

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TM 11-866

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RADIO RECEIVERS

BC-779-A, -B; BC-794-A, -B;
BC-1004-B, -C, -D; AND R-129/U;

POWER SUPPLY UNITS

RA-74-B, -C; RA-84-A, -B; AND RA-94-A;

RADIO SETS

SCR-244-A, -B; SCR-704; and AN/FRR-4
(HAMMARLUND SUPER PRO RECEIVER)



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TM 11-866, Radio Receivers BC-779-A, -B; BC-794-A, -B; BC-1004-B, -C, -D; and R-129/U; Power Supply Units RA-74-B, -C; RA-84-A, -B; and RA-94-A; Radio Sets SCR-244-A, -B; SCR-704; and AN/FRR-4 (Hammarlund Super Pro Receiver), is published for the information and guidance of all concerned.

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For explanation of distribution formula, see TM 38-405.

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WARNING

HIGH VOLTAGE

is used in the operation
of this equipment.

DEATH ON CONTACT

may result if operating personnel
fail to observe safety precautions.

SAFETY NOTICE

Be careful when working on the power supply unit with the bottom plate off. The d-c voltages are over 400 volts, and the a-c potentials up to 900 volts. *These voltages are dangerous to life.*

With the dust cover and bottom plate removed from the receiver, voltages up to 250 volts are exposed at several points on top of the chassis, and voltages up to 400 volts are exposed at several points underneath the chassis.

Some service checks must be made inside the set with the high voltage on. When making these checks, always have present another person capable of rendering aid. Keep one hand in your pocket while making high-voltage measurements. This precaution will prevent touching the electrical circuit with more than one part of the body at one time.

Audio-frequency voltages up to 150 volts may be present at the 600-ohm SPKR terminals under certain conditions. Turn the AUDIO GAIN control to 0 before touching these terminals. Never remove the sheet metal covers from the connector cable terminal strips without first detaching the plug from the a-c power line (or disconnecting the batteries, if used); *turning the OFF-ON switch to OFF is not enough.*

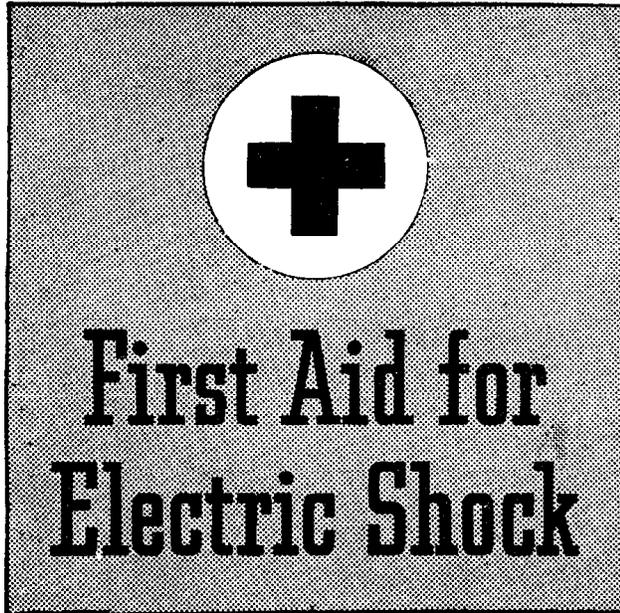
DESTRUCTION NOTICE

- WHY** — To prevent the enemy from using or salvaging this equipment.
- WHEN** — When ordered by your commander.
- HOW** —
1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crow-bars, heavy tools.
 2. Cut—Use axes, handaxes, machetes.
 3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
 4. Explosives—Use firearms, grenades, TNT.
 5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

- WHAT** —
1. Smash—Meter, crystal, controls, tubes, coils, switches, capacitors, headset.
 2. Cut—Cords, headsets, wiring.
 3. Burn—Cords, technical manuals, resistors, capacitors, coils, wiring.
 4. Bend—Panels, cabinet, chassis.
 5. Bury or scatter—All the above pieces after destroying.

DESTROY EVERYTHING



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:

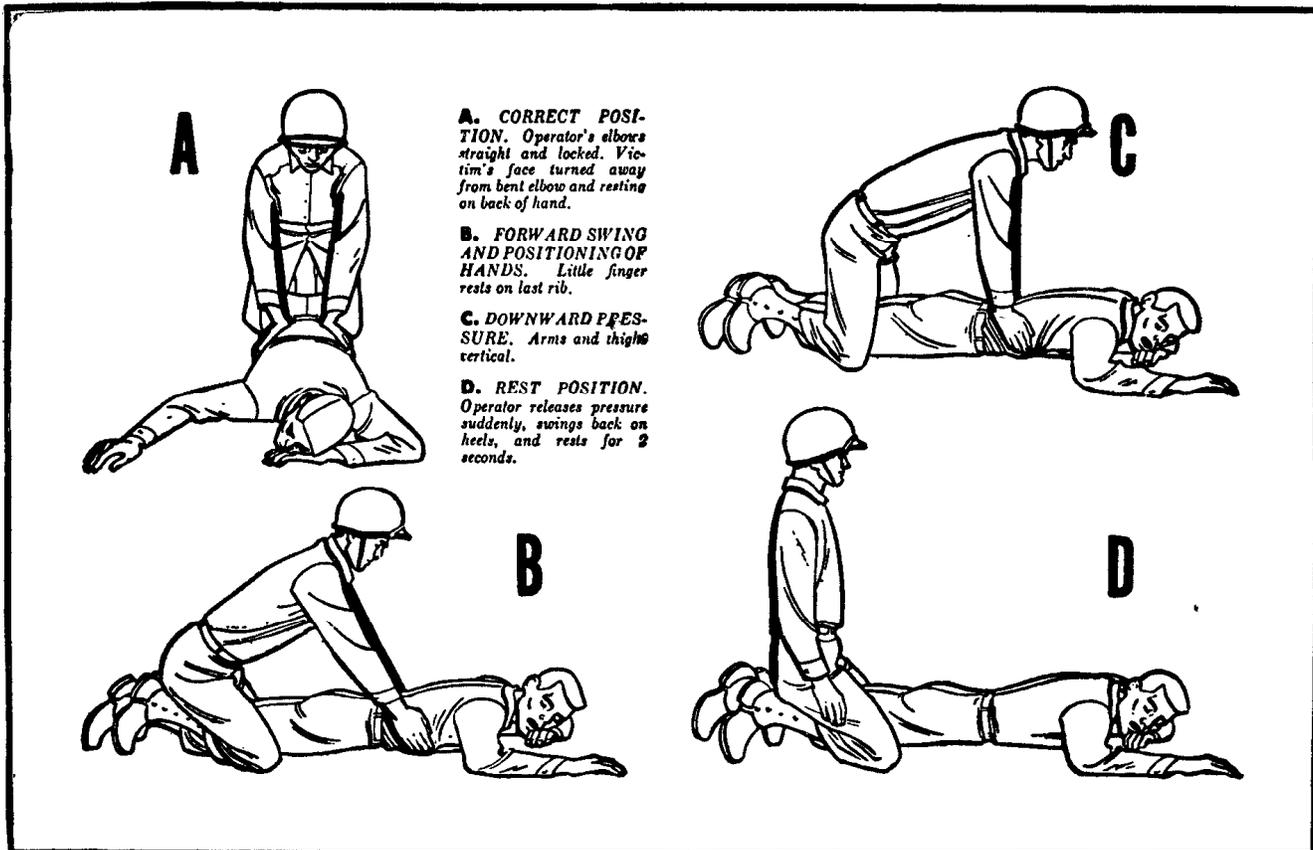
(1) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(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

TL15338-D



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 aro-

matic 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 $\frac{1}{2}$ 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.*

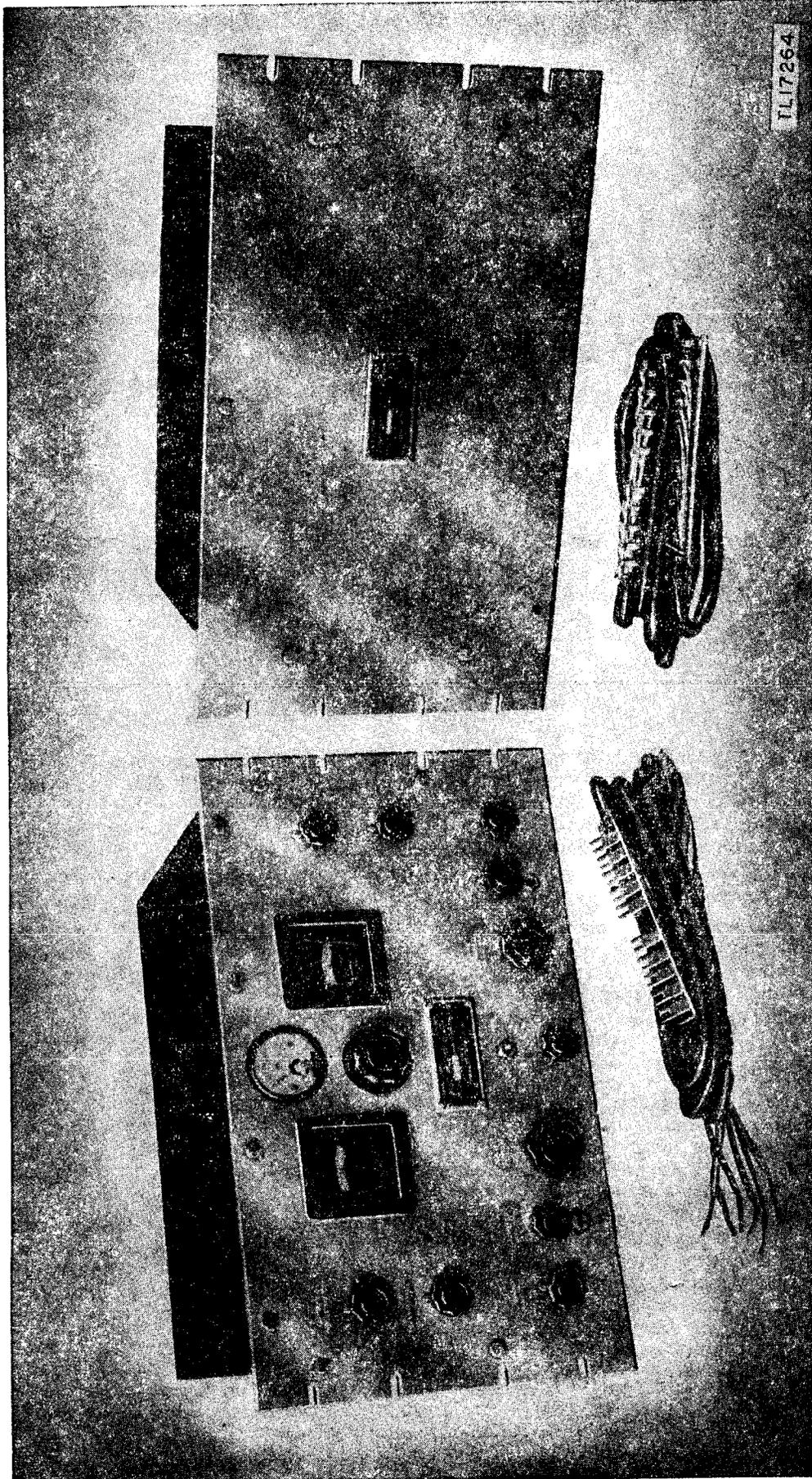


Figure 1. Radio Receiver BC-779-B with associated power supply.

PART ONE

INTRODUCTION

Section I. DESCRIPTION

1. General

a. The radio receivers described in this manual are of the superheterodyne type intended primarily for fixed station use although mountings for vehicular use may be provided. The receivers use a conventional superheterodyne circuit and are designed for the reception of either continuous-wave (c-w), or amplitude-modulated (a-m) voice or tone signals with either manual or automatic volume control (avc).

b. The receivers use an external power supply. Both the receiver and power supply (fig. 1) are designed primarily for rack mounting in standard 19-inch relay racks, but the receiver may be used as a table model by placing it into Cabinet CH-104-A. In an emergency, the receiver can be operated from batteries.

c. The receivers are functionally identical. The basic difference is that each model is designed for

a different frequency coverage. Figure 2 shows eight receiver models and their frequency ranges. This figure also shows five power supply units and their input requirements. Each of the power supply units can be used with any receiver.

d. The four Radio Sets SCR-244-A, -B, SCR-704, and AN/FRR-4 are merely different combinations of receivers and power supply units plus additional accessories such as headsets, antenna wires, insulators, etc. Figure 3 shows the radio receiver and power supply unit combinations used in the four radio sets. Note that Radio Set AN/FRR-4 consists only of the receiver and power supply unit. No headphones, antenna wires, or other accessories are included.

e. Official nomenclature followed by (*) is used to indicate all models of the item of equipment covered by this technical manual. Thus Radio Receiver BC-779-(*) represents Radio Receivers BC-779-A and BC-779-B. When the text material is equally applicable to all the receivers described in this manual, the term *receiver* will be used.

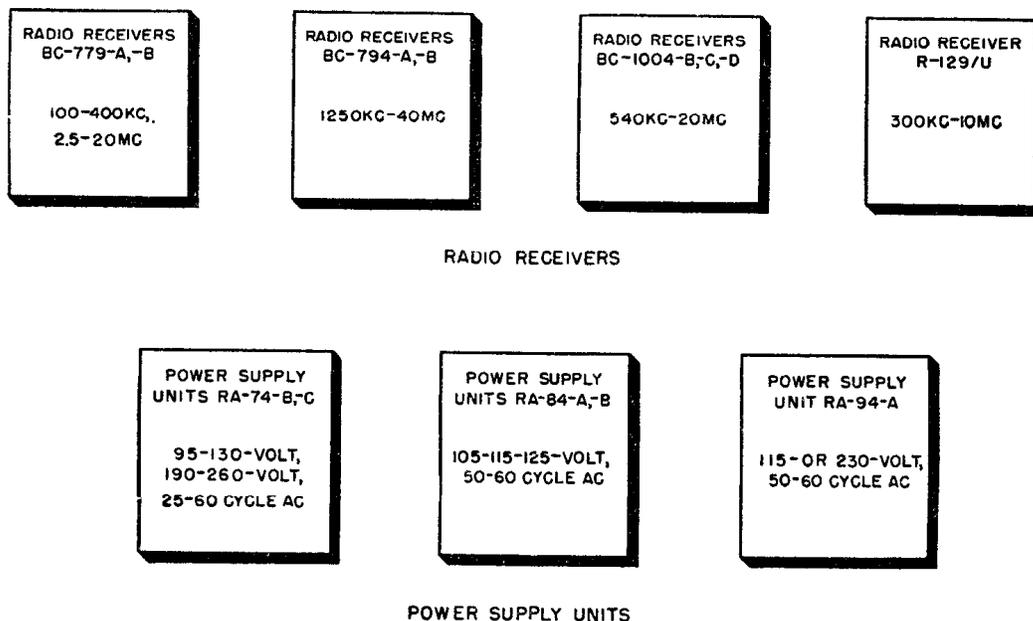


Figure 2. Radio receivers and power supply units, block diagram.

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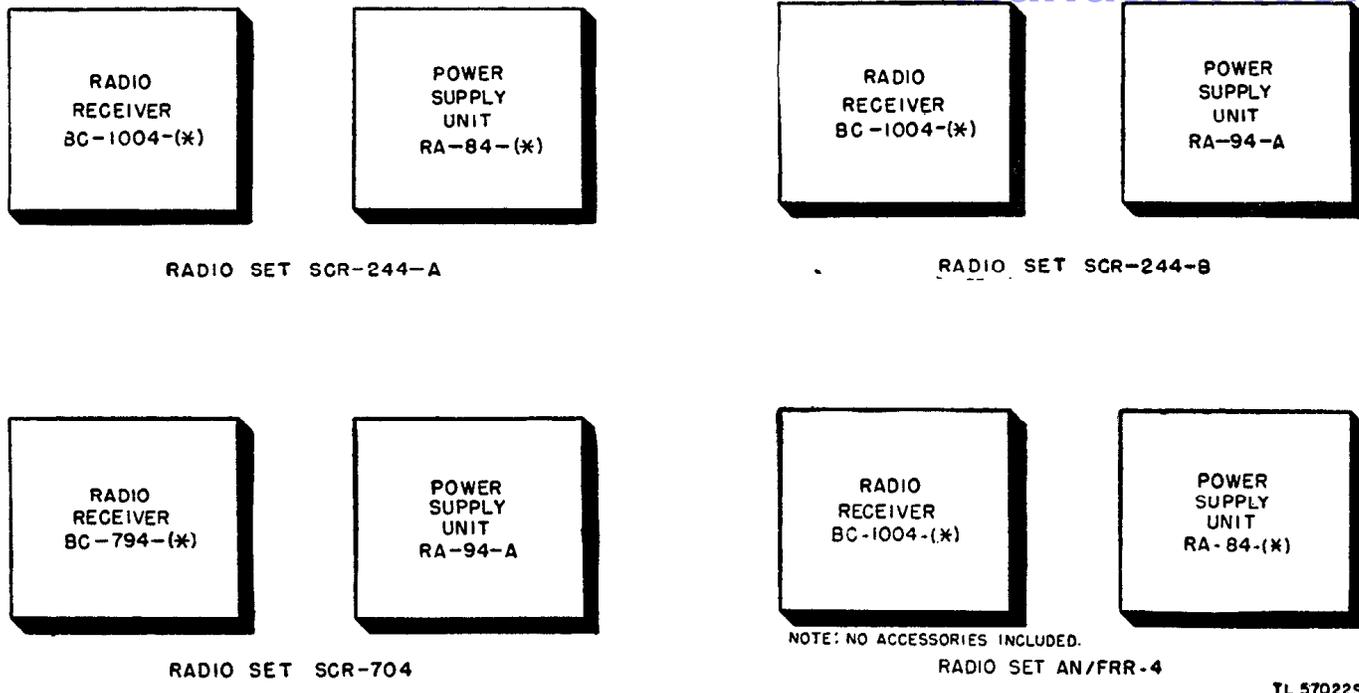


Figure 3. Radio sets, block diagram of main components.

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2. Technical Characteristics

Frequency range (in kilocycles (kc) or megacycles (mc)):

Radio Receiver BC-779-(*)	100-200 kc
	200-400 kc
	2.5-5 mc
	5-10 mc
	10-20 mc
Radio Receiver BC-794-(*)	1,250-2,500 kc
	2.5-5 mc
	5-10 mc
	10-20 mc
	20-40 mc
Radio Receiver BC-1004-(*)	540-1,160 kc
	1,160-2,500 kc
	2.5-5 mc
	5-10 mc
	10-20 mc
Radio Receiver R-129/U	300-540 kc
	540-1,160 kc
	1,160-2,500 kc
	2.5-5 mc
	5-10 mc
Receiver type	Superhetrodyne
Types of signals which can be received	C-w, tone, and voice

Number of tubes	18
Intermediate frequency	465 kc
Power input	180 watts
Power supply:	
Power Supply Unit RA-74-(*)	95-130-volt, 190-260-volt, 25-60-cycle alternating current (ac)
Power Supply Unit RA-84-(*)	105-115-125-volt, 50-60-cycle ac
Power Supply Unit RA-94-A	115- or 230-volt, 50-60-cycle ac
Battery supply	One 6-volt storage battery
	Five 45-volt B batteries
	One 45-volt C battery
Antenna	Doublet antenna with balanced transmission line or single wire and ground

3. Frequency Spectrum Chart

The frequency coverage of the receivers is included in paragraph 2. Signal Corps radio sets which can

be monitored by the receivers are graphically indicated in the frequency spectrum chart (fig. 4).

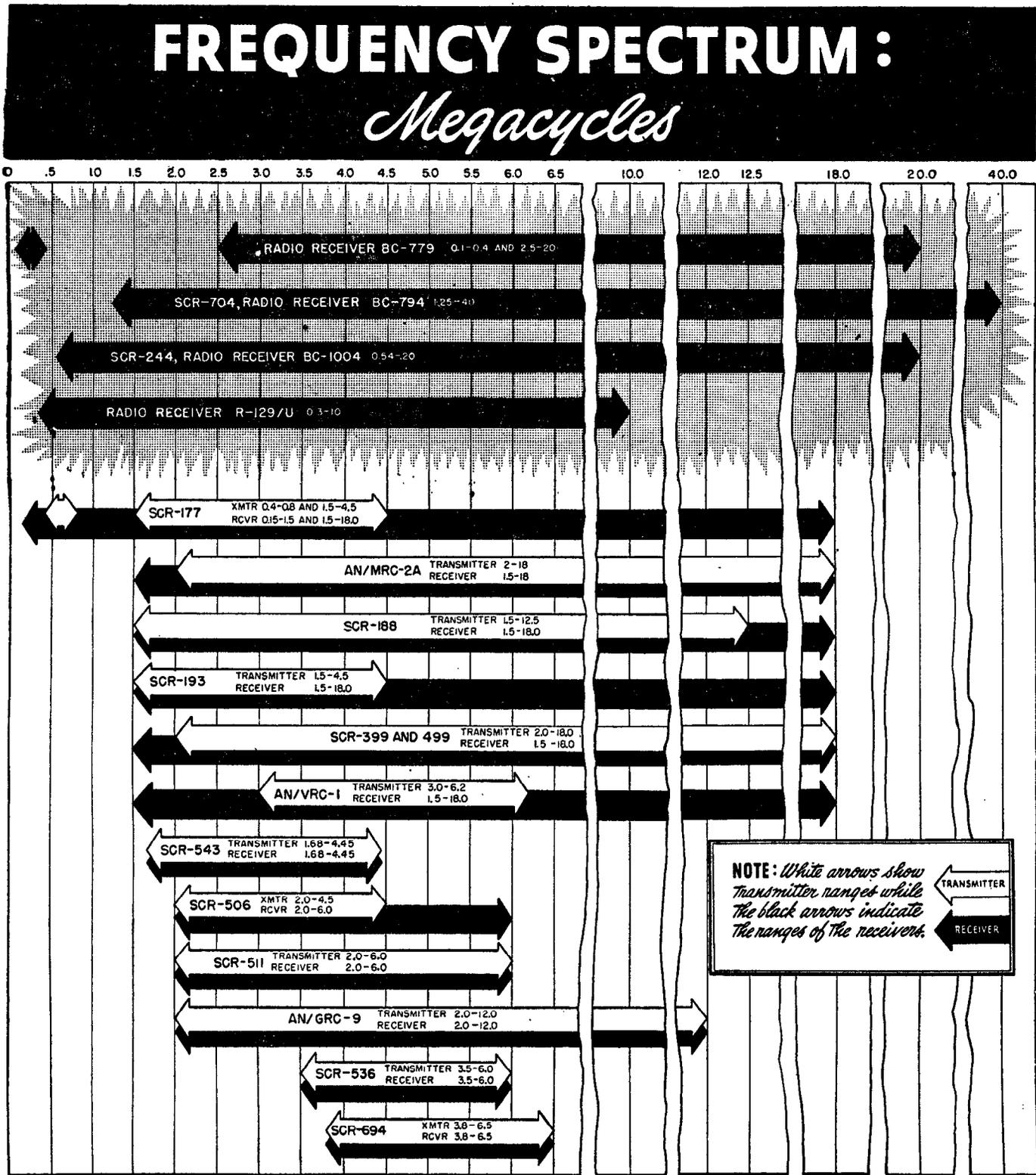


Figure 4. Frequency spectrum chart.

4. Table of Components

Component	Required quan.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Weight (lb)
Radio Receivers BC-779-(*), BC-794-(*), BC-1004-(*), and R-129/U with power and battery cables and dust cover	1	10½	15¾	19	1.8	55
Radio Receivers BC-779-(*), BC-794-(*), BC-1004-(*), and R-129/U with power and battery cables and Cabinet CH-104-A	1	12¾	16½	23	3.2	73
Power Supply Units RA-74-(*), RA-84-(*), and RA-94-A with dust cover	1	10½	10	19	1.2	60
Radio Set SCR-244-(*), includes:						
Radio Receiver BC-1004-(*)	1	10½	15¾	19	1.8	55
Cabinet CH-104-A	1	12¾	16½	23	3.2	18
Power Supply Units RA-84-(*), and RA-94-A for Radio Sets SCR-244-A and SCR-244-B, respectively	1	10½	10	19	1.2	60
Headset HS-30	1				0.05	1.7
Cord CD-874	1				0.02	0.5
Wire W-151	150 ft				0.15	3
Wire W-152	150 ft				0.15	3
Rope RP-3	150 ft				0.5	5
Insulator IN-124	1				0.004	0.2
Insulator IN-125	3				0.007	0.2
Radio Set SCR-704: same as Radio Set SCR-244-B except Radio Receiver BC-794-(*), replaces Radio Receiver BC-1004-(*).						
Radio Set SCR-AN/FRR-4:						
Radio Receiver BC-1004-(*), with power and battery cables and dust cover	1	10½	15¾	19	1.8	55
Power Supply Unit RA-84-(*)	1	10½	10	19	1.2	60

Note. This list is for general information only. See appropriate supply publications for information pertaining to requisitioning of spare parts.

5. Packaging Data for Export Shipment

a. Radio receivers and power supply units are packed in nailed wood shipping containers of the size and quantity listed in table I. Running spare parts, operating parts removed for safe packaging, and accessories are packed in additional nailed wood boxes, the gross weight of each of which does not exceed 150 pounds. The sizes and weights of the main boxes as given in table I may vary from time to time because of minor differences in the packaging material used. Such differences occur because of current material availability and differing supply channels. Table I is computed on the basis of rack models. If table models are packaged instead, receiver dimensions will be slightly greater and power supply dimensions slightly less.

b. Radio receivers are packaged and packed in general as illustrated in figure 5. Power supply

units are also packaged and packed as illustrated in figure 5. Both receivers and power supply units may require a partial disassembly in that plug-in units, such as vacuum tubes, unless they lock securely in their sockets, are removed. Particular attention is given to tubes over 4 inches in height. All loose wires, cables, or connections are compacted and secured against their respective units before packaging.

6. Packaging Data for Domestic Shipment

a. Radio receivers and power supply units packed for domestic (other than oversea) shipment may be received in shipping containers similar to those described for export, with the following changes, depending upon the amount of handling anticipated and the length of storage contemplated:

(1) The use of a dehydrating agent, or desic-

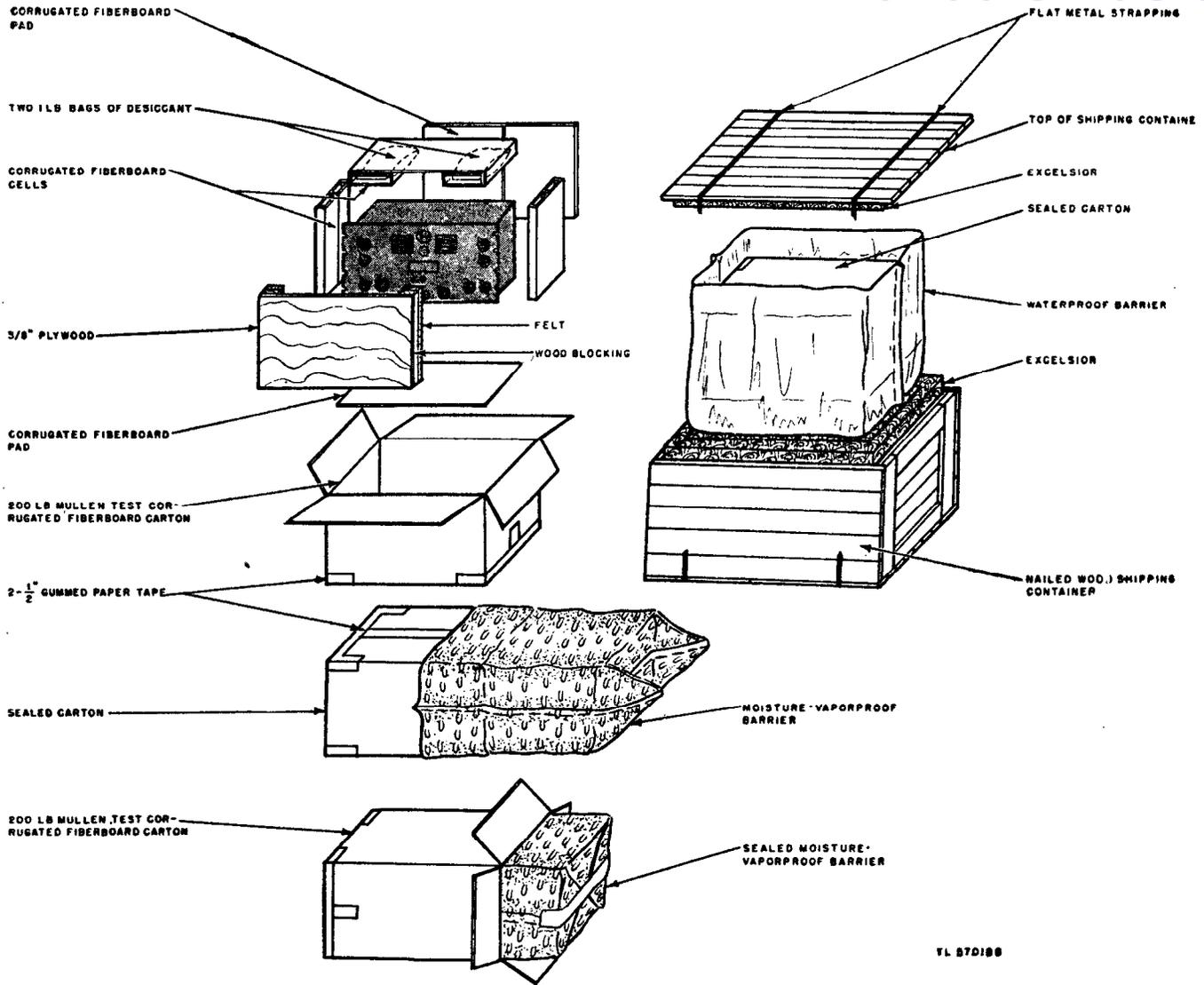


Figure 5. Packaging and packing of radio receivers.

Table I. Packaging data for export shipment

Item	No. of boxes	Outside dimensions (in.)	Volume (cu ft)	Gross weight (lb)	Item	No. of boxes	Outside dimensions (in.)	Volume (cu ft)	Gross weight (lb)		
Radio Receiver:					RA-84-A	1	24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.1	85		
BC-779-A	1	24 $\frac{1}{8}$ x 20 $\frac{1}{2}$ x 15 $\frac{1}{8}$	4.3	90	RA-84-B	1	24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.1	85		
BC-779-B	1				RA-94-A	1	24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.1	85		
BC-794-A	1				Radio Set:						
BC-794-B	1				SCR-244-A ..	2	24 $\frac{1}{8}$ x 20 $\frac{1}{2}$ x 15 $\frac{1}{8}$	4.3	90		
BC-1004-B	1						24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.1	85		
BC-1004-C	1				SCR-244-B ..	2	24 $\frac{1}{8}$ x 20 $\frac{1}{2}$ x 15 $\frac{1}{8}$	4.3	90		
BC-1004-D	1						24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.1	85		
R-129/U	1				SCR-704	2	24 $\frac{1}{8}$ x 20 $\frac{1}{2}$ x 15 $\frac{1}{8}$	4.3	90		
Power Supply Unit:											
RA-74-B	1	24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.2	89	AN/FRR-4 ..	2	24 $\frac{1}{8}$ x 20 $\frac{1}{2}$ x 15 $\frac{1}{8}$	4.3	90		
RA-74-C	1	24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.2	89			24 $\frac{1}{4}$ x 15 $\frac{3}{8}$ x 14 $\frac{3}{8}$	3.1	85		

cant, and moisture-vaporproof barrier may be omitted.

(2) The use of excelsior cushioning and a nailed wood shipping container may be omitted.

b. Table II indicates dimensions and weights of

receivers and power supply units as repackaged for short movements by using troops, or for domestic shipment and limited storage, providing minimum physical protection only within a water-resistant fiberboard container.

Table II. Packaging data for domestic shipment

Item	No. of boxes	Outside dimensions (in.)	Volume (cu ft)	Gross weight (lb)	Item	No. of boxes	Outside dimensions (in.)	Volume (cu ft)	Gross weight (lb)			
Radio Receiver:					RA-84-A	1	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13	1.7	59			
BC-779-A ...	1	19 $\frac{3}{4}$ x 17 $\frac{3}{4}$ x 12 $\frac{3}{4}$	2.6	57	RA-84-B	1	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13	1.7	59			
BC-779-B	1				RA-94-A	1	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13	1.7	59			
BC-794-A ...	1				Radio Set:							
BC-794-B	1				SCR-244-A ..	2	19 $\frac{3}{4}$ x 17 $\frac{3}{4}$ x 12 $\frac{3}{4}$	2.6	57	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13	1.7	59
BC-1004-B ...	1				SCR-244-B ..	2	19 $\frac{3}{4}$ x 17 $\frac{3}{4}$ x 12 $\frac{3}{4}$	2.6	57	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13	1.7	59
BC-1004-C ...	1				SCR-704	2	19 $\frac{3}{4}$ x 17 $\frac{3}{4}$ x 12 $\frac{3}{4}$	2.6	57	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13 $\frac{1}{2}$	1.8	63
BC-1004-D ..	1				AN/FRR-4 ..	2	19 $\frac{3}{4}$ x 17 $\frac{3}{4}$ x 12 $\frac{3}{4}$	2.6	57	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13	1.7	59
R-129/U	1											
Power Supply Unit:												
RA-74-B	1	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13 $\frac{1}{2}$	1.8	63								
RA-74-C	1	19 $\frac{7}{8}$ x 11 $\frac{5}{8}$ x 13 $\frac{1}{2}$	1.8	63								

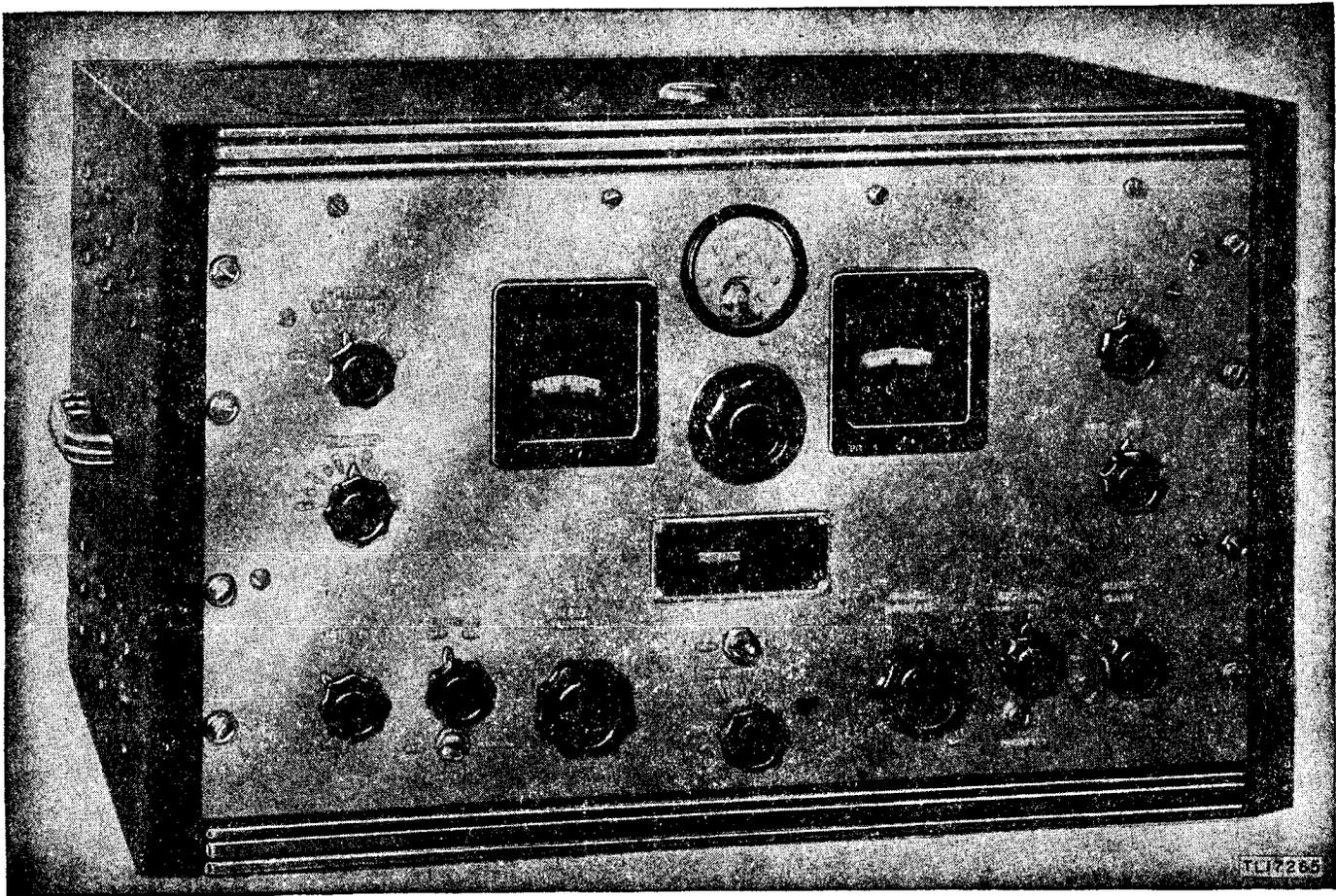


Figure 6. Radio Receiver BC-779-B in Cabinet CH-104-A.

7. Description of Radio Receiver

The eight receivers described in this manual are similar in outward general appearance. Each receiver consists of a plated or painted steel chassis to which is attached a 19-inch panel with four mounting notches on each side arranged to fit a standard relay rack (fig. 1). The panel is attached to the front of the chassis by spacing studs and heavy diagonal braces extending from the sides of the chassis deck to the upper corners of the panel. The rack mounting model of the receiver is supplied with an over-all shield or dust cover which is secured to the back of the panel and rear skirt of the chassis by spade bolts, thumbnuts, and knurled thumbscrews. For table mounting, the dust cover is removed, and the receiver is placed

in Cabinet CH-104-A (fig. 6). The under side of the receiver chassis is equipped with a steel cover plate which has heavy, felt-covered feet in the corners. The rear of the chassis (fig. 10) is provided with a terminal strip which is used in making connection either to the power supply unit or to batteries. The S meter located at the top center of the receiver panel is not supplied with Radio Receiver BC-1004-D.

8. Description of Power Supply Unit

The five power supply units are similar in appearance. Each one is mounted on a steel chassis. Like the receiver, the power supply unit can be used for either rack or table mounting. The rack mounting model is secured to an aluminum panel 19

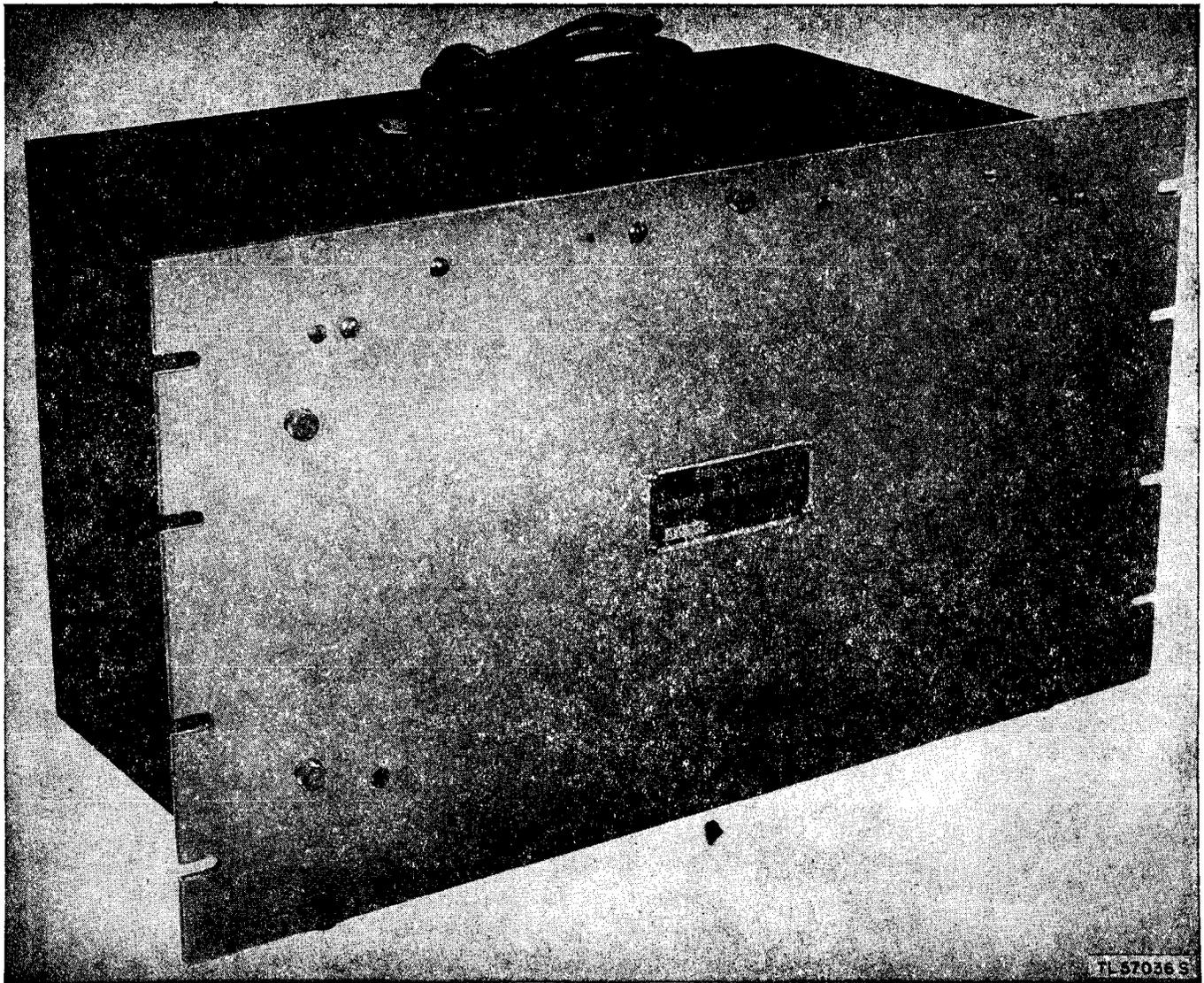


Figure 7. Power Supply Unit RA-94-A.

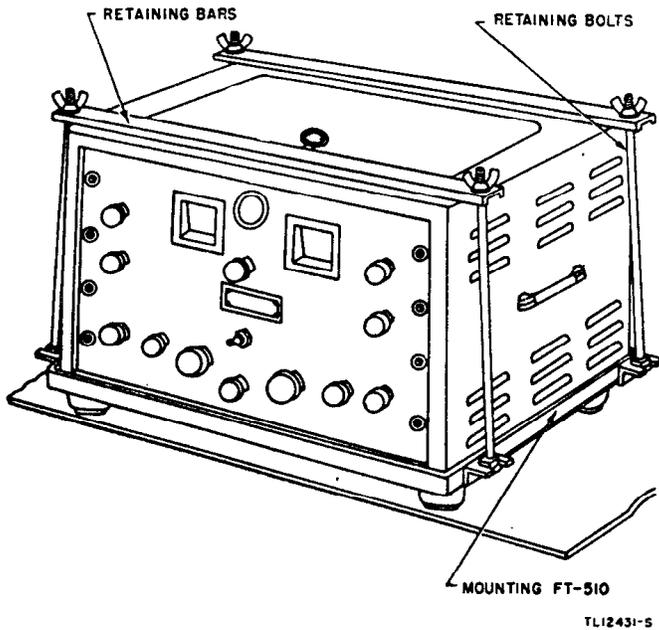


Figure 8. Radio receiver installed on Mounting FT-510.

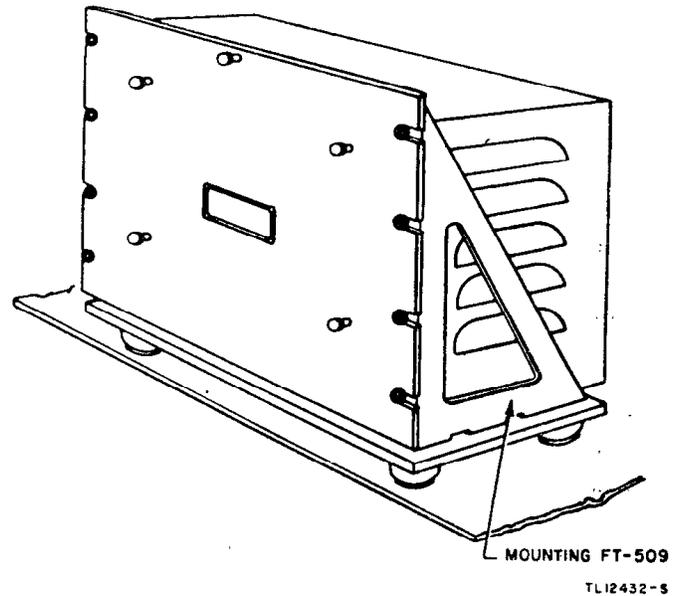


Figure 9. Power supply unit installed on Mounting FT-509.

inches wide by $8\frac{3}{4}$ inches high with appropriate mounting notches. It has a shield or dust cover secured to the panel and skirt of the chassis by thumbnuts and screws (fig. 7). The under side of the chassis is provided with a steel cover plate which has heavy, felt-covered feet in the corners. The rear of the chassis has a terminal strip which is connected to the terminal strip on the receiver by the power supply connecting cable.

9. Mountings FT-509 and FT-510

Mountings FT-509 and FT-510 are used to shock-mount the radio receiver and power supply unit in vehicular installations to prevent damage caused by shock and vibration. Mounting FT-510 is used with the radio receiver and Mounting FT-509 is used with the power supply unit (figs. 8 and 9).

10. Differences in Models

a. The external appearances of the receiver and power supply units for all models are practically identical except that Radio Receiver BC-1004-D does not contain the S meter. The various models can be rack or table mounted.

b. Radio Receivers BC-779-A and -B are alike, Radio Receivers BC-794-A and -B are alike, and Radio Receivers BC-1004-B and -C are alike with the exception that in the later issues of each

model, potted type transformers and chokes with terminal boards are used in place of leads.

c. Radio Receiver BC-1004-C and -D are identical except for the S meter.

d. Radio Receiver R-129/U is exactly the same as Radio Receiver BC-1004-C except for frequency coverage.

e. Radio Receivers BC-779-(*), BC-794-(*), BC-1004-(*), and R-129/U are functionally alike except for the differences in frequency ranges.

Table III. Cross references for commercial and Signal Corps nomenclature

Hammarlund commercial nomenclature*	Equivalent Signal Corps nomenclature
SP-210-LX	BC-779-A
SP-200-LX	BC-779-B
SP-210-SX	BC-794-A
SP-200-SX	BC-794-B
SP-210-X	BC-1004-B
SP-200-X	BC-1004-C and -D
None	R-129/U

*When an R appears in commercial nomenclature, such as in SPR, it indicates that the equipment is a rack model rather than a table model. For the purposes of this manual, all SP and SPR models can be considered identical.

f. Many models of Hammarlund Commercial Super Pro Receivers were put into field use prior to the assignment of Signal Corps nomenclature to such receivers. The text of this manual is also applicable to some of these super pro receivers,

namely, the SP-200 and SP-210 series. Table III indicates the relationship between super pro and Signal Corps nomenclature for all receivers to which this manual is applicable. The super pro receivers of the SP-10 and SP-110 series use different electrical components and circuits and have characteristics different from receivers listed in table III and, therefore, are not covered by this manual.

Section II. INSTALLATION

11. Siting

The receivers must be correctly situated to be sure of good performance. In many instances, particularly where the receiver is part of a larger set, the necessary tactical and technical requirements for proper operation of the system as a whole will determine the receiver location. In any case, remember the following points:

- a. The antenna should be high, and clear of surrounding objects.
- b. The receiver should be situated away from power lines, generators, and power units, or other unshielded electrical equipment.
- c. Hills and other high places are better for radio reception. Avoid dips, valleys, hollows, and other depressions.
- d. Trees and other dense foliage decrease radio reception.
- e. Choose an operating position which will have as even a temperature and as little humidity as possible.

12. Unpacking

Caution: Radio receivers and power supply units may be easily damaged during unpacking. Cut metal straps, remove top, sides, etc., of the cases carefully and according to the instructions given below. Avoid thrusting crowbars or other tools deeply into the interior of any shipping container. Unpacking should be done in a place where the equipment is not exposed to dust, dirt, or excessive moisture.

a. **UNPACKING OVERSEA SHIPPING CONTAINERS.** During unpacking do not damage the packaging material any more than necessary. Store the inside packaging materials in their respective shipping containers for re-use, with the exception of the bags of desiccant, or dehydrating agent, which will

either be destroyed or placed aside for reactivation. Cut metal straps with a suitable cutting device or twist with pliers until the straps crystallize and break. Remove nails with a nail puller. Prying may damage the equipment. The following subparagraphs describe details of packaging encountered as the containers are unpacked:

- (1) *Radio receivers.* (a) Cut metal straps.
- (b) Remove nails with nail puller and remove top of shipping container.
- (c) Remove excelsior from top of packaged receiver.
- (d) Lift out packaged receiver.
- (e) Slit waterproof overwrap at seams and remove from package.
- (f) Slit seal of outer carton and lift out moisture-vaporproofed package.
- (g) Slit seam of moisture-vaporproof barrier and lift out inner carton.
- (h) Slit seal of inner carton and open flaps.
- (i) Lift out desiccant and blocking of plywood, wood blocks, and corrugated fiberboard cells and pads.
- (j) Lift out receiver and remove dust cover.
- (k) Remove all interior blocking and bracing. Unfasten all cables, wires, and connections where secured against receiver for packaging.
- (2) *Power supply units.* The unpacking of power supply units is similar to the procedure outlined above for receivers.
- b. **UNPACKING DOMESTIC SHIPPING CONTAINERS.** Exercise the same caution in unpacking domestic shipping containers as required above for unpacking oversea shipping containers.
- c. **CHECKING EQUIPMENT.** After removal, examine the equipment carefully for damage that may have occurred during shipment. Compare the packing slip with the unpacked equipment.

13. Connections and Interconnections

a. **CONNECTIONS TO POWER SUPPLY UNIT.** Connect the receiver to the power supply unit as follows:

- (1) Remove the sheet metal covers from the terminal strip E4 on the rear of the receiver and from the terminal strip E1 on the power supply unit.
- (2) Make sure that all 10 screws on each strip are unscrewed at least three turns.
- (3) Attach one end of the connector cable to each terminal *exactly* as shown in figure 10 and

securely tighten all the screws. Make certain that each slotted spade lug on the cable strips makes contact with its respective screw terminal *only*, since a lug jammed between two of the screws could cause trouble. The spacing of the spade lugs on the cable terminal strips is exactly the same as the spacing of the screws in the terminal strips on the receiver and power unit. If the two do not

go together easily, do not use force. Make sure that all the screws are loosened enough. If one of the spade lugs has been bent or pushed out of place, straighten it and try again. The spade lugs slip under the screw heads from the top.

(4) Replace both metal covers immediately and do not remove them while the power supply unit is connected to the a-c power line.

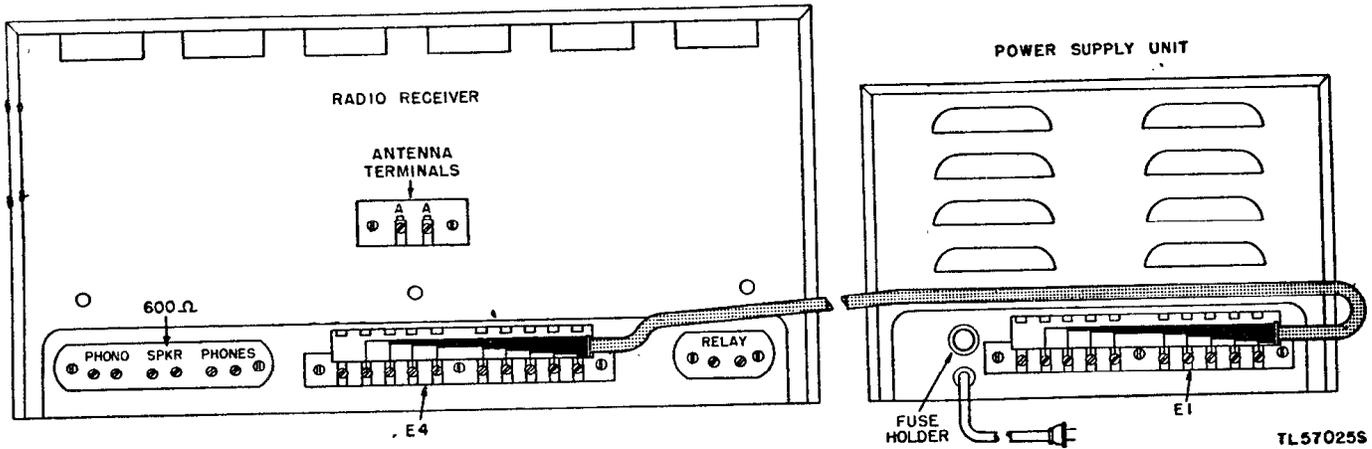


Figure 10. Cable connections for a-c operation.

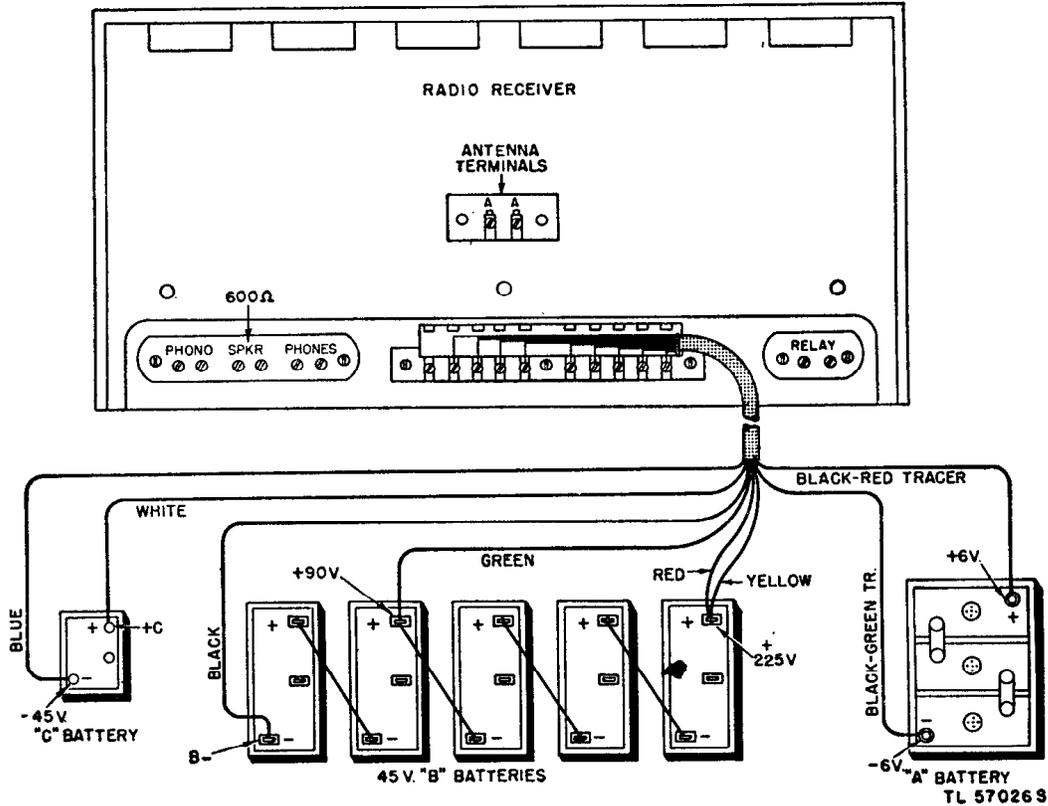


Figure 11. Cable connections for battery operation.

b. CONNECTION FOR BATTERY OPERATION. The cable used for battery connection is the one with only one terminal strip. The other end of the cable is made up of eight loose wires.

(1) Connect the battery cable to the receiver *first* and then replace the terminal cover before connecting the cable to the batteries.

(2) Connect the eight loose wires to the batteries according to the color code shown in figure 11.

(3) When discontinuing battery operation, disconnect the loose ends of the cable from the batteries *before* detaching the cable from the receiver.

c. ANTENNA. The antenna terminals can be coupled to a doublet antenna by a balanced transmission line of about 115 ohms' impedance or to a single wire antenna and ground. There is an electrostatic screen between the primary and secondary of each antenna input transformer. This screening, plus a two-wire balanced lead-in, cuts noise pick-up to a minimum.

(1) *Transmission line lead-in.* Connect the feeders to the terminals marked AA at the rear of the receiver.

(2) *Single wire antenna.* If this is used, connect its lead-in to one of the A terminals. Connect a good ground to the other A terminal.

Note. Unusually good reception can be obtained when receiving over a narrow band of high frequencies if a suitably designed doublet or similar tuned antenna is connected to the receiver through a good lead-in, twisted or spaced pair, or coaxial cable.

(3) *Ground.* It is not necessary to ground the receiver chassis but it can be done by connecting a wire under one of the thumbscrews that hold the dust cover to the rear of the chassis.

d. EARPHONES. Insert the plug of Headset HS-30 (or any other available headphone) into the PHONES jack (fig. 15), or connect it to the screw terminals marked PHONES on the rear of the chassis (fig. 10). No matching transformer is necessary.

e. A-C INPUT. Before plugging the power cord into the a-c power line, remove the bottom plate from the power supply unit to see that the primary tap is properly connected for the particular a-c voltage available. This primary tap connects the fuse holder to one of the screw terminals on the power transformer, and is marked PRIMARY TAP in figure 12. Connect the primary tap to the screw terminal most closely agreeing with the available a-c line voltage and replace the bottom cover plate.

(1) Power Supply Unit RA-74-(*) has eight

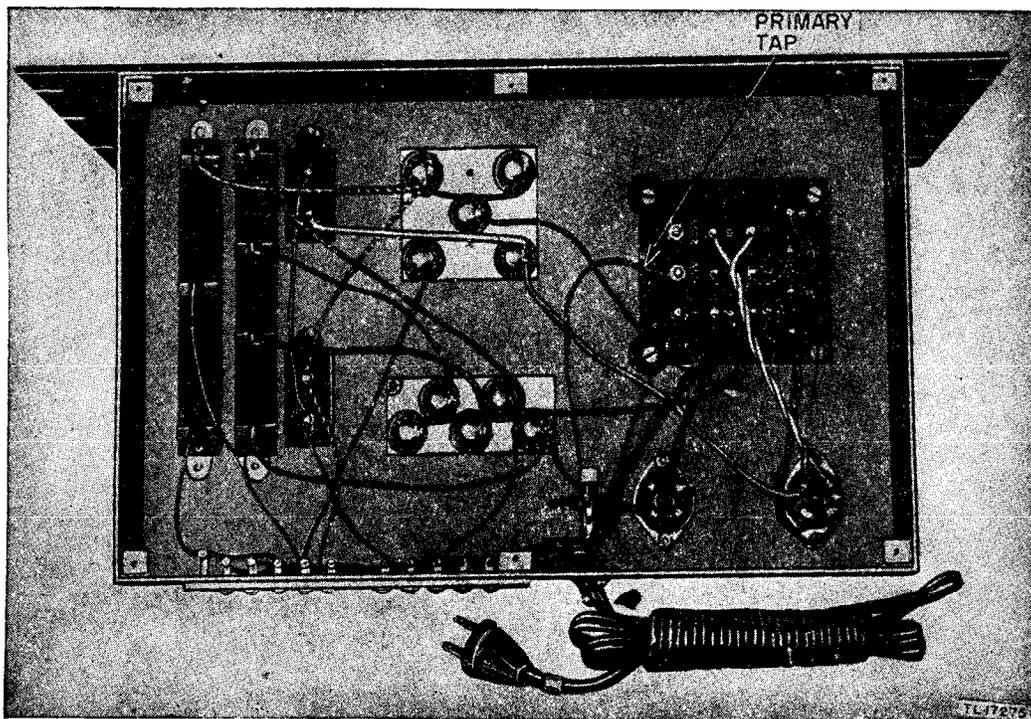


Figure 12. Bottom view of power supply unit, showing primary tap connection.

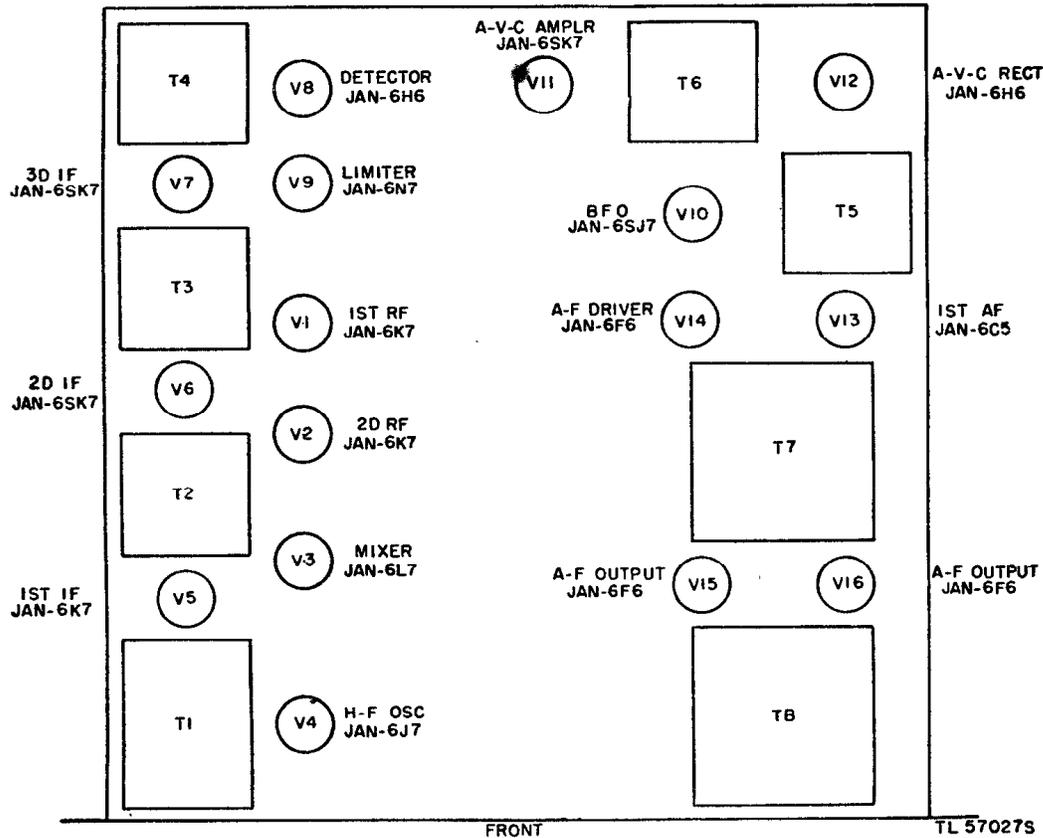


Figure 13. Radio receiver, tube location.

taps marked 95, 105, 117, 130, 190, 210, 234, and 260.

(2) Power Supply Unit RA-84-(*) has three taps marked 105, 115, and 125.

(3) Power Supply Unit RA-94-A has two taps marked 115 and 230.

f. POWER CORD. Turn the power OFF-ON switch on the receiver front panel to OFF and plug the power cord into the a-c power line.

14. Preparation for Use

a. TUBES. Check to see that the tubes are in the proper sockets before turning on the receiver.

(1) Receiver. To inspect the receiver tubes, remove the dust cover by removing the thumbnuts which hold the cover to the front panel and rear edge of the chassis. A receiver tube location diagram is shown in figure 13. Their proper location, as well as the marking of their respective sockets, is clearly shown also in the etched location plates attached to the top of the tuning unit. All of the receivers use the same set of tubes.

(2) Power supply unit. Take the dust cover off the power supply unit and remove the cardboard jackets from the two rectifier tubes. Figure 14 shows the location of these tubes.

b. ADJUSTMENTS. The equipment is already adjusted when received. No further adjustments are necessary.

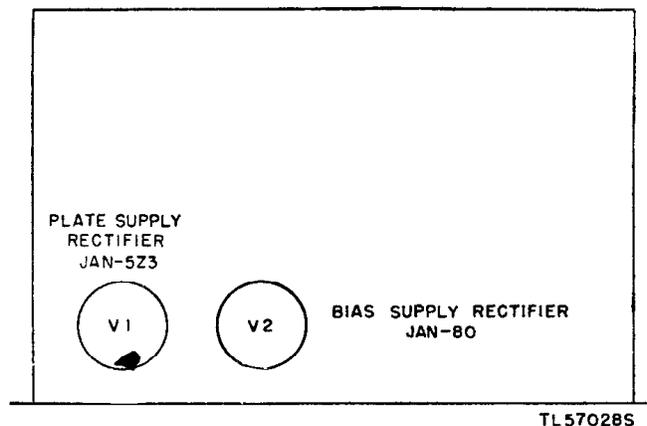


Figure 14. Power supply unit, tube location.

PART TWO

OPERATING INSTRUCTIONS

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

Section III. CONTROLS AND THEIR USE

15. Receiver Controls (fig. 15)

a. BAND SWITCH. The 5-position band switch selects the proper coils and capacitors in the radio-frequency (r-f) stages to tune the desired frequency range. In addition, this control operates a masking plate over the MAIN TUNING dial in order to expose only the scale of the particular frequency band selected.

b. MAIN TUNING CONTROL AND DIAL. The MAIN TUNING dial consists of a flat disk on which are engraved five scales. All but the frequency scale being used are covered by a masking plate as described in *a* above. The dial, which is translucent, is illuminated from the rear. The MAIN TUNING control is used to tune the receiver to the desired signal in the selected band.

c. BAND SPREAD CONTROL AND DIAL. The BAND SPREAD control and dial are used to simplify tuning over a narrow range of frequency.

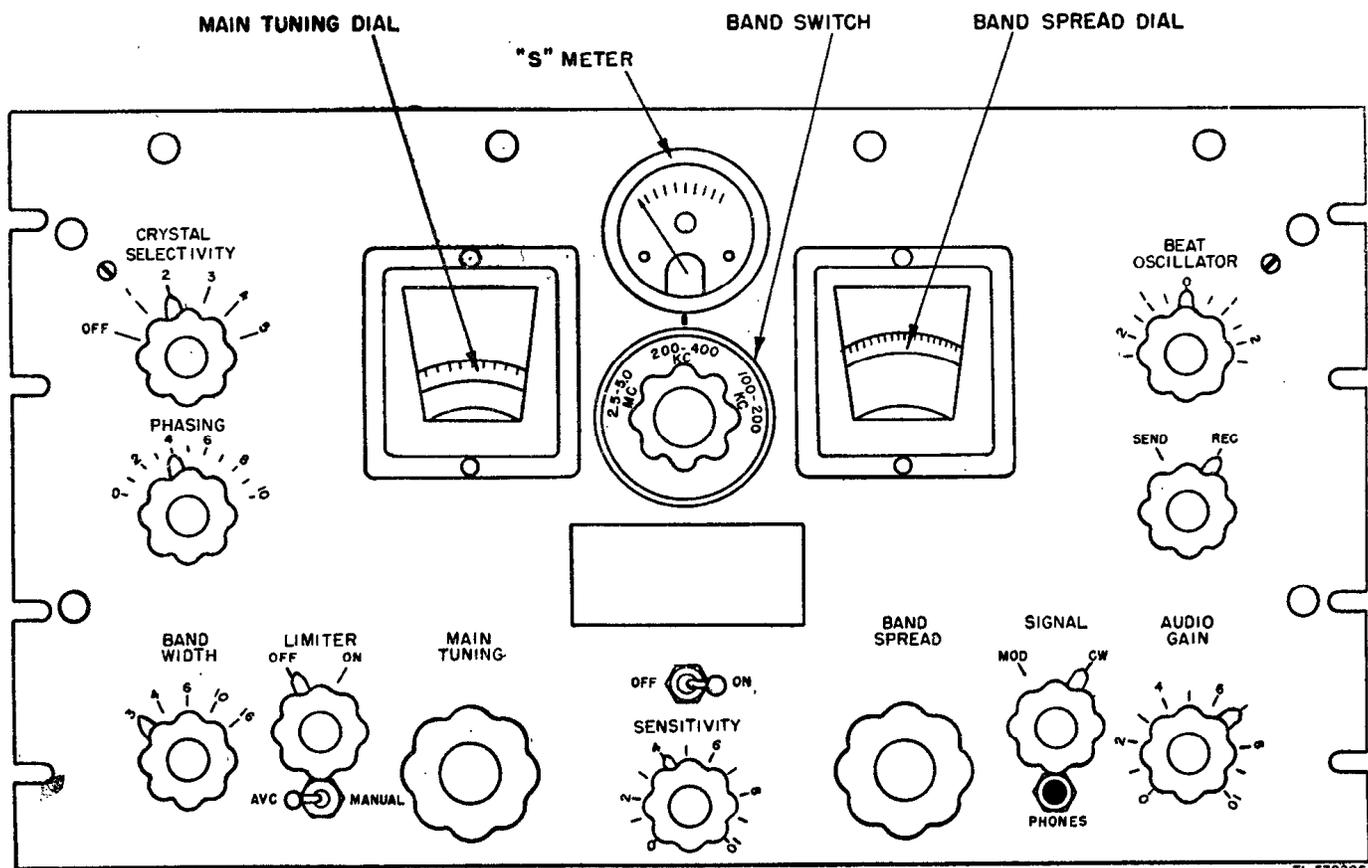


Figure 15. Radio Receiver BC-779-B, front panel.

The BAND SPREAD dial has a scale reading from 0 to 100. If set at 100, the frequency covered by moving the dial will extend from that shown by the setting of the MAIN TUNING dial to some lower frequency, depending on how far the BAND SPREAD dial is moved. The capacity of the BAND SPREAD capacitor increases as the scale approaches zero. The BAND SPREAD control is operative on all five bands of Radio Receiver BC-794-(*), the three highest frequency bands of Radio Receivers BC-779-(*), and BC-1004-(*), and the two highest frequency bands of Radio Receiver R-129/U.

d. S-METER. The meter in the center of the panel may be used for tuning when operating on AVC. The meter reading varies as the receiver is tuned through a signal, being highest at exact resonance. Strong signals produce higher meter readings than weak signals, therefore the actual meter reading at resonance is an indication of the strength of the incoming signal carrier. The meter circuit is adjusted at the factory so that a change of one S number on the meter indicates a change in signal strength of approximately two to one.

e. CRYSTAL SELECTIVITY CONTROL. This control is used to increase the selectivity of the receiver. The first three positions are generally used for radiophone reception and can serve for code reception if interference is not serious. The last two positions are for code reception only.

f. PHASING CONTROL. With the CRYSTAL SELECTIVITY control in any position but OFF, the PHASING control is used to eliminate heterodyne interference or whistle.

g. BAND WIDTH CONTROL. This control adjusts the bandwidth of the intermediate-frequency (i-f) stages of the receiver. Minimum bandwidth is obtained with the control set at 3. Clockwise rotation of the control increases the bandwidth.

h. LIMITER OFF-ON SWITCH. This switch turns the noise limiter on and off. The noise limiter is useful at the higher frequencies where interference from gas engine ignition systems and other noise sources is likely to be quite strong.

i. OFF-ON SWITCH. This switch is in series with the primary of the power supply unit transformer. When the switch is in the ON position, power is applied to the transformer, and the receiver operates.

j. AVC-MANUAL SWITCH. This switch, when set to the MANUAL position, permits the SENSITIVITY control to be used as an r-f volume control. In the AVC position, manual r-f volume control need not be used, since the SENSITIVITY control may be set to 10 and the a-v-c circuit will regulate the r-f gain.

k. SENSITIVITY CONTROL. This control is used to vary the receiver r-f gain when the AVC-MANUAL switch is at MANUAL. When the AVC-MANUAL switch is set to AVC, the SENSITIVITY control should be set to 10 for maximum r-f gain. However, various degrees of r-f gain and a-v-c action may be obtained at various settings of the control.

l. AUDIO GAIN CONTROL. This control varies the audio gain of the receiver.

m. SIGNAL MOD-CW SWITCH. When this switch is in the CW position, the beat frequency oscillator (bfo) is turned on. CW code signals can then be received. The bfo is also useful for locating weak signals of any kind. When the switch is in the MOD position, the bfo is turned off.

n. BEAT OSCILLATOR CONTROL. This control adjusts the frequency of the bfo and thus the pitch of the audible tone.

o. SEND-RECEIVE SWITCH. This switch is provided for use when the receiver is used with an associated transmitter. The receiver is silenced when the switch is in the SEND position. This position allows the receiver to remain ready for instant use. The RELAY terminals at the rear of the receiver (fig. 10) are for convenience in connecting a relay to disconnect automatically the receiver in preference to operating the SEND-REC switch.

p. PHONES JACK. This jack provides for the connection of a headset to the output of the receiver. The jack is in parallel with the PHONES terminal lugs on the rear of the receiver.

q. SPKR TERMINALS. These terminals on the rear of the receiver (fig. 10) are provided so that a permanent magnet type loudspeaker may be connected to the output of the receiver.

r. PHONO TERMINALS. These terminals at the rear of the receiver provide a convenient means of using the audio portion of the receiver as an audio amplifier, the input level to which may be regulated by the AUDIO GAIN control.

SECTION IV. OPERATION

16. Starting

a. Set the front panel controls as follows:

Control	Position
CRYSTAL SELECTIVITY	OFF
PHASING	On arrow
BAND WIDTH	3
LIMITER	OFF
AVC-MANUAL	AVC
SENSITIVITY	10
BAND SPREAD	100
SIGNAL MOD-CW	MOD
AUDIO GAIN	7
SEND-REC	REC
BEAT OSCILLATOR	0

b. Turn on the receiver by placing the OFF-ON power switch in the center of the panel to ON.

17. Radiophone Reception

a. Set the band switch to the band which covers the frequency of the signal to be received. Do this by turning the band switch knob until the engraving of the desired band on the band switch dial is at the top just beneath the vertical line above the dial.

b. Leave the band spread dial at 100 because all tuning can be done with the MAIN TUNING control. The band spread control spreads out a narrow band of frequencies *below* the frequency to which the MAIN TUNING dial is set.

c. Do all tuning, with or without the meter, with the BAND WIDTH control set at 3. Make bandwidth adjustments after the signal is tuned in properly. If interference is not serious adjust the BAND WIDTH control to a wider degree of selectivity (clockwise rotation) to obtain the best tone quality with the least interference.

d. If interference is present, adjust the CRYSTAL SELECTIVITY control to the optimum position. The first three positions are generally used for radiophone reception and will serve for code reception where interference is not serious.

e. After the CRYSTAL SELECTIVITY control is adjusted to the selectivity desired, rotate the PHASING control to eliminate heterodyne interference or whistle.

f. Turn the LIMITER ON-OFF control to ON to reduce the high-frequency noise caused by ignition interference, etc.

g. The receiver can be silenced by turning the SEND-REC switch to SEND. This allows the receiver to remain ready for instant service during transmission periods.

18. Code Reception

a. Place the AVC-MANUAL switch at MANUAL and turn down the SENSITIVITY control to provide proper sensitivity.

b. On strong signals, do not turn the SENSITIVITY control all the way on (clockwise) because it will cause overloading. By setting the AUDIO GAIN control at about 7, the volume can be regulated with only the SENSITIVITY control.

c. Turn on the beat frequency oscillator by setting the SIGNAL MOD-CW switch to CW position.

d. Place the CRYSTAL SELECTIVITY switch in position 4 or 5.

e. Tune in a code signal and adjust the BEAT OSCILLATOR control to obtain the desired pitch or tone, of the beat note. Since the desired tone may be obtained by setting the BEAT OSCILLATOR control to either side of the 0 (zero) marking, choose the side which gives the least interference.

f. Use the PHASING control to eliminate heterodyne interference.

19. Stopping

To turn off the receiver, place the OFF-ON switch at OFF.

Section V. EQUIPMENT PERFORMANCE CHECKLIST

20. Purpose and Use of Checklist

a. GENERAL. The equipment performance checklist (par. 21) will help the operator to determine whether the receiver and the power supply unit are functioning properly. The list gives the item to be checked, the conditions under which the item is checked, the normal indications and tolerances of correct operations, and the corrective measures the operator can take. Check items 1 through 14 before starting (before turning the equipment on), item 15 when starting, items 16 through 28 during

operation, and item 29 when stopping (when turning the equipment off). Items 16 through 28 of this list should be checked at least once during a normal operating period or at least four times a day during continuous operation.

b. ACTION OR CONDITION. For some items, the information given in the action or condition column consists of the settings of various switches and controls under which the item is to be checked. For other items it represents an 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 will perceive when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. CORRECTIVE MEASURES. The corrective measures listed are those the operator can make without turning in the equipment for repairs. When reference is made in the table to "part five" 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 com-

pletely inoperative or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

e. ITEMS 1 THROUGH 15. Items 1 through 15 should be checked each time the equipment is put into operation.

f. ITEMS 16 THROUGH 28. 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 SENSITIVITY and AUDIO GAIN controls. This will aid in an approximate determination of the sensitivity and amplification of the receiver.

g. ITEM 29. Item 29 is checked whenever the station is taken out of operation. Any abnormal indications at this time are probably caused by trouble in the set and should be corrected before the next expected period of operation.

21. Equipment Performance Checklist

	Item No.	Item	Action or condition	Normal indications	Corrective measures
P R E P A R A T O R Y	1	Antenna	Lead-in wire connected.		
	2	Loudspeaker	Speaker cord connected to SPKR terminals.		
	3	Line cord	Line cord plug inserted into socket of a-c power source.		
	4	CRYSTAL SELECTIVITY control.	Set at OFF position.		
	5	PHASING control	Set pointer at arrow (5).		
	6	BAND WIDTH control..	Set at position 3.		
	7	LIMITER switch	Rotate to OFF.		
	8	AVC-MANUAL switch ..	Set at AVC position.		
	9	SENSITIVITY control ..	Set at 10.		
	10	BAND SPREAD control.	Set at 100.		
	11	SIGNAL MOD-CW switch.	Set at MOD position.		
	12	AUDIO GAIN control ...	Set at 7.		
	13	SEND-REC switch	Set at REC position.		
	14	BEAT OSCILLATOR control.	Set at zero (0).		