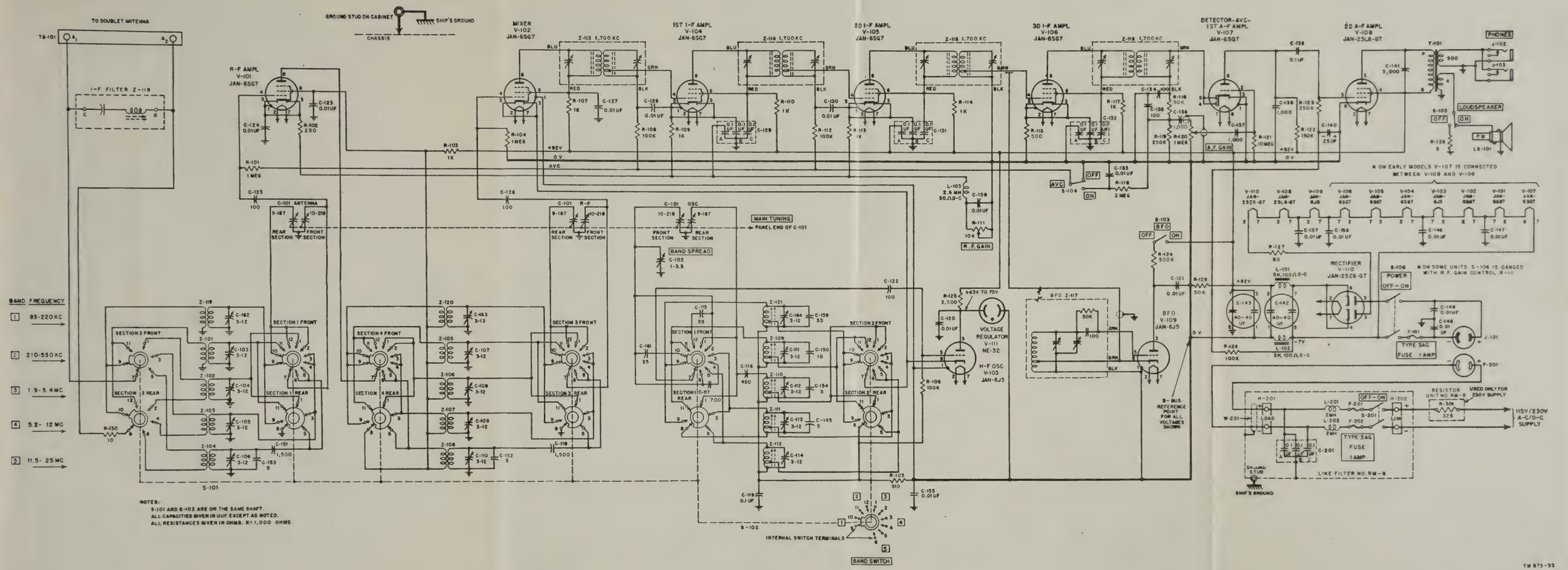


Figure 35. Radio Receiver R-203/SR, schematic diagram.

APPENDIX I

REFERENCES

Note.—For availability of items listed, check SR 310–20-series and the Department of the Army Supply Catalog SIG 1.

1. Army Regulations

AR 380–5	Safeguarding Military Information.

2. Supply Publications

SIG 1	Introduction and Index.
SIG 3	List of Items for Troop Issue.
SIG 10	Fixed Plant Maintenance Lists.
SB 11–6	Dry Battery Supply Data.
SB 11–17	Electron Tube Supply and Reference Data.
SB 11–47	Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11–76	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Technical Manuals on Test Equipment

TM 11–300	Frequency Meter Sets SCR–211–(*).
TM 11–303	Test Sets I–56–C, –D, –H, and –J.
TM 11–307	Signal Generators I–72–G, –H, –J, and –K.
TM 11–321	Test Set I–56–E.
TM 11–1067A	Oscilloscope TS–34A/AP.
TM 11–1209	Test Set I–157–A (Tube and Set Tester, Precision Model 920P).
TM 11–2524	Oscillator I–151–A.
TM 11–2526	Oscilloscope BC–1060–A.
TM 11–2613	Voltohmmeter I–166.
TM 11–2624B	Voltohmmeters, TS–294/U and TS–294B/U.
TM 11–2626	Test Unit I–176.
TM 11–2627	Tube Tester I–177.
TM 11–2654	Vacuum Tube Voltmeter (Hickok Model 110–B).
TM 11–2684	Audio Oscillator TS–312/-FSM–1 (Hewlett-Packard Model 200 CR).
TM 11–5017	Output Meter TS–585A/U.
TM 11–5504	Electronic Multimeter TS–620A/U.

4. Painting, Preserving, and Lubrication

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.
TM 9-2851	Painting Instructions for Field Use.

5. Camouflage

FM 5–20	Camouflage, Basic Principles.

6. Decontamination

TM 3–220	Decontamination.

7. Demolition

FM 5–25	Explosives and Demolitions.

8. Packaging and Packing Instructions

a. Joint Army-Navy Packaging Specifications.

JAN–D–169	Desiccants (activated).
JAN–P–100	General Specifications.
JAN–P–106A	Boxes, Wood, Nailed.
JAN–P–116	Preservation, Methods of.
JAN–P–125	Barrier Material, Waterproof, Flexible.
JAN–P–131	Barrier Material, Moisture-Vaporproof, Flexible.

b. U. S. Army Specification.

100–2E	Marking Shipments by Contractors, standard specifications for.

c. Signal Corps Instructions.

720–7	Standard Pack.
726–15	Interior Marking.

9. Other Publications

FM 24–18	Field Radio Techniques.
SR 310–20–3	Index to Field Manuals, Training Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint-Army-Navy-Air Force Publications, and Combined Communications Board Publications.
SR 310–20–4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, Tables of Equipment, and Tables of Basic Allowances.
TB 11–300–3	Rectifier Power Unit RA–133 and RA–133–A.
TB 11–2627–2	Tube Test Data Cards for Use with Tube Tester I–177.
TB SIG 5	Defense Against Radio Jamming.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of 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.
TM 1–455	Electrical Fundamentals.
TM 9–2851	Painting Instructions for Field Use.
TM 9–2857	Storage Batteries, Lead-Acid Type.
TM 11–314	Antennas and Antenna Systems.
TM 11–453	Shop Work.
TM 11–455	Radio Fundamentals.
TM 11–472	Repair and Calibration of Electrical Measuring Instruments.
TM 11–477	Fixed Station Radio Repair and Maintenance (Personnel Training Text).
TM 11–483	Suppression of Radio Noises.
TM 11–486	Electrical Communication Systems Engineering.
TM 11–496	Training Text and Applicatory Exercises for Amplitude-Modulated Radio Sets.
TM 11–499	Radio Propagation Handbook.
TB 11–499–( )*	Basic Radio Propagation Predictions.
TM 11–875	Intermediate and High Frequency Receiver, Model AR–8506–B.
TM 11–4000	Trouble Shooting and Repair of Radio Equipment.
TM 38–650	Basic Maintenance Manual.

10. Abbreviations

a-c	alternating-current
a-f	audio-frequency
a-m	amplitude-modulated
amp	ampere
ampl	amplifier
avc	automatic volume control
bfo	beat-frequency oscillator
BP	bandpass
C	centigrade

*A new TB in this series is issued monthly which gives propagation predictions for 3 months in advance.

cps	cycles per second
cw	continuous wave
cy	cycle
db	decibel
d-c	direct-current
diam	diameter
dimen	dimension
E	enameled
EC	enameled and cotton covered
F	Fahrenheit
f-m	frequency-modulation
ft	feet
ga	gage
h	high
hex	hexagonal
h-f	high-frequency
HS	hermetically sealed
h-v	high-voltage
icw	interrupted continuous waves
i-f	intermediate-frequency
in	inch
ins	insulator
JAN	Joint Army-Navy
k	kilo (1,000)
kc	kilocycle
l-f	low-frequency
lg	long
LP	lowpass
MA or ma	milliampere
max	maximum
mc	megacycle
mcw	modulated continuous waves
meg	megohm
mh, MH	millihenry
min	minimum
mtg	mounting
mtg/c	mounting centers
mv	millivolt
mw	milliwatt
oper	operation
OSC	oscillator
out	output
pa	power amplifier
par	paragraph
pl	plated
pol	polarity
pwr	power
R	ohms
rect	rectangular
r-f	radio-frequency
RMS	root mean square
secd	secondary
SigC	Signal Corps
SLC	straight-line capacity
term	terminal
thk	thick
TS	test set
uf	microfarad
uuf	micromicrofarad
uuw	micromicrowatt
uv	microvolt
v or V	volt
VTVM	vacuum-tube voltmeter
w	watt
wd	wide

11. Commercial Publication

Recommended Practice for Electric Installations on Shipboard (American Institute of Electrical Engineers, 33 West 39th St., New York, N. Y.).

12. Glossary

For an explanation of the terms used in this manual, refer to TM 11–455.

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Note.—The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as T/O&E, T/A, T/BA, SIG 7&8, SIG 7–8–10, SIG 10, list of allowances of expendable material, or another authorized supply basis. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1.

1. Identification Table of Parts for Radio Receiver R–203A/SR

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Fig. 1	RECEIVING SET, radio: Sig C Radio Receiver R–203A/SR; AM and CW; for communications; 85 to 550 kc in 2 bands, 1.9 to 25 mc in 3 bands; input 115/230 v AC or DC, 45 w at 115 v, 90 w at 230 v; mtd in metal cabinet; designed for standard 19″ rack mtg; 21″ wd x 11¾″ h x 13$\frac{1}{16}$″ d o/a incl knobs and shock absorber plate; 10 tube superheterodyne circuit; incl 1 headset Navy type #49507, 1 Fixed Resistor MX–1024/U for 230 v, 1 Electrical Noise Suppressor F–91/U, plugged-in tubes and running spares c/o 1 set of spare tubes, 1 neon lamp and 18 fuses; AVC, BFO, electrical band spread, built-in speaker; RMCA receiver model #AR–8506–B.	Receives a-m, m-c-w, and c-w, r-f signals.	
W–201	CABLE ASSEMBLY, power: two #20 stranded cond, ea cond rubber ins, covered w/tinned copper shield, cotton wrap, $\frac{1}{32}$″ rubber o/a, 0.310″ OD; 4.5 ft lg excluding terminations; fitted w/Hubbell #7464 female locking plug and 2 solder lugs; Birnback (bulk) cable #772.	Suppressor power cable.	
C–116	CAPACITOR, fixed: mica; 450 uuf ±2%; 500 vdcw; temp coef C; case approx$\frac{23}{32}$″ lg x $\frac{15}{32}$″ wd x 0.2″ h; red molded low loss bakelite; 2 axial wire leads; term mtg; silver mica; Sangamo type #KR–1345 capacitor.	Band 3 oscillator padder.	
C–117	CAPACITOR, fixed: mica; CM30C681G	Band 4 oscillator padder.	
C–118, C–151	CAPACITOR, fixed: mica; 1500 uuf ±2%; 500 vdcw; temp coef not specified by letter, extremely stable, drift factor per °C. as low as 0.002%; 1⅜″ lg x $\frac{13}{16}$″ wd x $\frac{5}{16}$″ h; silver mica films mtd on ceramic and coated w/wax; 2 flat strip leads; term mtg; silver mica and strip leads; Teleradio type #SMF–5, modified.	C–118: Band 5 second r-f padder. C–151: Band 5 first r-f padder.	
C–119	CAPACITOR, fixed: paper dielectric; single sect; 100,000 uuf −10% +20%; 600 vdcw; paper tube wax sealed case; 1⅝″ lg x $\frac{1}{16}$″ diam; impr and sealed w/non-hydroscopic wax sealing compound; 2 axial wire lead term; no internal grounds; term mtg; Incco type #PT–139.	Oscillator coils bypass.	
C–120, C–121, C–124, C–125,	CAPACITOR, fixed: paper dielectric; single sect; 10,000 uuf −10% +20%; 600 vdcw; paper tube wax sealed case; 1¼″ lg x ⅜″ diam; impr and sealed w/non-hydroscopic wax sealing compound; 2 axial	C–120: V–103 plate bypass. C–121: V–109 plate bypass. C–124: V–101 cathode bypass. C–125: V–101 screen bypass.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C–127, C–128, C–130, C–133, C–146, C–147, C–148, C–149, C–155 through C–158.	wire lead term; no int grounds; term mtg; Incco type #PT–135.	C–127: V–102 screen bypass. C–128: V–104 AVC bypass. C–130: V–105 AVC bypass. C–133: AVC timing. C–146: V–103 heater bypass. C–147: V–102 heater bypass. C–148 and C–149: Line bypass. C–155: Zero V (B—) bus bypass. C–156: R–111 R. F. GAIN bypass. C–157 and C–158: V–109 heater bypass.	
C–122, C–123, C–126, C–134, C–135.	CAPACITOR, fixed: ceramic; CC26SL101J	C–122: V–103 grid coupling. C–123: V–101 grid coupling. C–126: V–102 grid coupling. C–134 and C–135: Diode load filters.	
C–129, C–131, C–132.	CAPACITOR, fixed: paper dielectric; triple sect; 100,000 uuf ±10% per sect; 600 vdcw; HS rectangular metal case, bathtub type; approx 1 13/16" lg x 1" wd x 13/16" h; Incco oil filled; 3 solder lug term on top; internally gnd to case, 2 integral mtg ears w/3/16" diam holes on 2⅛" mtg/c; Incco #6BAT111.	C–129: Bypass for r-f gain voltage on cathodes of V–101, V–104, and V–105, plate circuit of V–104, and cathode of V–104. C–131: Bypass for +92 v bus, cathode of V–105, and plate circuit of V–105. C–132: Bypass for O v (B—) bus, cathode of V–106, and plate ciruit of V–106.	
C–136 through C–138.	CAPACITOR, fixed: paper dielectric; single sect; 1000 uuf—30% +40%; 1000 vdcw; paper tube wax sealed case: 1¼" lg x ⅜" diam; impr and sealed w/non-hydroscopic wax sealing compound; 2 axial wire lead term; no int grounds; term mtg; Incco type #PT–103.	C–136: Af coupling, V–107. C–137: V–107 grid coupling. C–138: A–f plate bypass.	
C–139	CAPACITOR, fixed: paper dielectric; single sect; 100,000 uuf ±10%; 600 vdcw; HS rectangular metal case, bathtub style; approx 1 13/16" lg x 1" wd x 13/16" h; Incco oil filled; 2 solder lug term on top; no int grounds; 2 integral mtg ears with 3/16" diam holes on 2⅛" mtg/c; Incco #6BAT10.	V–108 grid coupling.	
C–140	CAPACITOR, fixed: electrolytic; single sect; 25 uf —15% +100%; 50 vdcw; oper temp range —20° C. to +85° C.; 1½" lg x 11/16" diam; HS tubr metal case w/ins cardboard tube; 2 axial wire lead term; neg term gnd; term mtg; Mallory type #TC 36.	V–108 grid bias filter.	
C–141	CAPACITOR; fixed: paper dielectric; single sect; 5000 uuf —30% +40%; 1000 vdcw; paper tube wax sealed case; 1½" lg x 7/16" diam; impr and sealed w/non-hydroscopic wax sealing compound; 2 axial wire lead term; no int grounds; term mtg; Incco type #PT–105.	V–108 plate h-f bypass and output resonating.	
C–142, C–143	CAPACITOR, fixed: electrolytic; 2 sect; 40–40 uf; 150 vdcw for ea sect; oper temp range —20° C. to +85° 3.; 2 7/16" h x 1⅜" diam; HS metal can w/bakelite base; 4 octal tube base term; all term brought thru the base and ins from the can; term tube socket mtg; Aerovox type #29042.	C–142: B+ filter. C–143: B+ filter.	
C–115, C–159.	CAPACITOR, fixed: ceramic; CC26SL55OG	C–115: Band 2 oscillator padder. C–159: Z–121 fixed trimmer.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C–152 through C–154.	CAPACITOR, fixed: ceramic; CC21UJO50F_____	C–152: Z–108 fixed trimmer. C–153: Z–104 fixed trimmer. C–154: Z–110 fixed trimmer.	
C–150_____	CAPACITOR, fixed: ceramic; CC21CK100D_____	Z–109 fixed trimmer.	
C–161_____	CAPACITOR, fixed: ceramic; CC26SL350G_____	Band 1 oscillator padder.	
C–201_____	CAPACITOR, fixed: CP67B5DF104V_____	Supressor filter.	
C–101_____	CAPACITOR, variable: air dielectric; plate meshing, 3 sect, 2 stators per sect; 3 sect 10 to 218 uuf, 3 sect 9 to 187 uuf; SLW modified per RCC curve C; air gap 0.0235″; 6⅜″ lg x 2 23/32″ wd x 3 3/16″ h excluding shaft and mtg studs, ¼″ diam shaft ⅜″ beyond bearing holder bushing; extension drive shaft adj; ea sect has 2 capacitors w/15 and 13 aluminum plates; 182 deg ±2 deg counterclockwise rotation to increase capacity; ceramic insulation; solder lug term; mts on 4 threaded 6–32 spade bolts on 6 7/32″ x 2.292″ mtg/c; shaft has bakelite insert between second and third sect from shaft extension end, high end plates; RCC series 21 type C modified per RMCA dwg; RMCA dwg #K–77.	MAIN TUNING.	
C–102_____	CAPACITOR, variable: air dielectric; plate meshing, single sect; 1 to 3.5 uuf ±20% of max; SLC; air gap approx 5/64″; 1 3/32″ lg x 1 13/32″ wd x 1 1/32″ h excluding shaft and lugs and w/plates meshed, ¼″ diam shaft extends ½″ beyond ⅜″–32 threaded mtg bushing; extension shaft adj; 2 plates; 360 deg rotation clockwise and counterclockwise; ceramic insulation; lug term; single hole ⅜″ diam mtg bushing; RMCA dwg #K–192.	BAND SPREAD.	
C–103 through C–114, C–162 through C–164.	CAPACITOR, variable: ceramic; rotary, single sect; 3 to 12 uuf; 500 vdcw; temp coef zero mmf/mf/°C.; 55/64″ x 21/32″ wd x ⅜″ h excluding 9/32″ lg term; solder lug term; two 0.120″ diam mtg holes in base on 0.445″ mtg/c; screwdriver slot adj; ceramic base; Erie Ceramicon trimmer style #TS2A-NPO.	C–103: Z–101 trimmer. C–104: Z–102 trimmer. C–105: Z–103 trimmer. C–106: Z–104 trimmer. C–107: Z–105 trimmer. C–108: Z–106 trimmer. C–109: Z–107 trimmer. C–110: Z–108 trimmer. C–111: Z–109 trimmer. C–112: Z–110 trimmer. C–113: Z–111 trimmer. C–114: Z–112 trimmer. C–162: Z–119 trimmer. C–163: Z–120 trimmer. C–164: Z–121 trimmer.	
Z–119_____	COIL, RF: antenna transf; 2 wnd, pri single pie universal wnd, secd 2 pie universal wnd; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–A1 DELTA; heavy wax impr; Delta Rad per RMCA dwg; RMCA dwg #T–1199 and spec #T1199–A1.	Band 1 antenna coupling.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Z–101	COIL, RF: antenna transf; 2 wnd, pri single pie universal wnd, secd 3 pie universal wnd; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1½″ mtg/c ea w/one #28 drill hole; 4 solder lug term on the upper outer side of the form; grid lug colored green before use, coil marked T–1199–A2 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–A2.	Band 2 antenna coupling.	
Z–102	COIL, RF: antenna transf; 2 wnd, pri single pie universal wnd, secd single layer close wnd; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1½″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–A3 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–A3.	Band 3 antenna coupling.	
Z–103	COIL, RF: antenna transf; 2 wnd, pri single layer close end, secd single layer space wnd 18 turns per inch on threaded sect; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1½″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of the form; grid lug colored green before use, coil marked T–1199–A4 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–A44.	Band 4 antenna coupling.	
Z–104	COIL, RF: antenna transf; 2 wnd, pri single layer close wnd, secd single layer 18 turns per inch on threaded sect; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–A5 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–A5.	Band 5 antenna coupling.	
Z–120	COIL, RF: RF transf; 2 wnd, pri single pie universal wnd, secd 2 pie universal wnd; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–B1 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–B1.	Band 1 r-f coupling.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Z-105	COIL, RF: RF transf; 2 wnd, pri single pie universal wnd, secd 3 pie universal wnd; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacifor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–B2 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–B2.	Band 2 r-f coupling.	
Z-106	COIL, RF: RF transf; 2 wnd, pri single pie universal wnd, secd single layer close wnd; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–B3 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–B3.	Band 3 r-f coupling.	
Z-107	COIL, RF: RF transf; 2 wnd, pri single pie universal wnd, secd single layer 18 turns per inch on threaded sect; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–B4 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–B4.	Band 4 r-f coupling.	
Z-108	COIL, RF: RF transf; 2 wnd, pri single pie universal wnd, secd single layer 18 turns per inch on threaded sect; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, air core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer capacitor; capacitor adj thru hole in metal shield plate; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–B5Δ; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–B5.	Band 5, r-f coupling.	
Z-121	COIL, RF: osc; single wnd tapped; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, separate iron core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer and ext built-in adj iron core on mtg plate; core adj thru hole in chassis; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–C1 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–C1.	Band 1, oscillator.	
Z-109	COIL, RF: osc; single wnd tapped; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, separate iron core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer and ext built-in adj iron core	Band 2, oscillator.	

Ref symbol	Name of part and description	Function of part	Signal Corp stock No.
	on mtg plate; core adj thru hole in chassis; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use; coil marked T–1199–C2 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–C2.		
Z–110	COIL, RF: osc; single wnd tapped; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, separate iron core; form ⅞″ OD x 1/16″ thk x 2″ lg; ext built-in trimmer and ext built-in adj iron core on mtg plate; core adj thru hole in chassis; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–C3 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–C3.	Band 3, oscillator.	
Z–111	COIL, RF: osc; single wnd tapped; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, separate iron core; form ⅞″ OD x 1/16″ thk x 2″ lg; trimmer and ext built-in adj iron core on mtg plate; core adj thru hole in chassis; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form, grid lug colored green before use, coil marked T–1199–C4 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–C4.	Band 4, oscillator.	
Z–112	COIL, RF: osc; single wnd, spaced and tapped; unshielded; 2″ lg x 1½″ diam o/a; paper base bakelite tubr form, separae iron core; form ⅞″ OD x 1/16″ thk x 2″ lg; trimmer and ext built-in adj iron core on mtg plate; core adj thru hole in chassis; 2 right angle brackets on 1⅛″ mtg/c ea w/one #28 drill hole; 4 solder lug term on upper outer side of form; grid lug colored green before use, coil marked T–1199–C5 DELTA; heavy wax impr; RMCA dwg #T–1199 and spec #T–1199–C5.	Band 5, oscillator.	
L–103	COIL, RF: choke; continuous universal wnd in 4 sect; unshielded; rated at 2.5 mh at approx 160 kc, distributed cap 1 uuf, current rating 125 ma, DC resistance 50 ohms; approx 7/32″ OD x 2 1/16″ lg o/a; isolantite form and core; form approx ¼″ OD x 1¾″ lg; term mtg by two 2¾″ lg flex wire leads attached radially to metal caps at ends of form; Natl Co. type #R–100.	R. F. GAIN control isoltaing.	
L–201, L–202	COIL, RF: choke; 2 pie universal wnd; unshielded; 2 mh ±5% at 1000 cyc, 1.4 ohms max DC resistance, 1.2 amp nominal cur rating; 1 13/16″ h x 2 5/16″ diam max o/a dimen; phenolic dowel form with axial #8/32 thread; form 1 5/16″ h x 1″ diam; single hole mtg in axial 8/32 thd in form; 2 solder lug term on top bakelite disc; top disc marked X–917–4; RMCA dwg #K–317.	R-f filter chokes.	
J–102, J–103	CONNECTOR, receptacle: for 2 cond plug 0.25″ diam; 1 11/16″ lg x ¾″ wd x 1 11/16″ d; one ea nut and washer for ⅜″ bushing; requires ⅜″ mtg hole; Mallory Junior Jack #702A.	Inputs for headset.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
P–201	CONNECTOR, plug: 2 curved female cont that accommodates polarized and nonpolarized cont; body 1.187″ lg x 1″ diam less cord grip; 10 amp 250 v; cylindrical shaped brown bakelite; for cords 0.218″ to 0.312″; 2 int screw term and cord grid for mtg; incl cable clamp noted above; Hubbell cat. #7464.	Power plug.	
J–101	CONNECTOR, receptacle: 2 curved polarized male cont; 0.937″ lg x 1.625″ diam o/a; 10 amp 250 v; cylindrically shaped nickel pl metal; molded brown bakelite insert; two 0.156″ diam holes on 1.375″ mtg/c; two screw term, twist lock device, larger and longer cont nickel pl; Hubbell cat. #7476.	Power connection.	
O–114 through O–116.	COUPLING, flexible: c/o canvas bakelite disc and 2 nickel pl metal collars; provides coupling to two ¼″ diam shafts; c/o a canvas bakelite disc and 2 nickel pl metal collars w/2 set screws ea; approx 1 1/16″ diam x 9/16″ lg; mts on two ¼″ diam shafts axially situated; Natl Co. TX–10.	O–114: Coupling for C–102. O–115: Coupling for C–101. O–116: Coupling for S–101.	
Z–118	FILTER, band suppression: range 450 to 2100 kc with peak adj, used in the 1275 to 2100 kc range; approx 2⅞″ lg x 1 7/16″ wd x 1 7/16″ d; rectangular metal can; 2 spade bolts on 1⅜″ mtg/c; 6 solder lug term; can contains 3 capacitors and 1 coil, iron core adj, can marked Wave Trap #33033; Delta Rad per RCA #33033.	I-f wave trap.	
F–101, F–201, F–202.	FUSE, cartridge: Sig C Fuse FU–26; 1 amp, blowing time at 110% is life, at 135% equals 0 to 1 hr, at 200% equals 0 to 2 min; 250 v; 1 time; glass body; ferrule term; 1¼″ lg x ¼″ diam o/a; term ¼″ diam x ¼″ lg; Littelfuse #312001.	F–101: Receiver protection. F–201 and F–202: Suppressor protection.	
HS–101	HEADSET: radio; magnetic; 200,000 ohms impedance; 2 rec, 2⅛″ OD x ¾″ d, 2 fabric covered metal headbands approx ½″ wd, connecting cord, and phone tips for insertion into separate plug; for general service; Trimm headset similar to cat. #154.	Audio signal output.	
E–121, E–201, E–202.	HOLDER, fuse: extractor post type; one 3AG cartridge; black bakelite case; 15 amp, 125 v max; approx 2¼″ lg x 1 1/16″ diam o/a; panel mtg, barrel threaded ½″–24 thd; pl copper cont, 1 backed by compression spring, other force fit clip; 2 solder lug term; 1 turn screw-off cover marked fuse; Buss #HKP.	Fuse mountings.	
Fig. 1	KNOB: round w/pointer; molded black bakelite; for ¼″ diam shaft; double #8–32 set screws; white pointer line marking; 1 19/32″ OD x ⅞″ h o/a; brass insert; shaft hole 9/16″ d; skirt type knob w/fluted hand grip; Molded Insul per RCA dwg #P–712336, part 5.	For BAND SPREAD control and for BAND SWITCH.	
Fig. 1	KNOB: round w/pointer; molded black bakelite; for ¼″ diam shaft; single #8–32 set screw; white pointer line marking; 1⅛″ OD x ⅝″ h o/a; brass insert; shaft hole ½″ d; skirt type knob w/fluted hand grip; Molded Insul per RCA dwg #P–712336, part 7.	For A. F. GAIN control and for R. F. GAIN control.	
Fig. 10	KNOB: round; molded black bakelite; for ¼″ diam shaft; single #8–32 set screw; no markings; 1⅛″	For BFO tuning.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	OD x 5/8" h o/a; brass insert; shaft hole 1/2" d; skirt type knob w/fluted hand grip; Molded Insul per RCA dwg #P–255541, part 4.		
Fig. 1	KNOB: round; molded black bakelite; for 1/4" diam shaft; double #8–32 set screws; no markings; 1 1/2" OD x 7/8" h o/a; brass insert; shaft hole 9/16" d; skirt type knob w/fluted hand grip; Molded Insul per RCA dwg #P–255541, part 1.	For main tuning.	
V–111	LAMP, glow: 106 to 125 v, 1 w, strikes at 60 v AC; bulb G–10 clear o/a lg 2 1/16"; double cont bayonet candelabra base; cold cathode type electrode shape PW–5; burn any position; neon gas, no int resistor; GE lamp #NE–32.	Voltage regulation.	
X–111	LAMPHOLDER: for double cont bayonet candelabra; hard rubber body in nickel pl shell; for 1 w lamp, 125 v; approx 1 3/8" lg x 1 1/2" diam o/a; no switch; mts by two 1/8" diam mtg holes on 1 3/16" mtg/c on flange at top of shell; contains 2 spring loaded cont; has 2 holes to receive leads which are held tight with set screws; Morse FW Ediswan #23.	Socket for V–111.	
I–101	LENS, indicator light: colorless; threaded integral mtg bezel, clamped into bezel; approx 1/4" rad clear glass; nickel pl metal bezel w/knurled outer sect and 9/16-27 thd 3/16" lg; Drake Mfg part #25–CSP.	On-off indicator.	
Z–117	OSCILLATOR SUBASSEMBLY: for use in BFO; u/w Sig C Radio Receiver R–203A/SR; all parts encl in can, tuning shaft protrudes from top of can; 1700 kc BFO coil; rectangular can; 4 1/2" lg x 1 7/8" wd x 1 1/2" d; mts w/2 spade bolts on 1 3/8" mtg/c; marked 12600; can contains 3 capacitors, 1 resistor, and 1 tapped coil; wnd painted w/Q-max varnish; Sickles FW part #12600.	BFO coil.	
P–102	PLUG, telephone: 2 cond; single shank; trapezoidal black bakelite shell; shank 1 3/16" lg x 1/4" diam, shell is a rounded trapezoid 1 3/16" h x 5/8" on small base x 1" on large base x 3/8" thk; for phone tip cable termination; 2 set screws to lock phone tips, and hole to tie cord; Trimm plug similar to cat. #512.	Headset connection.	
H–117	POINTER, indicator: p/o Sig C Radio Receiver R–203A/SR and RMCA Receiver AR–8506–B; lucite; has bright red hairline less than 1/64" wd; lg triangle shape w/round vertex and round base; approx 4 3/16" lg x 3/4" diam at the base; mts by three #42 drill holes spaced 120 deg around a 1/4" hole; marked w/a red hairline; RMCA dwg #TS–323, part 2.	Frequency indicator.	
L–101, L–102	REACTOR: filter choke; single sect; 5 hy, 100 ma; 100 ohms DC resistance; 1200 v RMS test; sealed and potted in metal case, 3 3/16" lg x 2 3/4" wd x 2 3/8" d; four 3/16" diam mtg holes on 1 13/16" x 2 1/8" mtg/c, top or bottom mtg; two solder lug term on bakelite board on smallest side; Kenyon type #S–15056.	Filter chokes.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Fig. 13	RESISTOR, fixed: WW; 350 ohms ±5%; 160 w at 340° C. max cont oper temp; body 8½″ lg x 1⅛″ OD; vitreous enamel coating on ceramic tube; resistant to humidity; 2 heavy weight stud term; axial mtg hole ¾″ diam; mtd in an expanded steel mesh cage which has two ¼″–20 stud term; line dropping accessory for Sig C Radio Receiver R–203A/SR and RMCA Receiver AR–8506–B; WL 8½″ type D resistor w/type #201 term and type #100 cage.	Line voltage dropping unit.	
R–101, R–104	RESISTOR, fixed: comp; RC20BF105K	R–101: V–101 a-v-c decoupling. R–104: V–102 grid input.	
R–102	RESISTOR, fixed: comp; RC20BF271K	V–101 cathode bias.	
R–103,	RESISTOR, fixed: comp; RC20BF102K	R–103: V–101 plate isolation.	
R–107,		R–107: V–102 plate isolation.	
R–109,		R–109: V–104 cathode bias.	
R–110,		R–110: V–104 plate isolation.	
R–113,		R–113: V–105 cathode bias.	
R–114,		R–114: V–105 plate isolation.	
R–117.		R–117: V–106 plate isolation.	
R–105	RESISTOR, fixed: comp; RC20BF511J	V–102 and V–103 cathode bias.	
R–106,	RESISTOR, fixed: comp; RC20BF104K	R–106: V–103 grid leak.	
R–108,		R–108: V–104 a-v-c decoupling.	
R–112,		R–112: V–105 a-v-c decoupling.	
R–126.		R–126: V–108 grid filter.	
R–115	RESISTOR, fixed: comp; RC20BF471K	V–106 cathode bias.	
R–116	RESISTOR, fixed: comp; RC20BF205J	A-v-c filter (timing).	
R–118,	RESISTOR, fixed: comp; RC20BF473K	R–118: V–107 diode filter.	
R–129.		R–129: High-voltage bleeder.	
R–119,	RESISTOR, fixed: comp; RC20BF244J	R–119: A-v-c and diode load.	
R–123.		R–123: V–108 grid input.	
R–121	RESISTOR, fixed: comp; RC20BF106K	V–107 audio grid input.	
R–122	RESISTOR, fixed: comp; RC20BF154K	V–107 plate load.	
R–124	RESISTOR, fixed: comp; RC20BF474K	V–109 plate dropping.	
R–125	RESISTOR, fixed: comp; RC20BF242J	V–111 current limiting.	
R–127	RESISTOR, fixed: WW; 50 ohms ±10%; 10 w at 140° C. max continuous oper temp; 3.117″ lg x $^{27}/_{32}$″ wd x $^{15}/_{64}$″ h excluding term and mtg ears; rigid form; molded in bakelite and clad in metal, resistant to humidity; 2 solder lug term; 2 integral mtg ears w/one 0.148″ diam hole and one 0.210″ elongated hole on 3½″ mtg/c; Clarostat type MR part #1–6538.	Filament voltage dropping.	
R–128	RESISTOR, fixed: WW; 5 ohms ±10%; 2 w at 120° C; 1¾″ lg x $^{21}/_{64}$″ diam; rigid body; molded phenolic encl, resistant to humidity; 2 axial wire leads; term mtg; IRC type #BW–2.	Output loading.	
R–130	RESISTOR, fixed: comp; RC20BF100K	Radiation limiter and load matching.	
R–111	RESISTOR, variable: comp; 10,000 ohms ±20%; 2 w at 70° C. max continuous oper temp; 3 solder lug term; encl metal case $1^{1}/_{16}$″ diam x $^{9}/_{16}$″ d; ¼″ diam, ½″ lg plain round metal shaft; counter-clockwise modified logarithmic taper; cont arm ins from case w/o off position; normal torque w/o locking device; mtg bushing ⅜″–32 x ⅜″ lg w/non-turn device located on $^{17}/_{32}$″ rad at 9 o'clock; AB Type #J, #1765 CRA.	R. F. GAIN control.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
R–120	RESISTOR, variable: comp; 1 meg ±20%; 2 w at 70° C. max continuous oper temp; 3 solder lug term; encl metal case 1¼″ diam x 9/16″ d; ¼″ diam, ⅜″ lg plain round metal shaft; logarithmic taper; cont arm ins from case w/o off position; normal torque w/o locking device; mtg bushing ⅜″–32 x ⅜″ lg w/non-turn device located on 17/32″ rad at 9 o'clock; IRC type #VC–8823 w/C taper.	Audio gain control.	
R–301	RESISTOR, fixed: WW; 350 ohms ±5%; 160 w at 340° C. max oper temp; body 8½″ lg x 1⅛″ OD; vitreous enamel coating on ceramic tube resistant to humidity; 2 heavy wt stud term; axial mtg hole ¾″ diam; WL 8½″ type D with type #201 term.	Line voltage dropping.	
H–113 through H–116.	SCREW, thumb: knurled thumb head w/screwdriver slot; brass, nickel pl; 19/32 thd; 19/32″ lg under head; thread 3/16″ lg; flat point; head 5/32″ h x 9/16″ diam; captive screw; RMCA dwg #KS–1264.	Panel mountings.	
H–111, H–112.	SCREW, thumb: knurled thumb head w/screwdriver slot; brass, nickel pl; 19/32 thd; 17/32″ lg under head; thread 3/16″ lg; flat point; head 5/32″ h x 9/16″ diam; captive screw; RMCA dwg #KS–1264.	Cover locking.	
X–101 through X–110, X–112, X–113.	SOCKET, tube: octal; no cont missing; under chassis water plate mtg; two ⅛″ wd x 5/16″ lg mtg slots on 1¾″ mtg/c; round ceramic body approx 2 3/16″ lg x 1 7/16″ wd x ½″ h o/a excl cont; phosphor bronze silver pl cont; c/o socket, keyed adapter plate at right angles to mtg/c and retaining ring; Ucinite #115078.	X–101: For V–101. X–102: For V–102. X–103: For V–103. X–104: For V–104. X–105: For V–105. X–106: For V–106. X–107: For V–107. X–108: For V–108. X–109: For V–109. X–110: For V–110. X–112: For C–142. X–113: For C–143.	
LS–101	SPEAKER, dynamic: 3″ diam cone; PM field; 2 w normal, 4 w peak; voice coil impedance 5 ohms; 3 9/16″ lg x 3 9/16″ wd x 2⅛″ d o/a; mts by four 3/16″ diam holes on 2 13/16″ x 2 13/16″ ctr on mtg fl; dustproof voice coil suspension; Tartak type #3C5M, spec #S–5072.	Audio signal output.	
Fig. 9	SUPPRESSOR, electrical noise: capacitor 3 x 0.1 uf and 2 coils c/o 2 pies ea, ea pie 1 mh connected series aiding; 7¼″ lg x 6⅞″ wd x 3⅝″ h o/a; 1 amp, 115 v AC or DC; rectangular metal case w/hinged cover; four ¼″ holes on 4⅜″ mtg/c; 2 term boards, 4 screws ea, 1 ground stud and 1 cord and outlet plug; unit incl switch and fuses, outside marked type 3AG 1 AMP and OFF-ON and GND, inside marked LINE+−and SET (or LOAD)+−; RMCA filter p/o dwg #T–1198.	Suppressing line noise.	
S–101	SWITCH, rotary: 2 pole 5 position; 2 sect; 2500 v min breakdown; solid silver spring clips, coin silver rotor plates; ceramic wafers, metal spacers; approx 2 11/32″ lg x 1⅞″ diam o/a; shorting and non-shorting type cont; locking action; solder lug term; mtg bushing ⅜″–32 thd x ¼″ lg FMS shaft 7/16″ lg x ¼″ diam, flush mtg; RMCA dwg #K–216.	Antenna section band selection.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
S–102	SWITCH, rotary: 4 pole 5 position; 4 sect; 2500 v min breakdown; solid silver spring clips, coil silver rotor plates; ceramic wafers, metal spacers; approx 6 25/32" lg x 1 7/8" diam o/a; shorting type cont; locking action; solder lug term; mtg bushing 3/8"–32 thd x 1/4" lg FMS, shaft 2 1/2" lg x 1/4" diam, flush mtg; RMCA dwg #K–215.	Oscillator section band selection.	
S–103	SWITCH, toggle: SPST; 3 amp 250 v; ins strips partly encl in metal overlap; body 1 9/16" lg x 1/2" wd x 1/2" d o/a; nonshorting cont; metal ball head toggle lever approx 3/8" lg; locking action, normally open in the off position; solder lug term; single hole flush panel mtg by 15/32"–32 thd x 7/16" lg bushing; AH&H #20992.	BFO on-off.	
S–104, S–105.	SWITCH, toggle: SPDT; 3 amp 125 v; ins strips in metal overlap; body approx 1 1/2" lg x 1/2" wd x 1/2" d incl term; non-shorting cont; ball head toggle approx 3/8" lg; locking action; solder lug term; single hole mtg by 15/32"–32 thd bushing 7/16" lg, flush mtg; AH&H #21350.	S–104: AVC on-off. S–105: Loudspeaker on-off.	
S–106	SWITCH, toggle: DPST; 12 amp 125 v, 6 amp 250 v; bakelite encl case; body 1 3/4" lg x 3/4" wd x 5/8" d o/a; non-shorting cont; metal ball head toggle approx 1/2" lg; snap action; screw type term; single hole mtg by 15/32"–32 thd bushing 5/16" lg, flush mtg or 2 hole screw mtg; AH&H #80600.	Power on-off.	
S–201	SWITCH, toggle: 20 amp, 250 v; encl in gray porcelain cup; 2 13/16" lg x 1 3/4" wd x 1 1/2" d; actuated by plastic handle approx 1" long; snap action; screw term; ins yoke for flush mtg w/two holes on 2 3/8" mtg/c; plain handle not engraved; Bryant Elec cat. #3982, special.	Power on-off.	
P–101	TRANSFORMER, AF: plate coupling type; pri 2000 ohms impedance, secd 500 ohms and 4 ohms, 40 ma DC in the pri; upright shielded case, lam steel core; 2 7/8" lg x 2 7/16" wd x 2" d; max oper lever approx 2 w; turns ratio pri to secd 3.16 and 35.3; freq response 400 to 5000 cyc ±1 db, less than 2 db down at 200 cyc and less than 4 db down at 100 cyc, 400 cyc ref level; no int shield, schematic below; 6 solder lug term mtd at bottom on bakelite; four 3/16" diam mtg holes on 2 1/32" x 1 9/16" mtg/c; Kenyon type #S–17586	Audio output coupling.	
Z–113 through Z–115.	TRANSFORMER, IF: 1700 kc; interstage; shielded; 4 1/2" lg x 1 7/8" wd x 1 1/2" d; powdered iron core mtd in wood dowel; double tuned; variable air capacitor tuning; mts w/2 spade bolts on 1 3/8" mtg/c; 4 wire lead term; secd coil tapped, coils impr w/wax; cans marked 12568; Sickles FW part #12568.	Z–113: 1st i-f input. Z–114: 2d i-f input. Z–115: 3d i-f input.	
Z–116	TRANSFORMER, IF: 1700 kc; output to diode; shielded; 4 1/2" lg x 1 7/8" wd x 1 1/2" d; powdered iron core mtg on wood dowel; double tuned; variable air capacitor tuning; mts w/2 spade bolts on 1 3/8" mtg/c; 4 wire lead term; coils impr w/wax, cans marked 12569; Sickles FW part #12569.	Diode input.	

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
V–101,	TUBE, electron: JAN–6SG7; pentode	V–101: R-f amplifier.	
V–102,		V–102: Mixer.	
V–104,		V–104: 1st i-f amplifier.	
V–105,		V–105: 2d i-f amplifier.	
V–106.		V–106: 3d i-f amplifier.	
V–103,	TUBE, electron: JAN–6J5; triode	V–103: Oscillator.	
V–109.		V–109: BFO.	
V–107	TUBE, electron: JAN–6SQ7; duplex diode triode	Detector, a-v-c, and 1st audio amplifier.	
V–108	TUBE, electron: JAN–25L6GT; beam power pentode.	Audio output.	
V–110	TUBE, electron: JAN–25Z6GT; double diode	Rectifier.	

2. Identification Table of Parts for Radio Receiver R–203/SR

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	INTERMEDIATE AND HIGH FREQUENCY RECEIVER: 115 or 230 v DC, freq range 85 kc —25 mc.	Receives a-m, m-c-w, and c-w, r-f signals.	2C4519–8506B 2C4519–850B/B1
C–101	CAPACITOR, variable: 3 gang, double stator, 3 x 210 uuf and 3 x 187 uuf.	MAIN TUNING	3D9218VE8
C–102	CAPACITOR, variable: 1–3.5 uuf	BANDSPREAD	3D9003VE5–2
C–103,	CAPACITOR, fixed: ceramic; 3–12 uuf	C–103: Z–101 trimmer	3DK9012V–2
C–104,		C–104: Z–102 trimmer.	
C–105,		C–105: Z–103 trimmer.	
C–106,		C–106: Z–104 trimmer.	
C–107,		C–107: Z–105 trimmer.	
C–108,		C–108: Z–106 trimmer.	
C–109,		C–109: Z–107 trimmer.	
C–110,		C–110: Z–108 trimmer.	
C–111,		C–111: Z–109 trimmer.	
C–112,		C–112: Z–110 trimmer.	
C–113,		C–113: Z–111 trimmer.	
C–114,		C–114: Z–112 timmer.	
C–162,		C–162: Z–119 trimmer.	
C–163,		C–163: Z–120 trimmer.	
C–164.		C–164: Z–121 trimmer.	
C–115,	CAPACITOR, fixed: silver mica, 55 uuf ±2%, 500 vdcw.	C–115; Band 2 oscillator padder	3D9055–2
C–159.		C–159: Z–121 fixed trimmer.	
C–116	CAPACITOR, fixed: silver mica, 450 uuf ±2%, 500 vdcw.	Band 3 oscillator padder	3DK9450
C–118,	CAPACITOR, fixed: silver mica, 0.0015 uf, 500 vdcw.	C–118: Band 5 second r-f padder	3DA1500–14
C–151.		C–151: Band 5 first r-f padder	
C–119	CAPACITOR, fixed: paper, 0.1 uf, 600 vdcw.	Oscillator coils bypass	3DA100–26.9

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C–120,	CAPACITOR, fixed: paper, 0.01 uf, 600 vdcw.	C–120: V–103 plate bypass	3DA10–210
C–121,		C–121: V–109 plate bypass.	
C–124,		C–124: V–101 cathode bypass.	
C–125,		C–125: V–101 screen bypass.	
C–127,		C–127: V–102 screen bypass.	
C–128,		C–128: V–104 avc bypass.	
C–130,		C–130: V–105 avc bypass.	
C–133,		C–133: A-v-c filter.	
C–146,		C–146: V–103 filament bypass.	
C–147,		C–147: V–102 filament bypass.	
C–148,		C–148 and C–149: Line bypass.	
C–149,			
C–155,		C–155: B—(O–v) bus bypass.	
C–156,		C–156: R. F. GAIN control (R–111) bypass.	
C–157,		C–157 and C–158: V–109 filament bypass.	
C–158.			
C–122,	CAPACITOR, fixed: silver mica, 0.0001 uf, 500 vdcw.	C–122: V–103 grid coupling	CD9100–63
C–123,		C–123: V–101 grid coupling.	
C–126,		C–126: V–102 grid coupling.	
C–134,		C–134 and C–135: Diode load filter.	
C–135.			
C–129,	CAPACITOR, fixed: paper, oil, 0.1 x 0.1 x 0.1 uf, 400 vdcw.	C–129: Bypass for R. F. GAIN voltage on cathodes of V–101, V–104, and V–105, plate circuit of V–104, and cathode of V–104.	3DA100–126.5
C–131,		C–131: Bypass for +92 V bus, cathode of V–105, and plate circuit of V–105.	
C–132.		C–132: Bypass for B— (O–V) bus, cathode of V–106, and plate circuit of V–106.	
C–136,	CAPACITOR, fixed: paper, 0.001 uf, 100 vdcw.	C–136: A-f coupling, V–107	3DA1–119
C–137,		C–137: V–107 grid coupling.	
C–138.		C–138: A-f plate bypass.	
C–139	CAPACITOR, fixed: paper, oil, 0.1 uf, 200 vdcw.	V–108 grid coupling	3DA100–202
C–140	CAPACITOR, fixed: dry electrolytic, 25 uf, 50 vdcw.	V–108 grid-bias filter	3DB25–63
C–141	CAPACITOR, fixed: paper, 0.005 uf, 600 vdcw.	V–108 plate h-f bypass and output resonating.	3DA5–115
C–142, C–143.	CAPACITOR, fixed: dry electrolytic (plug in type), 40 x 40 uf, 150 vdcw.	C–142: B+ filter	3DB40–31
		C–143: B+ filter.	
C–145,	CAPACITOR: fixed: ceramic, 0.000005 uf ±15%.	C–145: Z–111 fixed trimmer.	3D9005–25
C–152.		C–152: Z–108 fixed trimmer.	
C–153,		C–153: Z–104 fixed trimmer.	
C–154.		C–154: Z–110 fixed trimmer.	
C–150	CAPACITOR, fixed: silver mica, 0.00001 uf ±15%, 500 vdcw.	Z–109 fixed trimmer	3D9010–15
C–161	CAPACITOR, fixed: silver mica, 0.000035 uf ±2%, 500 vdcw.	Band 1 oscillator padder	3D9035–6
L–100,	CHOKE, filter: 5 hy, 100 ohms, 100 ma	Filter chokes	3C369–19
L–102.			
L–103	COIL, RF: 2.5 mh, 50 ohms, 125 ma	R. F. GAIN control isolating	3C326–100
Z–101	COIL, RF: pri, 10 mh, secd, 1.29 mh (for band 2).	Band 2 antenna coupling	2C4519–8506B/C3
Z–102	COIL, RF: pri, 50 uh, secd, 16.6 uh (for band 3).	Band 3 antenna coupling	2C4519–8506B/C4
Z–103	COIL, RF: pri, 1.5 uh, secd, 6.63 uh (for band 4).	Band 4 antenna coupling	2C4519–8506B/C5

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Z–104	COIL, RF: pri, 0.23 uh, secd, 0.82 uh (for band 5).	Band 5 antenna coupling	2C4519–8506B/C6
Z–105	COIL, RF: pri, 43.2 uh, secd, 1.32 mh. (for band 2).	Band 2 r-f coupling	2C4519–8506B/C8
Z–106	COIL, RF: pri, 500 uh, secd 16.1 uh (for band 3).	Band 3, r-f coupling	2C4519–8506B/C1
Z–107	COIL, RF: pri, 100 uh, secd 3.66 uh (for band 4).	Band 4, r-f coupling	2C4519–8506B/C9
Z–108	COIL, RF: pri, 50 uh, secd 0.84 uh (for band 5).	Band 5, r-f coupling	2C4519–8506B/C10
Z–109	COIL, RF: 65 uh, tapped 12¼ turns from bottom (for band 2).	Band 2, oscillator	3C1081–18B
Z–110	COIL, RF: 7–37 uh, tapped 2¼ turns from bottom.	Band 3, oscillator	3C1081–18C
Z–111	COIL, RF: 2.38 uh, tapped 1¼ turns from bottom (for band 4).	Band 4, oscillator	3C1081–18D
Z–112	COIL, RF: 0.97 uh, tapped 1¼ turns from bottom (for band 5).	Band 5, oscillator	3C1081–18E
Z–113, Z–114, Z–115.	COIL, ASSEMBLY, IF: includes pri, 76 uh; secd 76 uh tapped at 8 uh; 2 trimmer capacitors.	Z–113: 1st i-f input Z–114: 2d i-f input. Z–115: 3d i-f input.	2Z9642.44
Z–116	COIL ASSEMBLY, IF: includes pri and secd 76 uh each; 2 trimmer capacitors.	Diode input	2Z9642.43
Z–117	COIL ASSEMBLY, IF; includes 50 uh coil tapped at 4.7 uh; 1 grid leak; 2 trimmer capacitors.	BFO coil	2Z9644. 14
Z–119	COIL, RF: pri, 50 mh; secd, 8.93 mh (for band 1).	Band 1 antenna coupling	2C4519–8506B/C2
Z–120	COIL, RF: pri, 210 uh; secd, 9.17 uh	Band 1 r-f coupling	2C4519–8506B/C7
Z–121	COIL, RF: 65 uh, tapped 12¼ turns from bottom (for band 1).	Band 1, oscillator	3C1081–18A
F–101	FUSE: 1 amp, 250 v, non-renewable, type 3AG.	Receiver protection	3Z1926
J–102, J–103.	JACK: single ckt, normally open	Input for headset	2Z5534A.1
R–101, R–104.	RESISTOR, fixed: 1 meg, ½ w, carbon	R–101: V–101, a-v-c decoupling R–104: V–102 grid input.	3RC20AE105K
R–124	RESISTOR, fixed: 500,000 ohms, ½w, carbon.	V–109 plate dropping.	
R–102	RESISTOR, fixed: 250 ohm, ½w, carbon	V–101 cathodd bias	3Z6025–21
R–103, R–107, R–109, R–110, R–113, R–114, R–117.	RESISTOR, fixed: 1000 ohms, ½w, carbon.	R103: V–101 plate isolation R–107: V–102 plate isolation. R–109: V–104 cathode bias. R–110: V–104 plate isolation. R–113: V–105 cathode bias. R–114: V–105 plate isolation. R–117: V–106 plate isolation.	3RC20AE102K
R–105, R–115.	RESISTOR, fixed: 500 ohms, ½ w, carbon	R–105: V–102 and V–103 cathode bias. R–115: V–106 cathode bias.	3Z6050–65
R–106, R–108, R–112, R–126.	RESISTOR, fixed; 100,000 ohms, ½ w, carbon.	R–106: V–103 grid leak R–108: V–104 a-v-c decoupling. R–112: V–105 a-v-c decoupling. R–126: V–108 grid filter.	3RC20AE104K
R–111	RESISTOR, variable: pot; 100,000 ohms, 2 w, WW; includes S–106 SPDT switch.	R. F. GAIN control and off-on switch.	2Z7280–75
R–116	RESISTOR, fixed: 2 meg, ½ w, carbon	A-v-c filter	3ZK6802–17
R–118, R–129.	RESISTOR, fixed: 50,000 ohms, ½ w, carbon.	R–118: V–107 diode filter R–129: High-voltage bleeder.	3ZK6650–75

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
R–119, R–123.	RESISTOR, fixed: 250,000 ohms, ½ w, carbon.	R–119: A-v-c and diode load. R–123: V–108 grid input.	3Z6725–38
R–120	RESISTOR, variable: pot; 1 meg	A. F. GAIN control	2Z7273–37
R–121	RESISTOR, fixed: 10 meg, ½ w, carbon	V–107 audio grid input	3RC20AE106K
R–122	RESISTOR, fixed: 150,000 ohms, ½ w, carbon.	V–107 plate load	3RC20AE154K
R–125	RESISTOR, fixed: 2500 ohms, ½ w, carbon.	V–111 current limiting	3ZK6250–56
R–127	RESISTOR, fixed: 50 ohms, 10 w, WW	Filament voltage dropping	3Z6005–87
R–128	RESISTOR, fixed: 5 ohms ±20%, 2 w, WW.	Output loading	3Z5995–26
R–130	RESISTOR, fixed: 10 ohms, ½ w, carbon	Radiation limiter and load matching.	3RC20AE100K
X–101, X–102, X–103, X–104, X–105, X–106, X–107, X–108, X–109, X–110, X–112, X–113.	SOCKET, tube: 8 prong, octal, steatite	X–101: V–101 socket. X–102: V–102 socket. X–103: V–103 socket. X–104: V–104 socket. X–105: V–105 socket. X–106: V–106 socket. X–107: V–107 socket. X–108: V–108 socket. X–109: V–109 socket. X–110: V–110 socket. X–112: C–142 socket. X–113: C–143 socket.	2Z8795.1
X–111	LAMPHOLDER: for double cont bayonet candelabra.	V–111 socket.	
S–101	SWITCH, rotary: 2 wafer, 5 positions	Antenna section band selector	3Z9825–94.1
S–102	SWITCH, rotary: 4 wafer, 5 positions	Oscillator section band selector	3Z9825–94
S–103	SWITCH, toggle: SPST	BFO OFF-ON control	3Z9692.1
S–104, S–105.	SWITCH, toggle: SPDT	S–104: AVC OFF-ON control. S–105: LOUDSPEAKER OFF-ON control.	3Z9846.2
T–101	TRANSFORMER, AF: output, 25L6 tube to 500/4 ohm.	Audio output coupling	2Z9632.147
V–101, V–102, V–104, V–105, V–106.	TUBE, JAN–6SG7	V–101: R-f amplifier. V–102: Mixer. V–104: 1st i-f amplifier. V–105: 2d i-f amplifier. V–106: 3d i-f amplifier.	2J6SG7
V–103, V–109	TUBE, JAN–6J5	V–103: H-f oscillator. V–109: BFO.	2J6J5.
V–107	TUBE, JAN–6SQ7	Detector, a-v-c, and 1st audio amplifier.	2J6SQ7
V–108	TUBE, JAN–25L6GT/G	Audio power amplifier	2J25L6GT/G
V–110	TUBE, JAN–25Z6	Rectifier	2J25Z6
V–111	LAMP, glow: 1 w, neon; DC; candelabra base.	Voltage regulation for h-f oscillator	2Z5889–8
Z–118	FILTER, band suppression: series connected, adj core.	I-f wave trap	3Z12629
	LINE FILTER UNIT		
C–201	CAPACITOR, fixed: paper; oil, 0.1 x 0.1 x 0.1 uf, 400 vdcw.	Line filter	3DA100–201
L–201, L–202.	COIL, RF: 2 mh, 1.3 ohms, 2 pies	Line filter	3C322–26C
F–201, F–202.	FUSE: 1 amp, 250 v, non-renewable, type 3AG.	Line filter protection	3Z1926
S–201	SWITCH, toggle: DPST, 115 v, 20 amp	Line filter OFF-ON control	3Z9862–3.3

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