DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

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TO 16-30SRT13-5

RADIO TRANSMITTING SETS AN/SRT-13 AND -13X





DEPARTMENTS OF THE ARMY AND THE AIR FORCE

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TECHNICAL MANUAL
No. 11-844
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THE AIR FORCE
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	Paragraph	Page
CHAPTER 1. INTRODUCTION		
Section I. General	1,2	1,2
II. Description and data	3-17	2-16
CHAPTER 2. OPERATING INSTRUCTIONS		
Section I. Service upon receipt of materiel	18-30	17-30
II. Controls and instruments	31-33	30-33
III. Operation under usual conditions	34-36	34
IV. Operation under unusual conditions	37-40	34,35
V. Initial adjustment of equipment	41-43	35-37
CHAPTER 3. ORGANIZATIONAL MAINTENANCE INSTRUCTIONS		
Section I. Organizational tools and equipment	44,45	38
II. Preventive maintenance services	46-52	38-42
III. Weatherproofing and lubrication	53,54	44
IV. Trouble shooting at organizational maintenance level	55-59	44-46
CHAPTER 4. THEORY	60-70	50-58

		Paragraph	Page
CHAPTER 5.	FIELD MAINTENANCE INSTRUCTIONS		
Section I.	Trouble shooting at field maintenance level	71-78	59-63
II.	Repairs	79-81	72
III.	Final testing	82-84	72,73
CHAPTER 6.	SHIPMENT AND LIMITED STORAGE TO PREVENT ENEMY USE		
Section I.	Shipment and limited storage	85-87	74
II.	Demolition of materiel to prevent enemy use	88,89	74 75
APPENDIX.	REFERENCES		75,76
	INDEX		82-85

WARNING

HIGH VOLTAGE

is used in the operation of
this equipment.

DEATH ON CONTACT

may result if operating personnel
fail to observe safety precautions.

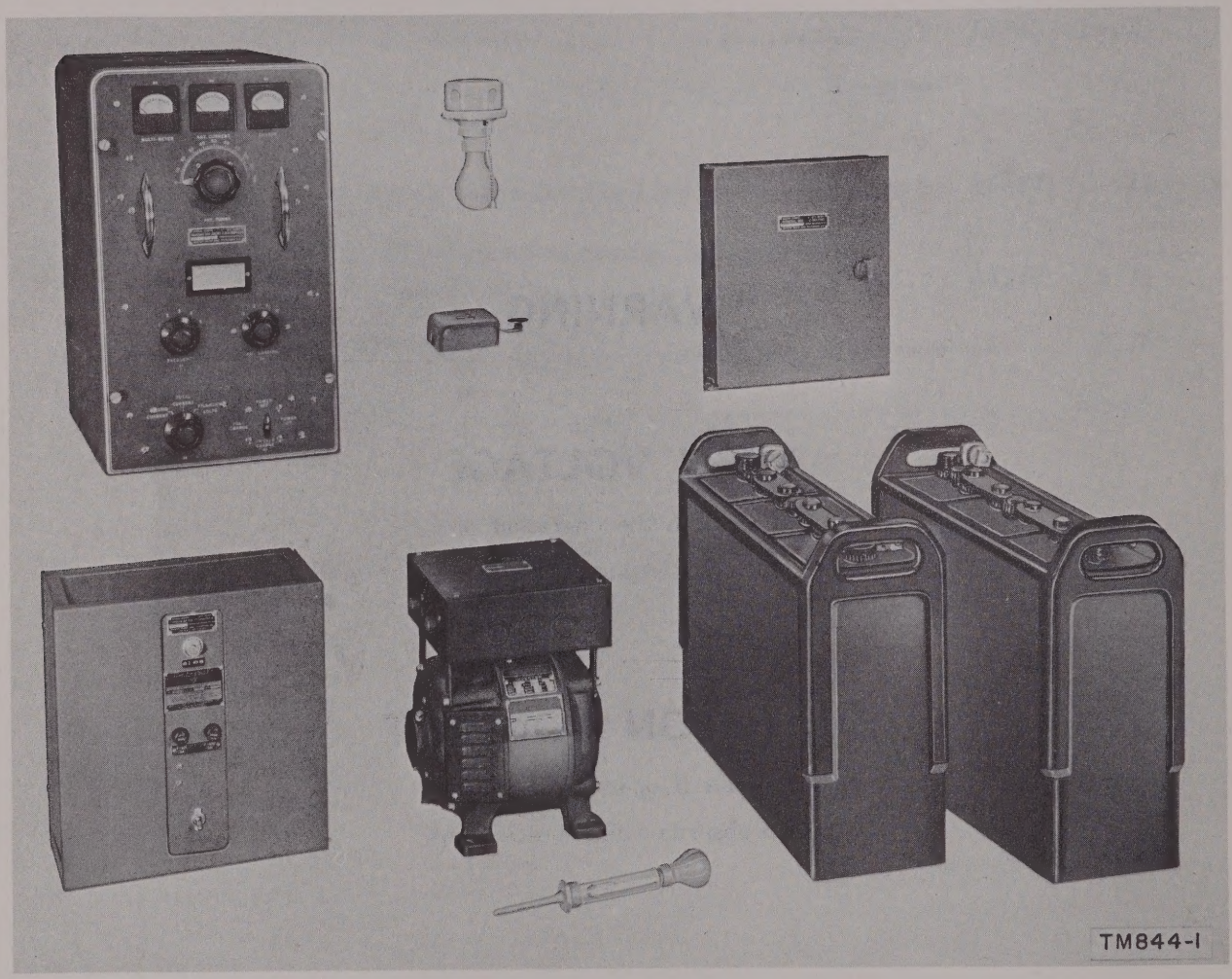


Figure 1. Radio Transmitting Set AN/SRT-13.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This technical manual contains necessary information for the installation, operation, maintenance, and repair of Radio Transmitting Set AN/SRT-13 (fig. 1) and Radio Transmitting Set AN/SRT-13X (fig. 2). In addition to these instructions there is an appendix covering a list of references.

b. Because of the similarity of Radio Transmitter T-433/SRT-13 and Radio Transmitter T-434/SRT-13X, the word *transmitter* is used throughout

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army equipment and in performing preventive maintenance.

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army), Navy Shipping Guide, Article 1850-4, and AFR 71-4 (Air Force).

b. DA Form 468, 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. DD Form 535, Unsatisfactory Report, will be filled out and forwarded as prescribed in SR 700-45-5 and TO 00-35D-54.

d. DA Form 11-238, Operator First Echelon Maintenance Check List for Signal Corps Equipment—Radio Communication, Direction Finding, Carrier, Radar will be prepared in accordance with instructions on the back of the form.

e. DA Form 11-239, Second and Third Echelon Maintenance Check List for Signal Corps Equipment—Radio Communication, Direction Finding, Carrier, Radar will be prepared in accordance with the instructions on the back of the form.

f. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Radio Transmitting Set AN/SRT-13 (fig. 1) and Radio Transmitting Set AN/SRT-13X (fig. 2) are battery-powered radiotelegraph transmitting sets, designed primarily for marine emergency service. They comply with all the technical requirements for emergency transmitters as specified in Section 8.144 of the Federal Communications Rules and Regulations governing shipboard radio equipment. These requirements are that the emergency transmitter be capable of at least 6 hours of operation entirely independent of the normal power supply of the ship, and that the transmitter have at least 50- to 100-mile range, depending on atmospheric conditions. This equipment is not limited to emergency marine use, but will provide satisfactory service whenever a radiotelegraph transmitter of its power output, frequency range, and source of power is required.

b. The transmitter will generate 40 watts of carrier power at any one of five preset channels within the frequency range of 350 to 505 kilocycles (kc). A self-rectifying type circuit which results in a signal modulated 70 to 90 percent at approximately 700 cycles per second (cps) (A2 emission) is used in the transmitter. This distinctive signal can be read through strong atmospheric noise and interference.

c. The components supplied with Radio Transmitting Set AN/SRT-13 are designed to permit battery charging from a 115-volt, 50 to 60 cps power source; in Radio Transmitting Set AN/SRT-13X, battery charging is accomplished by a charger that operates from 115-volt direct-current (dc) power source. Primary power for either transmitting set is supplied by two 6-volt lead-acid type storage batteries through a motor generator.

4. System Application

a. Figure 3 is a simplified block diagram of Radio Transmitting Set AN/SRT-13 showing the relationship between the various components of the set and the supplementary circuits. When used with a receiver of the appropriate frequency range, the combination of receiver and transmitter makes up a complete radiotelegraph receiving and transmitting station.

(1) Primary power for the set is supplied by two 6-volt lead-acid type storage batteries BT201 and BT202. Motor-

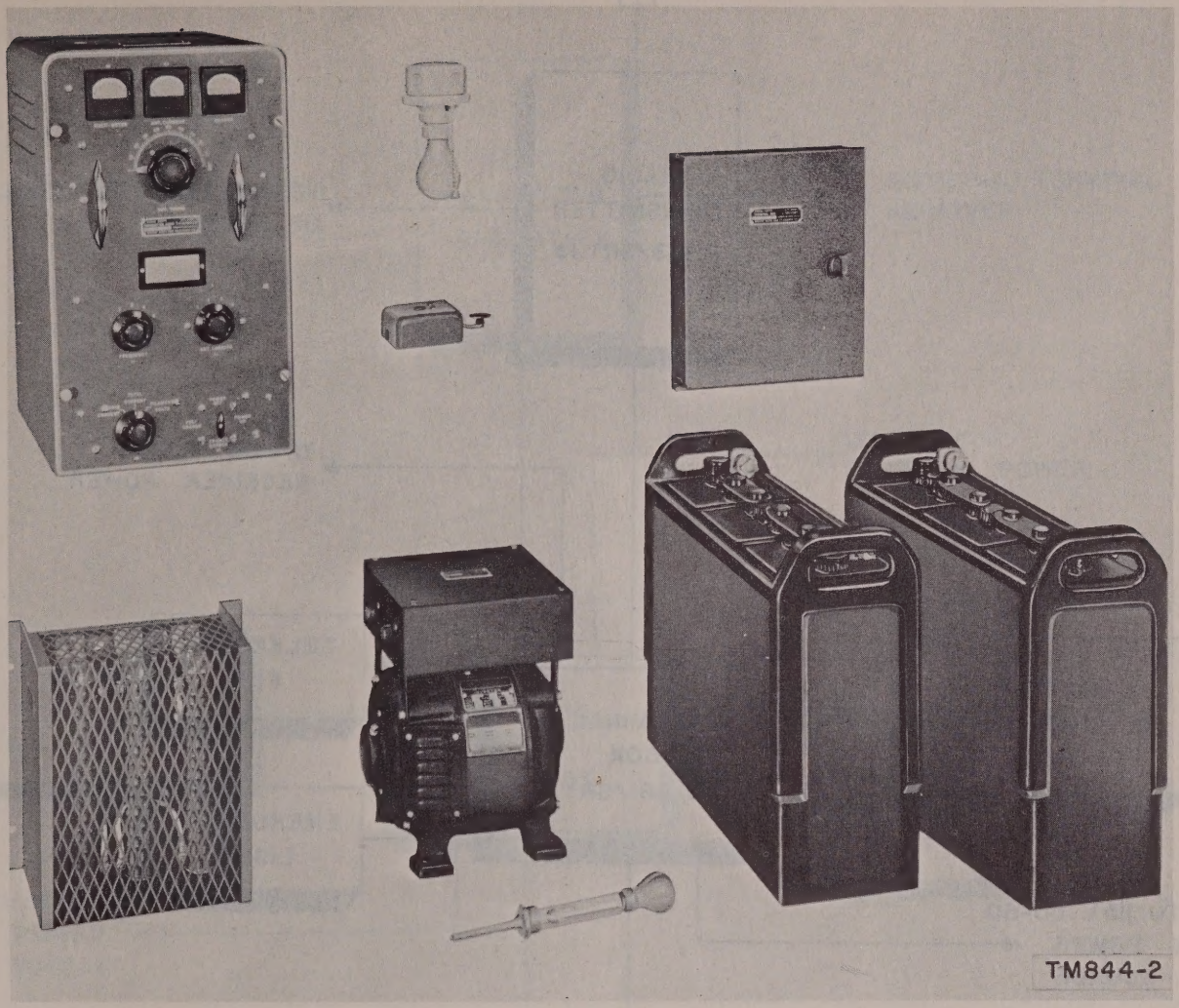


Figure 2. Radio Transmitting Set AN/SRT-13X

Generator PU-277/SRT, powered by batteries BT201 and BT202, supplies 140 volts at 350 cps to the primary of plate supply transformer T1 located in transmitter.

(2) Terminal Box J-581/SRT interconnects the various components of the set.

(3) In Radio Transmitting Set AN/SRT-13, the batteries are charged by a metallic rectifier-type battery charger (Battery Charger PP-1030/SRT-13) that receives its power from a 115-volt, 50 to 60 cps, single phase, power source.

(4) The emergency light illuminates the operator's working area.

(5) When used with a receiver, both the receiver and transmitter operate from a common antenna. When the telegraph key is not depressed, the antenna is connected to the receiver through antenna switching relay K1 which is located in the transmitter. When the telegraph key is depressed, the relay automatically connects the antenna to the transmitter and energizes the plate supply transformer. This arrangement reduces the operating time by permitting the operator to listen-in between code characters, allowing a word or character missed by the receiving station to be filled in, instead of requiring the entire message to be repeated. This also allows higher priority messages to get

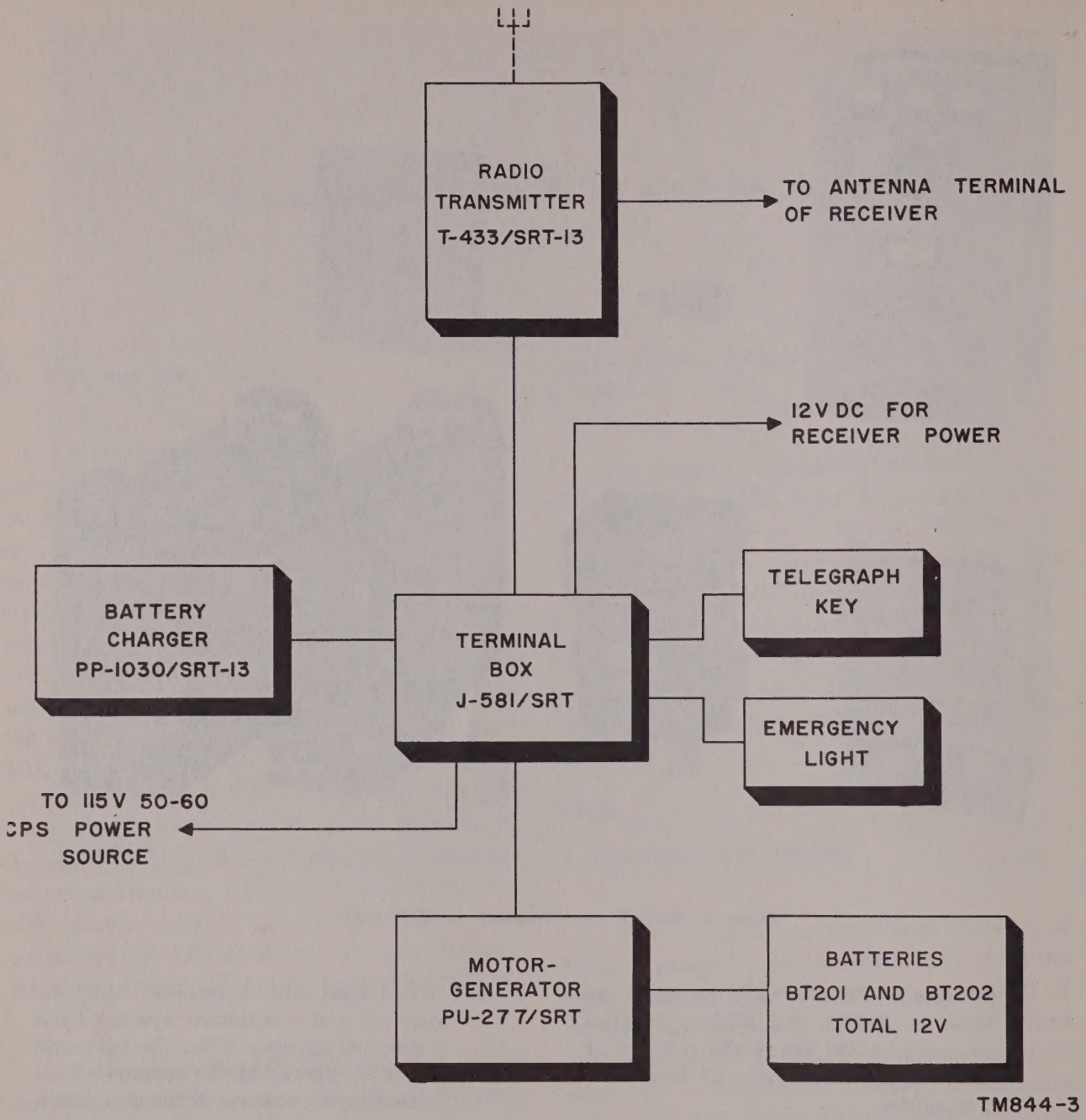


Figure 3. Radio Transmitting Set AN/SRT-13, simplifed block diagram.

through faster, since other stations can break-in.

b. Figure 4 is a simplified block diagram of Radio Transmitting Set AN/SRT-13X. With the exception of the battery charging circuit and the battery charger, Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X are identical. The batteries used with Radio Transmitting Set AN/SRT-13X are charged by a resistance-type charger (Battery Charger PP-1031/SRT-13X) which receives its power from a 115-volt dc power source.

Note. Radio Transmitter T-434/SRT-13X cannot be interchanged with Radio Transmitter T-433/SRT-13 because of the difference in resistor R8 (par. 17).

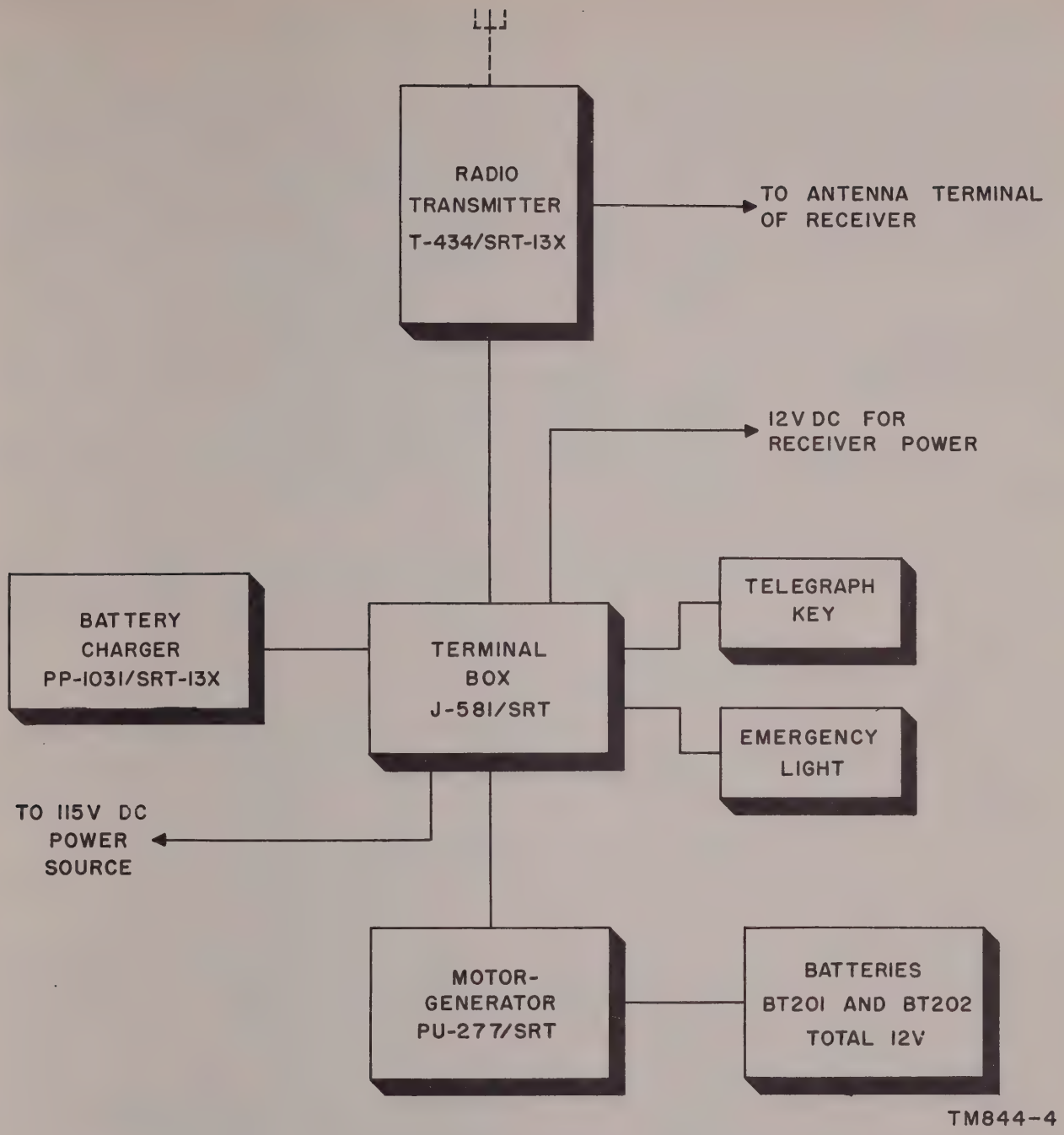


Figure 4. Radio Transmitting Set AN/SRT-13X, simplified block diagram.

5. Technical Characteristics

a. Radio Transmitters T-433/SRT-13 and T-434/SRT-13X.

Frequency range:
Five preset channels..... 350 to 505 kc.
Transmitter type..... Master oscillator power amplifier.
Frequency deviation (max)..... 3 percent.
Type of emission..... Modulated continuous wave (A2).
Type of modulation..... Amplitude.
Percent of modulation..... 70 to 90 percent.
Frequency of modulation..... 700 cps (approx).

Number of tubes..... 4.

Power input:

Standby (key up)..... 22 amperes.

Transmit (key down)..... 38 amperes.

Input voltage..... 12-volts dc.

Power supply..... Two 6-volt lead-acid storage batteries in series through Motor-Generator PU-277/SRT.

Power output..... 40 watts.

Type of antenna required..... Single wire antenna with characteristic constants between 2 to 8 ohms and 500 to 1,250 uuf.

Weight..... 75 pounds.

b. Motor-Generator PU-277/SRT.

Power input:

Voltage..... 12 volts dc.

Current..... 34 amperes (max).

Power output:

Voltage..... 140 volts.

Current..... 1.2 amperes (max).

Frequency..... 350 cps.

Weight..... 52 pounds.

c. Battery Charger PP-1030/SRT-13.

Power input:

Voltage..... 115 volts (single phase).

Frequency..... 50 to 60 cps.

Power output:

Voltage..... 12 volts dc.

Current..... 7 amperes.

Weight..... 29 pounds.

d. Battery Charger PP-1031/SRT-13X.

Power input:

Voltage..... 115 volts dc.

Power output:

Voltage..... 12 volts.

Current..... 7 amperes.

Weight..... 10 pounds.

6. Packaging Data

a. When packaged for export shipment, the components of Radio Transmitting Set AN/SRT-13 are placed in moisture-vaporproof containers and are packed in four wooden export crates; the components of Radio Transmitting Set AN/SRT-13X are packed in a similar manner. An exploded view of a typical component packed for export is shown in figure 11. The size, weight, and volume of each crate for the components of Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X are listed in the tables below.

Note. Items may be packaged in a manner different from that shown, depending on the supply channel.

b. The following table indicates the dimensions of each case for Radio Transmitting Set AN/SRT-13.

Number of crates	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)
1	22	20	38	11.4	215
1	17	17	12	2	50
2	19	25	10	2.2	185
Total weight (lb)					635

c. The following table indicates the dimension of each case for Radio Transmitting Set AN/SRT-13X.

Number of crates	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)
1	22	20	38	11.4	215
1	15	17	11	1.	25
2	19	25	10	2.2	185
Total weight (lb)					610

d. The following list indicates the contents of each case for Radio Transmitting Set AN/SRT-13. See the packing list attached to each case for exact contents.

6*d* (contd)

Case dimensions (in.)	Contents	Notes
22 x 20 x 38	1 Radio Transmitter T-433/SRT-13	Less tubes.
	1 Motor-Generator PU-277/SRT	Spare brush set packed inside motor generator.
	1 Terminal Box J-581/SRT	
	1 telegraph key with cover	
	1 hydrometer	
	1 lighting fixture	
	1 incandescent lamp	
	1 set of vacuum tubes	Two 1624 tubes; two 812 tubes.
17 x 17 x 12	1 Battery Charger PP-1030/SRT-13	
19 x 25 x 10	1 storage battery	Shipped dry.
19 x 25 x 10	1 storage battery	Shipped dry.

e. The following list indicates the contents of each case for Radio Transmitting Set AN/SRT-13X. See the packing list attached to each case for exact contents.

Case dimensions (in.)	Contents	Notes
22 x 20 x 38	1 Radio Transmitter T-434/SRT-13X	Less tubes.
	1 Motor-Generator PU-277/SRT	Spare brush set packed inside motor generator.
	1 Terminal Box J-581/SRT	
	1 telegraph key with cover	
	1 hydrometer	
	1 lighting fixture	
	1 incandescent lamp	
	1 set of vacuum tubes	Two 1624 tubes; two 812 tubes.
15 x 17 x 11	1 Battery Charger PP-1031/SRT-13X	
19 x 25 x 10	1 storage battery	Shipped dry.
19 x 25 x 10	1 storage battery	Shipped dry.

7. Table of Components

a. The following is a list of components supplied with Radio Transmitting Set AN/SRT-13.

7*a* (contd)

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Radio Transmitter T-433/SRT-13	1	21	13	18½	2.9	75
Motor-Generator PU-277/SRT	1	12⅛	8¼	9-5/16	.54	52
Battery Charger PP-1030/SRT-13	1	12¾	8⅝	12¼	.8	29
Terminal Box J-581/SRT	1	12¼	3⅛	11	.24	9
Storage battery	2	16	6¾	20¼	1.3	155
Telegraph key	1	1¼	2⅝	4¾	.1	.50
Hydrometer	1		1¾ oa	10	.02	.25
Lighting fixture	1	3¾		3⅛ oa		1
Incandescent lamp, 12 volts, 25 watts	1	4¼		2½		.125
Brush set	1 set					.125
Total					5.9	322

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

b. The following is a list of components supplied with Radio Transmitting Set AN/SRT-13X.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Radio Transmitter T-434/SRT-13X	1	21	13	18½	2.9	75
Motor-Generator PU-277/SRT	1	12⅛	8¼	9-5/16	.54	52
Battery Charger PP-1031/SRT-13X	1	11	7⅛	10¾	.5	10
Terminal Box J-581/SRT	1	12¼	3⅛	11	.24	9
Storage battery	2	16	6¾	20¼	1.3	155
Telegraph key	1	1¼	2⅝	4¾	.1	.50
Hydrometer	1		1¾ oa	10	.02	.25
Lighting fixture	1	3¾		3⅛ oa		1
Incandescent lamp, 12 volts, 25 watts	1	4¼		2½ oa		.125
Brush set	1 set					.125
Total					5.6	303

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

8. Description of Radio Transmitters T-433/SRT-13 and T-434/SRT-13X (fig. 5)

a. Radio Transmitters T-433/SRT-13 and T-434/SRT-13X are identical in external appearances and circuitry with the exception of the value and type of resistor R8 (par. 17).

b. The transmitter uses a master oscillator power-amplifier (mopa) type circuit. Four tubes are used: two for the master oscillator and two for the power amplifier. The transmitter generates 40 watts of radio-frequency (rf) carrier power at any one of the five preset frequencies within the range of 350 to 505 kc. Transmitting channels are selected readily by means of a five-position front panel switch, S1.

c. The transmitter is housed in a compact gray

painted steel cabinet, copper-flashed to reduce power losses and painted to resist corrosion. Adequate ventilation is provided by louvers on both sides of the cabinet. The components of the transmitter are mounted on a single chassis-panel assembly. The chassis is bolted securely and braced to the front panel. All operating controls and meters are conveniently placed on the front panel and each is designated clearly by the appropriate panel markings. The oscillator portion of the transmitter is a subassembly that is mounted on top of the chassis and can be removed readily for servicing or replacement. For servicing purposes, the transmitter is constructed so that after loosening four captive screws on the front panel, the front panel may be swung to one side exposing all components that may require servicing or replacement.

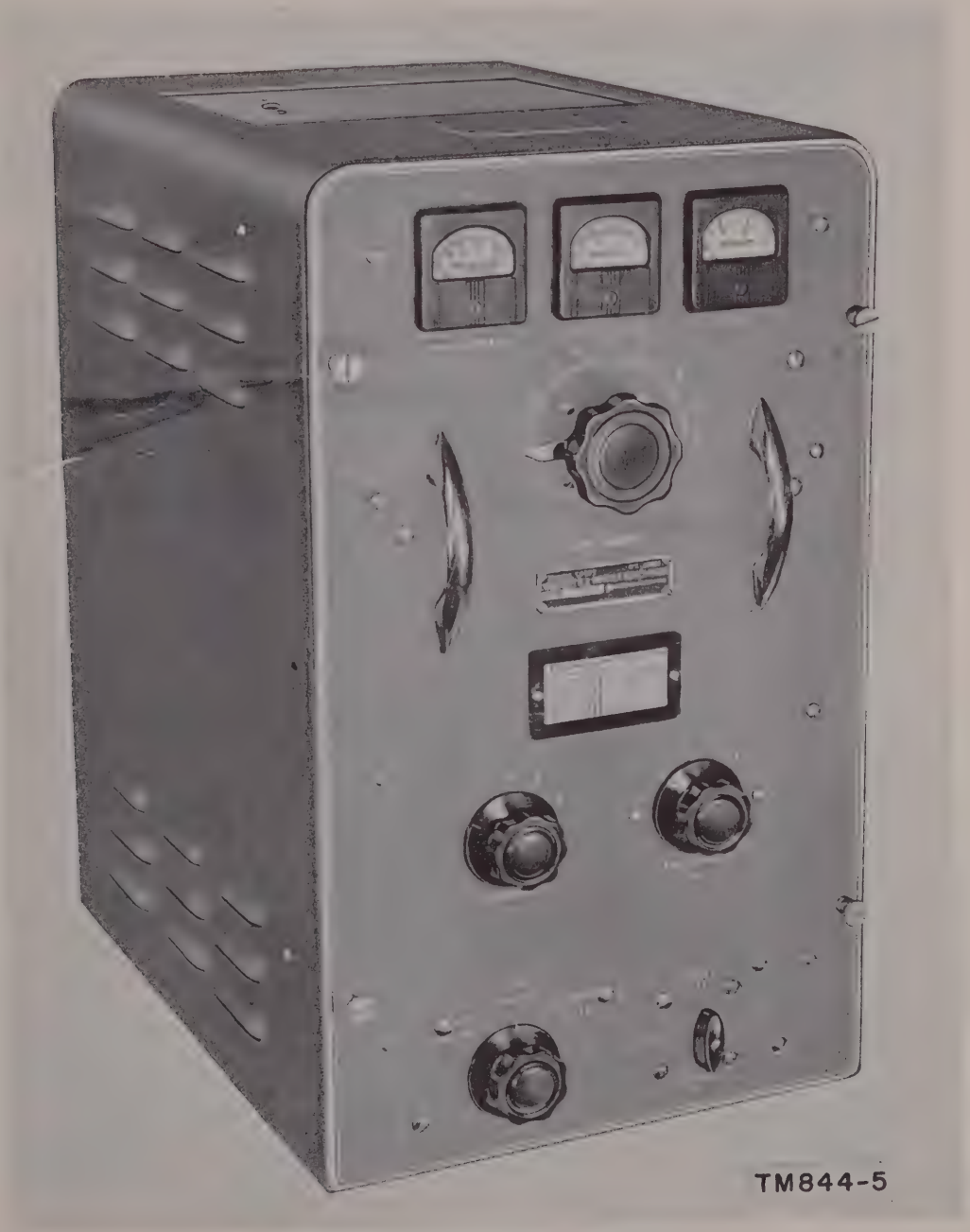


Figure 5. Radio Transmitters T-433/SRT-13 and T-434/SRT-13X.

d. Plate and screen voltages for the transmitter are derived directly from an alternating-current (ac) source (Motor-Generator PU-277/SRT) with an output of 140 volts at 350 cps through plate supply transformer T1 to the oscillator and power-amplifier (pa) stages. The stages are connected as full-wave rectifiers with respect to the plate supply transformer, thus forming a self-rectifying circuit which results in an amplitude-modulated (am) signal, modulated 70 to 90 percent at approximately 700 cps (A2-type emission).

9. Description of Terminal Box J-581/SRT

a. Terminal Box J-581/SRT (fig. 6) is used to interconnect the various components to the

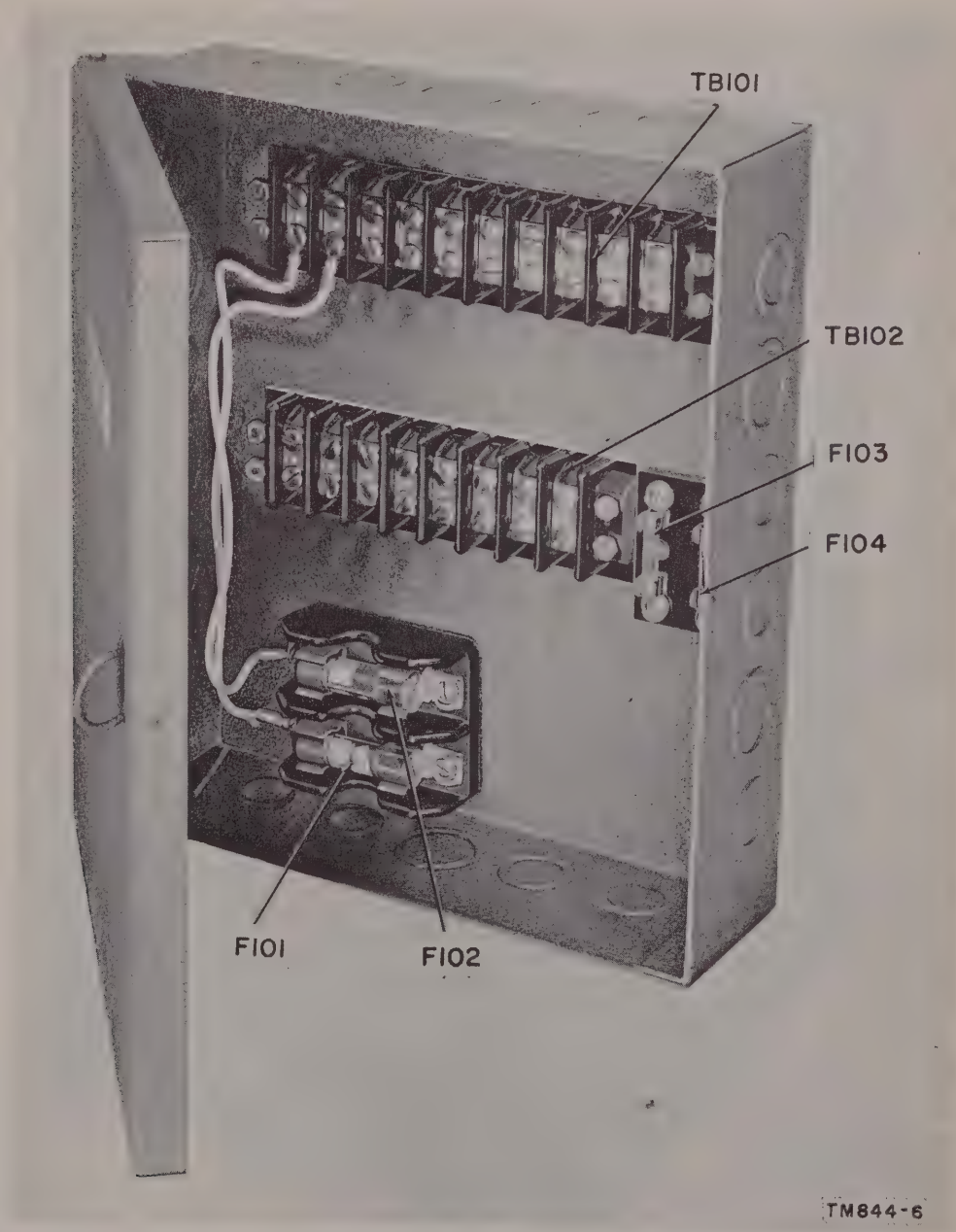


Figure 6. Terminal Box J-581/SRT.

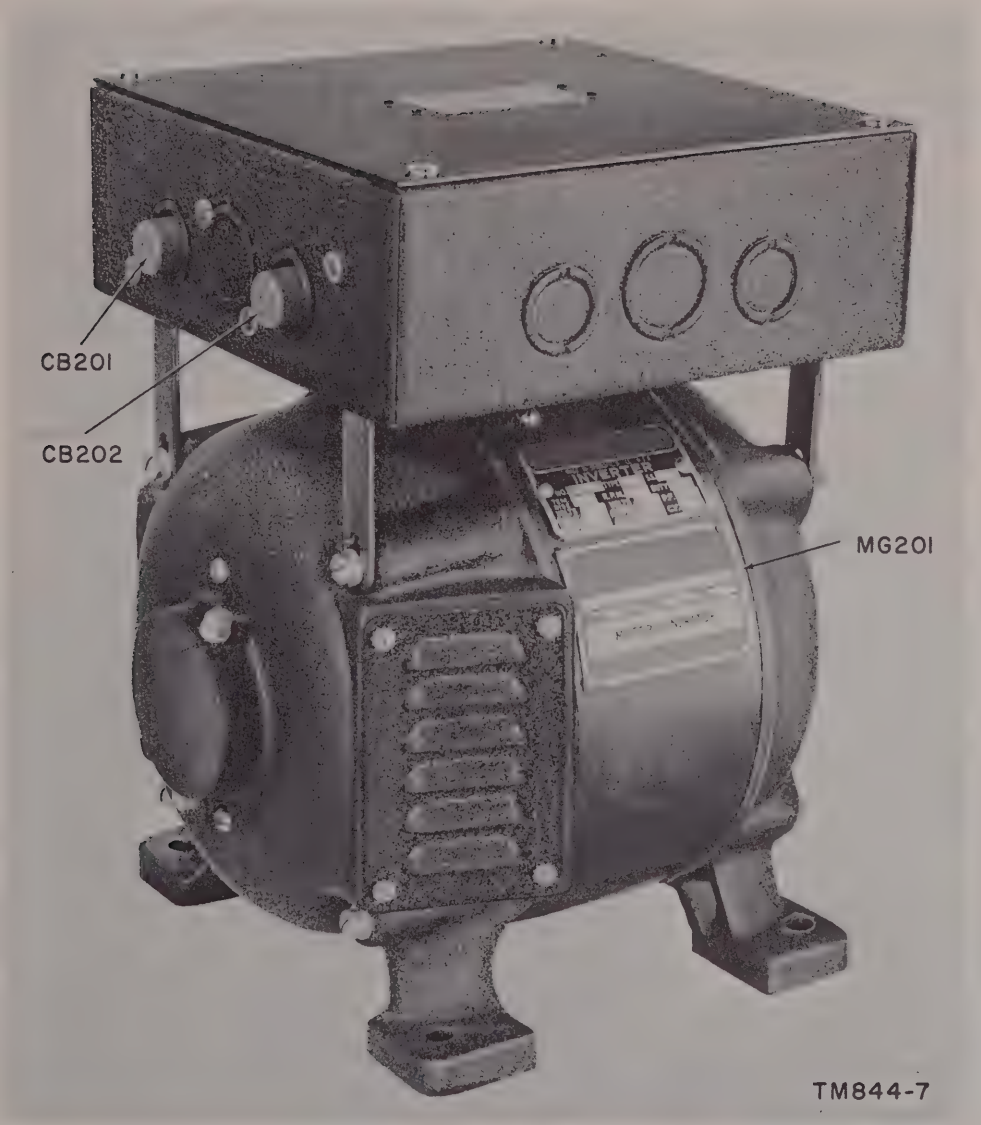


Figure 7. Motor-Generator PU-277/SRT.

transmitter. Terminal Box J-581/SRT is used with Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X. Refer to paragraph 4 and figures 3 and 4 which show and describe the relationship of the terminal box to the various components of the radio transmitting sets.

b. The terminal box is provided with a cover which, when opened, exposes the terminal boards so that the various connections can be made. Four fuses also are mounted inside the terminal box, two of which are used for the emergency light circuit and two for the battery charging circuit.

10. Description of Motor Generator PU-277/SRT

a. Motor-Generator PU-277/SRT (fig. 7) furnishes 140 volts at 350 cps to the transmitter. A motor generator is used with both Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X.

b. The motor generator consists of a two-pole, compound wound, 12-volt dc motor and a 140-volt, 350 cps secondary, mounted on a single frame. A box, housing the motor generator starting relay, terminal board, and two circuit breakers, is mounted on top of the motor generator. Two terminals are provided on the terminal board for the output of the motor generator and two for the 12-volt dc input. Two leads are connected to Terminal Box J-581/SRT from the input terminals to furnish filament power for the transmitter. One terminal is used to connect the lead that energizes the motor generator starting relay. The two circuit breakers protect the motor generator from overloads.

11. Description of Battery Charger PP-1031/SRT-13X

a. Battery Charger PP-1031/SRT-13X (fig. 8) is used with Radio Transmitting Set AN/SRT-13X. This battery charger uses a 115-volt dc power source, and is used only with Radio Transmitter T-434/SRT-13X, because of the battery charging control circuit in the transmitter.

b. The battery charger consists of six 2.5-ohm, 300-watt resistors connected in series. The re-

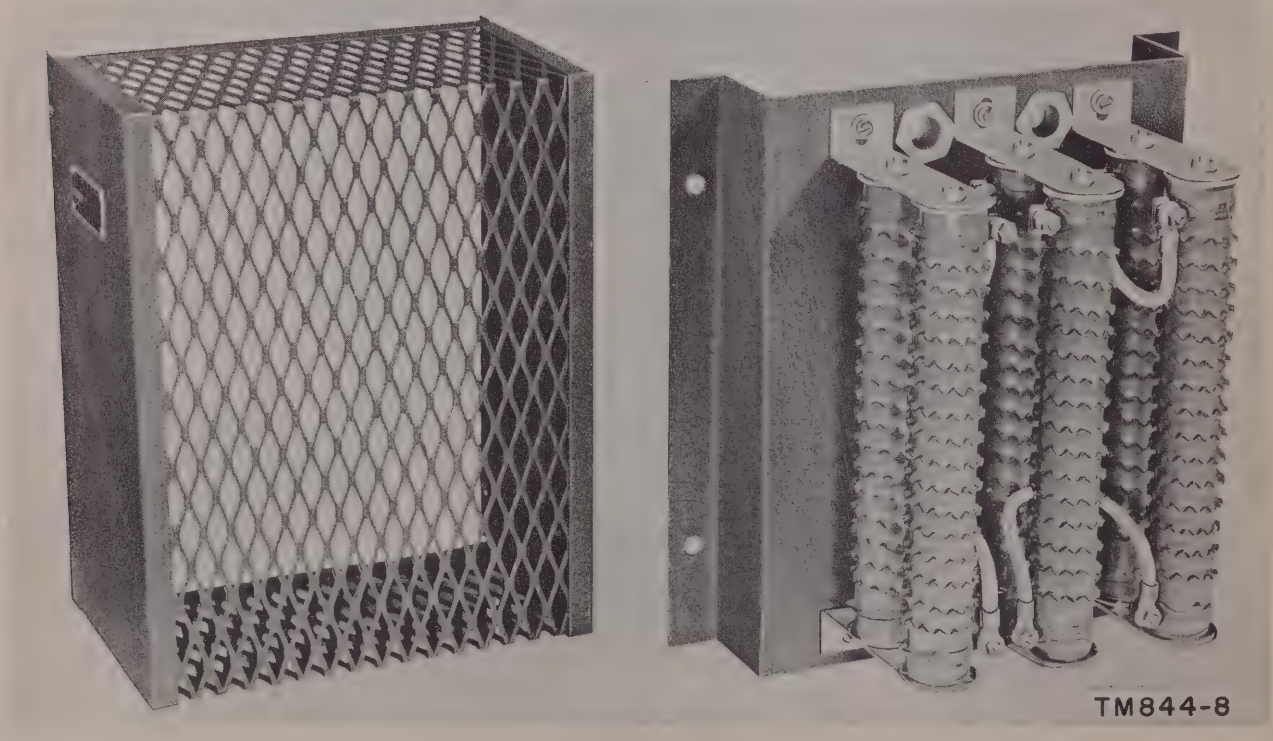


Figure 8. Battery Charger PP-1031/SRT-13X, with cover removed.

sistors drop the 115-volt dc power to a value suitable for charging the batteries.

c. Adequate ventilation is provided by a perforated cover, which is easily removable for servicing and replacement.

12. Description of Battery Charger PP-1030/SRT-13

a. Battery Charger PP-1030/SRT-13 (fig. 9) is used with Radio Transmitting Set AN/SRT-13. This battery charger uses a 115-volt, 50 to 60 cps ac power source, and is used only with Radio Transmitter T-433/SRT-13, because of the battery charging control circuit in the transmitter.

b. Battery Charger PP-1030/SRT-13 is a metallic rectifier-type charger and power for the rectifier is supplied by two step-down transformers. All the components are mounted on a common chassis with a removable cover.

13. Description of Batteries BT201 and BT202

Two 6-volt, 260-ampere-hour, storage batteries (fig. 10) are supplied with each radio transmitting set. They furnish power for Motor-Generator PU-277/SRT and the transmitter filaments.

14. Description of Minor Components

a. One hydrometer (fig. 10) is furnished with each radio transmitting set. The hydrometer is



Figure 9. Battery Charger PP-1030/SRT-13.

used to check the specific gravity of the batteries to give an indication of the condition of the batteries.

b. One telegraph key is furnished with the transmitter (fig. 10).

c. One emergency light assembly is supplied with each radio transmitting set. This light illuminates the operator's working area. A 12-volt, 25-watt bulb is provided with the emergency light assembly (fig. 10).

15. Running Spares

The only running spare supplied with each radio transmitting set is a spare set of brushes with each Motor-Generator PU-277/SRT. The brushes are packaged inside of the terminal box, mounted on top of the motor generator.

16. Additional Equipment Required

a. The following material is *not* supplied as part of Radio Transmitting Set AN/SRT-13, but is required for its installation and operation.

(1) One 6-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Radio Transmitter T-433/SRT-13 to Terminal Box J-581/SRT.

(2) One 7-conductor #12 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Radio Transmitter T-433/SRT-13 to Terminal Box J-581/SRT.

(3) One 1-conductor #14 AWG wire, 600-volt insulation, lead-covered cable that connects Radio Transmitter T-433/SRT-13 to the receiver.

(4) One copper tubing, ⅜-inch overall diameter, that connects Radio Transmit-

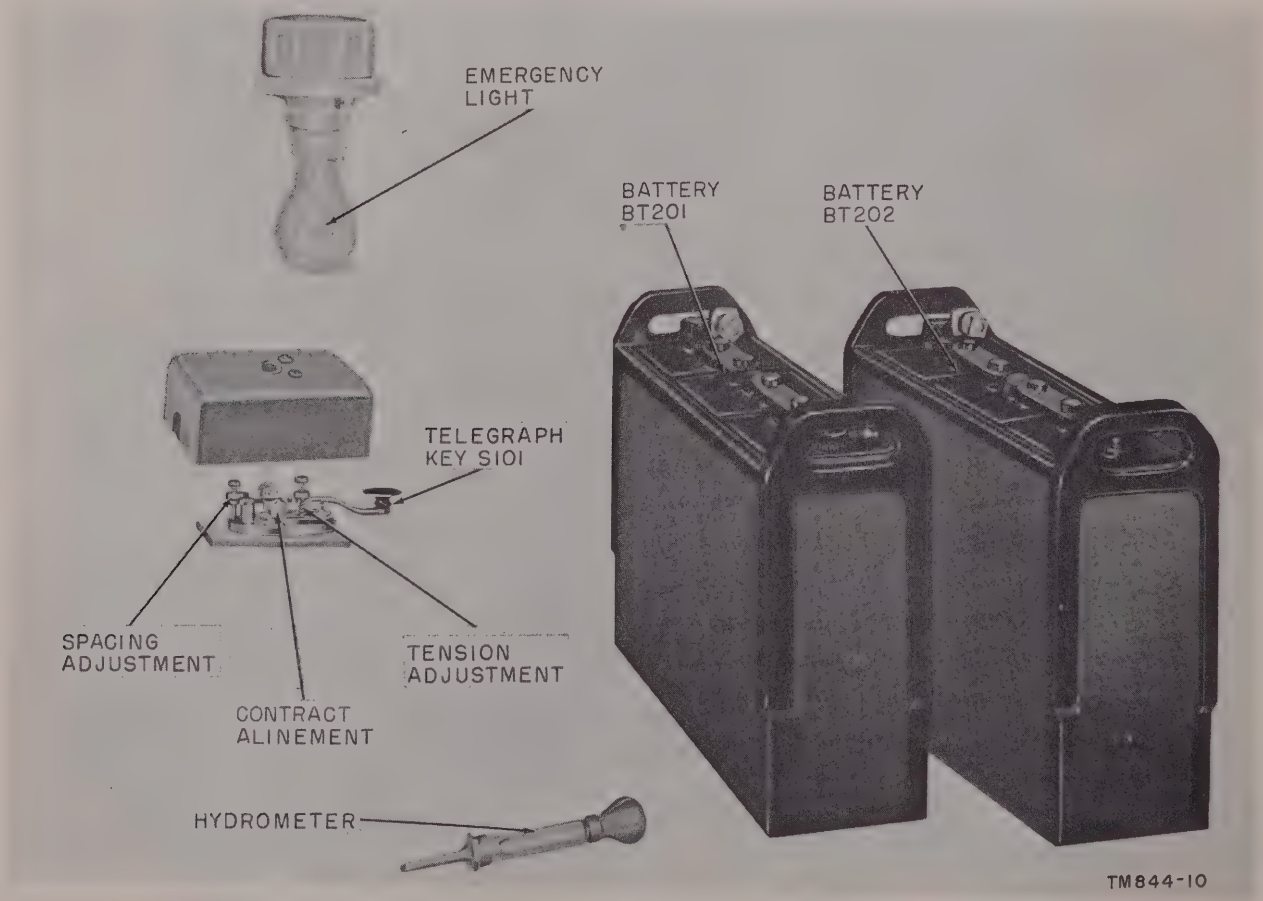


Figure 10. Batteries BT201 and BT202 and accessory equipment.

ter T-433/SRT-13 antenna terminal to the antenna.

(5) One copper braid, ½-inch wide, that connects Radio Transmitter T-433/SRT-13 to ground.

(6) One 4-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to Battery Charger PP-1030/SRT-13.

(7) One 2-conductor #14 AWG wire, 600-volt insulation, lead-covered cable that connects Terminal Box J-581/SRT to the telegraph key.

(8) One 1-conductor #14 AWG wire, 600-volt insulation, used as a jumper between terminal 11 on terminal board TB101 and terminal 12 on terminal board TB1 on the transmitter.

(9) One 2-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects the emergency light to Terminal Box J-581/SRT.

(10) One 5-conductor #12 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to Motor-Generator PU-277/SRT.

(11) One 2-conductor #12 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to the receiver.

(12) One 2-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to a 115-volt, 50 to 60 cps, power source.

(13) One 2-conductor, 600-volt insulation, lead-covered and armored cable that connects Motor-Generator PU-277/SRT to batteries BT201 and BT202. Refer to figure 21 to determine cable wire size.

(14) Single wire antenna with characteristic constants between 2 to 8 ohms and 500 to 1,250 micromicrofarads (uuf).

(15) One receiver with a frequency range of 350 to 505 kc and designed to operate from a 12-volt dc power source.

b. The following material is not supplied as part of Radio Transmitting Set AN/SRT-13X, but is required for its installation and operation.

(1) One 6-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Radio Transmitter T-434/SRT-13X to Terminal Box J-581/SRT.

(2) One 7-conductor #12 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Radio Transmitter T-434/SRT-13X to Terminal Box J-581/SRT.

(3) One 1-conductor #14 AWG wire, 600-volt insulation, lead-covered cable that connects Radio Transmitter T-434/SRT-13X to the receiver (not supplied).

(4) One copper tubing, ⅜-inch overall diameter, that connects Radio Transmitter T-434/SRT-13X antenna terminal to the antenna.

(5) One copper braid, ½-inch wide, used to connect Radio Transmitter T-434/SRT-13X to ground.

(6) One 2-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to a 115-volt dc power source.

(7) One 2-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to the telegraph key.

(8) One 2-conductor #14 AWG wire, 600-volt insulation, lead-covered and ar-

mored cable that connects Terminal Box J-581/SRT to Battery Charger PP-1031/SRT-13X.

(9) One 2-conductor #14 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to the emergency light.

(10) One 5-conductor #12 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to Motor-Generator PU-277/SRT.

(11) One 2-conductor #12 AWG wire, 600-volt insulation, lead-covered and armored cable that connects Terminal Box J-581/SRT to the receiver.

(12) One 2-conductor, 600-volt insulation, lead-covered and armored cable that connects Motor-Generator PU-277/SRT to batteries BT201 and BT202. Refer to figure 21 to determine cable wire size.

(13) Single wire antenna with characteristic constants between 2 to 8 ohms and 500 to 1,250 uuf.

(14) One receiver with a frequency range of 350 to 505 kc and designed to operate from a 12-volt dc power source.

17. Difference in Models

a. Radio Transmitter T-433/SRT-13 and Radio Transmitter T-434/SRT-13X are identical in external appearance and circuitry with the exception of one resistor in each transmitter. The differences between Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X are given in the table below.

b. Battery Charger PP-1030/SRT-13 must be used with Radio Transmitter T-433/SRT-13 and Battery Charger PP-1031/SRT-13X must be used with Radio Transmitter T-434/SRT-13X. Radio Transmitters T-433/SRT-13 and T-434/SRT-13X are not interchangeable, unless resistor R8 is changed to the proper value to permit battery charging with the particular battery charger used.

Item	Radio Transmitting Set AN/SRT-13	Radio Transmitting Set AN/SRT-13X
Transmitter	Radio Transmitter T-433/SRT-13: Resistor R8 is a 7.5-ohm, 10-watt adjustable wire wound type resistor to permit trickle charging with Battery Charger PP-1030/SRT-13.	Radio Transmitter T-434/SRT-13X: Resistor R8 is a 250-ohm, 78-watt wire wound resistor to permit trickle charging with Battery Charger PP-1031/SRT-13X.
Battery charger	Battery Charger PP-1030/SRT-13 permits battery charging from 115-volt, 50 to 60 cps power source.	Battery Charger PP-1031/SRT-13X permits battery charging from a 115-volt dc power source.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

18. Siting

a. Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X are designed primarily for shipboard use. The following instructions pertain to siting and installing the equipment aboard ship. The facilities provided by the vessel determine to a large extent the specific details of each installation. A preliminary survey of the vessel must be made to determine the best location for the components of the transmitting set used. The length of the interconnecting cables and tubing, the dimensions of the antenna, as well as the miscellaneous fixtures and hardware required also will be determined by this survey. Whenever practical, each of the following points should be considered during the preliminary survey of the facilities on the vessel.

b. Excessively hot or humid locations as well as locations which expose the equipment to spray should be avoided.

c. The transmitter is designed for either table or shelf mounting. Locate the transmitter where it will be reached easily by the operator and where the circulation of air around the transmitter is not restricted (fig. 12).

d. Terminal Box J-581/SRT usually is mounted on either a bulkhead or shelf so that it conveniently interconnects the various components of the set. It must be located so that the cover can be removed easily to permit replacement of fuses and to make connections. The information in paragraphs 28 and 29 will aid in determining the location of the terminal box with respect to the other components of the set used. These paragraphs list all the cabling, connections, and diagrams for connecting the various components of the particular set used.

e. The location of Motor-Generator PU-277/SRT will be determined by the facilities afforded by the vessel and the cabling to the motor generator from Terminal Box J-581/SRT and battery BT201. Refer to paragraphs 28 and 29 for cabling information, and figure 14 for dimensions and clearances for the motor generator. The motor generator should be installed in a location that will permit easy replacement of brushes, accessibility of circuit breakers, and ease of making connections.

Caution: Do *not* install the Motor-Generator PU-277/SRT in or near the battery compartment. Explosive fumes are given off by the batteries during charging. Only explosion-proof-type equipment should be installed near the batteries. No open type switches or other open type equipments that have sparking contacts should be installed near the batteries.

f. When Battery Charger PP-1030/SRT-13 is used, it may be installed in any location convenient to the operator and where the interconnecting cables are not excessively long. Use the same precautions outlined in subparagraph *b* above when siting the charger (fig. 8).

g. When using Battery Charger PP-1031/SRT-13X it should be mounted on a wall or bulkhead in a well-ventilated location where the heat developed will have no objectionable effect on any other equipment. The battery charger consists

of six 2.5 ohm 300-watt resistors connected in series. The resistors drop the 115-volt dc power source to a value suitable for charging the batteries. Because of this, a large amount of heat will be developed by the resistors while charging. The resistors are mounted in the charger in two layers of three resistors each (fig. 8). Thus the charger must be mounted with the resistor axes vertical. If the charger were mounted with the resistor axes horizontal, each succeeding resistor would become much hotter because of the heat developed by the resistor below and possibly shorten the life of the resistors.

h. The precise location assigned to the battery depends on the facilities of the vessels. Whether a battery compartment or deck boxes are provided to house the two batteries, care should be taken in the installation not to obstruct any ventilating ducts.

Caution: Do not locate switches, fuses or other electrical fittings, which are likely to produce an arc, in the battery compartment.

i. The emergency light fixture should be installed over the operator's working area so that it illuminates the front panel of the transmitter and so that it may be turned on or off easily.

19. Uncrating, Unpacking, and Checking New Equipment

Note. For used or reconditioned equipment, refer to paragraph 30.

a. General. Equipment may be shipped in oversea or domestic packing cases. When new equipment is received, select a location which is convenient to the permanent or semipermanent installation of the equipment and where the equipment may be unpacked without exposure to the elements. The instructions in subparagraph *b* through *d* below apply to equipment shipped in export cases. Subparagraph *b* below contains instructions for unpacking the crate that contains the transmitter, motor generator, terminal box, and accessory equipment. This unpacking procedure applies to either Radio Transmitting Set AN/SRT-13 or AN/SRT-13X. The instructions in subparagraph *c* below apply to either Battery Charger PP-1030/SRT-13 or PP-1031/SRT-13X. Subparagraph *d* below describes the unpacking instructions for the storage batteries.

Caution: Be careful when uncrating, unpacking, and handling the equipment; it is easily damaged. If it becomes damaged or exposed, a complete overhaul might be required or the equipment might be rendered useless.

Note. Do not attempt to pry off the top or sides of the packing cases since this may result in damage to the equipment.

b. Step-by-step Instructions for Uncrating and Unpacking Transmitter, Motor Generator, Terminal Box, and Accessory Equipment Case (fig. 11).

(1) Place the packing case as near the operating position as convenient.

(2) Cut and fold back the steel straps.

(3) Remove the nails in the top cover with a nail puller. Remove the cover.

(4) Remove the instruction books.

(5) Remove the nails from the side of the case with a nail puller and remove the side.

(6) Tear open moistureproof paper in the small top compartment and remove the outer carton from the compartment.

(7) Open the outer cardboard carton and moistureproof paper. Then open the inner cardboard carton and lift out the cardboard wadding and cartons containing tubes, telegraph key, hydrometer, lighting fixture, and incandescent lamp.

(8) Tear open the moistureproof paper in the large compartment and lift out the outer cardboard carton. Open the outer carton, the moistureproof paper, and the inner carton. Lift out the cardboard wadding and filler and remove the transmitter from the inner carton and place it on the workbench or near its final location.

(9) Tear open the moistureproof paper in the small bottom compartment of the

packing case and remove the outer carton. Open the outer cardboard carton, the moistureproof paper, and the inner carton. Lift out the cardboard wadding and remove the motor generator and terminal box; place them on the workbench or near their final location.

c. Step-by-step Instructions for Uncrating and Unpacking Battery Chargers (fig. 11).

(1) Place the packing case as near the operating position as convenient.

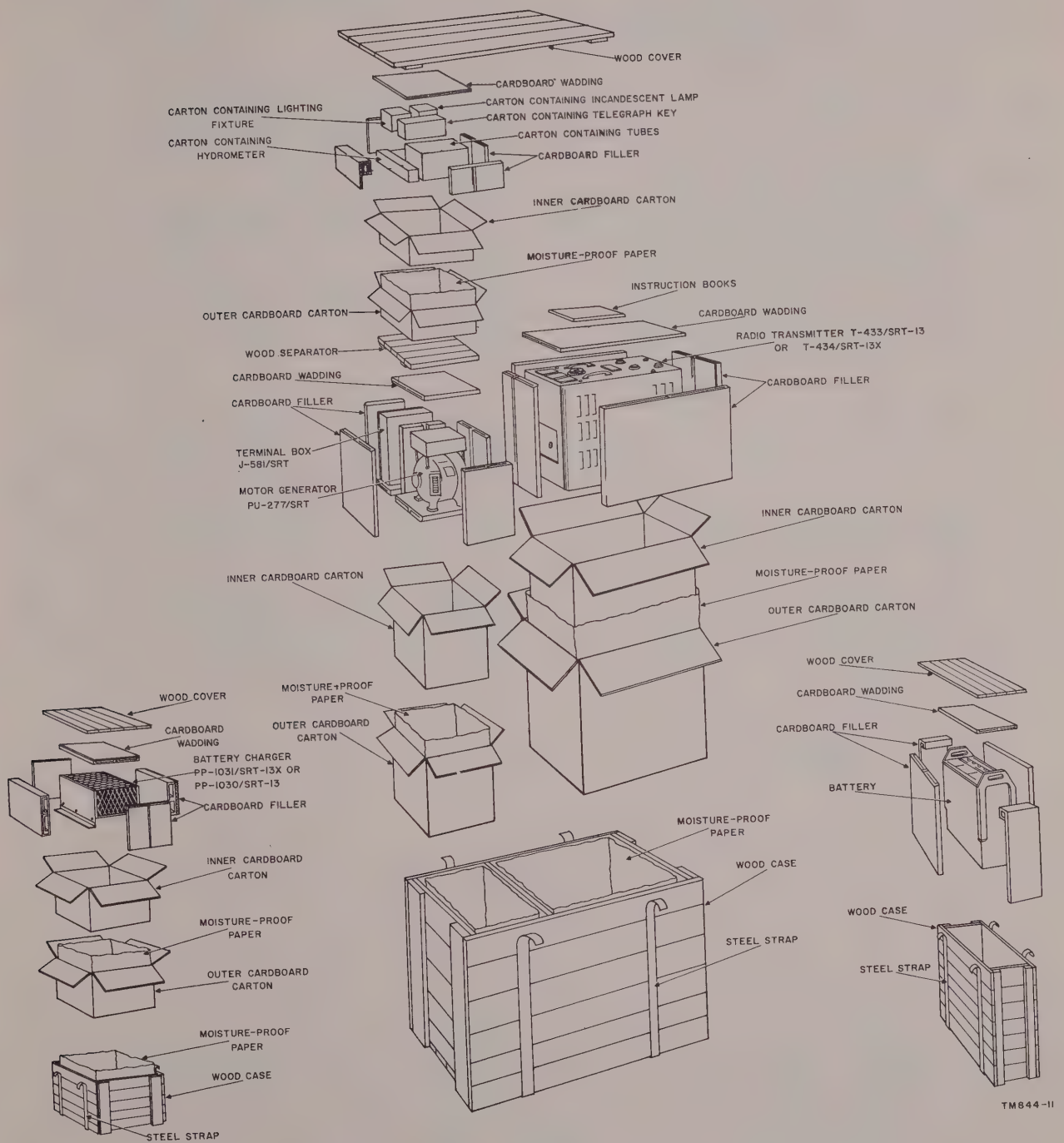


Figure 11. Packaging diagram.

(2) Cut and fold back the steel straps.

(3) Remove the nails in the top cover with a nail puller. Remove the cover.

(4) Open the moistureproof paper and lift out the outer carton.

(5) Open the outer carton, the moistureproof paper, and the inner carton.

(6) Lift out the cardboard wadding and filler; lift out the battery charger and place it on the workbench or near its final location.

d. Step-by-step Instruction for Uncrating and Unpacking Batteries (fig. 11).

(1) Place the packing case as near the operating position as convenient.

(2) Cut and fold back the steel straps.

(3) Remove the nails in the top cover with a nail puller. Remove the cover.

(4) Lift out the cardboard wadding and filler and remove the battery.

(5) Place the battery near its final location.

e. Checking. Inspect the equipment for possible damage incurred during shipment. Check the contents of each packing case against the master packing slip.

Note. Save the original packing cases and containers. They can be used again when the equipment is repacked for storage or shipment.

20. Installation of Radio Transmitters T-433/SRT-13 and T-434/SRT-13X

a. The following installation instructions apply to either Radio Transmitter T-433/SRT-13 or T-434/SRT-13X. The transmitter is designed for mounting on the operator's table or shelf. In either case, the following instructions must be considered.

b. The external cables enter the transmitter cabinet through knockout holes in the rear of the cabinet. Allow at least 10 inches clearance behind the cabinet to permit bending of the incoming armored cables.

c. Allow at least 6 inches clearance on the left side of the cabinet to permit circulation of air through the louvers on the side of the cabinet, and allow at least 13 inches clearance on the right side to permit the front panel to be placed in its servicing position (fig. 12).

d. The type of supporting surface provided for the transmitter cabinet depends on the facilities of the vessel. The four mounting holes on the supporting surface are located according to the mounting dimensions shown in figure 12. After the four mounting centers are located and it is practical to secure the bolts with nuts, drill four clearance holes for 3/8-16 bolts and then fasten the cabinet to the supporting surface with 3/8-16 bolts of adequate length; secure the bolts with flat washers, lock washers, and nuts. If it is

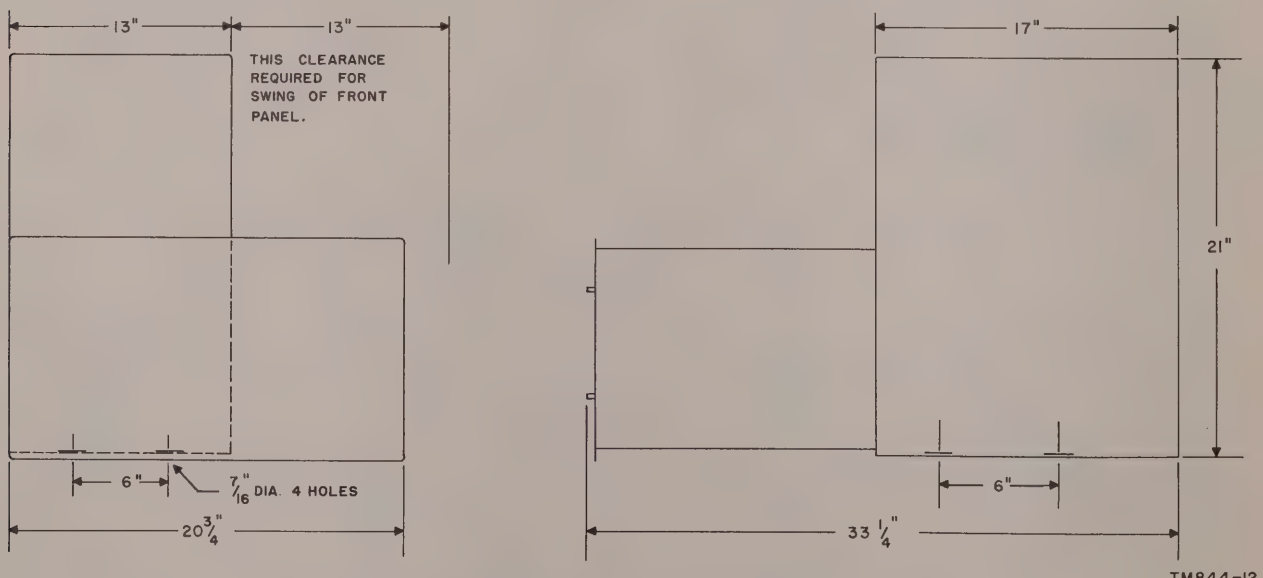


Figure 12. Transmitter cabinet, mounting dimensions and clearances.

not practical to secure the bolts with nuts, drill and tap for 3/8-16 bolts when mounting on a metal surface. When mounting on a wooden surface and nuts cannot be used, use wood screws of an appropriate length and size.

21. Installation of Terminal Box J-581/SRT

The four mounting holes for the terminal box are located on the mounting surface according to the mounting dimensions shown in figure 13. After the four mounting centers are located on the mounting surface and it is practical to secure the mounting bolts with nuts, drill four clearance holes for 1/4-20 bolts and then fasten the terminal box to the supporting surface with 1/4-20 bolts of adequate length; secure the bolts with flat washers, lock washers, and nuts. If it is not practical to secure the bolts with nuts, drill and tap for 1/4-20 bolts when mounting on a metal surface. When mounting on a wooden surface and nuts cannot be used, use wood screws of an appropriate length and size.

22. Installation of Motor-Generator PU-277/SRT

The four mounting holes for the motor generator are located on the mounting surface according to the dimensions shown in figure 14. Drill four clearance holes for 5/16-18 bolts and then fasten the motor generator to the supporting surface with 5/16-18 bolts of adequate length and secure the bolts with flat washers, lock washers, and nuts. When mounting on a metal surface and it is not practical to secure the bolts with nuts, drill and tap four holes for 5/16-18 bolts.

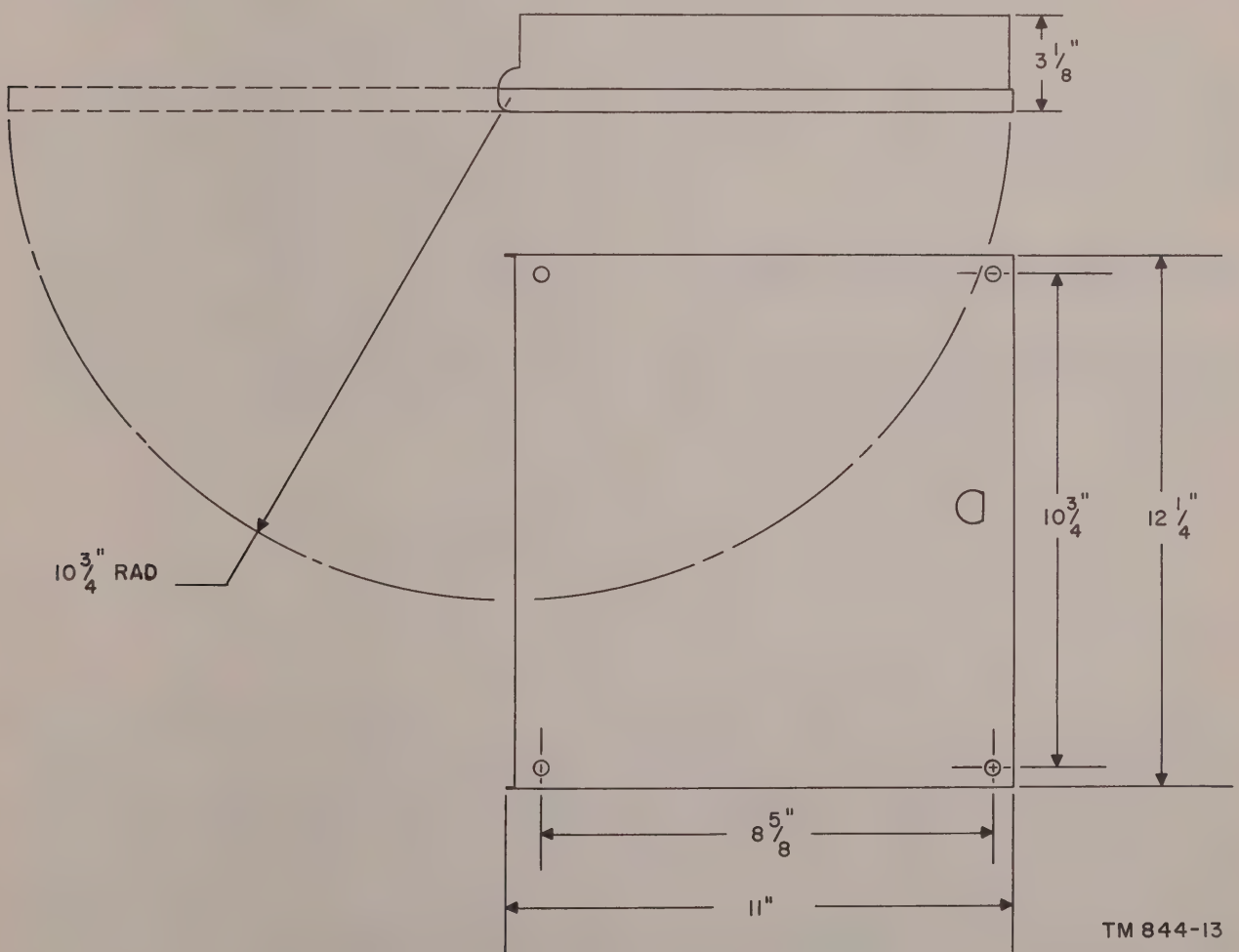


Figure 13. Terminal Box J-581/SRT, mounting dimensions and clearances.

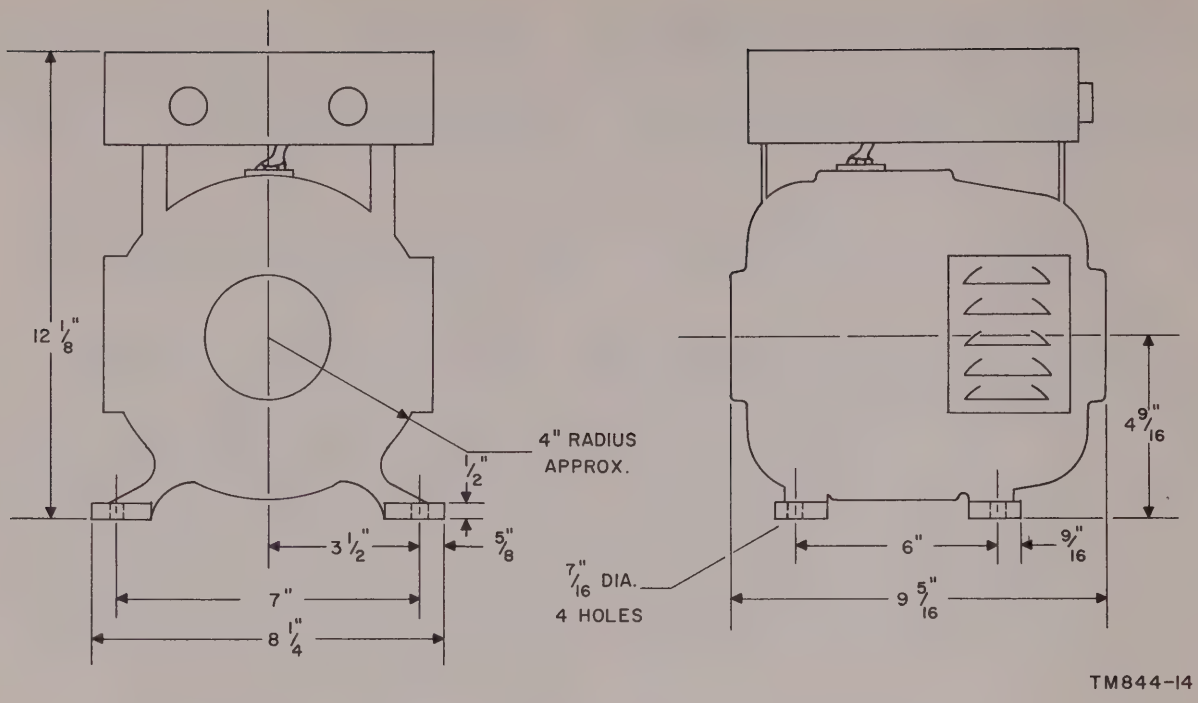


Figure 14. Motor-Generator PU-277/SRT, mounting dimensions.

When mounting on a wooden surface and nuts cannot be used with the bolts, use wood screws of appropriate length and size.

23. Installation of Battery Charger PP-1030/SRT-13

Figure 15 shows the mounting dimensions for Battery Charger PP-1030/SRT-13. Locate the four hole centers on the mounting surface according to the dimensions given in figure 15. Drill four clearance holes for 1/4-20 bolts. Remove the cover and fasten the battery charger to the mounting surface with 1/4-20 bolts of adequate length and secure the bolts with flat washers, lock washers and nuts. Replace the cover of the battery charger. When mounting on a metal surface and it is not practical to use nuts to secure the

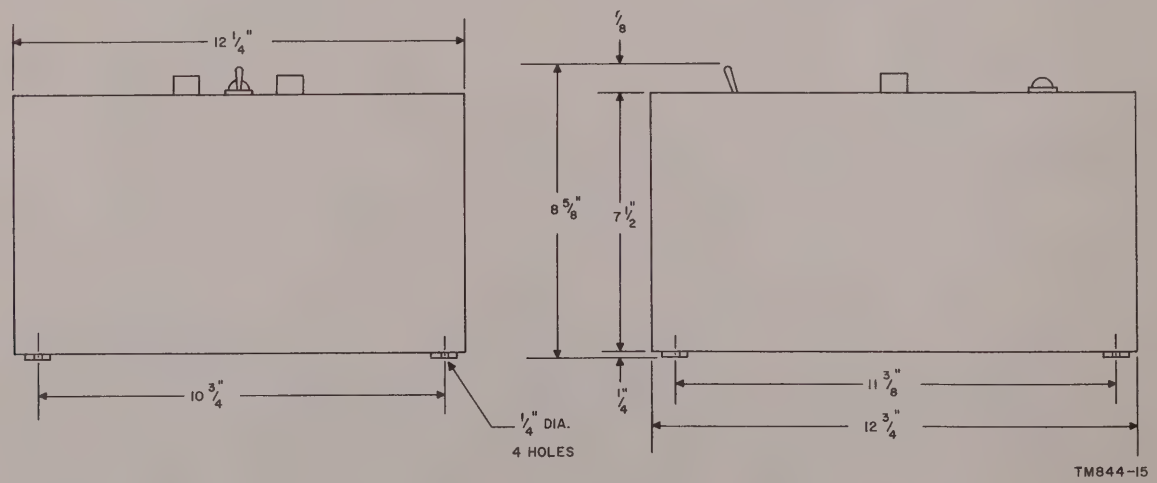


Figure 15. Battery Charger PP-1030/SRT-13, mounting dimensions.

mounting bolts, drill and tap four holes for 1/4-20 bolts. When mounting on a wooden surface and nuts cannot be used with the bolts, use wood screws of adequate length and size.

24. Installation of Battery Charger PP-1031/SRT-13X

When Battery Charger PP-1031/SRT-13X is used, mount it on a bulkhead or wall in a well-ventilated location where the heat developed will have no objectionable effect on other equipment. The charger must be positioned with the resistor axes vertical as shown in figure 8. Figure 16 shows the mounting dimensions of Battery Charger PP-1031/SRT-13X. The four mounting holes for the battery charger are located on the mounting surface in accordance with the dimensions given in figure 16. When the mounting centers are located, drill four clearance holes for four 1/4-20 bolts, then fasten the battery charger to the mounting surface with 1/4-20 bolts of adequate length and secure the bolts with flat washers, lock washers, and nuts. When mounting on a metal surface and it is not practical to secure the bolts with nuts, drill and tap four holes for 1/4-20 bolts. When mounting on a wooden surface and nuts cannot be used with the bolts, use wood screws of appropriate length and size.

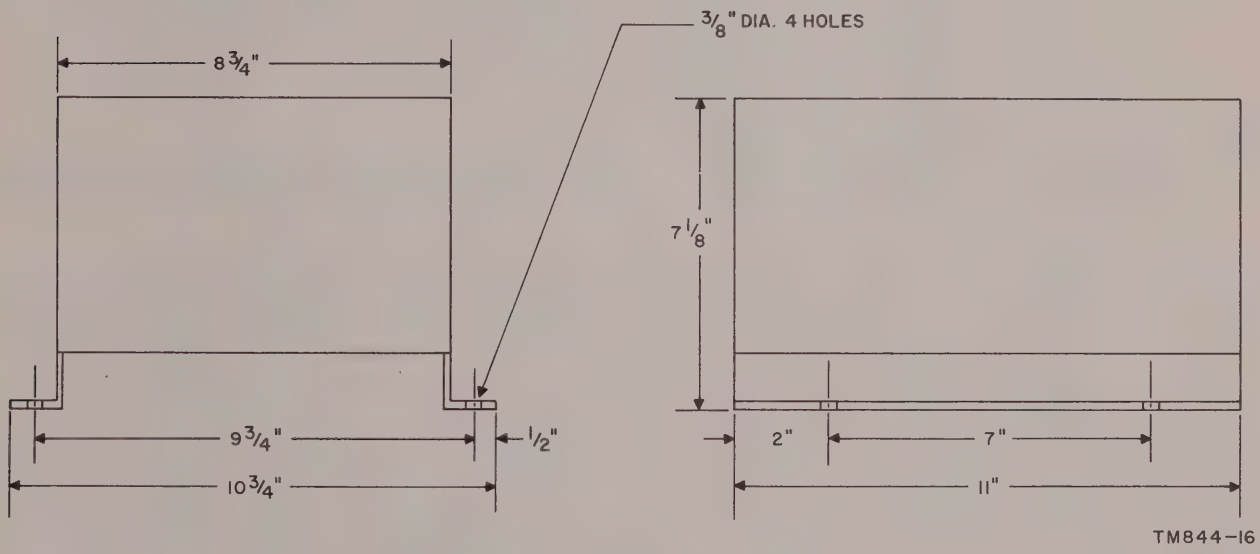


Figure 16. Battery Charger PP-1031/SRT-13X, mounting dimensions.

25. Installation of Batteries

The installation of the batteries will depend on the facilities of the vessel. If a suitable battery compartment is not available on the vessel, construct a wooden battery box as shown in figure 17 and coat it with a paint that will not be affected by the battery electrolyte. Place a lead tray in the bottom of the box to prevent leakage of electrolyte which may occur during the movement or roll of the vessel. Drill ventilation holes near the top of the box to permit the fumes generated by the batteries to escape. Where cables enter the battery box, bush the holes tightly as required for watertight bulkheads. Set each battery in the tray and block each battery securely in place with wooden blocks. Securely fasten the battery box to the deck.

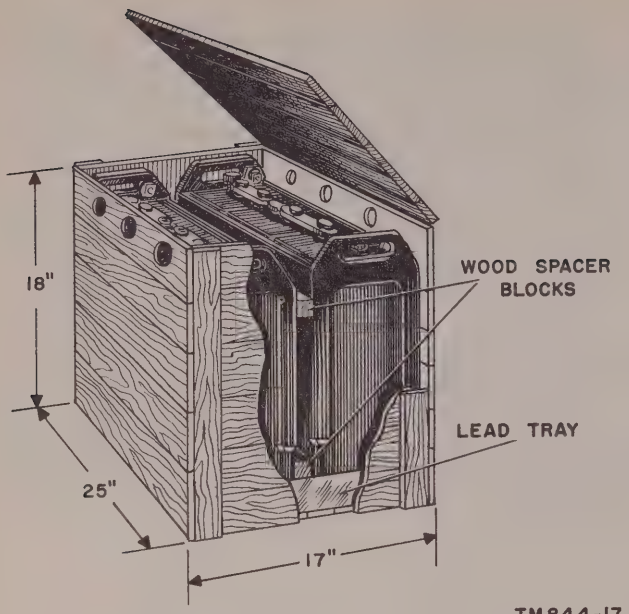


Figure 17. Battery box.

26. Installation of Emergency Light Assembly

The emergency light assembly junction box should be mounted first to the supporting surface. If the junction box is to be mounted on a metal surface and it is not practical to use nuts to secure the mounting screws, drill and tap two holes for 1/4-20 bolts spaced 1-1/2 inches center to center; if nuts can be used, drill clearance holes for the screws, and secure the screws with nuts. If the box is to be mounted on a wood surface, drill two pilot holes for 1/4-inch wood screws. Before mounting the emergency light, feed the connecting cable through the knockout hole in the junction box and connect it to the receptacle on the light assembly. Two screws are supplied with the junction box to fasten the light to the box.

27. Installation of Tubes

To install the transmitter tubes, loosen the four knurled captive screws on the front panel and pull the panel out.

a. To install the two 1624 tubes, the master oscillator subassembly cover must be removed to gain access to the tube sockets. Remove the six screws that fasten the cover to the subassembly, and remove the cover. Insert the 1624 tubes into the sockets marked V1 and V2 (fig. 18). Place the plate leads on the tubes and dress these leads away from the grounded shield. Replace the master oscillator subassembly cover.

b. Insert the two 812 tubes into the sockets marked V3 and V4. Place the plate leads on the tube caps and dress these leads away from the adjacent wires.

28. Connections for Radio Transmitting Set AN/SRT-13

a. After installing the components of Radio Transmitting Set AN/SRT-13, connect the units as shown in figure 19. The length of each cable run is determined by the facilities of the vessel. At the termination of lead-armored cables, secure the metal sheath with a box connector to assure good electrical connection between the cable armor and grounded chassis. Allow a minimum of 6 inches of slack in each wire between the box connector and the terminating point.

b. The following chart lists the cables required to connect the various units of Radio Transmitting Set AN/SRT-13 and designates the terminals that are connected by the cables.

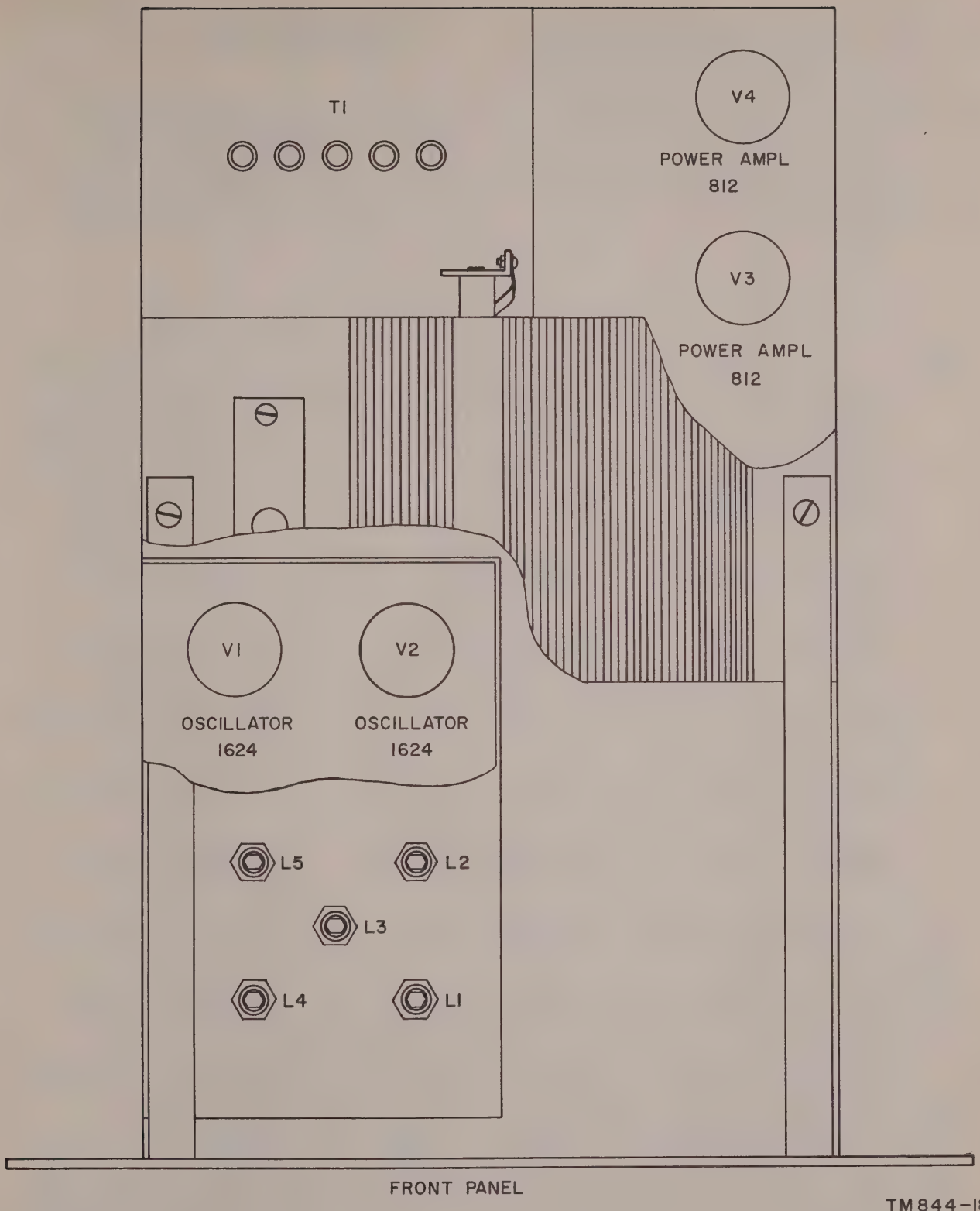


Figure 18. Transmitter tube locations.

c. Figures 19 and 20 are complete interconnection diagrams for both radio transmitting sets. All connections between the various components of the sets are shown in cables to simplify the diagram. The letter part of the cable reference symbol signifies the wire and the number indicates the number of the cable. The bend where the wire enters the cable indicates its direction after entering the cable.

29. Connections for Radio Transmitting Set AN/SRT-13X

a. After installing the components, connect the units according to the connection diagram in figure 20. The length of each cable run is determined by the facilities of the vessel. At the terminations of lead-armored cables, secure the metal sheath with a box connector to assure good

Cable No.	Cable type and size	From		To	
		Unit	Terminal	Unit	Terminal
1	Six-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Radio Transmitter T-433/SRT-13	7, 8, 13, 5, 14, 15, and 16 on TB1	Terminal Box J-581/SRT	1, 2, 3, 4, 5 on TB101; 13 and 14 on TB102
2	Seven-conductor #12 AWG wire, 600-volt insulation, lead covered and armored.	Radio Transmitter T-433/SRT-13	1, 2, 3, 4, 6, 9, 10 on TB1	Terminal Box J-581/SRT	F104, F103, 7, 8, 9, and 10 on TB101; 11 on TB102
3	One-conductor #14 AWG wire, 600-volt insulation, lead covered.	Radio Transmitter T-433/SRT-13	17 on TB1	Receiver (not supplied)	Antenna terminal
4	Copper tubing, ⅜ inch overall diameter.	Radio Transmitter T-433/SRT-13	Antenna terminal E1	Ships antenna (not supplied)	Antenna connector
5	Copper braid, ½ inch wide.	Radio Transmitter T-433/SRT-13	Ground stud	Metal hull of ship	Nearest point
6	Four-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	F101, F102 terminals 12, 14 on TB102	Battery Charger PP-1030/SRT-13	Four terminals on TB401
7	Two-conductor #14 AWG wire, 600-volt insulation, lead covered.	Terminal Box J-581/SRT	3 and 4 on TB101	Telegraph key	Binding posts
8	One-conductor #14 AWG wire, 600-volt insulation.	Radio Transmitter T-433/SRT-13	11 on TB1	Radio Transmitter T-433/SRT-13	12 on TB1
9	Two-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	F103 and F104	Emergency light	Screw terminals
10	Five-conductor #12 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	F103, F104 and 7, 8, 9 on TB101	Motor-Generator PU-277/SRT	6, 5, 4, 2, 1 on TB201
11	Two-conductor #12 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	10 on TB101; 11 on TB102	Receiver (not supplied)	12-volt dc input terminals
12	Two-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	12 and 13 on TB102	115-volt, 50 to 60 cps power source	
13	Two-conductor wire, 600 volt insulation, lead covered and armored. (Refer to fig. 21 for cable size.)	Motor-Generator PU-277/SRT	5 and 6 on TB201	Batteries BT201 and BT202	+ and — terminals of battery

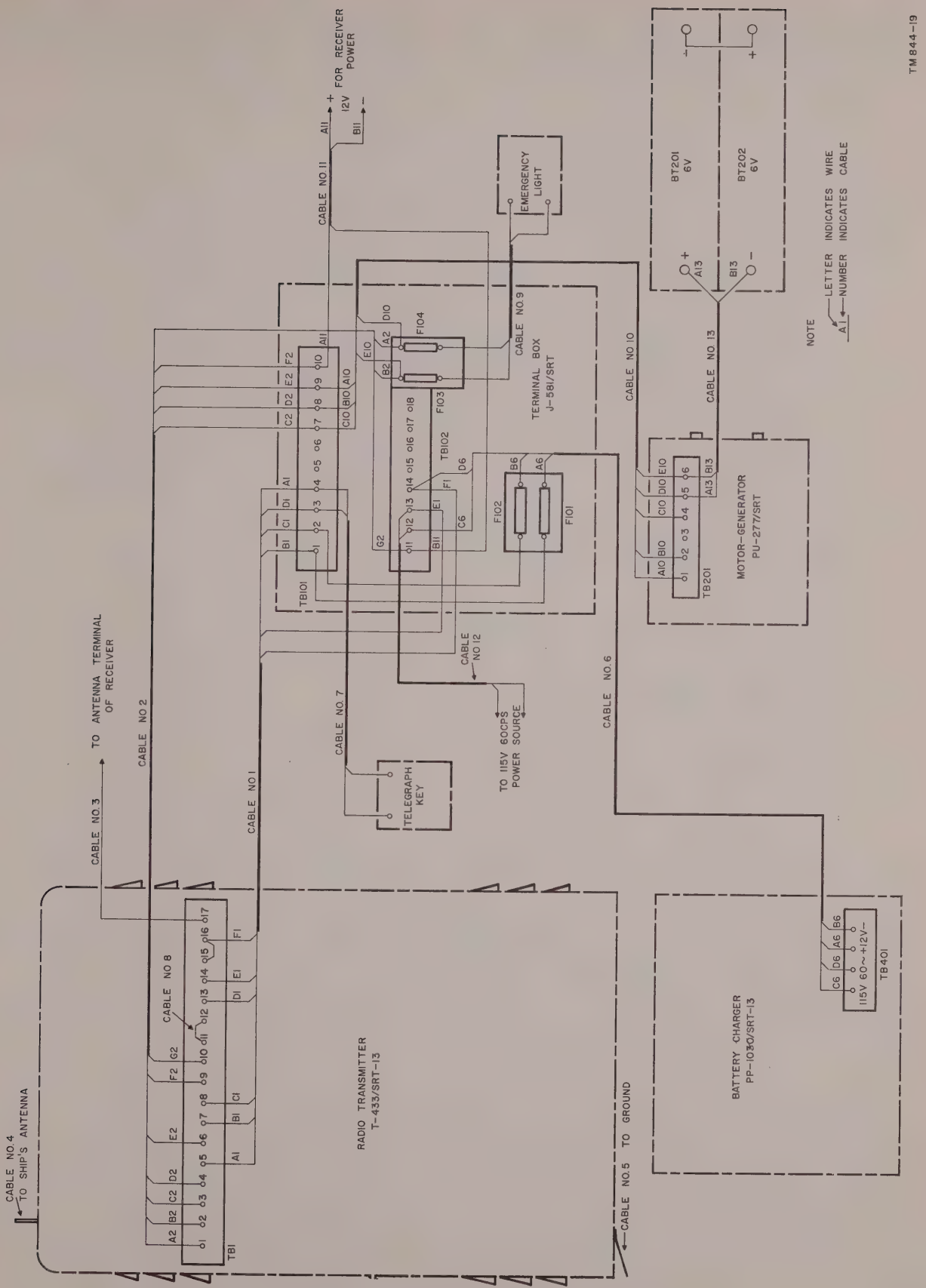


Figure 19. Connections for Radio Transmitting Set AN/SRT-13.

electrical connection between the cable armor and the grounded chassis. Allow a minimum of 6 inches of slack in each wire between the box connector and the terminating point.

b. The following chart lists the cables required to connect the various units of Radio Transmitting Set AN/SRT-13X and designates the terminals connected by the cables.

Cable No.	Cable type and size	From		To	
		Unit	Terminal	Unit	Terminal
1	Six-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Radio Transmitter T-434/SRT-13X	7, 8, 13, 5, 12, 11 on TB1	Terminal Box J-581/SRT	1, 2, 3, 4, 5, 6 on TB101
2	Seven-conductor #12 AWG wire, 600-volt insulation, lead covered and armored.	Radio Transmitter T-434/SRT-13X	2, 1, 3, 4, 6, 9, 10 on TB1	Terminal Box J-581/SRT	F103, F104, 7, 8, 9, 10 on TB101; 11 on TB 102
3	One-conductor #14 AWG wire, 600-volt insulation, lead covered.	Radio Transmitter T-434/SRT-13X	17 on TB1	Receiver (not supplied)	Antenna terminal
4	Copper tubing, ⅜ inch overall diameter.	Radio Transmitter T-434/SRT-13X	Antenna terminal E1	Ships antenna (not supplied)	Antenna connector
5	Copper braid, ½ inch wide.	Radio Transmitter T-434/SRT-13X	Ground stud	Metal hull of ship	Nearest point
6	Two-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	F101 and F102	115-volt dc power source	
7	Two-conductor #14 AWG wire, 600-volt insulation, lead covered.	Terminal Box J-581/SRT	3 and 4 on TB101	Telegraph key	Binding post
8	Two-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	5 and 6 on TB101	Battery Charger PP-1031/SRT-13X	Screw terminals
9	Two-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	F103 and F104	Emergency light	Screw terminals
10	Five-conductor #12 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	F103, F104, 7, 8, 9 on TB101	Motor-Generator PU-277/SRT	6, 5, 4, 2, 1 on TB201
11	Two-conductor #14 AWG wire, 600-volt insulation, lead covered and armored.	Terminal Box J-581/SRT	10 on TB101; 11 on TB102	Receiver (not supplied)	12-volt dc input terminals
12	Two-conductor, 600-volt insulation, lead covered and armored. (Refer to fig. 21 for cable size.)	Motor-Generator PU-277/SRT	5 and 6 on TB201	Batteries BT201 and BT202	+ and — terminals

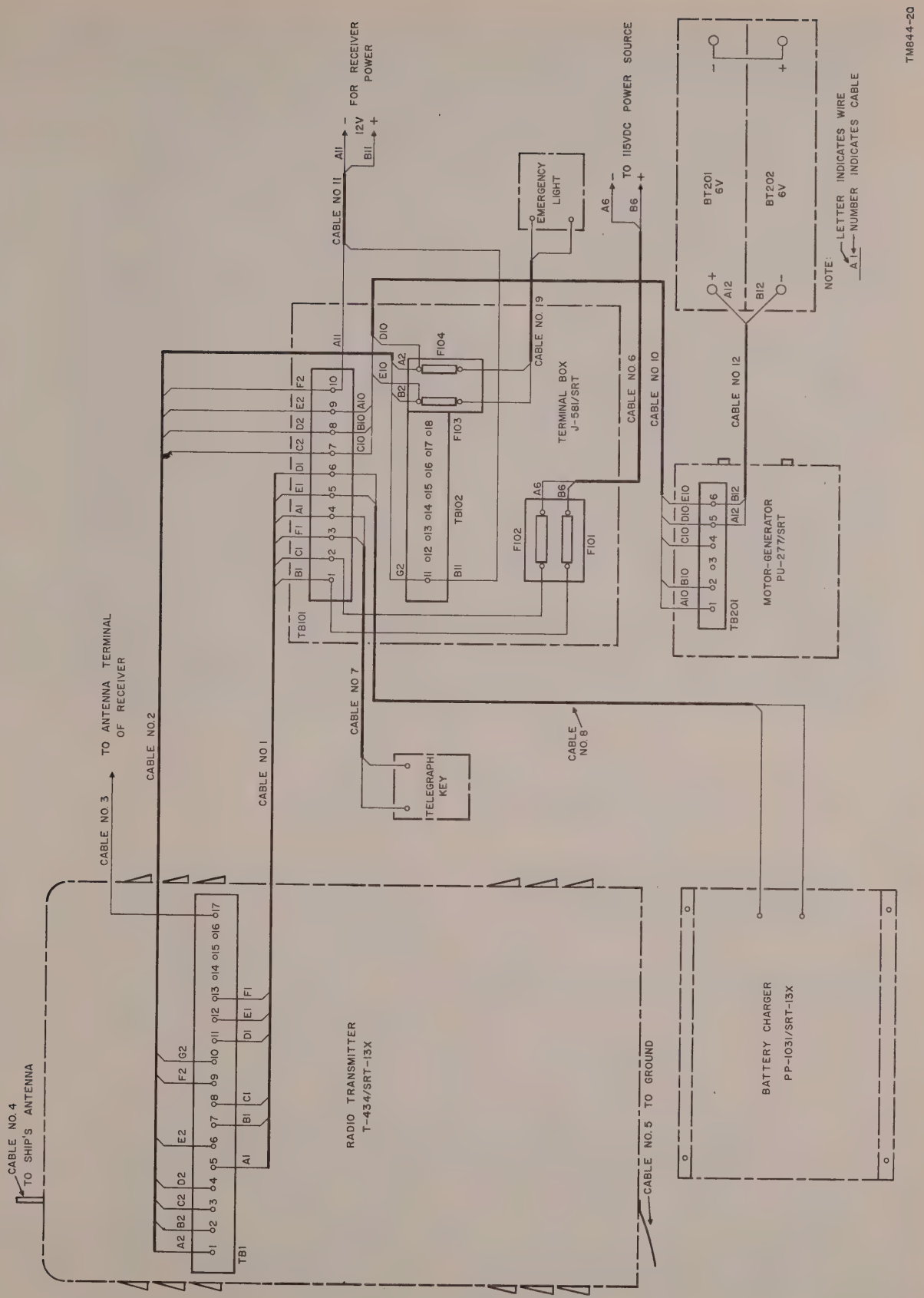


Figure 20. Connections for Radio Transmitting Set AN/SRT-13X.

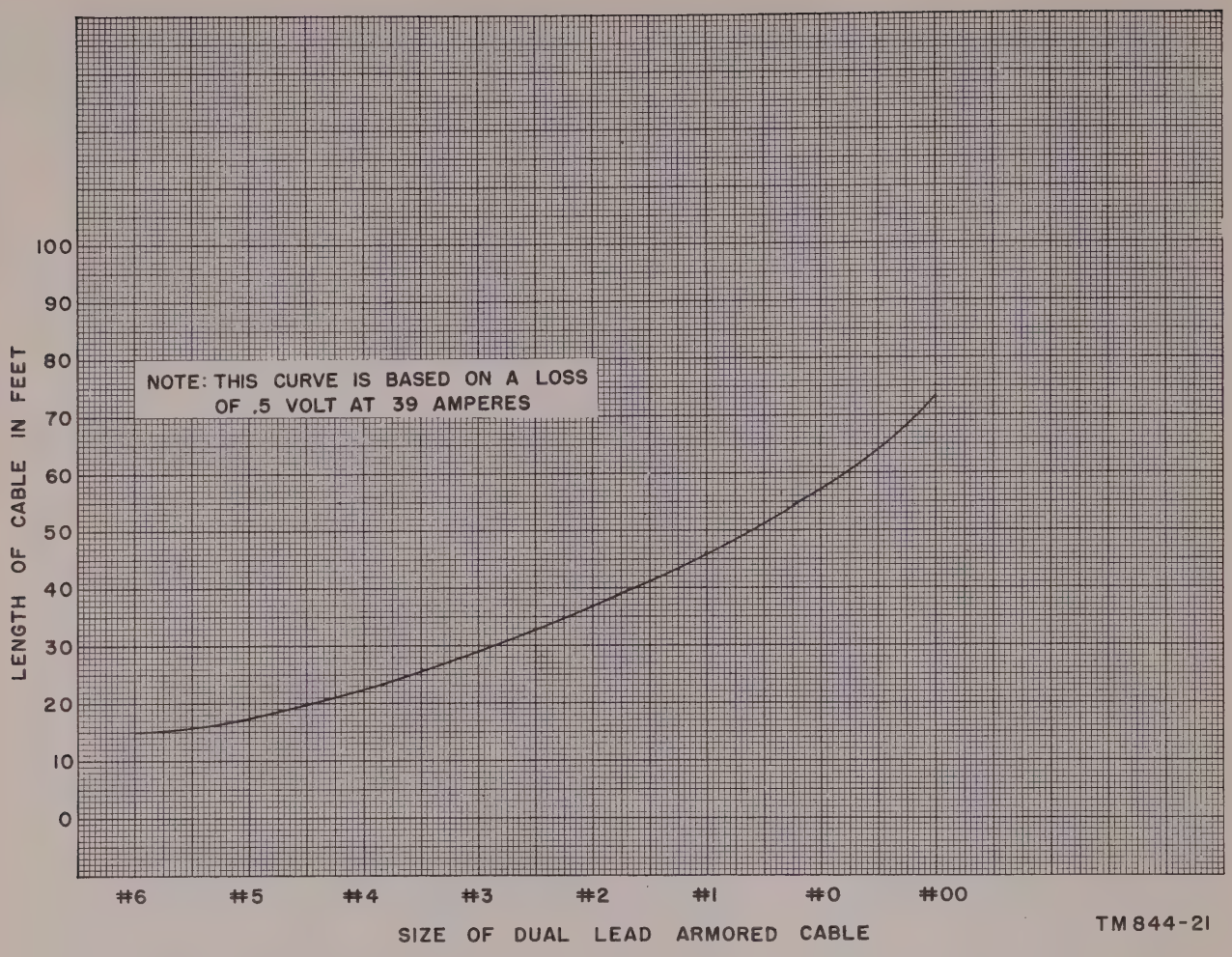


Figure 21. Wire size versus length chart for dual lead armored cable.

30. Service upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 19 for uncrating, unpacking, and checking the equipment.

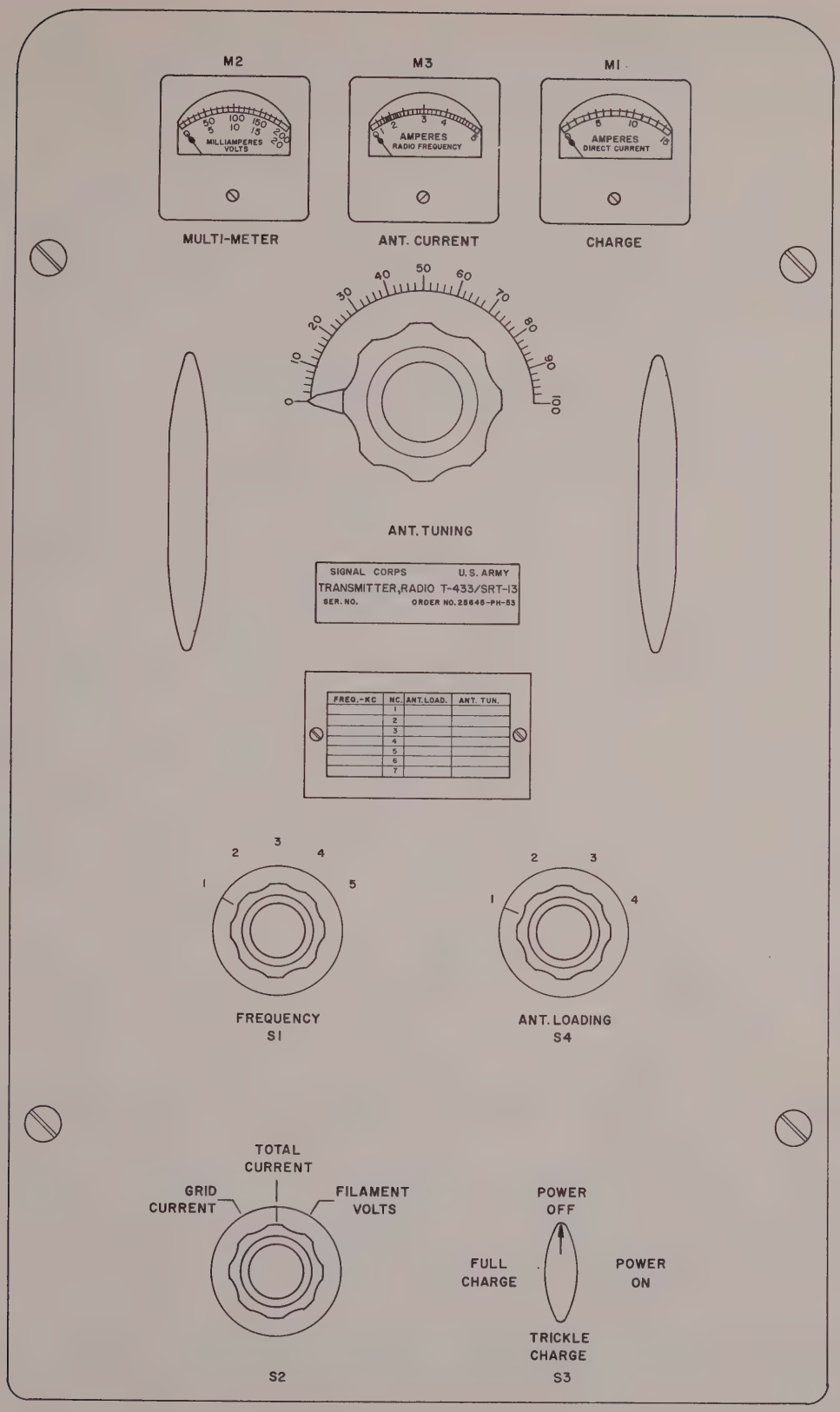
b. Check the reconditioned equipment for tags or other indications pertaining to changes in the wiring. Note any such changes in this instruction book on the schematic diagrams (figs. 44 and 45).

c. Perform the installation and connection procedure given in paragraphs 18 through 29.

Section II. CONTROLS AND INSTRUMENTS

31. General

Haphazard operation or improper setting of the controls can cause damage to the equipment. For this reason it is important to know the function of every control. The actual operation of the equipment is discussed in section IV, this chapter.



TM844-22

Figure 22. Transmitter front panel.

32. Transmitter Controls

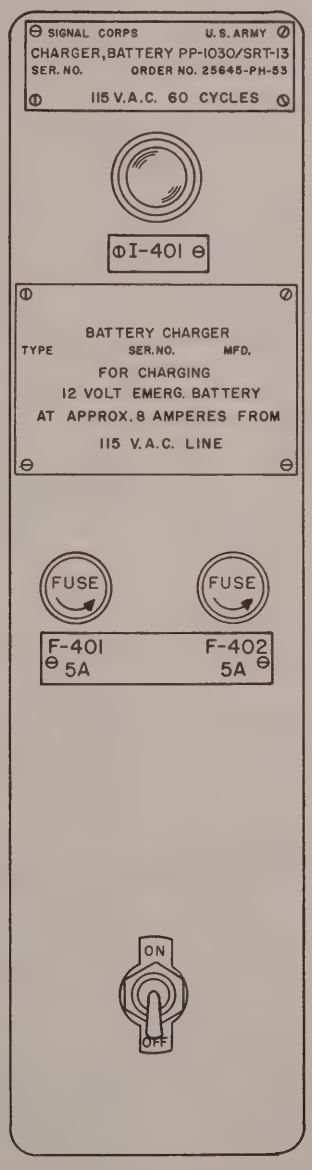
The following table lists the controls and instruments of the transmitters and their functions (fig. 22).

Control	Function
Main control switch S3	Four-position, five-section, rotary switch used to energize transmitter and control battery charger.
	Position — *Function*
	POWER OFF — Disconnects transmitter and motor generator from battery while maintaining battery connection to receiver.
	POWER ON — Connects motor generator to battery, energizes transmitter, while maintaining connection to receiver.
	FULL CHARGE — In Radio Transmitter T-434/SRT-13X this position connects battery to 115-volt dc power source through Battery Charger PP-1031/SRT-13X for charging at approximately 7 amperes and disconnects receiver.
	In Radio Transmitter T-433/SRT-13 this position energizes Battery Charger PP-1030/SRT-13 from 115-volt ac power source and connects output of Battery Charger PP-1030/SRT-13 to battery for charging at approximately 7 amperes and disconnects receiver.
	TRICKLE CHARGE — In Radio Transmitter T-434/SRT-13X this position connects battery to 115-volt dc power source through Battery Charger PP-1031/SRT-13X and additional resistance (R8, 250 ohms) for charging at approximately .4 ampere. Receiver is disconnected in this position.
	In Radio Transmitter T-433/SRT-13 this position energizes Battery Charger PP-1030/SRT-13 from 115-volt ac power source and connects output of Battery Charger PP-1030/SRT-13 to battery through an additional resistance (R8, 7.5 ohms, wire wound adjustable) for charging at approximately .4 ampere. Receiver is disconnected in this position.
Multimeter control switch S2	Three-position, three-section rotary switch used in conjunction with MULTI-METER M2.
	Position — *Function*
	GRID CURRENT — Connects MULTI-METER M2 to read V3 and V4 grid current which indicates excitation of pa.
	TOTAL CURRENT — Connects MULTI-METER M2 to read the combined plate and screen currents in pa to indicate loading.
	FILAMENT VOLTS — Connects MULTI-METER M2 to read battery voltage applied to filaments of V3 and V4 in series.
FREQUENCY switch S1	Five-position, two-section, rotary switch used to select one of five operating channels for transmission. Channels 1 through 5 correspond to frequencies indicated on calibration chart on front panel.
ANT. LOADING switch S4	Four-position, one-section, rotary switch used to adjust antenna approximately to operating frequency. One of four numbered positions is used as indicated on calibration chart.
ANT. TUNING control	Variable rf transformer used to tune antenna to actual operating frequency by setting for peak ANT. CURRENT as indicated on meter M3.
CHARGE meter M1	Indicates battery charging current.
MULTI-METER M2	Provides continuous reading of V3 and V4 GRID CURRENT, TOTAL CURRENT, or FILAMENT VOLTS as determined by setting of multimeter control switch S2.
ANT. CURRENT meter M3	Provides continuous reading of antenna current; indicates antenna resonance by peak reading.
Emergency light (I 101)	Illuminates operator's working area.

33. Battery Charger PP-1030/SRT-13, Controls

The following table lists the controls of Battery Charger PP-1030/SRT-13 and their function. (fig. 23):

Control	Function
ON-OFF switch S401	Turns battery charger ON or OFF.
Indicator light I-401	Indicates when battery charger is ON or OFF.



TM844-23

Figure 23. Battery Charger PP-1030/SRT-13, front panel.

Section III. OPERATION UNDER USUAL CONDITIONS

34. Preliminary Starting Procedure

After the transmitter has been adjusted and tuned as described in the instructions given in section V, it is ready for operation. Perform the preliminary starting procedure given below, before using the starting procedure given in paragraph 35.

Caution: High ac voltages present in this unit can inflict serious injuries, or death, while the high rf voltages developed by the transmitter can cause painful burns. In normal operation, the antenna and antenna lead-in carry the only *exposed* high voltage, while battery voltage is present at the telegraph key. *Do not touch the antenna or antenna connections while operating this transmitter. Do not leave metal objects near the key.*

a. Throw main control switch S3 to the POWER OFF position.

b. Check the transmitter front panel to see that it is securely in place.

c. Check to see that no metal objects are left near the telegraph key.

d. Check to see that the antenna is connected properly.

35. Starting Procedure

Note. If, during the starting procedure, an abnormal indication is obtained, refer to the equipment performance checklist (par. 57). Refer to paragraph 34 before using this starting procedure.

a. Set FREQUENCY switch S1 to the number of the channel selected.

b. Set ANT. LOADING switch S4 to the position specified by the calibration card for the channel selected.

c. Set the ANT. TUNING control to the position specified by the calibration card for the channel selected.

d. Energize the transmitter by moving main control switch S3 to POWER ON.

e. Close the telegraph key and adjust the ANT. TUNING control for peak reading on ANT. CURRENT meter M3.

f. The transmitter now is adjusted for normal keying.

Caution: Open the telegraph key before resetting FREQUENCY switch S1 or ANT. LOADING switch S4.

36. Stopping Procedure

To stop the transmitter, turn main control switch S3 to the POWER OFF position.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

37. General

When not used on shipboard, the operation of these radio sets may be difficult in regions where extreme cold, heat, humidity and moisture, and sand conditions prevail. In the following paragraphs, instructions are given on procedures for minimizing the effect of these unusual operating conditions.

38. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow:

a. Handle the equipment carefully.

b. Keep the equipment warm and dry. If the the set is not in a heated inclosure, construct an insulated box for the set.

c. Locate the equipment inside a heated inclosure where there is no danger of a cold draft striking the glass tubes when a door is opened. A sudden draft of cold air is often sufficient to shatter the glass envelope of a heated tube. If the inclosure is so constructed that this precaution is impossible, place a blanket or some barrier between the source of the draft and the equipment.

d. When equipment that has been exposed to the cold is brought into a warm room, it will sweat and will continue to do so until it reaches the room temperature. When the equipment has reached room temperature, dry it thoroughly. This condition also arises when equipment warms up during the day after exposure during a cold night.

e. Use any improvised means to protect the storage batteries from freezing when not in use. When the storage batteries are used or when they are being charged sufficient heat is developed to prevent freezing. Place a lighted bulb in the battery compartment to prevent freezing. Remove the bulb when the batteries are in use or being charged.

39. Operation in Tropical Climates

When the equipment is operated in tropical climates extreme moisture and heat conditions are encountered. The relatively high humidity causes condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than the ambient air temperature. To minimize this condition, place lighted electric bulbs under or near the equipment.

40. Operation in Desert Climates

The main problem that arises with equipment operation in desert areas is the large amount of sand and dust or dirt which enters the moving parts of radio equipment, such as motors and power units. Be sure to keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (ch. 3). Pay Particular attention to the condition of the lubrication of the motor generator. Excessive amounts of dust, sand, or dirt that come in contact with oil and grease result in grit, which will damage the equipment.

Section V. INITIAL ADJUSTMENT OF EQUIPMENT

41. Adjustment of Oscillator Frequency

After the equipment has been installed and connected (pars. 18 through 29), the transmitters must be adjusted to the operating frequencies desired. Then the transmitters may be operated in accordance with the instructions given in chapter 2, section III.

a. Each oscillator coil L1, L2, L3, L4, L5 is the frequency determining component for the associated transmitting channel. A portable heterodyne meter, such as Frequency Meter Set SCR-211 or equivalent, is required for an accurate check of the output frequencies.

b. To adjust the oscillator coils, loosen the four knurled screws on the front panel and pull the front panel out of the cabinet and swing it to one side. The adjusting screws are shown in figure 36.

c. The five oscillator coils are identical and each can be pretuned to any frequency within the 350- to 505-kc range by adjusting its associated slug. Normally the transmitting channels are set up for the frequencies indicated below.

Channel No.	Frequency (kc)	Wavelength (meters)
1	375	800
2	400	750
3	425	706
4	468	640
5	500	600

d. Adjustments in frequency are made by using the bakelite wrench provided for this purpose to turn the adjusting screw of the proper slug. These adjusting screws are held tight by friction within split bushings. The screws are at ground potential and may be adjusted safely with the panel open and the transmitter on.

e. Connect the antenna by a jumper from the stud on the variometer to the clip within the transmitter cabinet.

Caution: When adjusting oscillator slugs, do not touch the exposed terminals at the antenna variometer.

f. In tuning the oscillator coils, turn the adjusting screw clockwise to decrease frequency or counterclockwise to increase frequency. When adjusting each oscillator coil use Frequency Meter Set SCR-211 to check frequency and refer to TM 11-300 for operation of the frequency meter.

42. Adjustment of Antenna Coupling

The adjustment in pa loading depends on the constants of the particular antenna used and is required with each installation. The pa feeds the antenna through the plate coupling transformer that consists of L6 and L7 (fig. 36) and whose secondary L7 is in series with the antenna. The primary impedance of this transformer determines the loading of the pa. This primary is broadly resonated by the tube and distributed capacity to the midfrequency of the 350- to 550-kc range and thereby presents a high impedance to pa plates V3 and V4. Thus the no-load pa plate current is low. The degree of coupling to the antenna and the loading of the pa is adjusted by changing the connections to the secondary L7 of the coupling transformer. Nine taps are provided for adjustment in coupling. For optimum operation of the transmitter adjust the antenna coupling between 105 and 115 milliamperes (ma) as indicated on MULTIMETER M2 with multimeter controls switch S2 in the TOTAL CURRENT position. To determine the need for adjustment in antenna coupling and the adjustment procedure, proceed as follows:

Caution: Damage to plate supply transformer T1 can result from operation of this transmitter with TOTAL CURRENT in excess of 115 ma.

a. Set FREQUENCY selector switch S1 on channel 5, and ANT. LOADING switch S4 on position 1.

b. Energize the transmitter by setting main control switch S3 to POWER ON.

c. Set multimeter control switch S2 to TOTAL CURRENT, and close the telegraph key.

d. Adjust the ANT. TUNING control for a peak reading on ANT. CURRENT meter M3. If no well-defined peak is observed, open the telegraph key and reset ANT. LOADING switch S4 to position 2. Then close the telegraph key and adjust the ANT. TUNING control for a peak reading on ANT. CURRENT meter M3. This operation resonates the antenna.

e. After the antenna is resonated, note the reading on the MULTIMETER M2. If the meter reads less than 110 ma or greater than 115 ma the lead that connects the antenna transfer contacts on antenna switching relay K1 to one of the taps on secondary L7 (fig. 34) of the plate coupling transformer must be changed to another tap.

f. Open the telegraph key and set main control switch S3 to the POWER OFF position.

g. To increase loading (when total current is below 110 ma) move the antenna connection to the tap next in line away from the center of the coil.

h. To decrease loading (when total current is greater than 155 ma) move the antenna connection to the tap next in line toward the center of the coil. The taps are arranged to provide two steps of 10 turns each, 2 of 3 turns each, and four steps of 2 turns each.

i. Energize the transmitter by setting main control switch S3 to POWER ON.

j. Resonate the antenna as outlined in subparagraph *d* above.

k. If the total current still is less than 110 ma or greater than 115 ma, adjust the coupling as indicated in subparagraphs f, g, and h above, and then recheck the total current.

43. Calibration of Transmitters

a. Resonate the antenna to each of the five operating frequencies, in sequence, proceeding from channel 5 to channel 1 in accordance with instructions given in subparagraph 42*d* above.

b. Determine for each channel the settings of ANT. LOADING switch S4 and the ANT. TUNING control at which a well-defined peak reading on ANT. CURRENT meter M3 is observed.

c. Check to see that on each channel the total current is between 105 and 115 ma.

d. Record the settings of ANT. LOADING switch S4 and the ANT. TUNING control in the appropriate spaces of a blank calibration card and insert the card into its holder on the front panel.

Note. With some antennas, the antenna may resonate with different settings of the ANT. TUNING control for two adjacent positions of the ANT. LOADING switch S4. This is caused by an overlap between the inductance range of the variometer rotor and the inductance increment between adjacent stator taps. In such cases, record the settings for which ANT. LOADING switch S4 is at the lower position. This reduces the power dissipated in the variometer thereby increasing radiated power.

e. A typical set of calibration data is shown below. Do not use this calibration data, since it is only an example.

Frequency (kc)	Channel No.	ANT. LOADING	ANT. TUNING
375	1	3	52
400	2	2	86
425	3	2	72
468	4	2	53
500	5	1	79

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. ORGANIZATIONAL TOOLS AND EQUIPMENT

44. Tools and Materials Used with Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X

Tools and materials used but not supplied with Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X are listed in subparagraphs *a* and *b* below. The tools and materials contained in Tool Equipment TE-41 are listed in Department of the Army Catalog SIG 6 TE-41.

a. Tools.

1 Tool Kit TK-61/SR or Tool Equipment TE-41.

b. Materials.

Orangestick
Cheesecloth, bleached, lint-free[1]
Carbon tetrachloride[1]
Paper, sand, flint #000[1]
Solvent, (SD)

c. Test Equipment.

Multimeter TS-297/U or equal

45. Special Tools Supplied with Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X

A bakelite tuning wrench is the only special tool supplied with Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X. This tool is located inside the transmitter and is held in place by two clips mounted on the support for coil L8 (fig. 36). It is used to turn the adjusting screw of the proper slug for coil L1, L2, L3, L4 or L5 when adjustments in frequency are required. Refer to paragraph 41 for adjustments of oscillator frequency.

Section II. PREVENTIVE MAINTENANCE SERVICES

46. Definition of Preventive Maintenance

Preventive maintenance is a systematic series of operations performed periodically (usually when the equipment is not in use) to keep breakdowns and needless interruptions in service to a minimum. Preventive maintenance differs from trouble shooting and repair. Its object is to *prevent* certain troubles from occurring. See AR 750-5.

47. General Preventive Maintenance Techniques

a. Use #000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth or a dry brush for cleaning.

(1) If necessary, except for electrical contacts, moisten the cloth or brush with solvent (SD); then wipe the parts with a dry cloth.

[1] Part of Tool Equipment TE-41.

(2) Clean electrical contacts with a cloth moistened with carbon tetrachloride; then immediately wipe them dry with a dry cloth.

Caution: Repeated contact of carbon tetrachloride with the skin or prolonged breathing of the fumes is dangerous. Make sure adequate ventilation is provided.

c. If available, dry compressed air may be used at a line pressure not exceeding 60 pounds per square inch (psi) to remove dust from inaccessible places; be careful, however, or mechanical damage to fragile components may result from the air blast.

d. For further information on preventive maintenance techniques, refer to TB SIG 178.

48. Use of Preventive Maintenance Forms (figs. 24 and 25)

a. The decision as to which items on DA Forms 11-238 and 11-239 are applicable to this equipment is a tactical decision to be made in the case of first echelon maintenance by the communications officer/chief or his designated representative, and in the case of second or third echelon maintenance, by the individual making the inspection. Instructions for the use of each form appear on the reverse side of the form.

b. Circled items in figures 24 and 25 are partially or totally applicable to the equipment. References in the ITEM block refer to paragraphs in text which contain additional maintenance information.

49. Performing Exterior Preventive Maintenance

Caution: Tighten screws and nuts carefully. Fittings tightened beyond the pressure for which they are designed may become damaged or broken.

a. Check for completeness and satisfactory condition of the equipment.

b. Check suitability of location and installation for normal operation.

c. Remove dirt and moisture from the equipment.

d. Inspect panel controls for binding, scraping, excessive looseness, and positive action.

e. Check for normal operation.

Caution: Remove all power before performing the following operations. When the operations are completed, reconnect the power and check for satisfactory operation.

f. Clean and tighten the panel mountings on the transmitter.

g. Inspect the exposed metal surfaces for rust, corrosion, and moisture.

h. Inspect the cables for cuts, breaks, fraying, deterioration, and strain.

i. Inspect the instruction books for general condition.

j. Inspect the switches and knobs for looseness.

k. Clean the nameplates, meters and jewel assembly.

l. Inspect the meters for damaged glass and case.

m. If deficiencies noted are not corrected during inspection, indicate action taken to correct them.

n. Check antenna connections for corrosion and looseness.

o. Inspect batteries BT201 and BT202 for dirt, loose terminals, electrolyte level and specific gravity, and damaged cases.

50. Performing Interior Preventive Maintenance

Caution: Disconnect all power before performing the following operations. When the

OPERATOR FIRST ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT

RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE RADIO TRANSMITTING SET AN/SRT-13 OR AN/SRT-13X | EQUIPMENT SERIAL NO.

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; Ⓧ Defect corrected.

NOTE: Strike out items not applicable.

DAILY

NO.	ITEM	CONDITION S	M	T	W	T	F	S
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT *(receiver, transmitter, carrying cases, wire and cable, microphones, tubes, spare parts, technical manuals and accessories).* PAR. 49a							
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 49b							
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, CHESTSETS, KEYS, JACKS, PLUGS, TELEPHONES, CARRYING BAGS, COMPONENT PANELS. PAR. 49c							
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, CRYSTALS, FUSES, CONNECTORS, VIBRATORS, PLUG-IN COILS AND RESISTORS. PAR. 50b							
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR. 49d							
6	CHECK FOR NORMAL OPERATION. PAR. 49e							

WEEKLY

NO.	ITEM	CONDITION	NO.	ITEM	CONDITION
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, RACK MOUNTS, SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, WAVE GUIDES, AND CABLE CONNECTIONS. PAR. 49f		13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES. PAR. 49o	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR. 49g		14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES. PAR. 49k	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR. 49h		15	INSPECT METERS FOR DAMAGED GLASS AND CASES. PAR. 49l	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS. PAR. 49n		16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING.	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING. PAR. 49i		17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION.	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWERSTATS, RELAYS, SELSYNS, MOTORS, BLOWERS, CAPACITORS, GENERATORS, AND PILOT LIGHT ASSEMBLIES. PAR. 49j		18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE.	

19 IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 49m

DA FORM 1 MAY 51 11-238 REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

TM 844-24

Figure 24. DA AGO Form 11-238.

SECOND AND THIRD ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT

RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE: RADIO TRANSMITTING SET AN/SRT-13 OR AN/SRT-13X

EQUIPMENT SERIAL NO.

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; (X) Defect corrected.
NOTE: Strike out items not applicable.

NO.	ITEM	CONDITION
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT *(receiver, transmitter, carrying cases, wire and cable, microphones, tubes, spare parts, technical manuals and accessories).* PAR. 49a	
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 49b	
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, CHESTSETS, KEYS, JACKS, PLUGS, TELEPHONES, CARRYING BAGS, COMPONENT PANELS. PAR. 49c	
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, CRYSTALS, FUSES, CONNECTORS, VIBRATORS, PLUG-IN COILS AND RESISTORS. PAR. 50b	
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR. 49d	
6	CHECK FOR NORMAL OPERATION. PAR. 49e	
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, RACK MOUNTS, SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, WAVE GUIDES, AND CABLE CONNECTIONS. PAR. 49f	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR. 49g	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR. 49h	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS. PAR. 49n	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING. PAR. 49i	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWERSTATS, RELAYS, SELSYNS, MOTORS, BLOWERS, CAPACITORS, GENERATORS, AND PILOT LIGHT ASSEMBLIES. PAR. 49j	
13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES. PAR. 49o	
14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES.	
15	INSPECT METERS FOR DAMAGED GLASS AND CASES.	
16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING.	
17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION.	
18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE.	
19	ELECTRON TUBES - INSPECT FOR LOOSE ENVELOPES, CAP CONNECTORS, CRACKED SOCKETS; INSUFFICIENT SOCKET SPRING TENSION; CLEAN DUST AND DIRT CAREFULLY; CHECK EMISSION OF RECEIVER TYPE TUBES. PAR. 50a	
20	INSPECT FILM CUT-OUTS FOR LOOSE PARTS, DIRT, MISALIGNMENT AND CORROSION.	
21	INSPECT FIXED CAPACITORS FOR LEAKS, BULGES, AND DISCOLORATION. PAR. 50c	
22	INSPECT RELAY AND CIRCUIT BREAKER ASSEMBLIES FOR LOOSE MOUNTINGS; BURNED, PITTED, CORRODED CONTACTS; MISALIGNMENT OF CONTACTS AND SPRINGS; INSUFFICIENT SPRING TENSION; BINDING OF PLUNGERS AND HINGE PARTS.	
23	INSPECT VARIABLE CAPACITORS FOR DIRT, MOISTURE, MISALIGNMENT OF PLATES, AND LOOSE MOUNTINGS.	
24	INSPECT RESISTORS, BUSHINGS, AND INSULATORS, FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE. PAR. 50d	
25	INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR CORROSION, DIRT AND LOOSE CONTACTS. PAR. 50e	
26	CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES, AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE. PAR. 50f	
27	INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS. PAR. 50g	
28	CHECK SETTINGS OF ADJUSTABLE RELAYS.	
29	LUBRICATE EQUIPMENT IN ACCORDANCE WITH APPLICABLE DEPARTMENT OF THE ARMY LUBRICATION ORDER.	
30	INSPECT GENERATORS, AMPLIDYNES, DYNAMOTORS, FOR BRUSH WEAR, SPRING TENSION, ARCING, AND FITTING OF COMMUTATOR. PAR. 50k	
31	CLEAN AND TIGHTEN CONNECTIONS AND MOUNTINGS FOR TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS. PAR. 50h	
32	INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS FOR OVERHEATING AND OIL-LEAKAGE. PAR. 50i	
33	BEFORE SHIPPING OR STORING - REMOVE BATTERIES.	
34	INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS.	
35	INSPECT BATTERIES FOR SHORTS AND DEAD CELLS. PAR. 50l	
36	INSPECT FOR LEAKING WATERPROOF GASKETS, WORN OR LOOSE PARTS.	
37	MOISTURE AND FUNGIPROOF. PAR. 50j	
38	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 50m	

DA FORM 1 MAY 51 11-239 REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE. e6—16—64382-1

TM 844-25

Figure 25. DA AGO Form 11-239.

operations are completed, reconnect power and check for satisfactory operation.

a. Inspect the electron tubes for loose envelopes, cracked sockets, and insufficient socket spring tension. Carefully remove dust and dirt from tubes; check tubes.

b. Inspect the seating of fuses, pilot light, tubes, and cable connections.

c. Inspect the fixed capacitors for leaks, bulges, and discoloration.

d. Inspect the resistors for cracks, blistering, and discoloration.

e. Inspect the terminals of the fixed capacitors and resistors for corrosion, dirt, and loose contacts.

f. Clean and tighten the switches, terminal boards, interior of chassis, and the cabinet.

g. Inspect the terminal boards for loose connections, cracks and breaks.

h. Clean and tighten the transformers and chokes.

i. Inspect the transformers and chokes for overheating and leakage.

j. Check adequacy of moistureproofing and fungiproofing.

k. Inspect Motor-Generator PU-277/SRT for brush wear.

l. Inspect batteries BT201 and BT202 for shorts and dead cells.

m. If the deficiencies noted are not corrected during inspection, indicate action taken to correct them.

51. Motor Generator Maintenance

The following information is used to perform maintenance on Motor-Generator PU-277/SRT.

a. Inspection. Inspect brushes and commutator every 6 months. To gain access to the brushes and commutator of the motor generator, remove the eight screws that fasten the two covers, lift the covers and see that the brushes move freely in their holders. Remove any accumulation of dirt with a cloth dampened in carbon tetrachloride. The sealed bearings require no lubrication.

b. Commutator Sanding. If, after long service, the commutator becomes rough, sand it lightly with #00, or finer, sandpaper while the motor generator is running. After sanding, clean the commutator and brushes.

c. Replacing Brushes. When the brushes have become worn to the extent that the pressure arm is within 1/32 inch of the brush holder, replace the brushes. Fit the new brushes to the curvature of the commutator by drawing a strip of coarse sandpaper, then a strip of fine sandpaper, between the commutator surface and each brush.

52. Battery Maintenance

a. General. The utility of a shipboard emergency radio installation depends primarily on the condition of the emergency batteries. Battery maintenance, therefore, is of paramount importance. The basic care of batteries on shipboard requires maintaining the electrolyte at the proper level and maintaining normal charge.

b. Maintaining Level of Electrolyte. Keep the electrolyte ¼ inch to ½ inch above the separators at all times. A level of electrolyte below the top of the plates indicates that the concentration of battery acid is high enough to char and destroy the wooden separators and impair the cell by sulfation, drying, and warping. Maintain the level of the electrolyte by adding only distilled water. The presence of impurities in the water will reduce the battery charge and shorten the life of the battery. However, even slightly impure water is preferable to no water at all.

c. Maintenance of Charge.

(1) The state of charge of each cell in each battery should be measured daily. The hydrometer supplied is graduated to read specific gravities from 1.100 to 1.325 (1,100 to 1,325 points) with division to indicate differences of ten

points in specific gravity. The table below gives an interpretation of hydrometer readings.

Hydrometer reading (points)	Condition of battery
Above 1,300.	Specific gravity too high. Level of the electrolyte is probably too low. Water should be added.
Between 1,250 and 1,295 with less than 10 points difference between cells.	Battery is probably fully charged and in good condition.
Between 1,225 and 1,250 with less than 10 points difference between cells.	Battery is about 75% charged. Recharge, if practical, particularly in cold weather.
Less than 1,225.	Probably less than 50% charged. Recharge before using.
Cells show more than 20 points variation in gravity.	Short circuit in low specific gravity cell or slow leak in sealing compounds probable.

(2) To prepare the battery for charging, wash all accumulated dirt from the battery and clean the terminals before placing it on charge. Do not allow dirt to get into the cells. Bring the liquid in the cells to the correct level as directed in subparagraph b above. If the battery is extremely cold, the electrolyte level will rise as the battery warms up during charging.

(3) The table below indicates the operation of controls in both transmitting sets for full charging and trickle charging the batteries. It also lists the charging rates as indicated by CHARGE meter M1. During full or trickle charging, as the batteries begin to gas freely, record the hydrometer readings for each cell of each battery every hour. When these readings level off and do not rise for three successive hourly readings, while the battery is gassing freely, stop charging. (Return switch S3 to POWER OFF position.)

Caution: Hydrogen released during charging is highly explosive. The battery compartment must be well ventilated and removed from open flames or sparks (such as result in making and breaking electrical contacts).

Caution: If, when using Radio Transmitting Set AN/SRT-13X, the ship's dc power source fails during charging, set the main control switch S3 on the front panel of Radio Transmitter T-434/SRT-13X to the POWER OFF position to prevent discharging the batteries.

Operation	Radio Transmitting Set AN/SRT-13	Radio Transmitting Set AN/SRT-13X	Charge meter M1 indications
Full charge	Radio Transmitter T-433/SRT-13 main control switch S3 set to FULL CHARGE position. Battery Charger PP-1030/SRT-13 switch S401 set to ON.	Radio Transmitter T-434/SRT-13X main control switch S3 set to FULL CHARGE position.	7 amperes
Trickle charge	Radio Transmitter T-433/SRT-13 main control switch S3 set to TRICKLE CHARGE position. Battery Charger PP-1030/SRT-13 switch S401 set to ON.	Radio Transmitter T-434/SRT-13X main control switch S3 set to TRICKLE CHARGE position.	.4 ampere
Stop charging	Radio Transmitter T-433/SRT-13 main control switch S3 set to POWER OFF. Battery Charger PP-1030/SRT-13 switch S401 set to OFF.	Radio Transmitter T-434/SRT-13X main control switch S3 set to POWER OFF.	0 ampere

Section III. WEATHERPROOFING AND LUBRICATION

53. Weatherproofing and Lubrication

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. Further instructions for operation at low temperatures are contained in TB SIG 219.

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. Lubrication of this equipment is not required.

54. Rustproofing and Painting

a. When the finish on the panels has been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces. Use #00 or #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. 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 to use sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations.

Section IV. TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

55. General

a. The trouble shooting and repair work that can be performed at the organizational maintenance level (operators and repairmen) is limited necessarily in scope by the tools, test equipment, and replaceable parts issued, and by the existing tactical situation. Accordingly, trouble shooting is based on the performance of the equipment and the use of the senses in determining such troubles as a burned out tube or cracked insulators.

b. The paragraphs which follow in this section will help in determining which stage is at fault and which component in that stage is defective.

56. Visual Inspection

a. Failure of the equipment to operate properly usually will be caused by one or more of the following faults:

(1) Improperly connected battery cable.

(2) Worn, broken, or disconnected cables.

(3) Burned-out fuses.

(4) Relay contacts burned because of overloads.

(5) Wires broken because of excessive vibration.

(6) Poorly soldered joints.

(7) Defective resistors or capacitors.

(8) Defective tubes.

b. When failure is encountered and the cause is not immediately apparent, check as many of the above items as is practicable before starting a detailed examination of the component parts of the system. If possible, obtain information from the operator of the equipment regarding performance at the time the trouble occurred.

c. Visually inspect the antenna system for obvious abnormalities.

57. System Sectionalization of Trouble to Component

System sectionalization consists of determining whether the trouble is in the transmitter, terminal box, motor generator, battery, or battery charger.

a. Operate the radio transmitter set and observe its performance. Refer to the equipment performance checklist (par. 59) for normal operating indications.

b. The over-all operation of the transmitter can be checked by the ANT. CURRENT meter M3 and the various MULTI-METER meter M2 readings.

c. The operation of the battery charger can be checked by the CHARGE meter M1 readings.

d. If the entire radio transmitting set is dead, the trouble undoubtedly is in the battery.

e. If the motor generator does not operate, trouble may be due to an overload which would cause the circuit breakers to cut out. Do not continue resetting the circuit breakers before looking elsewhere to determine the basic source of trouble.

f. If only one component is dead, the trouble is in that component and it is probably a fuse. Check fuses during the early stages of trouble shooting. Do not continue to burn out fuses before looking elsewhere to determine the basic source of the trouble.

g. By use of the procedures similar to the simple checks given above, the trouble can be isolated to a particular unit.

58. Trouble Shooting by Using Equipment Performance Checklist

a. General. The equipment performance checklist (par. 59) will help the operator to locate trouble in the equipment. The list gives the items to be checked, the conditions under which the item is checked, the normal indications and tolerances of correct operation, and the corrective measures the operator can take. *To use this list, follow the items in numerical sequence.*

b. Action or Condition. For some items, the information given in the *Action or condition* column consists of various switch control settings 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 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 that the operator can make without turning in the equipment for repairs. A reference in the table to chapter 5 indicates that the trouble cannot be corrected during operation and that trouble shooting by an experienced repairman is necessary. If the set is completely inoperative, or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

59. Equipment Performance Checklist

a. Operation of Radio Transmitters T-434/SRT-13X and T-433/SRT-13.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Antenna.	Lead-in tubing connected.		
	2	Main control switch S3.	Set at POWER OFF.		
	3	FREQUENCY switch S1.	Set to number of the channel selected.		
	4	ANT. LOADING switch S4.	Set to the position specified by the calibration card for the channel selected.		
	5	ANT. TUNING control.	Set to the position specified by the calibration card for the channel selected.		
START	6	Multimeter control switch S2.	Place in the FILAMENT VOLTS position.		
	7	Telegraph key.	Open.		
	8	Main control switch S3.	Set to POWER ON position.	MULTIMETER M2 indicates 12 volts.	Check connections at the battery, motor generator terminal board TB201, terminal box terminal board TB102, and the terminal board TB1 on the transmitter.
					Check main control switch S3.
				Motor generator starts.	Reset circuit breakers on motor generator. If circuit breakers continue to cut out, trouble shooting is necessary. Refer to chapter 5.
					Check connections on motor generator terminal board TB201 terminals 2, 3, and 4.
					Check connections on terminal box terminal board TB101 terminals 7 and 8.
					Check connections on transmitter terminal board TB1 terminals 3 and 4.
					Check relay K201 in motor generator.
	9	Telegraph key.	Closed.		
	10	ANT. TUNING control.	Adjust the control for peak reading on ANT. CURRENT meter M3.	ANT. CURRENT meter M3 indicates approximately 3.16 amperes with 4 ohm impedance antenna.	Check to see that the antenna lead-in and ground are connected. Place multimeter control switch S2 in the GRID CURRENT position to check excitation of pa. If there is a very low or zero indication in

a. Operation of Radio Transmitters T-434/SRT-13X and T433/SRT-13 (contd).

	Item No.	Item	Action or condition	Normal indications	Corrective measures
					MULTI-METER M2 replace either V1 or V2. Meter should indicate 10 ma. Check the connection at terminal 6 on terminal TB1 on the transmitter, check the connection at terminal 9 on terminal board TB101 on the terminal box, and terminal 1 on terminal board TB201 on the motor generator.
EQUIPMENT PERFORMANCE	11	Multimeter control switch S2.	Place in TOTAL CURRENT position.	MULTI-METER M2 should read between 105 and 115 ma.	Make corrective measures as indicated in item 10 above.
	12	FREQUENCY switch S1; ANT. LOADING switch S4; ANT. TUNING control.	Operate controls as directed in item numbers 3, 4, and 5 above for each of the channels (1 through 5) and note the total current as indicated on MULTI-METER M2 for each channel. *Note.* When changing channels place the main control switch S3 in the POWER OFF position.	MULTI-METER M2 should read between 105 and 115 ma. on each channel.	Refer to paragraphs 42 and 43.
STOP		Main control switch S3.	Place in POWER OFF position.	Motor generator stops, ANT. CURRENT meter M3 indicates 0, and MULTI - METER M2 indicates 0.	Check main control switch S3. Check relay K201.

b. Battery Charging with Radio Transmitting Set AN/SRT-13X.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Main control switch S3.	Place in POWER OFF position.		
	2	Batteries BT201 and BT202.	Prepare for charge as indicated in paragraph 52.		
	3	115 v dc power source.	Check to see that power source is connected to fuses F101 and F102 on Terminal Box J-581/SRT.		
START	4	Main control switch S3.	Set on FULL CHARGE.	CHARGE meter indicates 7 amperes.	Check fuses F101 and F102 in terminal box. Do not continue to replace fuses when further trouble shooting is necessary. Check connections at Battery Charger PP-1031/SRT-13X, terminals 5 and 6 on terminal board TB101, and check connections at terminals 11 and 12 on terminal board TB1 on the transmitter. Check battery connections and connections 5 and 6 on terminal board TB201 on the motor generator. Check main control switch S3. Check Battery Charger PP-1030/SRT-13X; refer to chapter 5.
EQUIPMENT PERFORMANCE	5	Main control switch S3.	Set to TRICKLE CHARGE.	Charge meter M1 indicates .4 ampere.	Refer to the corrective measures given in item 4 above. Refer to chapter 5.
STOP	6	Main control switch S3.	Place in POWER OFF position.	CHARGE meter M1 indicates zero.	Check main control switch S3.

c. Battery Charging with Radio Transmitting Set AN/SRT-13.

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Main control switch S3.	Place in POWER OFF position.		
	2	Battery Charger ON-OFF switch S401.	Place in OFF position.		
	3	Batteries BT201, BT202.	Prepare for charge as directed in paragraph 52.		
	4	115-volt ac 60-cps power source.	Check to see that power source is connected to terminals 12 and 13 on terminal board TB102 on the Terminal Box J-581/SRT.		
START	5	Battery Charger PP-1030/SRT-13 ON-OFF switch S401.	Place in ON position.		
	6	Main control switch S3.	Place in FULL CHARGE position.	Indicator I401 glows, on Battery Charger PP-1030/SRT-13. CHARGE meter M1 indicates 7 amperes.	Check to see that 115 v 60 cps power source is connected to terminals 12 and 13 on terminal board TB102 on the terminal box. Check connections at the battery charger terminal board TB401 (terminals marked 115 v, 60 cps). Check fuses F401, F402. Check switch S401. Check the output connections (marked + 112 v and -12 v) on terminal board TB401. Check connections at fuses F101 and F102 and the fuses. Check battery charger, refer to Chapter 5.
PERF	7	Main control switch S3.	Place in TRICKLE CHARGE position.	CHARGE meter M1 indicates .4 ampere.	Refer to the corrective measures given in item 6 above. Refer to chapter 5.
STOP	8	Main control switch S3.	Place in POWER OFF position.	CHARGE meter M1 indicates zero, indicator I401 goes out.	Check main control switch S3.

CHAPTER 4

THEORY

60. Block Diagram (fig. 26)

Radio Transmitters T-433/SRT-13 and T-434/SRT-13X are radiotelegraph type transmitters which use a master oscillator power amplifier (mopa) type circuit. The transmitters are identical in external appearance and circuitry, with the exception of one resistor in each transmitter. This is discussed fully in paragraph 65, circuit differences. The transmitters generate 40 watts of rf carrier power at any one of the five preset frequencies within the range of 350 to 505 kilocycles. Plate and screen voltages for the master oscillator and power amplifier stages are derived directly from an ac power source. This is known as a self-rectifying circuit which results in a signal modulated 70 to 90 percent, at approximately 720 cps (A2 type emission). The signal and power supply paths are shown in figure 26. Complete schematic diagrams are shown in figures 44 and 45.

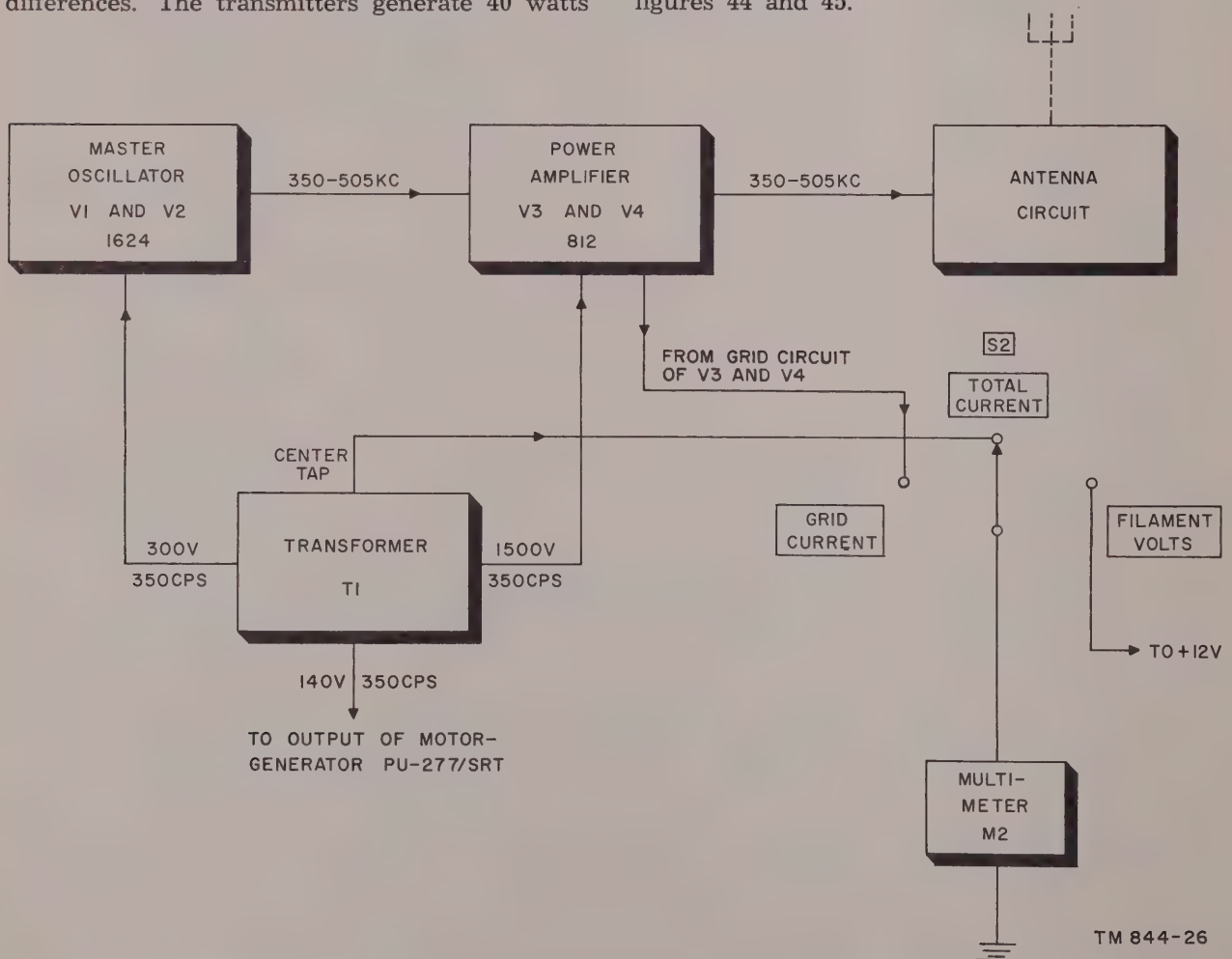


Figure 26. Radio Transmitter T-433/SRT-13 and T-434/SRT-13X, block diagram.

a. Master oscillator Stage V1 and V2. The master oscillator is a self-excited Colpitts type, which uses two tubes V1 and V2. The master oscillator generates an rf voltage at any one of the five preset frequencies within the range of 350 to 505 kilocycles, which is used to excite the power amplifier stage V3 and V4. By means of the FREQUENCY switch S1 and the associated circuitry in the master oscillator stage, the desired frequency may be selected.

b. Power Amplifier Stage V3 and V4. The pa amplifies the rf voltage generated by the master oscillator and feeds the antenna circuit through a well-balanced coupling network. The power amplifier is designed so that no tuning is required except for the adjustment of the coupling network.

c. Antenna Circuit. The antenna circuit is designed so that sufficient flexibility is provided to resonate antennas with equivalent resistance between 2 and 8 ohms and effective capacitance between 500 and 1,280 uuf. The constants of typical ship antennas generally lie within these limits.

d. Power Supply. A unique feature of these transmitters is the method of supplying power to the stages. Motor-Generator PU-277/SRT, operated from 12-volt batteries BT201 and BT202, generates 140 volts ac at 350 cycles per second. This is supplied through transformer T1 to the tube plates and screens. Therefore, the tubes operate with ac plate and screen grid voltages. The tubes then rectify this voltage themselves. The result is that the plate currents of the tubes are actually pulsating currents varying at twice the frequency of the ac source (at 700 cps). From this, the output of the transmitter is modulated directly with this frequency, making the output A2 type emission.

e. Metering Circuit. The multimeter control switch S2 is used to insert MULTI-METER M2 into either the ground return circuit for the center tap of transformer T1 to indicate the TOTAL CURRENT drawn by the two stages (master oscillator and power amplifier), or the grid return circuit of V3 and V4 power amplifier stage to indicate GRID CURRENT (power amplifier excitation), or to the 112-volt line to indicate FILAMENT VOLTS.

61. Master Oscillator Stage V1 and V2

a. The master oscillator stage V1 and V2 utilizes two beam power type 1624 tubes, connected as a Colpitts self-excited oscillator. For each operating channel, the frequency determining circuit consists of a coil and the capacity comprising the series capacitors, C1, C2, and C3. The five oscillator coils L1, L2, L3, L4, and L5, are identical but each is tuned to the output frequency of its channel by a variable powdered iron core. FREQUENCY switch S1 inserts the coil appropriate for each channel into the oscillator resonant circuit. Oscillator tank capacitors C1, C2, and C3 are common to operation on all five channels. These three capacitors form an rf voltage divider which provides adequate regenerative feedback for stable self-excited oscillations and drives the power amplifier grids (V3 and V4) with voltage developed across capacitor C2. Self-bias is developed by both tubes across the grid leak resistor R1 and the oscillator performance is stabilized by resistors R5 and R6 which serve as parasitic suppressors.

b. The oscillator plates are shunt fed from the 300-volt taps on the plate supply transformer T1. Blocking capacitors C4 and C5, in conjunction with the rf chokes L9 and L10, isolate the resonant circuit from the rectified plate currents. The screens are fed from the same taps on T1 through dropping resistors R2 and R3 which are bypassed to ground by C6 and C7. Plate and screen voltages for this stage are applied only when the plate supply transformer is energized by the telegraph key and the keying relay K1.

c. Both tubes of this stage have common rf input and output circuits and are connected as a full-wave rectifier with respect to the 300-volt 350 cycle per second anode supply voltage. Thus each tube conducts during alternate half-cycles of the plate ac, resulting in modulation of the signal at 700 cps.

d. The filaments of V1 and V2 require 2.5 volts each. The filaments are connected in series and an additional resistance R7, which is an adjustable resistor, is used to drop the battery voltage from 12 volts. Resistor R7 is adjusted at the factory and its setting should be changed only if the voltage at pin 1 of V2 to ground is not 5 volts. C13

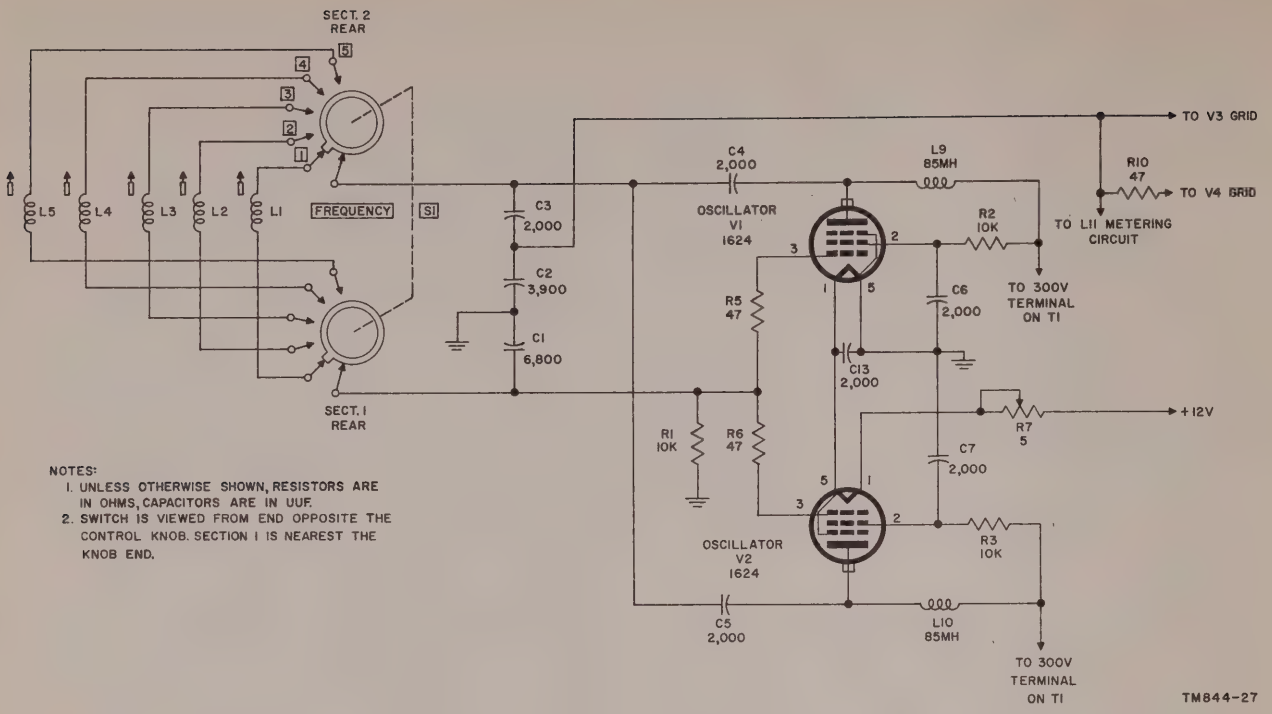


Figure 27. Master oscillator stage V1 and V2, schematic diagram.

serves to bypass any rf voltages which may be present in the filament circuit to ground.

62. Power Amplifier Stage V3 and V4 (fig. 28)

a. The power amplifier stage utilizes two triode type 812 tubes, which are connected in a periodic circuit that requires no tuning. The rf voltage developed across capacitor C2 in the master oscillator stage, drives the power amplifier grids of V3 and V4. The grids of V3 and V4 are connected together through R10 which serves as a parasitic suppressor to prevent self-oscillation of the power amplifier. The common grid return of V3 and V4 is completed to ground at either the multimeter control switch S2 or at the negative post of MULTI-METER M2 through L11 and the grid leak R4. Capacitor C12 provides a low impedance path to ground for rf, thereby bypassing R4 and the MULTI-METER M2.

b. The amplified rf output voltage from the plates of V3 and V4 is fed to the plate coupling transformer, which consists of L6 and L7, through the blocking capacitors C8 and C9. The primary L6 of the plate coupling transformer is resonated by tube and distributed capacity to approximately the midfrequency of the 350- to 505-kilocycle range and presents a high impedance to the plates of V3 and V4. Thus the plate current with the antenna not resonated or disconnected is low. The plate coupling transformer L6 and L7 minimizes radiation of harmonics and permits adjustment of the power amplifier loading by changing connections to the taps on the secondary L7. Refer to paragraph 42 for adjustment procedures of the power amplifier loading. The output of the plate coupling transformer is connected to the antenna transfer terminals on relay K1.

c. The power amplifier plates are shunt-fed from 1500-volt terminals on the plate supply transformer T1. Blocking capacitors C8 and C9, with chokes L12 and L13, isolate the rf resonant circuit from the plate supply. As in the master oscillator stage, both tubes of the power amplifier stage have common rf input and output circuits and are connected as a full-wave rectifier with respect to the 1,500-volt, 350 cps anode supply voltage. Thus each tube conducts during alternate half-cycles of the plate ac, resulting in modulation of the signal at 700 cps.

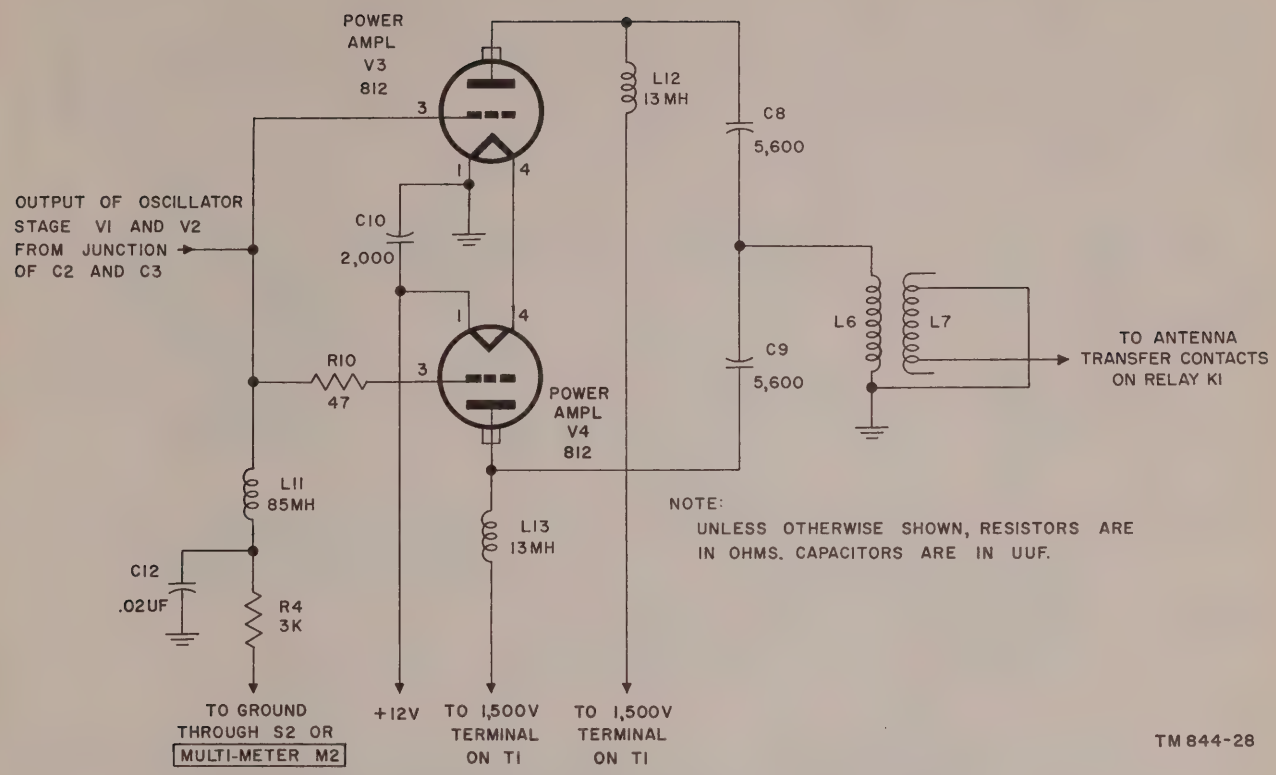


Figure 28. Power amplifier stage V3 and V4, schematic diagram.

d. The filaments of V3 and V4 are connected in series to provide the proper operating voltage for each filament (six volts) from the 12-volt power source. Capacitor C10 provides a low impedance path to ground for rf, thereby bypassing the filaments of V3 and V4.

63. Antenna Circuit (fig. 29)

a. The antenna circuit comprises the antenna transfer contacts of the keying relay K1, ANT. CURRENT meter M3, ANT. LOADING switch S4, and the antenna loading variometer L8.

b. When relay K1 is energized, the antenna transfer contacts on the relay connect the output rf voltage from the tap on the secondary L7 of the plate coupling transformer to ANT. CURRENT meter M3.

c. ANT. CURRENT meter M3 provides a continuous reading of the antenna current, thereby indicating antenna resonance by peak reading.

d. The variometer L8 adjusts the antenna to ¼ wavelength for each channel. Coarse adjustments in resonating the antenna are made by ANT. LOADING switch S4 which selects one of the four stator taps. Fine adjustment in resonating the antenna is provided by the variometer rotor which is actuated by the ANT. TUNING control. Refer to paragraph 42 for antenna adjustment.

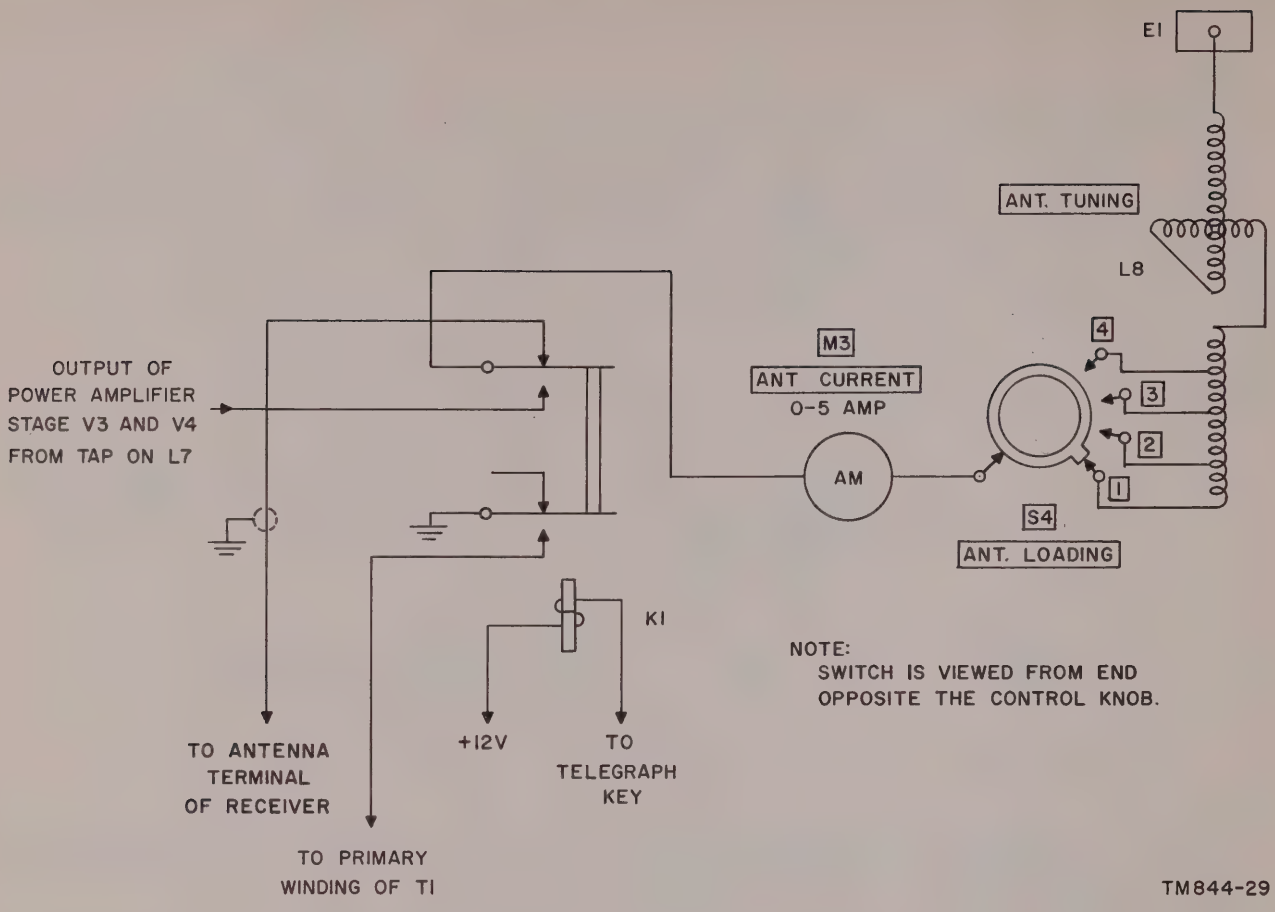


Figure 29. Antenna circuit, schematic diagram.

64. Metering Circuit (fig. 30)

a. The metering circuit comprises multimeter control switch S2 and MULTI-METER M2. The multimeter control switch is a three-position, three-section rotary switch. MULTI-METER M2 has two ranges: one is 0 to .2 ampere (or 200 ma) dc and the other is 0 to 20 volts dc.

b. Figure 30 shows multimeter control switch S2 in the TOTAL CURRENT position. In this position, the negative terminal of MULTI-METER M2 is connected to the center tap of plate supply transformer T1 through section 1 of switch S2. The positive .2-ampere (200 ma) terminal of the meter is connected to ground through section 2 (rear) and the positive 20-volt terminal on the meter is disconnected by section 2 (front). Section 3 removes the ground from the center tap of plate supply transformer T1; thus, the combined plate and screen currents flow through the meter to ground and permit the meter to indicate TOTAL CURRENT on the 0- to 200-ma scale. The switch must be in this position when adjusting the antenna loading.

c. When multimeter control switch S2 is in the GRID CURRENT position, section 1 connects the negative terminal of MULTI-METER M2 to R4, the grid return resistor for V3 and V4. Section 2 (front) disconnects the positive 20-volt terminal of the meter. Section 2 (rear) connects the positive .2-ampere (200 ma) terminal on the meter to ground. Section 3 removes the ground from R4 and maintains the ground to the center tap of plate supply transformer T1. Thus, grid V3 and V4 return circuit is made through resistor R4 and MULTI-METER M2 to ground. This permits the meter to indicate the pa grid current which indicates the excitation of the pa by the master oscillator stage (V1 and V2).

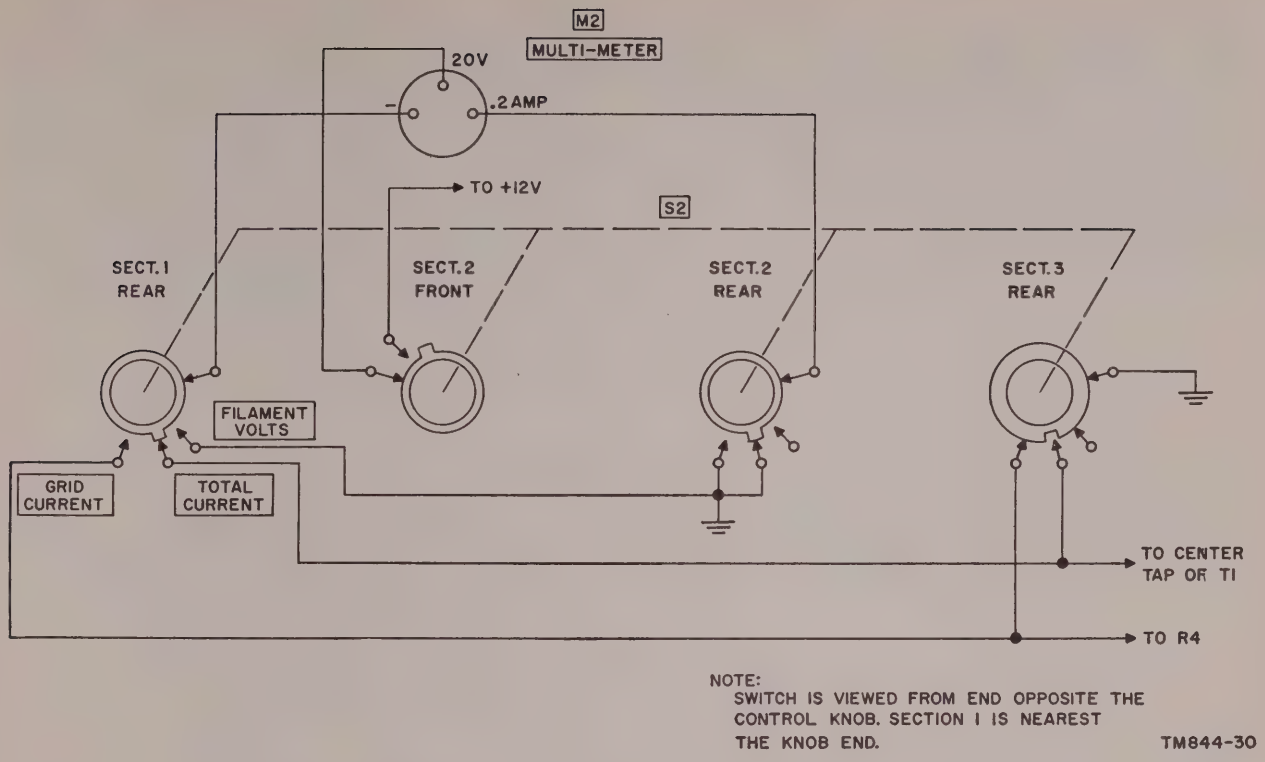


Figure 30. Metering circuit, schematic diagram.

d. When switch S2 is in the FILAMENT VOLTS position, the negative terminal of the meter is connected to ground through section 1. The positive 20-volt terminal is connected to the 12-volt power source by section 2 (front). At the same time, the positive .2-ampere (200 ma) terminal of the meter is disconnected by section 2 (rear), and section 3 maintains the ground connection from the center tap on plate supply transformer T1 and grid return resistor R4. The filament supply voltage may be read on the 0- to 20-volt scale on MULTI-METER M2.

65. Circuit Differences in Radio Transmitters T-433/SRT-13 and T-434/SRT-13X

In Radio Transmitter T-433/SRT-13, resistor R8 (fig. 31) is a 7.5-ohm wire-wound adjustable resistor. This resistor is used to adjust the output current from Battery Charger PP-1030/SRT-13 to .4 ampere when main control switch S3 is in the TRICKLE CHARGE position, as indicated on CHARGE ammeter M1. In Radio Transmitter T-434/SRT-13X, resistor R8 (fig. 32), is a 250-ohm nonadjustable wire-wound resistor, and is used to limit the output current from Battery Charger PP-1031/SRT-13X to .4 ampere when the main control switch S3 is in the TRICKLE CHARGE position.

66. Control Circuits of Radio Transmitting Set AN/SRT-13 (fig. 31)

a. Figure 31 is a simplified schematic of the control circuits in Radio Transmitting Set AN/SRT-13. When main control switch S3 is in the POWER ON position, section 3 of the switch energizes the filaments of V1, V2, V3, and V4 by connecting the positive terminal of battery BT201 to the junction of R7 and pin 1 of V4. The negative terminal of battery BT202 is connected to ground by section 4. At the same time, section 3 energizes motor generator starting relay K201. When telegraph key S101 is depressed, keying relay K1 is energized. The keying contacts of this relay close and apply power to the primary winding of plate supply transformer T1; thus, closing

the telegraph key applies plate and screen voltages to the transmitter. The antenna contacts of relay K1 transfer the antenna from *receive* in the key-up position to *send* in the key-down position. Sections 1 and 2 of S3 connect batteries BT201 and BT202 to the receiver; this permits automatic break-in operation.

b. When main control switch S3 is placed in the TRICKLE CHARGE position, section 3 de-energizes the transmitter, and the motor-generator sections 1 and 2 de-energize the receiver circuit. Section 5 applies 115 volts at 60 cps from the power source to the input terminals on Battery Charger PP-1030/SRT-13; this energizes the

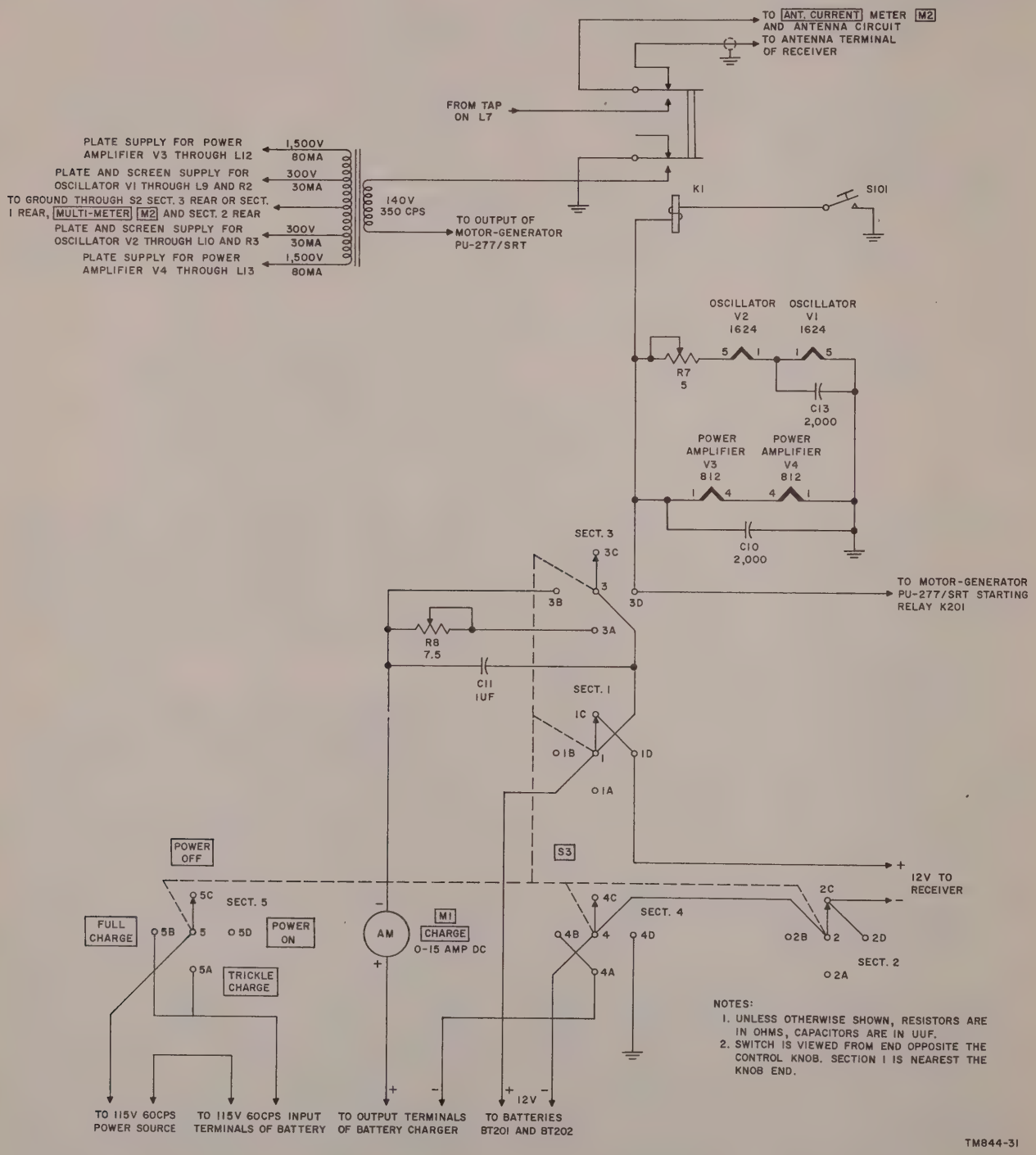


Figure 31. Radio Transmitting Set AN/SRT-13, simplified control circuit schematic.

charger. The 12-volt dc output from the charger is connected to batteries BT201 and BT202 by sections 3 and 4. CHARGE ammeter M1 indicates the charging current, and resistor R8 limits the charging current to .4 ampere for trickle charging.

c. When main control switch S3 is placed in the FULL CHARGE position, section 5 maintains the connection of the 115-volt 60-cps power source to Battery Charger PP-1030/SRT-13 input terminals. The transmitter and motor generator still are de-energized by section 3, and sections 1 and 2 de-energize the receiver. The full output of the battery charger (7 amperes) is connected to batteries BT201 and BT202 by sections 3 and 4.

d. In the POWER OFF position, the transmitter, motor generator, and battery charger are **de-energized. Sections 1 and 2 connect batteries BT201 and BT202 to the receiver.**

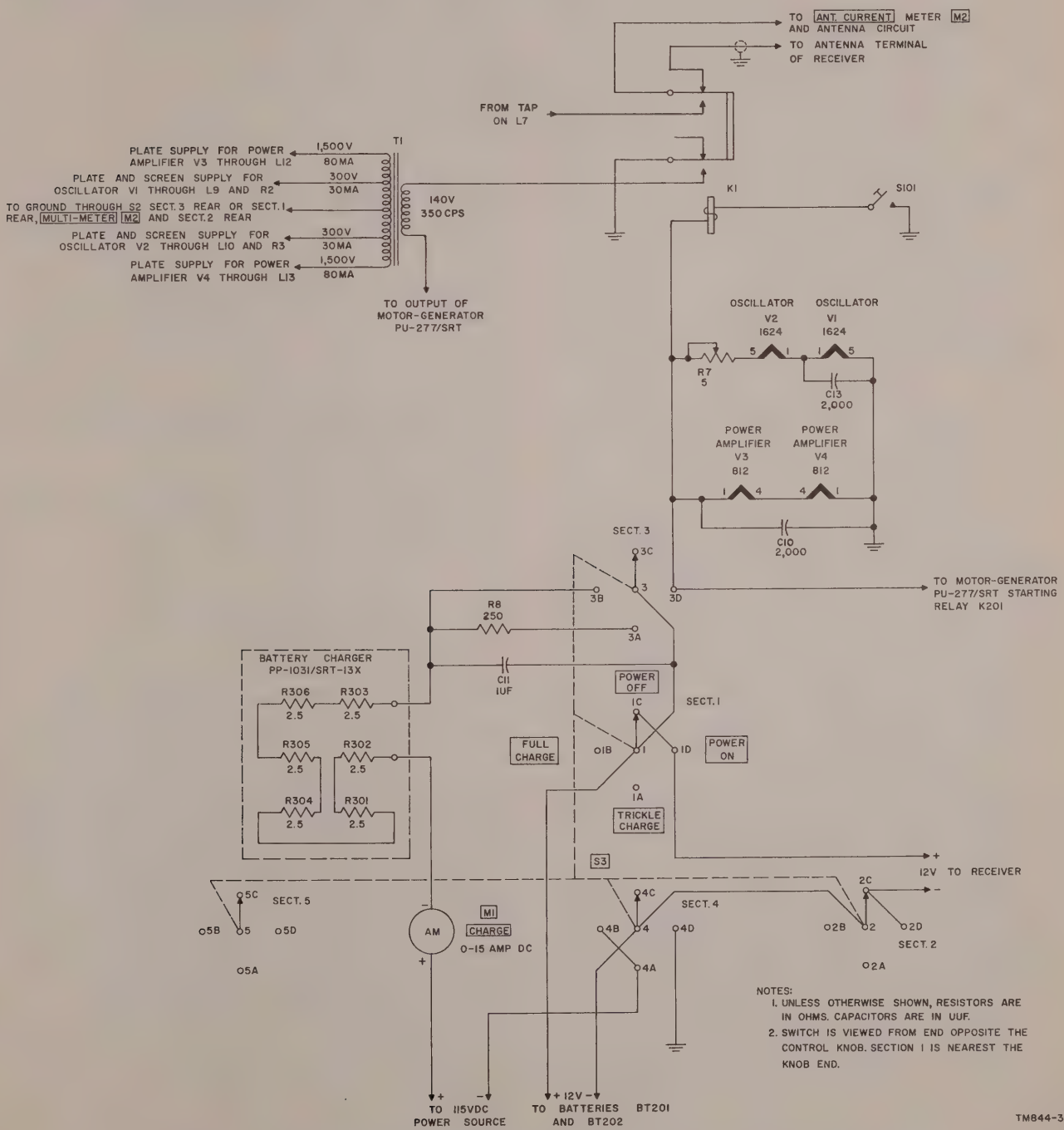


Figure 32. Radio Transmitting Set AN/SRT-13X, simplified control circuit schematic.

67. Control Circuit of Radio Transmitting Set AN/SRT-13X (fig. 32)

The control circuit in Radio Transmitting Set AN/SRT-13X is identical with the control circuit in Radio Transmitting Set AN/SRT-13 except for the battery charging circuit.

a. When main control switch S3 is placed in the FULL CHARGE position, sections 3 and 4 connect battery BT201 to a 115-volt dc power source through Battery Charger PP-1031/SRT-13X and CHARGE ammeter M1. Battery Charger PP-1031/SRT-13X is a resistance type charger which drops the 115-volt dc power source, and limits the charging rate to 7 amperes, as indicated on CHARGE ammeter M1.

b. When main control switch S3 is placed in the TRICKLE CHARGE position, section 3 places and additional 250-ohm resistor R8 in series with the battery charger to limit further the charging current to .4 ampere.

68. Theory of Motor-Generator PU-277/SRT (fig. 44)

Motor-Generator PU-277/SRT comprises motor generator MG201, starting relay K201, circuit breakers CB201 and CB202, and terminal board TB201. Motor generator MG201 comprises a two-pole compound-wound 12-volt dc motor, and a 140-volt 350-cps secondary. The 12-volt dc motor is connected to batteries BT201 and BT202 through circuit breakers CB201 and CB202, when starting relay K201 is energized and main control switch S3 on the transmitter is placed in the POWER ON position. Circuit breakers CB201 and CB202 are 60-ampere manual reset push button type, which protect the motor generator from overloads and shorts. The 140-volt 350 cps output from the motor generator is connected to the primary of plate supply transformer T1 which supplies the various plate and screen voltages for the transmitter.

69. Theory of Battery Charger PP-1030/SRT-13 (fig. 44)

Battery Charger PP-1030/SRT-13, used with Radio Transmitting Set AN/SRT-13, is a metallic rectifier type which recharges 12-volt storage type battery BT201 from 115-volt 50- to 60-cps power source. The battery charger is energized by main control switch S3 on Radio Transmitter T-433/SRT-13 when it is in either the FULL CHARGE or TRICKLE CHARGE position, and by switch S401 on the charger when it is in the ON position. The 115-volt 50- to 60-cps power is fed to the primaries of T401 and T402, which are connected in parallel, through switch S401, and fuses F401 and F402 which protect the charger from overloads. The secondaries of T401 and T402 are connected in series and are connected across metallic rectifier CR401. Rectifier CR401 is connected in a bridge type circuit which provides full-wave rectification of the voltage from the secondaries of T401 and T402. In series with the positive output side of rectifier CR401 are resistors R401 and R402, which are connected in parallel. These resistors serve to limit the current through the rectifier and aid in filtering. Connections to the charger are made on the four terminals of terminal board TB401.

70. Theory of Battery Charger PP-1031/SRT-13X (figs. 32 and 45)

Battery Charger PP-1031/SRT-13X, used with Radio Transmitting Set AN/SRT-13X is a resistance type charger which reactivates batteries BT201 and BT202 from 115-volt dc power source. The battery charger is energized by main control switch S3 on Radio Transmitter T-434/SRT-13X when switch S3 is in either the FULL CHARGE or TRICKLE CHARGE position. The charger consists of six 2.5-ohm 300-watt resistors (R301 through R306) which are connected in series. This arrangement drops the 115-volt dc power to a proper value for charging the battery.

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. TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

Warning: When servicing Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X, be careful of the high voltages. Keep one hand in the pocket when measuring socket voltages with a probe. Before touching any part after the voltage is shut off, short the part to ground.

71. Trouble-shooting Procedures

a. General. The tests listed in subparagraph *b* (1) through (5) below will aid in isolating the source of trouble. Follow the procedure in the order given. Servicing procedure should cause no further damage to the equipment.

b. Component Sectionalization and Localization. The first step in servicing a defective *transmitter* is to sectionalize the fault. This means tracing the fault to the stage or circuit responsible for the abnormal operation of the equipment. The second step is to localize the fault. Some faults, such as burned-out resistors and shorted transformers often can be located by sight and smell. The majority of faults, however, must be localized by checking voltages and resistances. The service procedure is summarized as follows:

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

(2) *Input resistance measurements.* These measurements (par. 75) prevent further damage to the transmitter from possible short circuits. Since this test gives an indication of the high voltage circuits, its function is more than preventive.

(3) *Operational test.* The operation test (par. 76) is important because it frequently indicates the general location of trouble. In many instances, the information gained will determine the exact nature of the fault. To utilize this information fully, all symptoms must be interpreted in relation to one another.

(4) *Trouble-shooting chart.* The trouble symptoms listed in this chart (par. 77) will aid greatly in localizing trouble.

(5) *Intermittents.* In all these tests, the possibility of intermittents should not be overlooked. 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 transmitter, but in the installation (antenna, interconnecting cables, or ground), or the trouble may be due to external conditions. In this case, test the installation, if possible.

72. 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. or par. No.	Description
Fig. 33	Transmitter front panel in servicing position.
Fig. 34	Transmitter right side.
Fig. 35	Transmitter left side, master oscillator subassembly cover removed.
Fig. 36	Transmitter, top view.
Fig. 37	Radio Transmitter T-433/SRT-13, bottom view.
Fig. 38	Radio Transmitter T-434/SRT-13X, bottom view.
Fig. 39	Battery Charger PP-1030/SRT-13, cover removed.
Fig. 40	Motor-Generator PU-277/SRT, cover removed.
Fig. 41	Tube socket voltage and resistance diagram.
Fig. 44	Radio Transmitting Set AN/SRT-13, schematic diagram.
Fig. 45	Radio Transmitting Set AN/SRT-13X, schematic diagram.
Par. 78	Dc resistances of transformers, relay coils, and coils.

73. Test Equipment Required for Trouble Shooting

The test equipment required for trouble shooting Radio Transmitting Set AN/SRT-13 and Radio Transmitting Set AN/SRT-13X is listed below. The technical manuals associated with the test equipment also are listed.

Test equipment	Technical manual
Electron Tube Test Set TV-7/U	TM 11-5083
Frequency Meter Set SCR-211-(*)	TM 11-300
Multimeter TS-352/U	TM 11-5527
Tool Equipment TE-113	
Tool Equipment TE-114	

74. General Precautions

When the transmitter is serviced, observe the following precautions:

a. Be careful of the exposed dangerous voltages when the front panel is lowered.

b. 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 a 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, since they may cause short circuits.

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

(5) When a part is replaced in rf circuits, it must be placed exactly in the position occupied by the original part. A part that has the same electrical value but different physical size may cause trouble in high-frequency circuits. Give particular attention to proper grounding when replacing a part. Use the same ground as in the original wiring. Failure to observe these precautions may result in poor operation of the circuit.

75. Checking Filament and B+ Circuits for Shorts

Trouble within the transmitter often may be detected by checking the resistance of the fila-

ment and high-voltage circuits before applying power to the equipment. This prevents any damage to plate supply transformer T1 and the motor-generator. See that main control switch S3 is in the POWER OFF position when making these measurements (fig. 41).

76. Operational Test

If the transmitter is connected to its associated components, as in normal operation, operate the equipment as described in the equipment performance checklist in paragraph 59. The checklist frequently indicates the general location of trouble. Listen for cracking noises which indicate high-voltage arcing. Check the transmitter for smoke and the odor of burned or overheated parts.

77. Trouble-shooting Charts

The following charts are supplied as an aid in locating trouble. These charts list the symptoms which the repairman observes while making a few simple tests and indicate the location of the faults and what to do to correct them. After the trouble has been localized, a tube check and voltage and resistance measurements of the faulty circuit should be sufficient to isolate the defective part. Normal voltage and resistance measurements are given in figure 41.

a. Trouble-shooting Chart for Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X.

Symptom	Probable trouble	Correction
1. Main control switch S3 in POWER ON position. Multimeter control switch S2 in FILAMENT VOLTS position. Telegraph key down. MULTI-METER M2 indicates 0 or less than 12 volts and the transmitter output is low as indicated on ANT. CURRENT meter M3 (should indicate 4.5 amperes with 2-ohm impedance antenna).	Batteries BT201 and BT202 discharged.	Check state of charge of each cell in each battery and charge batteries in accordance with instructions given in paragraph 52.
2. Main control switch S3 on POWER ON position. MULTI-METER M2 indicates 12 volts but motor generator fails to start.	Circuit breakers CB201 and CB202 on motor generator open.	Reset circuit breakers. If they open again, check capacitors C6, C7, C8, and C9. Check plate supply transformer T1 for possible shorts.
	Defective relay K201 on motor generator.	Replace.
	Defective main control switch S3.	Replace.
	Motor generator brushes excessively worn or improperly seated.	Replace or reseat in accordance with instructions given in paragraph 51.
	Motor generator armature open, or field open.	Replace motor generator.
3. Filaments of both V1 and V2 are dark.	Open filament in V1 or V2.	Replace defective tube.
	Resistor R7 open.	Replace, and adjust new resistor so that voltage from pin 5 of V2 to ground is 5 volts.
4. Filaments of both V3 and V4 are dark.	Open filament in V3 or V4.	Replace defective tube.
5. Controls set up as in step 1. No transmitter output.	Defective relay K1.	Make resistance check of relay coil, and replace entire relay, if necessary. Check relay contacts, replace relay, if defective.
	Defective plate supply transformer T1.	Check resistance (par. 78). Replace, if necessary.
	Defective multimeter control switch S2.	Check continuity for each position and replace.

a. Trouble-shooting Chart for Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X. (contd)

Sympton	Probable trouble	Correction
	Defective ANT. LOADING switch S4.	Check and replace.
6. Transmitter output low. Multimeter control switch S2 in GRID CURRENT position and MULTIMETER M2 indicates 0 (no excitation of pa, should indicate 10 ma).	Resistor R4 open.	Check R4, replace.
	Choke L11 open.	Check resistance (par. 78), replace.
	Capacitor C12 shorted.	Check and replace.
	No plate and screen voltages on V1 or V2.	Check resistance of T1 (par. 78).
	Resistor R2 or R3 open.	Check and replace.
	Choke L9 or L10 open.	Check resistance (par. 78), replace.
	Resistor R1 open.	Check and replace.
	Resistor R5 or R6 open.	Check and replace.
	Shorted C6 or C7.	Check and replace.
	Open C4 or C5.	Check and replace.
	Open C3.	Check and replace.
7. Erratic transmitter operation.	Dirty or bad fit between tube pins and sockets.	Clean and straighten contacts.
	Dirty switch contacts on either S1 or S4.	Clean contacts.
	Relay K1 contacts dirty.	Clean contacts.

b. Trouble-shooting Chart for Battery Charger PP-1030/SRT-13

Symptom	Probable trouble	Correction
1. Main control switch S3 placed in FULL CHARGE position. CHARGE meter M1 indicates 0 (should indicate 7 amperes).	Switch S401 on battery charger in OFF position.	Place in ON position.
	Open fuse F101 or F102, in Terminal Box J-581/SRT.	Replace fuse.
	Open fuse F401 or F402 in Battery Charger PP-1030/SRT-13.	Replace fuse.
	Defective main control switch S3.	Check and replace.
	Defective transformer T401 or T402 in battery charger.	Check resistance (par. 78), replace.
	Defective rectifier CR401 in battery charger.	Replace.
	Open resistor R401 and R402.	Check and replace.
2. Main control switch S3 placed in TRICKLE CHARGE position. CHARGE meter M1 indicates 0 (should indicate .4 ampere).	Open resistor R8 in transmitter.	Check and replace. Adjust new resistor so that .4 ampere is indicated on CHARGE meter M1.
	Defective main control switch S3.	Check and replace.

c. Trouble-shooting Chart for Battery Charging Circuit of Radio Transmitting Set AN/SRT-13X.

Symptom	Probable trouble	Correction
1. Main control switch S3 placed in FULL CHARGE position. CHARGE meter M1 indicates 0 (should indicate 7 amperes).	Defective fuse F101 or F102 in Terminal Box J-581/SRT.	Check and replace.
	Open resistor in Battery Charger PP-1031/SRT-13X.	Check and replace defective resistor.

	Defective main control switch S3 in Radio Transmitter T-434/SRT-13X.	Check and replace.
2. Main control switch S3 placed on TRICKLE CHARGE position. CHARGE meter M1 indicates 0 (should indicate .4 ampere).	Open resistor R8.	Check and replace.
	Defective main control switch S3.	Check and replace.

78. D-c Resistance of Transformer, Relay and Coils

The dc resistances of the transformer windings, the coils, transformers T401 and T402, which are part of Battery Charger PP-1030/SRT-13 and the relay coils are given below. Relay K1 is located in the *transmitter* and K201 is located in the motor generator.

Transformer or coil	Terminals	Ohms
T1	140-volt 350-cps primary	.55
	0 to 300-volts	34.0
	0 to 1500-volts	150.0

Transformer or coil	Terminals	Ohms
T401 and T402	Primary	3.0
	Secondary (over-all)	.07
K1		250.0
K201		27.5
L1, L2, L3, L4, L5		2.138
L6		13.4
L7		.750
L8		1.317
L9, L10, L11		280.0
L12, L13		34.5

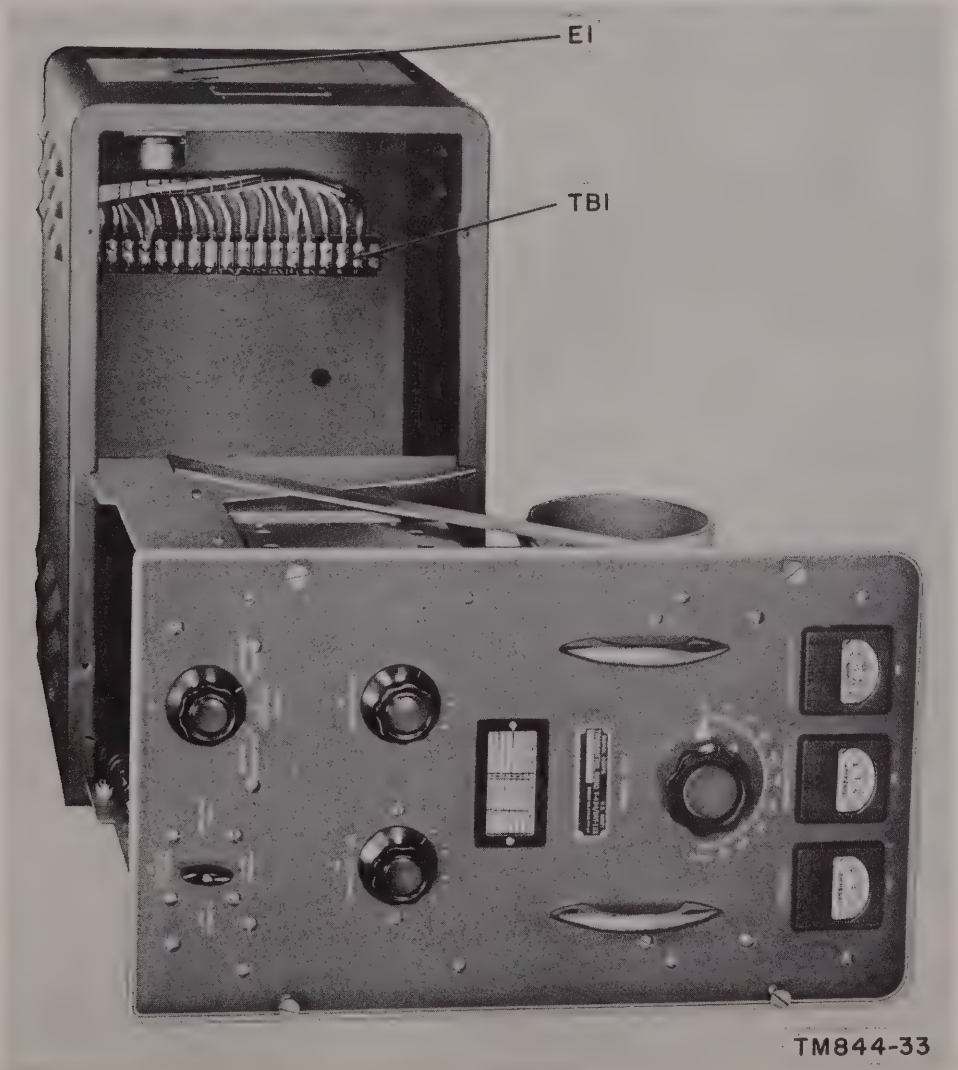


Figure 33. Transmitter front panel in servicing position.

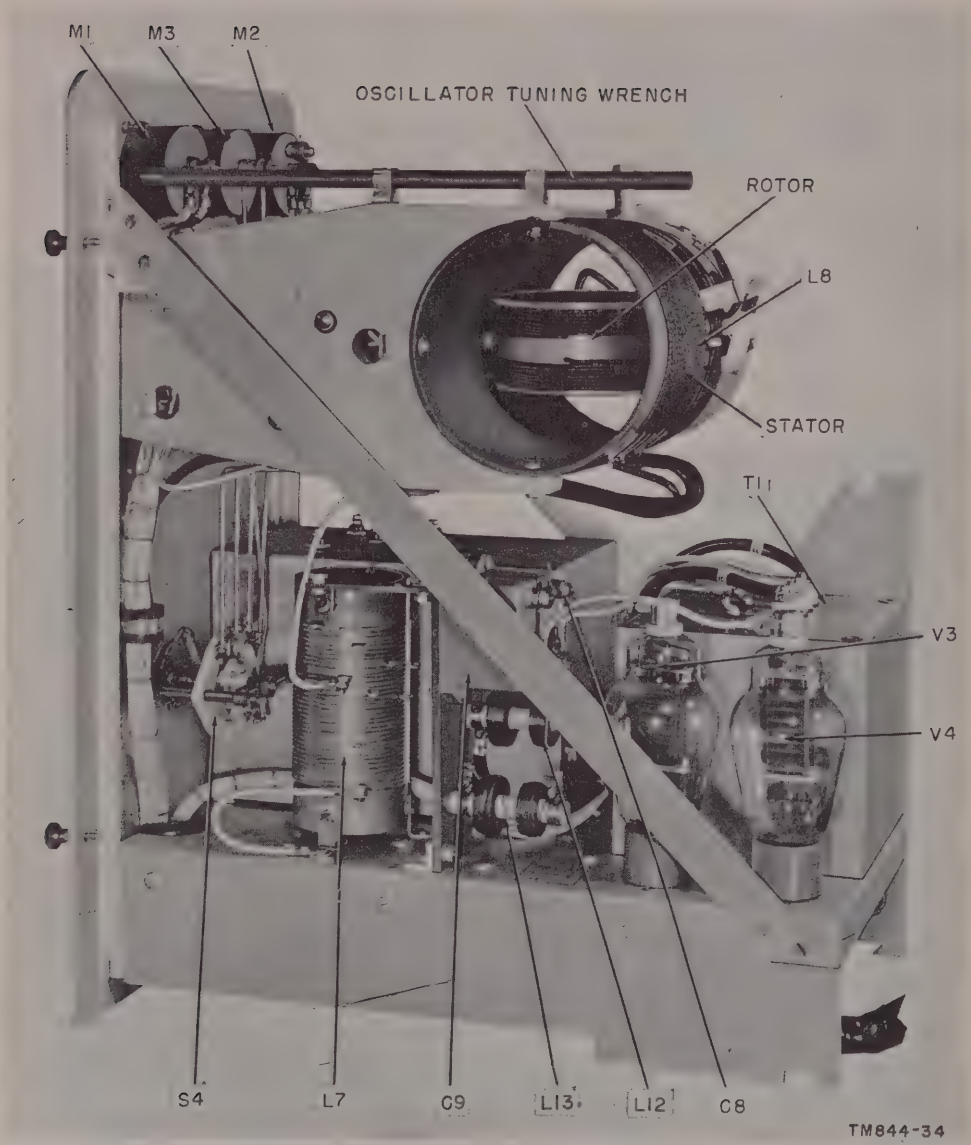


Figure 34. Transmitter, right side.

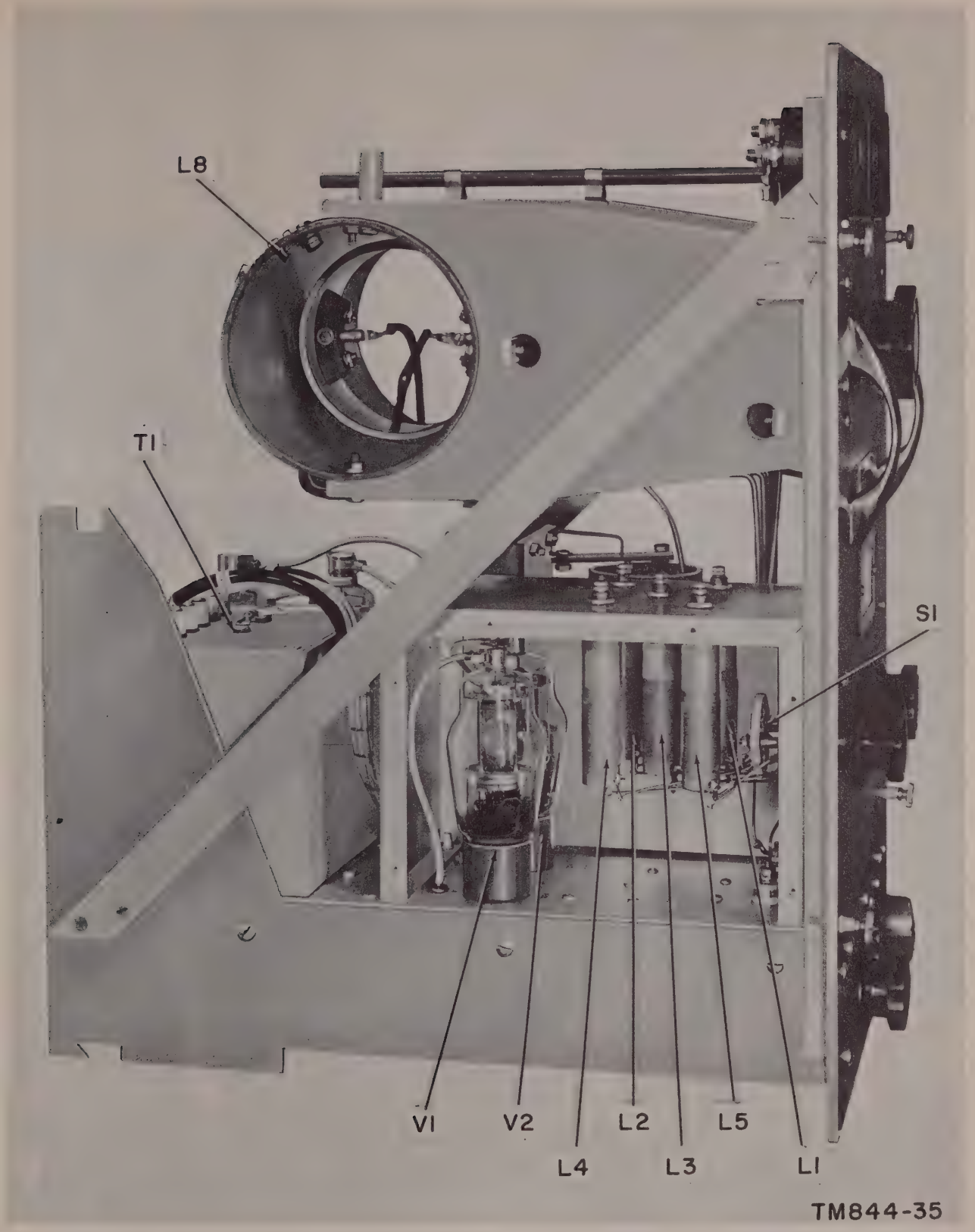


Figure 35. Transmitter, left side, master oscillator subassembly, cover removed.

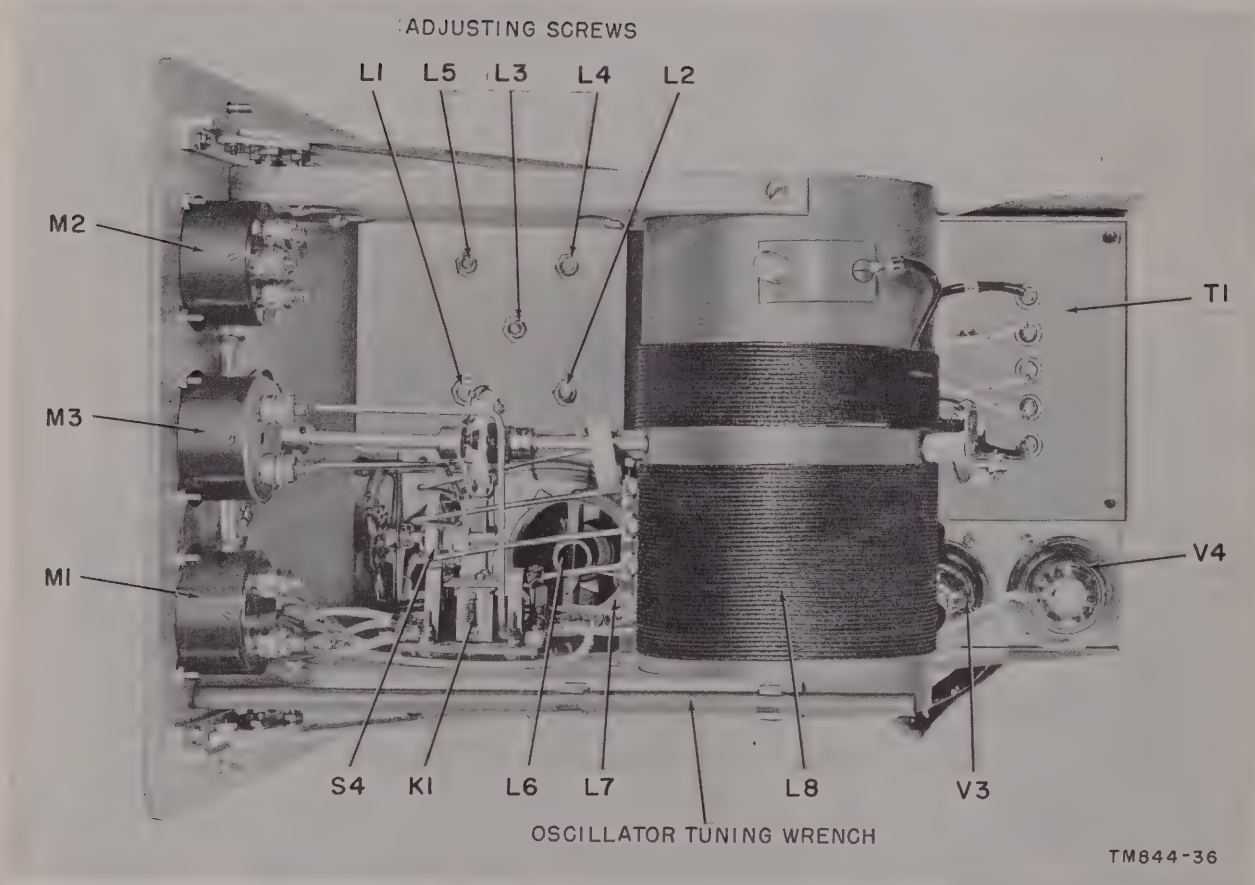


Figure 36. Transmitter, top view.

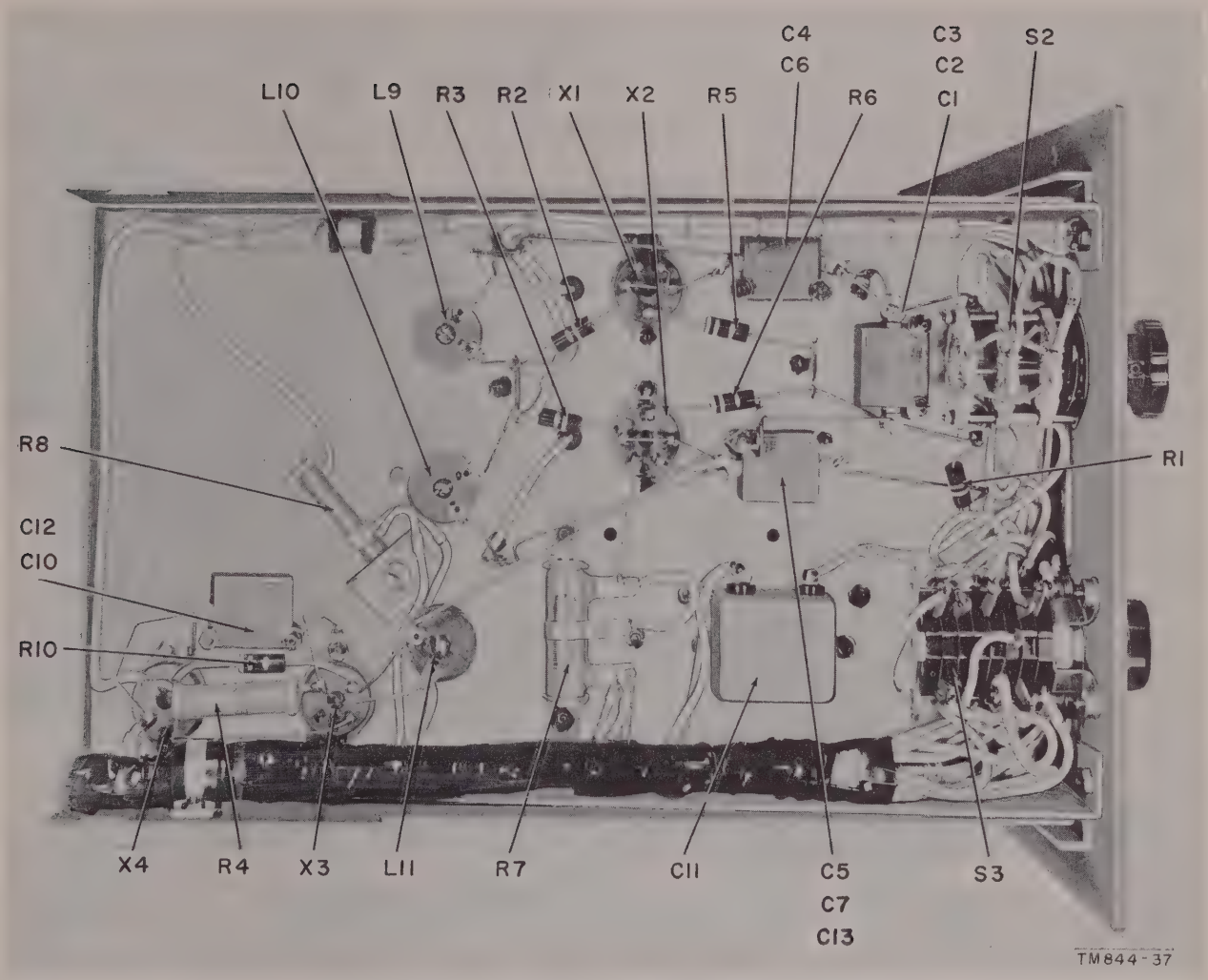


Figure 37. Radio Transmitter T-433/SRT-13, bottom view.

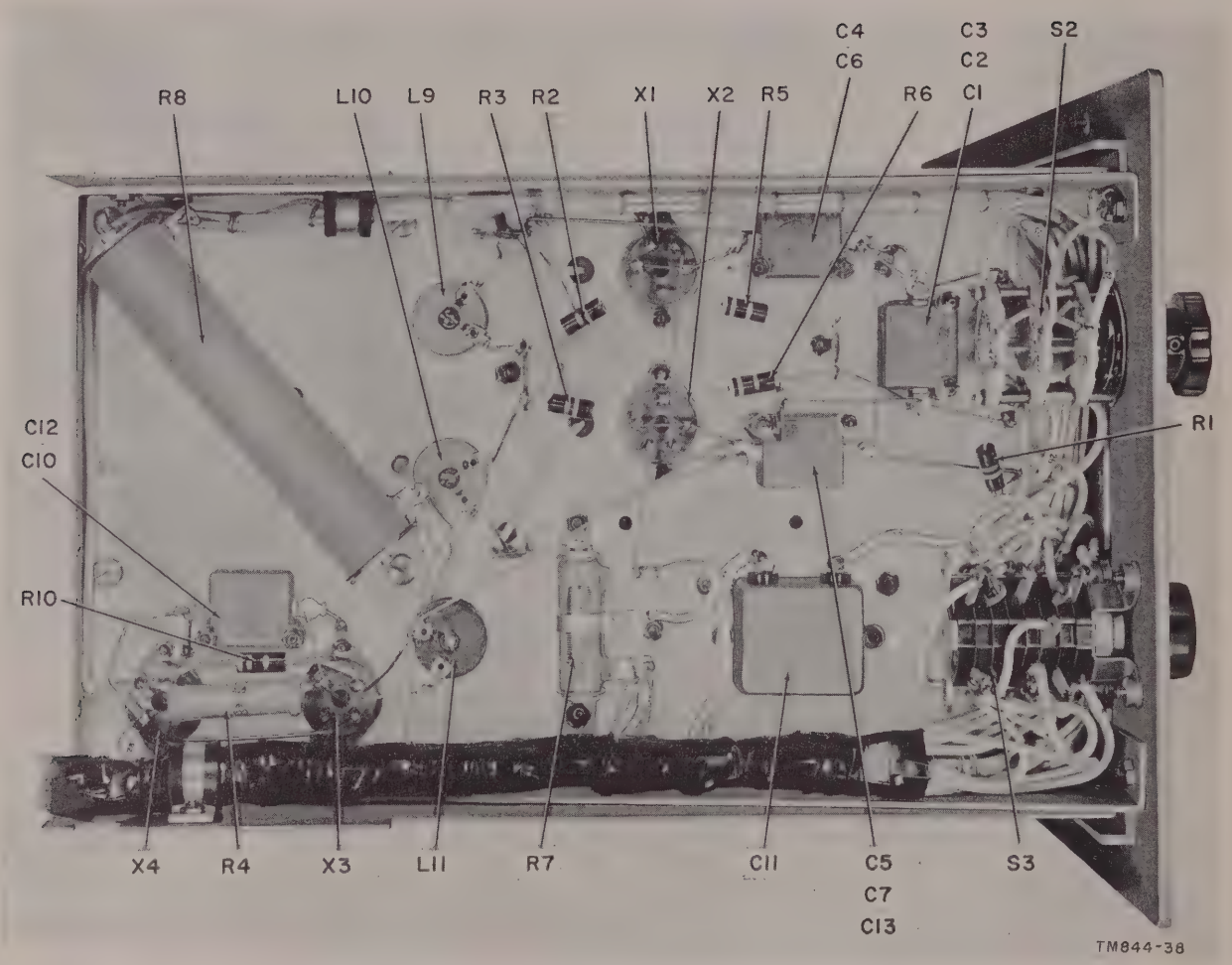


Figure 38. Radio Transmitter T-434/SRT-13X, bottom view.

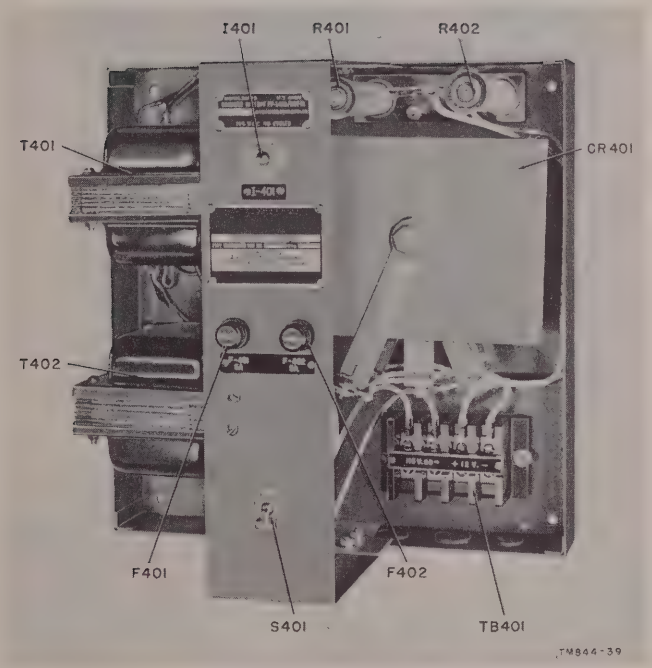


Figure 39. Battery Charger PP-1030/SRT-13, cover removed.

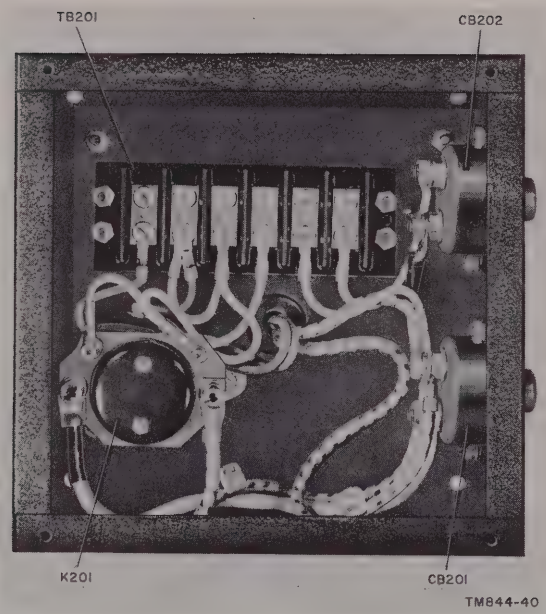
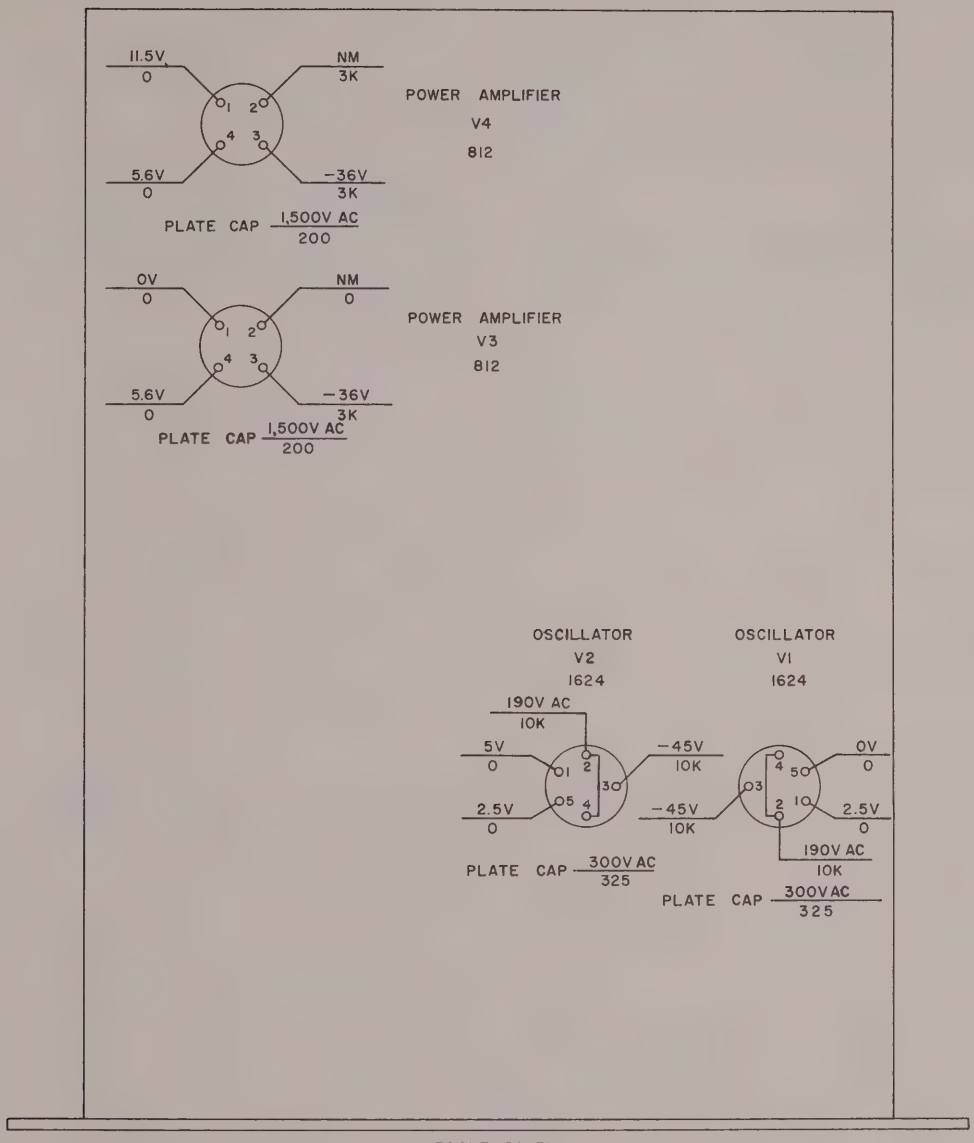


Figure 40. Motor-Generator PU-277/SRT, cover removed.



NOTES:

1. VOLTAGES AND RESISTANCES ARE MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER.
2. NM INDICATES NOT MEASURED.
3. UNLESS OTHERWISE SHOWN RESISTANCE READINGS ARE IN OHMS.

TM844-41

Figure 41. Tube socket voltage and resistance diagram.

Section II. REPAIRS

79. Replacement of Parts

a. Most parts in Radio Transmitting Sets AN/SRT-13 and AN/SRT-13X can be reached and replaced easily if they are found to be faulty. If main control switch S3 or multimeter control switch S2 requires replacement, mark the wires connected to the switch with tags to avoid misconnection when the new switch is installed. Follow this procedure whenever replacement requires the disconnection of numerous wires.

b. To replace FREQUENCY switch S1 or any of coils L1 through L5, remove the master oscillator subassembly. Figure 35 shows the left side of the transmitter chassis with the master oscillator subassembly cover removed.

(1) Remove the control knob from FREQUENCY switch S1.

(2) Remove the six screws which fasten the side cover of the oscillator subassembly and remove the cover.

(3) Remove tubes V1 and V2.

(4) Remove the panel-to-chassis brace; unscrew and remove the two screws at each end.

(5) Disconnect the two leads fastened to the two feedthrough insulators below FREQUENCY switch S1.

(6) Remove the four screws which fasten the oscillator subassembly to the chassis; then remove the subassembly from the chassis. The switch or coils now may be replaced.

80. Refinishing

Instructions for refinishing are given in paragraph 54. If the equipment is worn and badly marred, the exterior should be refinished in accordance with instructions in TM9-2851 before it is returned to use.

81. Apparatus Adjustment

a. Telegraph Key S101. Three adjustments are provided on the telegraph key (fig. 10). The tension may be adjusted by the knurled screw nearest the contacts, the contacts may be alined one above the other by the knurled screws at the center of the key, and the contacts may be spaced by adjusting the knurled screw toward the rear of the key.

b. Antenna Switching Relay K1. Antenna switching relay K1 has no adjustments. If it fails to function properly, note the manner in which it is installed and replace it with a new unit.

c. Motor Generator Starting Relay K201. Motor generator starting relay K201 requires no adjustments. If it fails to function properly, carefully note the manner in which it is installed and replace it with a new unit.

Section III. FINAL TESTING

82. General

This section is intended as a guide to be used in determining the quality of a repaired transmitter. The minimum test requirement outlined in paragraph 84 may be performed by maintenance personnel with adequate test equipment and the necessary skills. Repaired equipment meeting these requirements will furnish uniformly satisfactory operation.

83. Test Equipment Required for Final Testing

The equipment required for testing the repaired equipment is listed on following page:

a. One 0- to 5-ampere rf ammeter.

b. One 4-ohm 50-watt noninductive resistor.

c. One 750-uuf capacitor.

84. Power Output Test

Radio Transmitters T-433/SRT-13 and T-434/SRT-13X are designed to deliver 40 watts into a single wire antenna with characteristic constants between 2 to 8 ohms and 500 to 1,250 uuf. In this test, a 4-ohm noninductive resistor and a 750-uuf capacitor are used as a dummy antenna. An external rf ammeter is used to determine the amount of output current, and serves to check ANT. CURRENT meter M3 in the transmitter.

a. Connect the 4-ohm resistor, 750-uuf capacitor, and rf ammeter in series.

b. Connect the 4-ohm resistor to the antenna terminal on the transmitter cabinet, and the rf ammeter to ground (transmitter cabinet).

c. Operate the equipment as directed in paragraphs 34, 35, and 36.

d. The rf ammeter should indicate at least 3.16 amperes. MULTI-METER M2 should indicate between 105 and 115 ma when multimeter control switch S2 is in the TOTAL CURRENT position, and 10 ma when it is in the GRID CURRENT position.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

85. Disassembly

The following instructions are recommended as a guide for preparing the radio transmitting sets for transportation and storage.

a. Disconnect all cables and remove them from the components of the set.

b. Remove the equipment from their mountings; save the hardware as it may be used in future installations.

c. Be sure all spare equipment is stowed in its proper location. See paragraph 15 for location of spares.

86. Care of Batteries During Storage or Shipment

Charge the batteries to full charge and store them separately from other equipment for not more than 1 month. Refer to TM 11-430.

87. Repacking for Shipment or Limited Storage

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. Reverse the instructions given in paragraph 19.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

88. General

The demolition procedures outlined in paragraph 89 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.

89. Methods of Destruction

a. Smash. Smash the tubes, switches, meters, controls, capacitors, and transformers; use sledges, axes, handaxes, pickaxes, crowbars, or heavy tools.

b. Cut. Cut the internal and external wires and cables; use axes, knives, or machetes.

c. Burn. Burn cords, resistors, capacitors, wiring, and instruction books; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend panel, cabinet, and chassis.

e. Explode. If explosives are necessary, use firearms, grenades, or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches, fox holes, or throw them into streams.

g. Destroy. Destroy everything.

APPENDIX

REFERENCES

1. Army Regulation

AR 750-5	Maintenance of Supplies and Equipment, Maintenance Responsibilities and Shop Operation.

2. 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.

3. Other Publications

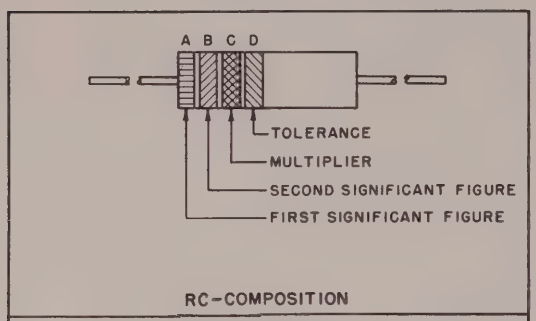
FM 24-18	Field Radio Techniques.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.
TM 11-300	Frequency Meter Sets SCR-211-A, B, C, D, E, F, J, K, L, M, N, O, P, Q, R, T, AA, AC, AE, AF, AH, AJ, AK, AL.
TM 11-430	Batteries for Signal Communication, Except Those Pertaining to Aircraft.

3. Other Publications (cont)

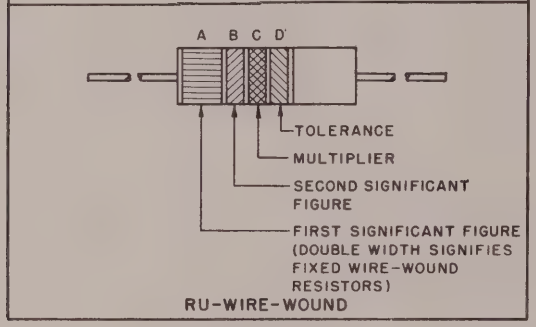
TM 11-5083	Electron Tube Test Set TV-7/U.
TM 11-5527	Multimeter TS-352/U.

RESISTOR COLOR CODE MARKING
(MIL-STD RESISTORS)

AXIAL-LEAD RESISTORS (INSULATED)

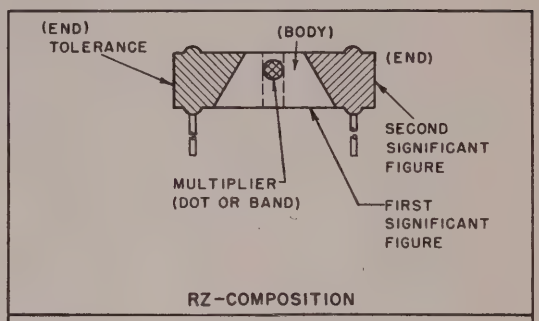


RC-COMPOSITION

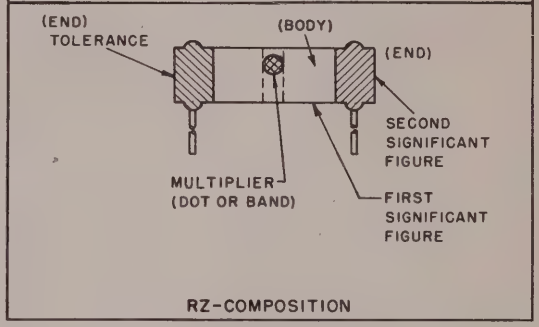


RU-WIRE-WOUND

RADIAL-LEAD RESISTORS (UNINSULATED)



RZ-COMPOSITION



RZ-COMPOSITION

RESISTOR COLOR CODE

BAND A OR BODY*		BAND B OR END*		BAND C OR DOT OR BAND*		BAND D OR END*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1	BODY	±20
BROWN	1	BROWN	1	BROWN	10	SILVER	±10
RED	2	RED	2	RED	100	GOLD	±5
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000		
GREEN	5	GREEN	5	GREEN	100,000		
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	GOLD	0.1		
WHITE	9	WHITE	9	SILVER	0.01		

*FOR WIRE-WOUND-TYPE RESISTORS, BAND A SHALL BE DOUBLE-WIDTH. WHEN BODY COLOR IS THE SAME AS THE DOT (OR BAND) OR END COLOR, THE COLORS ARE DIFFERENTIATED BY SHADE, GLOSS, OR OTHER MEANS.

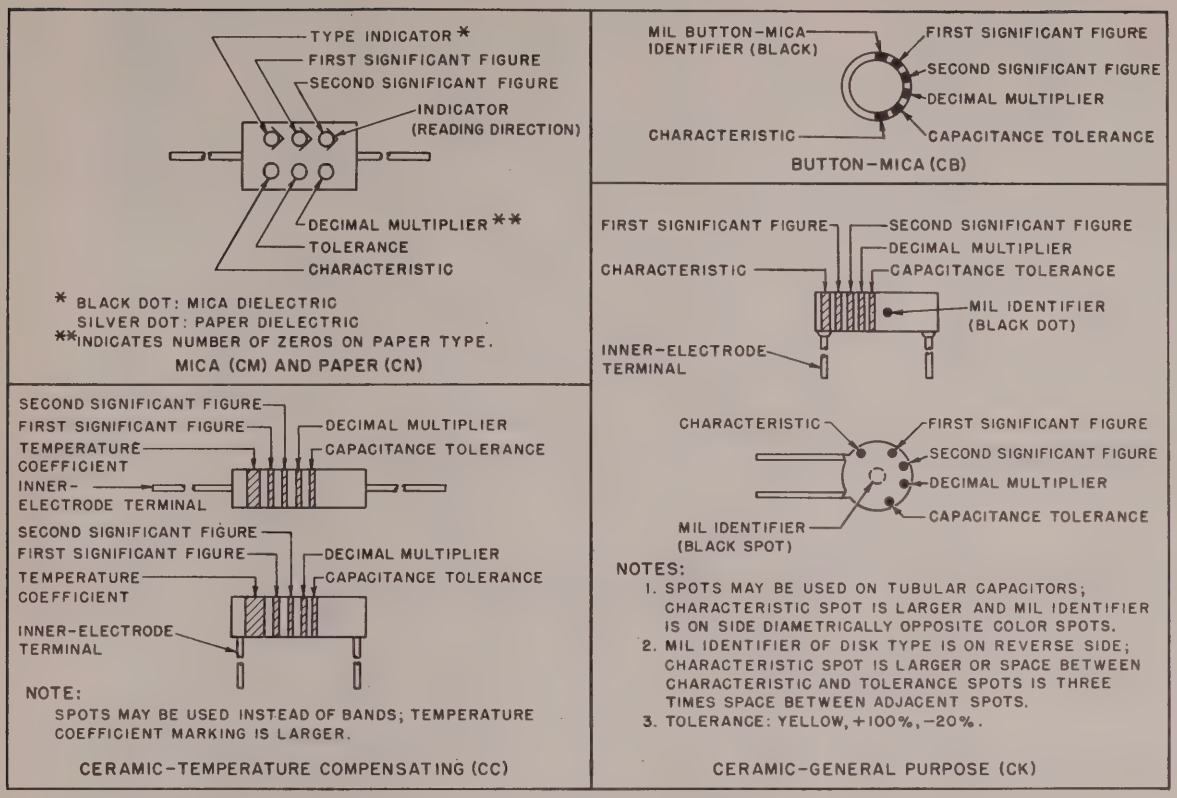
EXAMPLES (BAND MARKING):
10 OHMS ±20 PERCENT: BROWN BAND A; BLACK BAND B; BLACK BAND C; NO BAND D.
4.7 OHMS ±5 PERCENT: YELLOW BAND A; PURPLE BAND B; GOLD BAND C; GOLD BAND D.

EXAMPLES (BODY MARKING):
10 OHMS ±20 PERCENT: BROWN BODY; BLACK END; BLACK DOT OR BAND; BODY COLOR ON TOLERANCE END.
3,000 OHMS ±10 PERCENT: ORANGE BODY; BLACK END; RED DOT OR BAND; SILVER END.

STD-RI

Figure 42. Resistor color codes.

CAPACITOR COLOR CODE MARKING
(MIL-STD CAPACITORS)



CAPACITOR COLOR CODE

COLOR	SIG FIG.	MULTIPLIER		CHARACTERISTIC[1]				TOLERANCE [2]					TEMPERATURE COEFFICIENT (UUF/UF/°C)
		DECIMAL	NUMBER OF ZEROS	CM	CN	CB	CK	CM	CN	CB	CC		
											OVER 10UUF	10UUF OR LESS	CC
BLACK	0	1	NONE		A			20	20	20	20	2	ZERO
BROWN	1	10	1	B	E	B	W				1		-30
RED	2	100	2	C	H		X	2		2	2		-80
ORANGE	3	1,000	3	D	J	D			30				-150
YELLOW	4	10,000	4	E	P								-220
GREEN	5		5	F	R						5	0.5	-330
BLUE	6		6		S								-470
PURPLE (VIOLET)	7		7		T	W							-750
GRAY	8		8			X						0.25	+30
WHITE	9		9								10	1	-330(±500) [3]
GOLD		0.1						5		5			+100
SILVER		0.01						10	10	10			

1. LETTERS ARE IN TYPE DESIGNATIONS GIVEN IN MIL-C SPECIFICATIONS.
2. IN PERCENT, EXCEPT IN UUF FOR CC-TYPE CAPACITORS OF 10 UUF OR LESS.
3. INTENDED FOR USE IN CIRCUITS NOT REQUIRING COMPENSATION.

STD-CI

Figure 43. Capacitor color codes.

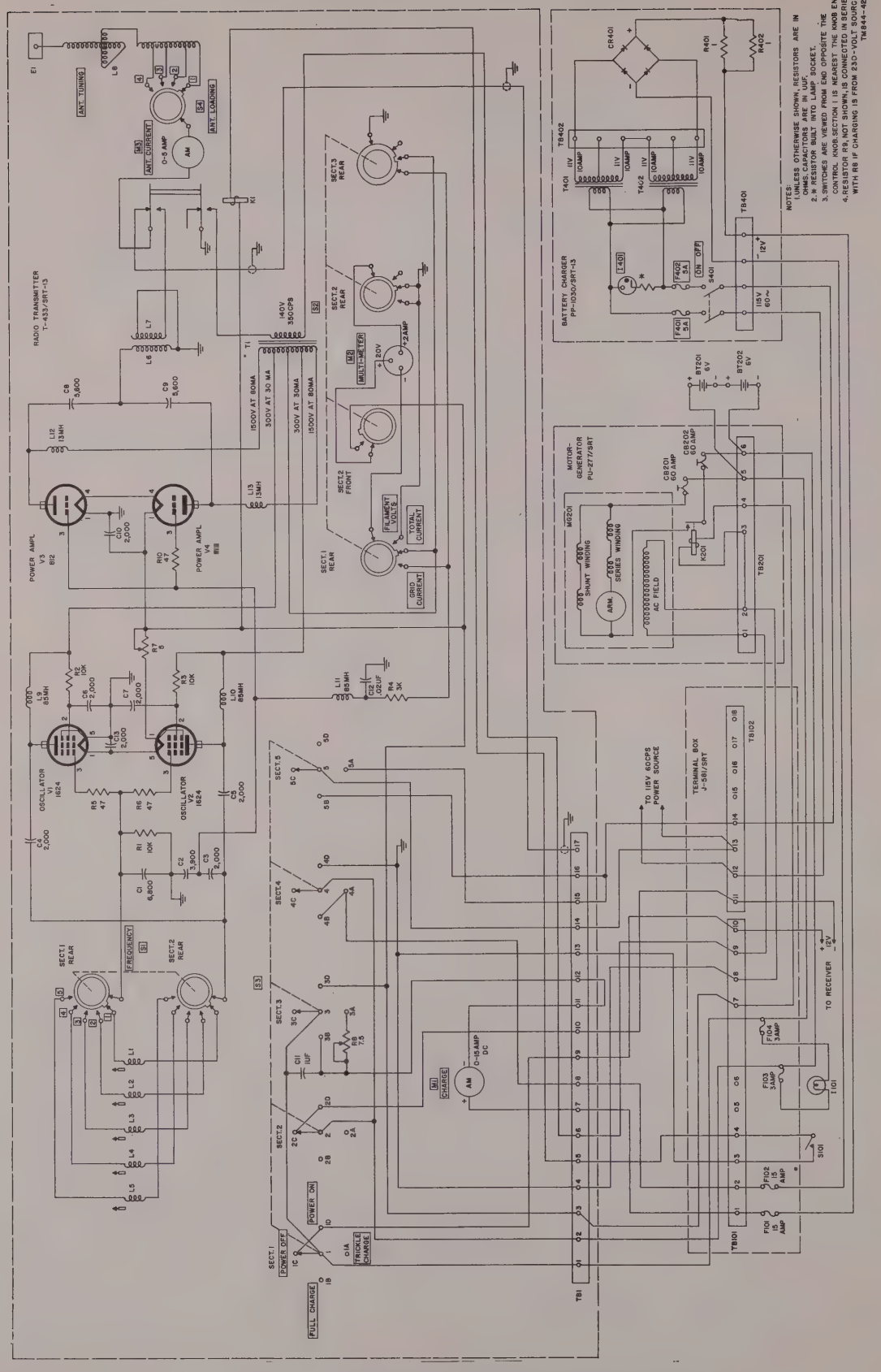


Figure 44. Radio Transmitting Set AN/SRT-13, schematic diagram.

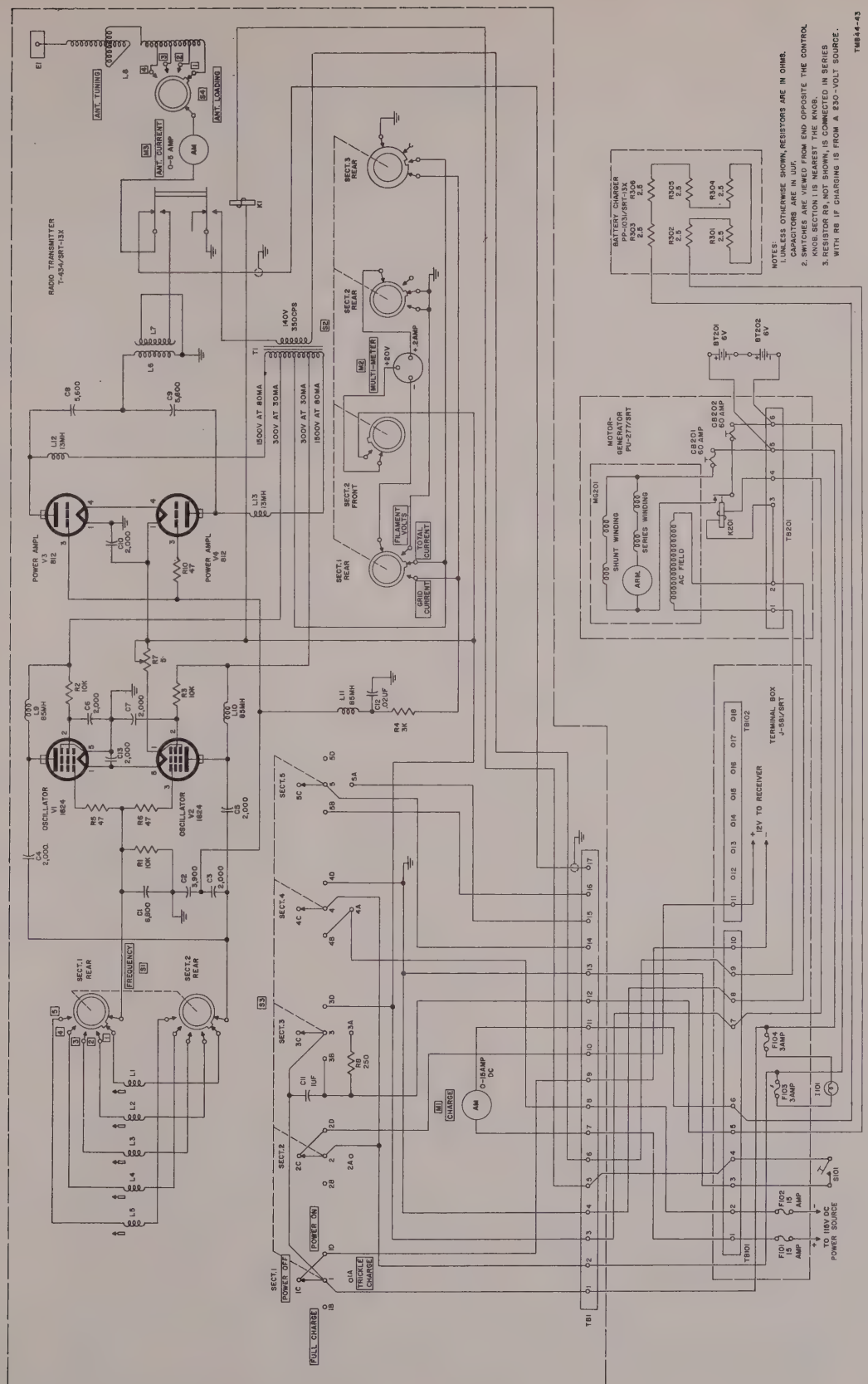


Figure 45. Radio Transmitting set AN/SRT-13X, schematic diagram.

INDEX

	Paragraph	Page
A		
Additional equipment required	16	14
Antenna circuit, theory of	63	53
Apparatus adjustment	81	72
Arctic operation	38	34
B		
Battery Charger PP-1030/SRT-13, controls	33	33
Battery maintenance	52	42
Block diagram	60	50
C		
Care of batteries during storage and shipment	86	74
Checking filament and B+ circuits for shorts	75	60
Circuit differences in Radio Transmitter T-433/SRT-13 and T-434/SRT-13X	65	55
Connections for Radio Transmitting Set AN/SRT-13	28	24
Connections for Radio Transmitting Set AN/SRT-13X	29	26
Controls and instruments:		
Battery Charger PP-1030/SRT-13, controls	33	33
General	31	30
Radio Transmitters T-434/SRT-13X and T-433/SRT-13 controls	32	32
Control circuits of Radio Transmitting Set AN/SRT-13	66	55
Control circuits of Radio Transmitting Set AN/SRT-13X	67	58
D		
Dc resistances of transformer, relay and coils	78	63
Definition of preventive maintenance	46	38
Demolition of materiel to prevent enemy use:		
General	88	74
Methods of destruction	89	74
Description of batteries BT201 and BT202	13	13
Description of Battery Charger PP-1030/SRT-13	12	13
Description of Battery Charger PP-1031/SRT-13X	11	12

	Paragraph	Page
Description of minor components	14	13
Description of Motor Generator PU-277/SRT	10	12
Description of Radio Transmitters T-433/SRT-13 and T-434/SRT-13X	8	8
Description of Terminal Box J-581/SRT	9	10
Desert operation	40	35
Difference in models	17	16
Disassembly	85	74
E		
Equipment performance checklist	59	46
F		
Field maintenance instructions	71-78	59-63
Final test:		
Power output	84	73
Test equipment	83	72
Forms	2	2
I		
Initial adjustment of transmitter	41-43	35-37
Installation:		
Batteries	25	23
Battery Charger PP-1030/SRT-13	23	22
Battery Charger PP-1031/SRT-13X	24	23
Emergency light assembly	26	24
Motor Generator PU-277/SRT	22	21
Radio Transmitters T-433/SRT-13 and T-434/SRT-13X	20	20
Terminal Box J-581/SRT	21	21
Tubes	27	24
L		
Lubrication	53	44
M		
Maintenance, battery	52	42
Maintenance, Motor Generator PU-277/SRT	51	42
Maintenance, preventive	46-52	38-42
Metering circuit, theory	64	54
O		
Operation:		
Unusual conditions	37-40	34-35
Usual conditions	34-36	34
Operational test	76	61
Organizational maintenance instructions	44-52	38-42

	Paragraph	Page
P		
Packaging	6	6
Painting	54	44
Power amplifier stage V3 and V4, theory of	62	52
Power output test	84	73
Preventive maintenance:		
Battery	52	42
Definition	46	38
General techniques	47	38
Motor Generator PU-277/SRT	51	42
Performing exterior	49	39
Performing interior	50	39
Use of forms	48	39
Procedures:		
Preliminary starting	34	34
Starting	35	34
Stopping	36	34
Purpose and use	3	2
R		
Records	2	2
References	app I	75
Refinishing	80	72
Repacking for shipment or limited storage	87	74
Repairs	79-81	72
Replacement of parts	79	72
Resistance (dc) of transformer, relay and coils	78	63
Running spares	15	14
Rustproofing and painting	54	44
S		
Scope	1	1
Service upon receipt of used or reconditioned equipment	30	30
Shipment and limited storage:		
Care of batteries	86	74
Disassembly	85	74
Repacking	87	74
Siting	18	17
Spares, running	15	14
Special tools	45	38
Starting procedure	35	34
Stopping procedure	36	34
System application	4	2
System sectionalization of trouble to a component	57	45
T		
Table of components	7	7
Technical characteristics	5	5

	Paragraph	Page
Test equipment:		
Final test	83	72
Trouble shooting	73	60
Test, final:		
Power output	84	73
Theory:		
Antenna circuit	63	53
Battery Charger PP-1030/SRT-13	69	58
Battery Charger PP-1031/SRT-13X	70	58
Block diagram	60	50
Circuit differences in Radio Transmitter T-433/SRT-13 and T-434/SRT-13X	65	55
Control circuits of Radio Transmitting Set AN/SRT-13	66	55
Control circuits of Radio Transmitting Set AN/SRT-13X	67	58
Master oscillator stage V1 and V2	61	51
Metering circuit	64	54
Motor Generator PU-277/SRT	68	58
Power amplifier stage V3 and V4	62	52
Tools:		
Organizational maintenance	44	38
Special	45	38
Tropical operation	39	35
Trouble shooting at field maintenance level:		
Charts	77	61
Checking filament and B+ circuits for shorts	75	60
Data	72	60
D-c resistances of transformer, relay and coils	78	63
Operational test	76	61
Precautions	74	60
Procedures	71	59
Test equipment required	73	60
Trouble shooting at organization maintenance level:		
Equipment performance checklist	59	46
General	55	44
System sectionalization of trouble to a component	57	45
Visual inspection	56	44

U

Uncrating, unpacking, and checking new equipment	19	18
Unusual operating conditions:		
Arctic climates	38	34
Desert climates	40	35
General	37	34
Tropical climates	39	35

V

Visual inspection	56	44

W

Weatherproofing	53	44

[AG 413.44 (11 Aug 54)]

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