WAR DEPARTMENT
TECHNICAL MANUAL

TM 11-312

REMOTE CONTROL EQUIPMENT RC-47-A, B, C, D, & G

(CONTROL UNIT RM-12-(*) AND CONTROL UNIT RM-13-(*) AND ASSOCIATED EQUIPMENT)

WAR DEPARTMENT • 11 OCTOBER 1943

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WAR DEPARTMENT **11 OCTOBER 1943**

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WAR DEPARTMENT
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TM 11-312, Remote Control Equipment RC-47-A, B, C, D, & G, is published for the information and guidance of all concerned.
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By order of the Secretary of War.

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:
J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

IBn 11(2), IC 11(2):

(For explanation of symbols see FM 21-6.)

Remote Control Equipment
RC-47-A, RC-47-B, RC-47-C, RC-47-D, RC-47-G

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LIST OF CHARTS

DESTRUCTION NOTICE

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

WHEN: When ordered by your commander or when you are in immediate danger of capture.

HOW:

1. Smash—Use sledges, axes, hand axes, pick axes, hammers, crowbars, heavy tools, etc.
2. Cut—Use axes, hand axes, machete, etc.
3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades, etc.
4. Explosives—Use firearms, grenades, TNT, etc.
5. Disposal—Bury in slit trenches, fox holes, other holes. Throw into streams. Scatter.
6. USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT:

1. Smash in front panels of control units, chassis, control unit case, and chests.
2. Cut control unit local cables and line wires.
3. Burn wooden chests, technical manuals, and all schematic and circuit labels.
4. Bury or scatter all of the above pieces.

DESTROY EVERYTHING

SAFETY NOTICE

HIGH VOLTAGES USED IN OPERATING THIS EQUIPMENT ARE EXTREMELY DANGEROUS. YOU MUST ALWAYS OBSERVE SAFETY REGULATIONS. NEVER REMOVE THE CHASSIS OF CONTROL UNIT RM-13-(*) FROM ITS CASE WITHOUT FIRST REMOVING THE 110-VOLT POWER CORD.

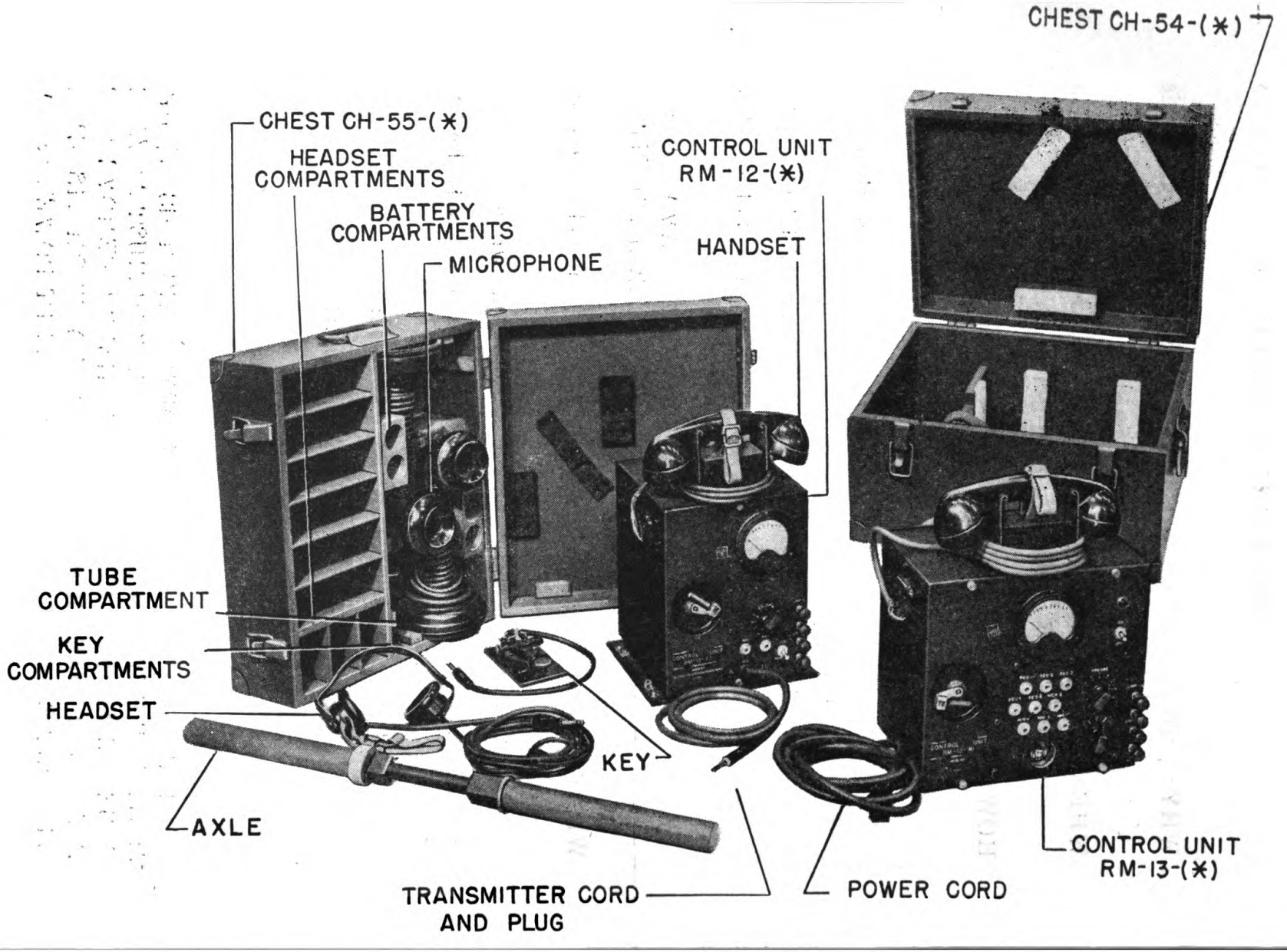


Fig. 1—*Remote Control Equiment RC-47-(*)*

Section I

DESCRIPTION

1. General

a. Remote Control Equipments RC-47-A, RC-47-B, RC-47-C, RC-47-D, and RC-47-G, (figure 1) are used with Radio Transmitter BC-191-(*). You can operate the transmitter with any of these equipments on phone, c w, or tone from the transmitter location or from a remote point. These equipments also permit telephone communication between the local and the remote operators.

b. Each of the remote control equipments consists of Control Unit RM-12-(*) (Note 1) to be operated at the radio transmitter location and Control Unit RM-13-(*) to be operated at some point remote from the transmitter. Line wires, consisting of two pairs of telephone lines, when connected between the control units, provide a microphone channel over one pair and a local battery telephone channel over the other pair. A third channel, used for telegraph, is obtained from a phantom circuit derived from the microphone pair and the local battery telephone pair. At the remote point, any one of three microphones, keys, or receivers may be selected through a rotary type three-position selector switch.

c. The operating range for Control Unit RM-13-(*) depends upon the type of telephone lines with which it is used. With field Wire W-110-B, the normal operating range is about 6 miles under wet weather conditions and about 10 miles in dry weather. The normal gain of the microphone amplifier is 17.5 db.

2. List of Components (Note 2)

Quan.	Article	Approx. Shipping Size (Inches)	Approx. Weight (lbs.)
1	Axle RL-27-A	28¾ x 2½	6
1	Chest CH-54-(*)	22 x 17 x 14	24
1	Chest CH-55-(*)	23 x 18 x 15	45
2	Microphone T-32	In Chest CH-55-(*)	
1	Tube VT-65 or VT-65-B (Note 3) (Spare)	In Chest CH-55-(*)	
1	Tube VT-94-D (Note 4) (Spare)	In Chest CH-55-(*)	

Note 1: Throughout this manual the symbol (*) used in designating equipment (i.e. RC-47-(*); RM-12-(*) etc.) is indicative of any and all equipment of that particular type. For example, Control Unit RM-13-(*) refers to any one of Control Units RM-13-A, RM-13-B, RM-13-C, RM-13-D, and RM-13-G.

Note 2: Suffix letters of control units and chests correspond to those of the complete assemblies with which they are associated. For example, Control Units RM-12-D and RM-13-D and Chests CH-54-D and CH-55-D are components of Remote Control Equipment RC-47-D. (*Exception* — Chests CH-54-H and CH-55-H are associated with Remote Control Equipment RC-47-G.)

Quan.	Article	Approx. Shipping Size (Inches)	Approx. Weight (lbs.)
1	Tube VT-126 or VT-126-B (Spare)	In Chest CH-55-(*)	
4	Battery BA-30 (Spares)	In Chest CH-55-(*)	
3	Key J-27	In Chest CH-55-(*)	
3	Key J-47	In Chest CH-55-(*)	
6	Headset HS-30-(*) or P-17 (Note 3)	In Chest CH-55-(*)	
6	Headset P-18 (Note 4)	In Chest CH-55-(*)	
6	Cord CD-605 (Note 5)	In Chest CH-55-(*)	
3	Cord CD-366		1.9
1	Control Unit RM-12-(*)		24.75
1	Control Unit RM-13-(*)	In Chest CH-54-(*)	
1	Cord (A.C. Power)	In Chest CH-54-(*)	
2	Technical Manuals TM11-312	In Chest CH-55-(*)	
As Req'd	Wire W-110-B on Reel DR-4		

3. Description of Components

a. ***Axle RL-27-A*** is used for laying the telephone lines between control units. It is carried between two persons and is equipped at each end with a handle; one can be removed to allow for the insertion of a reel of wire.

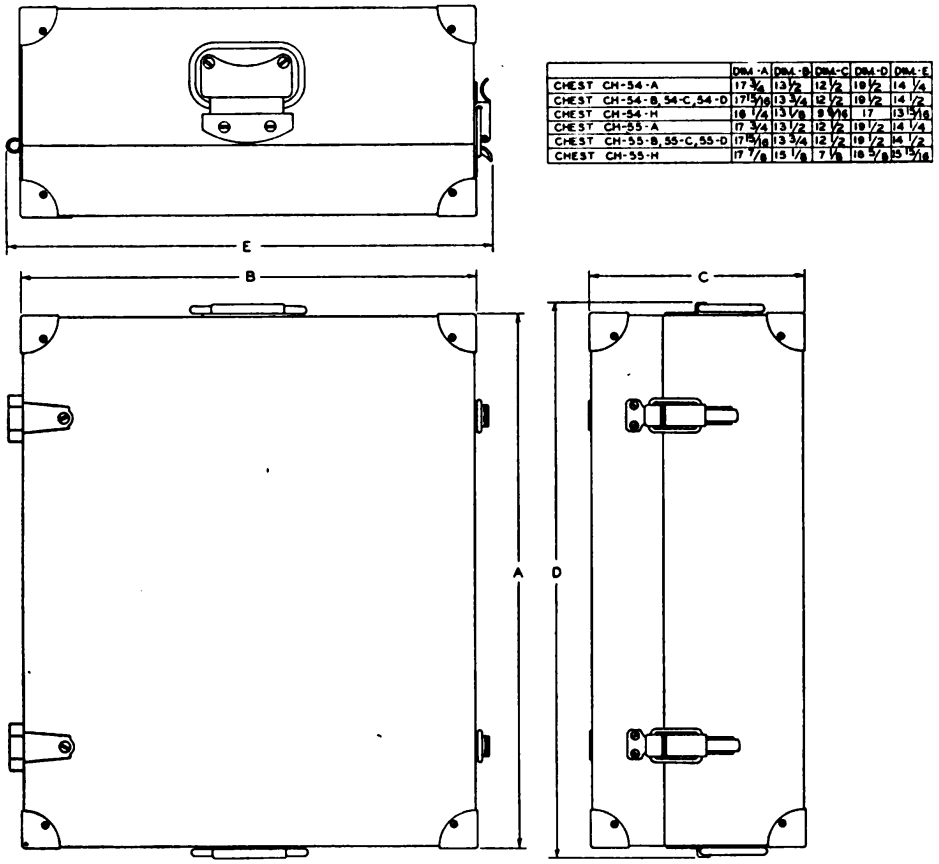
b. ***Chest CH-54-(*)*** houses Control Unit RM-13-(*). It is made of wood and finished in olive drab. Outline dimensions of two types of chests are shown in figure 2. A wooden partition in the chest provides a support for the handset cradle. Pads in the chest and inside the cover hold the unit firmly in place during transportation. The chest is fitted with one or two pull-down catches on the front and a metal carrying handle at each end. A web strap serves as a handle for lifting or lowering the control unit from or into the chest.

c. ***Chest CH-55-(*)*** houses the parts required in the operation of Remote Control Equipment RC-47-(*). It is made of wood and finished in olive drab. Outline dimensions of the two types of chests are shown in figure 2. One section of the chest is divided into nine compartments for holding six headsets and three telegraph keys. Retaining blocks and cleats provide mounting space for four batteries and two vacuum tubes. The microphone compartment accommodates two microphones. The case is fitted with two pull-down catches on the front and a metal carrying handle at each end.

Note 3: For use with RC-47-A, RC-47-B, RC-47-C, and RC-47-D only.

Note 4: For use with RC-47-G only.

Note 5: For use with Headset HS-30-(*) only.



	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E
CHEST CH-54-A	17 3/4	13 1/2	12 1/2	10 1/2	14 1/4
CHEST CH-54-B, 54-C, 54-D	17 5/16	13 3/4	12 1/2	10 1/2	14 1/2
CHEST CH-54-H	18 1/4	13 1/8	8 9/16	17	13 15/16
CHEST CH-55-A	17 3/4	13 1/2	12 1/2	10 1/2	14 1/4
CHEST CH-55-B, 55-C, 55-D	17 5/16	13 3/4	12 1/2	10 1/2	14 1/2
CHEST CH-55-H	17 7/8	13 1/8	7 1/8	18 5/8	35 15/16

Fig. 2—*Chests CH-54-(*) and CH-55-(*)—outline dimensions*

d. ***Microphone T-32,*** figure 3, is a single button carbon-granule type microphone, mounted on a desk stand and equipped with a PRESS TO TALK switch. This switch, when operated, connects the microphone to the amplifier circuit and also energizes the keying relay in Control Unit RM-12-(*). The microphone is equipped with a cord and plug for a jack connection to Control Unit RM-13-(*).

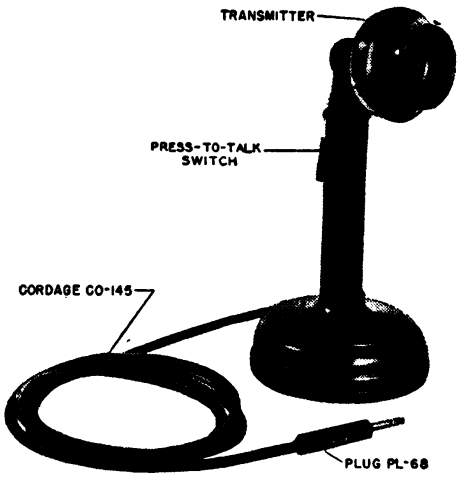


Fig. 3—*Microphone T-32*

e. ***Battery BA-30*** is a standard 1½-volt dry cell. Two of these batteries are required for operating Telephone EE-8-A or EE-8-B. The batteries are mounted in the battery compartment of the telephone chassis.

f. ***Key J-47*** is a standard telegraph key used to operate transmitter BC-191-(*) on c w from the remote and the local points.

g. ***Cord CD-133-A*** is a two-conductor cord fitted with a plug and is used for connecting Key J-47 to the set through the key jacks of the control units.

h. ***Headset HS-30-(*), P-17 or P-18*** are used at the remote control point in connection with the radio receiver.

i. ***Cord CD-605*** is used to connect Headset HS-30-(*) to Receiver BC-342-(*) through a suitable matching transformer.

j. ***Cord CD-366*** is a two-conductor cord fitted at one end with Plug PL-55 for connection to the receiver jacks on Control Unit RM-13-(*), and Plug PL-114 at the other end for connection to the radio receiver disabling jacks.

k. ***A-C Power Cord CD-370*** is used to connect Remote Con-

(For identification of parts see Fig. 5)

Fig. 4—*Control Unit RM-12-A*

trol Unit RM-13-(*) to either 110-volt a-c or 220-volt a-c, 60 cycle current supply.

*l. **Control Unit RM-12-(*)**,* (figures 4 and 5) is used at the radio transmitter location as the local control unit. It has a double-pole, double-throw switch for transferring the transmitter facilities to Control Unit RM-13-(*). It consists of a steel chassis upon which are mounted the line impedance matching transformers, keying relay, resistors, and capacitors. A metal panel is fastened to the chassis and mounts the control switches, jacks, binding posts, and meter. A three-conductor microphone cord and a two-conductor keying cord extend through the front of Control Unit RM-12-A panel for connecting to the radio transmitter. One three-conductor cord is used for Control Units RM-12-B, RM-12-C, RM-12-D, and RM-12-G and can be used for either the microphone or KEY connection to the transmitter. Telephone EE-8-B forms a part of the control unit, the telephone

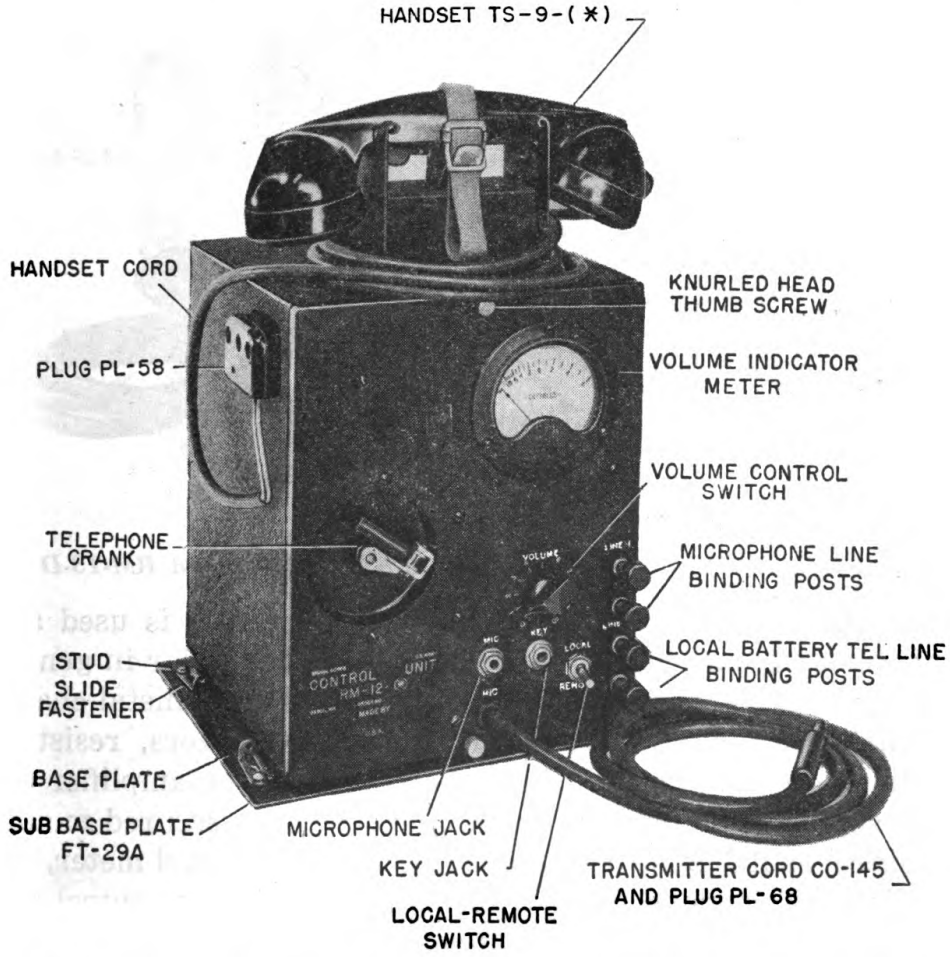


Fig. 5—*Control Units RM-12-B, RM-12-C, RM-12-D, and RM-12-G*

chassis being mounted on the back of the panel and the handset in a cradle on top of the control unit case which houses the entire assembly. The panel forms the front of the case and is secured to the case by means of knurled head thumb screws. Power for energizing the microphone circuit and keying relay, with the LOCAL REMOTE switch of Control Unit RM-12-(*) at LOCAL is derived from the radio transmitter through a cord and plug connection. The control unit is designed for mounting either in Chest CH-27-A or for operation on a desk or other flat surface (See Fig. 8).

(For identification of parts see Fig. 7)

Fig. 6—*Control Units RM-13-A, RM-13-B, RM-13-C, and RM-13-D*

m. ***Control Unit RM-13-(*),*** figures 6 and 7, is used at a point remote from the radio transmitter. It is similar in general design to Control Unit RM-12-(*) and consists of a metal chassis on which are mounted the transformers, capacitors, resistors, vacuum tubes, and choke coils associated with the amplifier and power supply. The panel to which the chassis is secured mounts the control switches, jacks, binding posts, output level meter, and pilot light. Telephone EE-8-B forms a part of this control unit and is mounted in the same manner as in Remote Control Unit RM-12-(*) (Par. 31).

(1) The amplifier equipment consists mainly of a single stage of amplification, an input transformer, output transformer, volume control potentiometer, and the necessary biasing resistors and capacitors.

(2) The power equipment which forms a part of Control Unit RM-13-(*) supplies the a-c and d-c voltages required for the operation of the amplifier as well as the d-c voltages for the microphone circuit and keying relay in Control Unit RM-12-(*). The equipment consists of a power transformer, full-wave vacuum tube rectifier, selenium rectifier, high voltage and low voltage filters.

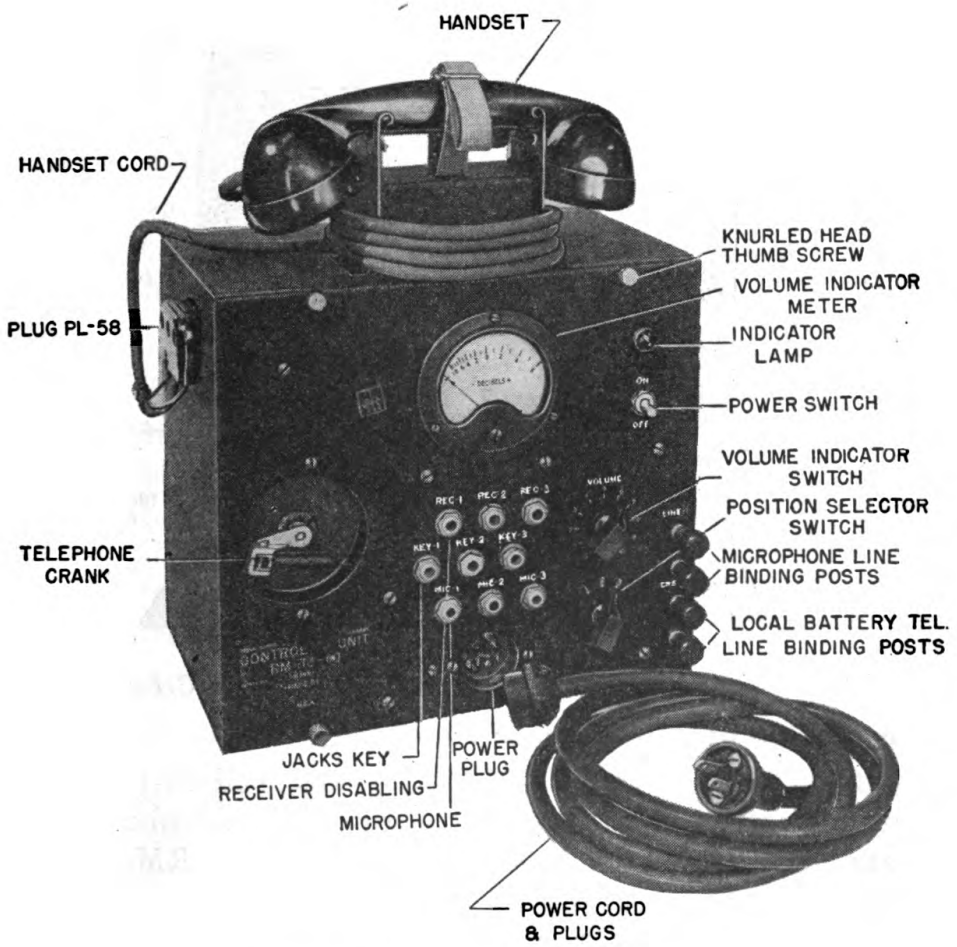


Fig. 7—*Control Unit RM-13-G*

(3) The chassis and panel assembly can be removed easily from the case by loosening the four knurled head thumb screws which secure the panel to the case.

Section II

INSTALLATION AND OPERATION

4. Line Wire

Determine the locations for the radio transmitter and remote stations and lay the line wires between these points. Axle RL-27-A is used for this purpose and carries a reel of wire which unreels as the axle is carried forward. To insert the reel of wire on the axle, release the removable handle lock by a slight rotation of the brass knurled ring and withdraw the handle from the arbor. Insert the arbor through the reel and replace the removable handle into full engagement until the spring catch locks in position. It isn't necessary to turn the knurled ring when replacing the handle.

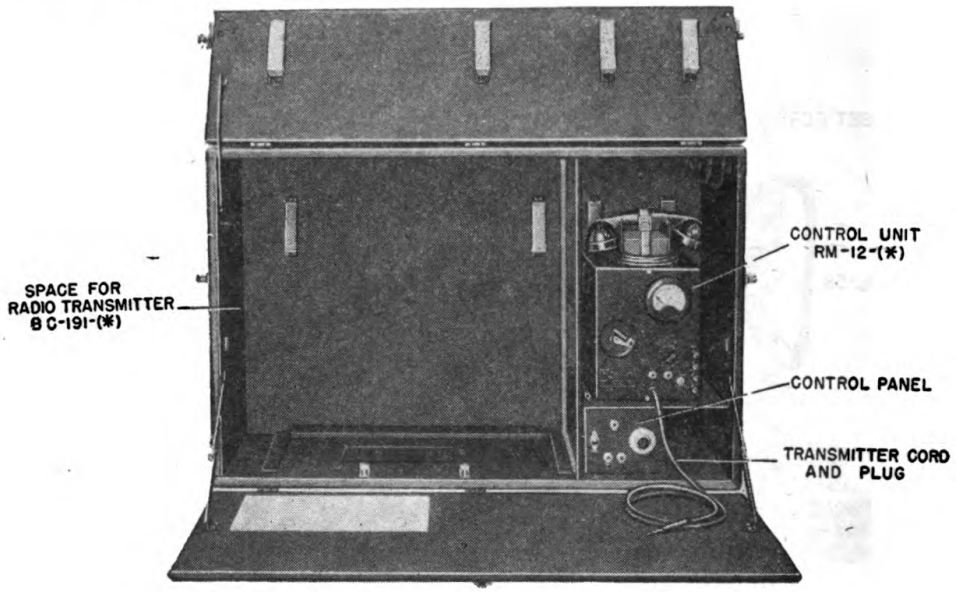


Fig. 8—*Control Unit RM-12-(*) mounted in chest CH-27-A*

5. Installation of Batteries and Tubes

Before Control Units RM-12-(*) and RM-13-(*) can be placed in operation, install the batteries for the telephone in each unit and install vacuum tubes in Control Unit RM-13-(*) as follows:

a. Remove the handset plug from the left side of Control Units RM-12-(*) and RM-13-(*).

b. Release the knurled thumb screws on the front of the panel and slide the chassis out of the case.

c. Install two batteries in the telephone chassis compartment of each control unit. Control Units RM-12-G and

RM-13-G have hand holes in the back of the case provided for insertion or replacement of batteries.

d. Install vacuum tubes in Control Unit RM-13-(*). The code and VT numbers of the tubes to be inserted are stamped on the chassis near their respective sockets. Each vacuum tube base has a key which aligns with the key way of the socket to insure the correct insertion of the tube.

e. Replace the chassis and panel assembly in the case.

f. Tighten thumb screws and replace handset plug.

6. Installation of Control Unit RM-12-(*)

Control Unit RM-12-(*) may be mounted in Chest CH-27-A to the right of the radio transmitter as shown in figure 8. To mount the control unit, separate the foot plate from the base plate by releasing the four snap slides located on the sides of the base plate. Mount the foot plate in Chest CH-27-A with the four No. 8-32 machine screws located in the supporting plate of the chest. Install the foot plate so that the snap slide studs are on the top side to engage with the snap slides of the base plate when the control unit is installed. Mount the control unit in the chest by fitting the base plate on the foot plate and engaging the snap slides.

7. Installation of Control Unit RM-13-(*)

a. Remove Control Unit RM-13-(*) and power cord from Chest CH-54-(*) and place the unit on the table or desk from which point it is to be operated. To remove the control unit from the chest, lift up on the free end of the web strap which passes under the cabinet of the control unit, thus raising the unit to a position where it can be readily handled.

b. Install telephone batteries and vacuum tubes (see Par. 5).

c. Check that ON-OFF Switch is at OFF position.

d. Plug the power cord into the power receptacle of the control unit and connect the other end into the local 110-volt, 60 cycle source.

CAUTION: CONTROL UNIT RM-13-(*) IS NORMALLY WIRED FOR 110-VOLT OPERATION. DON'T CONNECT THE UNIT TO THE LOCAL SUPPLY UNTIL THIS VOLTAGE HAS BEEN CHECKED. IF THE SUPPLY VOLTAGE IS 220-VOLTS, CHANGE THE POWER TRANSFORMER (ITEM 317) CONNECTIONS AS FOLLOWS:

For Control Units RM-13-A, RM-13-B, RM-13-C, and RM-13-D connect outside terminal 0 of the transformer to one side of the power receptacle; connect inside terminal 110 to inside terminal 0; connect outside terminal 110 to switch (Item 311).

For Control Unit RM-13-G, at terminal block (Item 333) change strap from terminals 2, 3 to terminals 1, 2.

8. External Line Connections

At the radio transmitter location, connect one pair of line wires to binding posts LINE 2 and await call. At the remote point establish connection with the transmitter point.

a. Connect two of the line wires to binding posts LINE-2 and ring.

b. If the transmitter station does not answer, connect different combinations of line wires to the same binding posts until the transmitter station answers the signal.

c. Connect the remaining pair of line wires to binding posts LINE 1 at both stations.

9. Preparation for Use of Control Unit RM-12-(*)

a. Connect Control Unit RM-12-(*) to the radio transmitter as follows:

(1) *Control Unit RM-12-A*—Insert the plug ended microphone and key cords of the control unit into the corresponding jacks located on the panel below the control unit in Chest CH-27-A.

(2) *Control Units RM-12-B, RM-12-C, RM-12-D, RM-12-G*—Insert the plug ended microphone cord of the control unit into the microphone jack located on the panel below the control unit in Chest CH-27-A.

b. Insert the plug ended cords of the local microphone and key into the MIC and KEY jacks. respectively, on the control unit.

10. Preparation for Use of Control Unit RM-13-(*)

a. Insert the plug ended cords of the microphones, keys, and receiver disabling cords into their respective jacks, MIC-1, MIC-2, MIC-3, KEY-1, KEY-2, KEY-3, REC-1, REC-2, and REC-3.

b. Turn VOLUME switch to the extreme left hand position.

c. Rotate the position selector switch to the desired operating position.

d. Throw ON-OFF switch to ON and allow about 20 seconds for vacuum tubes to warm up before proceeding.

e. Talk in a normal tone into the microphone of the selected position and slowly turn VOLUME switch to the right while talking until the volume indicator meter indicates midscale (zero decibels) on peak swings.

11. Operation of Control Unit RM-12-(*)

a. Figure 9 illustrates the operating layout of Remote Control Equipment RC-47-(*). To simplify the diagram only one microphone and one key connection is shown in connection with Remote Control Unit RM-13-(*). Selection of any one of three microphones or keys is possible in actual operation. The loss in the two two-wire interconnecting lines between control units may range from 0 to 15 db.

Control Unit RM-12-(*) functions are:

(1) Local operation of Radio Transmitter BC-191-(*).

(2) Switching control for remote operation.

(3) Local battery telephone operation in connection with Control Unit RM-13-(*).

b. Local operation of the radio transmitter may be by voice or telegraph. Voice operation is effected by pressing the PRESS TO TALK switch on the microphone stand and talking directly into the microphone in a normal tone.

In local operation the power required for microphone excitation and keying is supplied from the radio transmitter through the cord and plug connection to Control Unit RM-12-(*). In the case of voice operation, current is supplied over the ring connection of the microphone plug (203) through the contacts of LOCAL-REMOTE switch 205, at LOCAL, to the ring spring of microphone jack 201, through the PRESS TO TALK switch contacts, through the microphone and to the ground, connected to the sleeve of the jack.

For key operation the current is supplied from the tip connection of the microphone plug (203) through the contacts of the LOCAL-REMOTE switch (205) at LOCAL, through the KEY jack (202), contact of the telegraph key and then to ground through the jack (202) sleeve.

c. Switching control for remote operation is done by simply throwing the LOCAL-REMOTE switch to REMOTE position. This connects the transmitter over the microphone channel to Control Unit RM-13-(*) and breaks the connection between the transmitter and local microphone and keying circuits of Control Unit RM-12-(*).

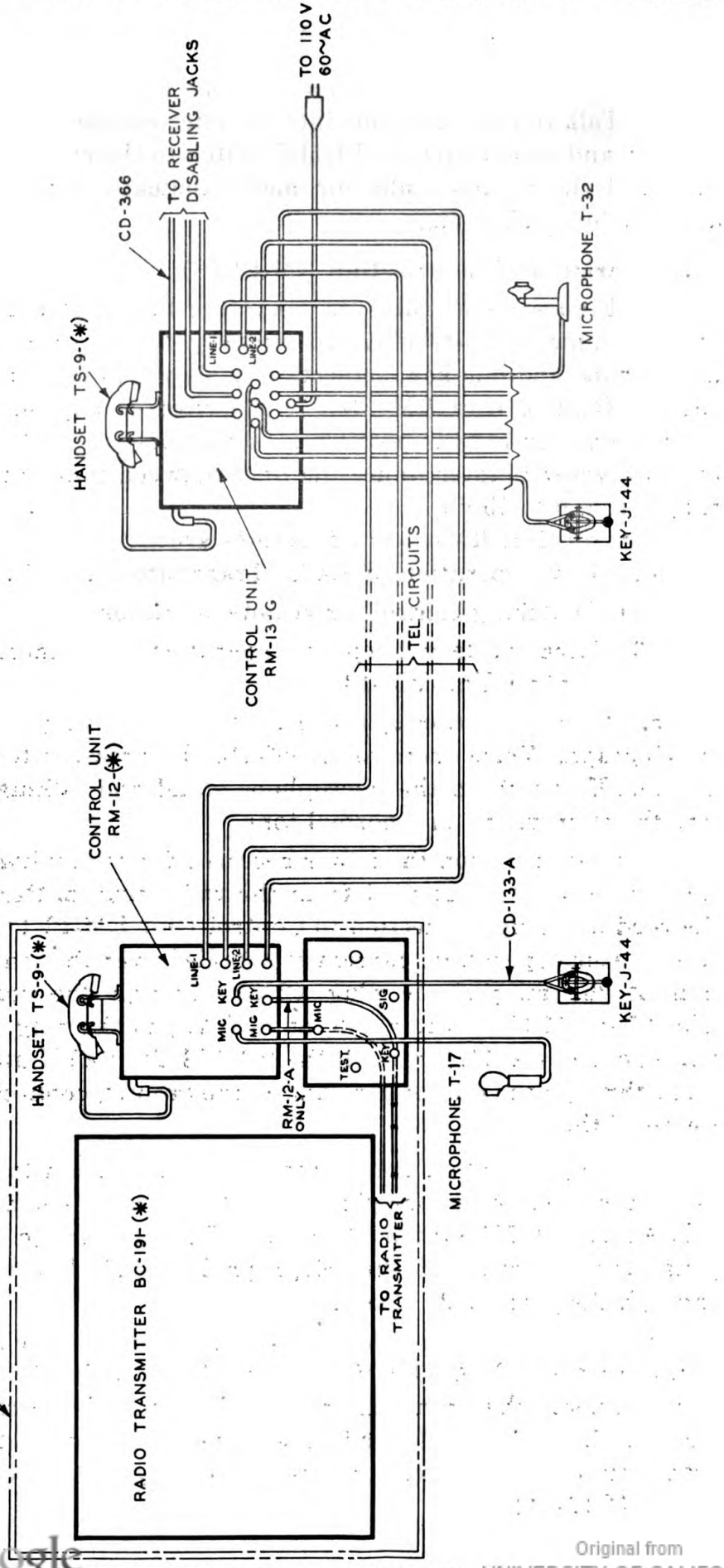


Fig. 9—Remote Control Equipment RC-47-(*)—Operating Layout

d. Local battery telephone operation is independent of the position of the LOCAL-REMOTE switch. The local battery telephone channel consists of Telephones EE-8-B connected at each end of the local battery line (Line 2) to the line terminating equipment. The terminating equipment for the RM-12-G and RM-13-G is a phantom bridge resistor consisting of two matched resistors in tandem, with a center tap brought out for the phantom keying circuit. For Control Units RM-12-A to RM-12-D and RM-13-A to RM-13-D the line terminating equipment is a transformer, also provided with a center tap for the keying circuit.

To establish contact, in either direction, with the remote station, unfold the telephone crank on the front of the panel and ring the distant station by rotating the crank briskly to the right. Remove the handset from the cradle and wait for the distant station to answer. Operate the switch located in the handgrip of the telephone set while talking. When listening, the switch must be released since the only function of the switch is to break the battery circuit to the transmitter while the phone is not in use.

12. Operation of Control Unit RM-13-(*)

a. The functions of Control Unit RM-13-(*) are:

(1) Remote operation of Radio Transmitter BC-191-(*).

(2) Power supply.

(3) Receiver disabling.

(4) Local battery telephone operation in connection with Control Unit RM-12-(*).

b. Remote operation of the radio transmitter may be by voice or telegraph and is effected by talking directly into the microphone in a normal tone or by operating the key for telegraph operation. A choice of any one of three microphones or three keys is afforded through a three-position rotary, selector switch.

c. The power supply for the microphone excitation, keying, and receiver disabling as well as the voltages required for operating the vacuum tubes is obtained from the power supply equipment forming a part of Control Unit RM-13-(*). The power equipment consists of a power transformer arranged for 110-volt or 220-volt connection to the local 60 cycle supply by means of a two-conductor cord with plug and receptacle. Four transformer secondary windings provide the voltages for the filament of the amplifier tube, filament of the rectifier tube, plate of the rectifier tube, and low voltage selenium rectifier which supplies the direct

current for microphone excitation, key, and receiver disabling. A high voltage and a low voltage filter associated with the rectifier tube and selenium rectifier respectively, function to produce approximately steady d.c. currents required for operation of the microphone and keys.

*d. **Receiver disabling*** is accomplished by depressing the PRESS TO TALK switch or by operating the telegraph key. The purpose of the disabling circuit is to cut out any of the three radio receivers which may be connected through to the radio transmitter over the line wires when it is desired to use the channel for microphone or keying. A receiver disabling relay associated with each radio receiver short circuits the antenna and ground connection of the receiver when the microphone switch or key is operated. The control unit is arranged for the connection of three radio receivers, any one of which may be connected to the transmitter.

e. Local battery telephone operation is described in paragraph 11*d*.

13. Combined Operation of Control Units RM-12-(*) and RM-13-(*)

a. Ring the radio transmitter station by turning the crank of Telephone EE-8-B. Remove the handset from the cradle on top of the unit and await response from the signalled station. *Operate the switch on the handset grip only when talking to the distant station.*

b. At the transmitter station, under directions issued from the remote station, throw the LOCAL-REMOTE switch to REMOTE and turn off the radio transmitter. At the remote station, turn the position selector switch to the desired operating position and talk over the local microphone plugged to this position. Close PRESS TO TALK switch on the microphone while talking. Talk long enough to allow the operator at the radio transmitter end to turn the VOLUME switch until the needle of the volume meter indicates midscale (0 decibels). During this interval turn the VOLUME switch at the remote station for a midscale deflection of the needle.

c. Use the local battery telephone channel to make sure the volume indicator adjustment has been made at the radio transmitter station. Turn on the radio transmitter. Voice or key operation of the radio transmitter is now possible through the microphone or by plugging the key into the respective jacks.

Section III
FUNCTIONING OF PARTS

14. Theoretical Considerations

a. The transmission quality of speech or other signals over telephone lines depends upon the characteristic impedance of the line wire between terminal points. It also depends upon the characteristics of the terminal equipment, the proper impedance matching between line and terminals, and the amplification which must be introduced to make up for the loss in energy over the line.

b. Remote Control Equipment RC-47-(*) is for use with two-wire lines whose characteristic impedance at 1,000 cycles is approximately 600 ohms. Similarly, the impedance of the transformer coils which couple the microphone to the amplifier matches the impedance of the microphone on the primary side and the vacuum tube grid on the secondary side. A simplified schematic

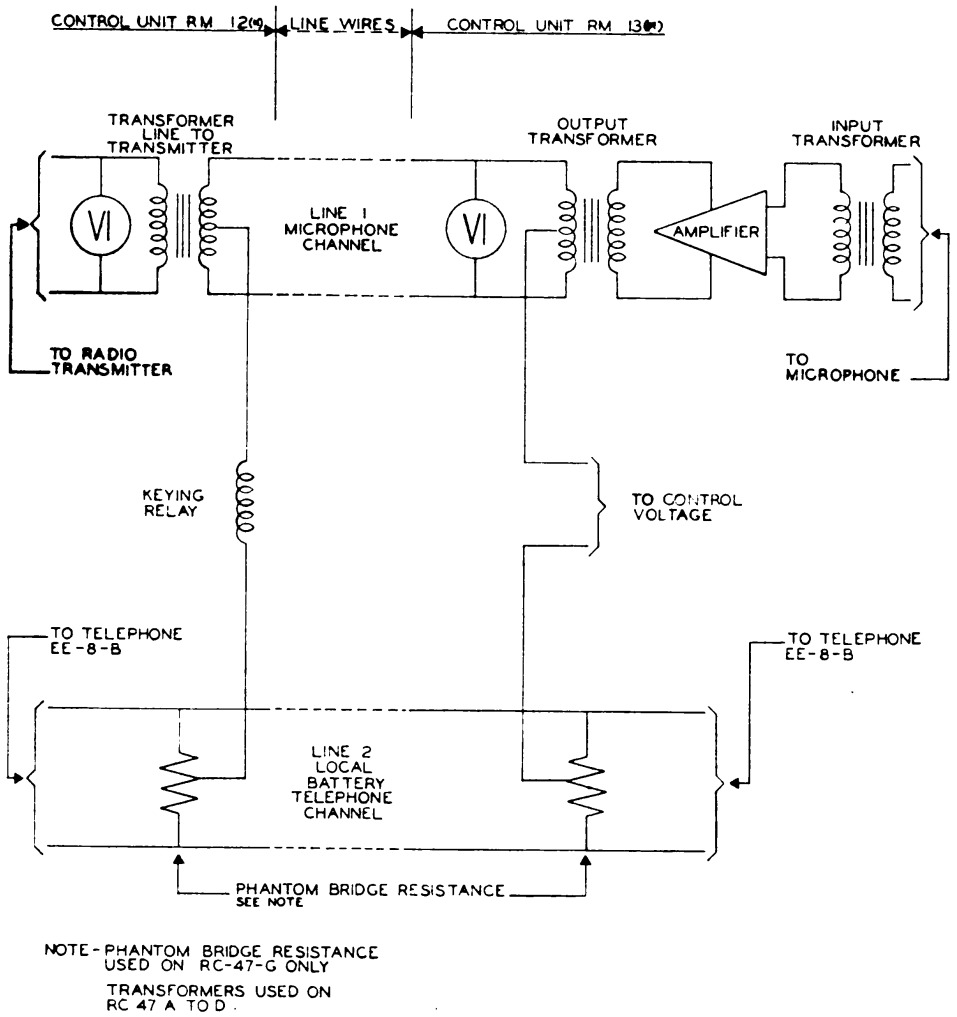


Fig. 10—*Functional diagram*

of the operation of the main components of the remote control equipment is shown in the functional diagram (Fig. 10).

c. The amplifier raises the speech level or signal strength to a proper value for transmission over the line. The output level is controlled at the remote point by a volume control potentiometer. The strength of the audio signal received at the transmitter is controlled by an adjustable resistance.

15. Equipment Arrangement

a. ***Control Unit RM-12-(*)*** is a self contained unit with the dimensions as shown in figure 11. Switching, control, and indicating equipment as well as facilities for external connections which are mounted on the front panel consist of:

(1) 1 – Volume indicator meter (−10 to +6 db scale)
(2) 1 – Volume control switch
(3) 1 – Jack JK-33-A (microphone)
(4) 1 – Jack JK-34-A (key)
(5) 1 – Microphone cord
(6) 1 – Key cord (See Note 6)
(7) 1 – Local remote switch
(8) 4 – Binding Posts (line connections)
(9) 1 – Telephone EE-8-B, crank

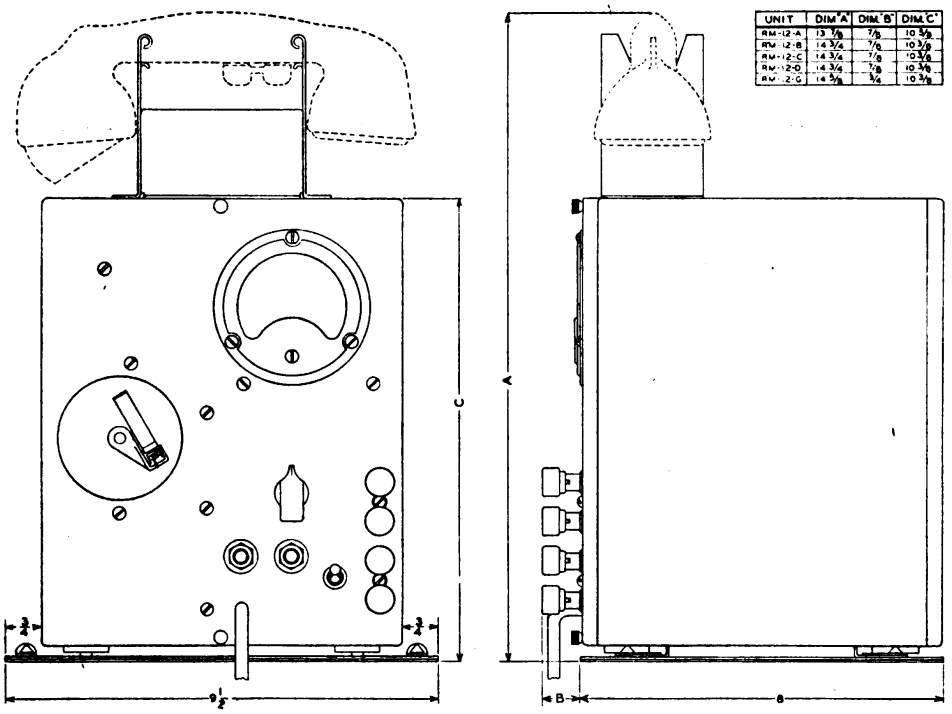


Fig. 11—*Remote Control Unit RM-12-(*)—outline dimensions*

Note 6: Supplied with Control Unit RM-12-A only.

The ouput of Control Unit RM-12-(*) is connected to Radio Transmitter BC-191-(*) by the cord and plug forming a part of the control unit. The telephone handset, strapped in a cradle on top of the case, has a three-conductor cord and plug which connects to the telephone set terminals through a hole in the side of the case.

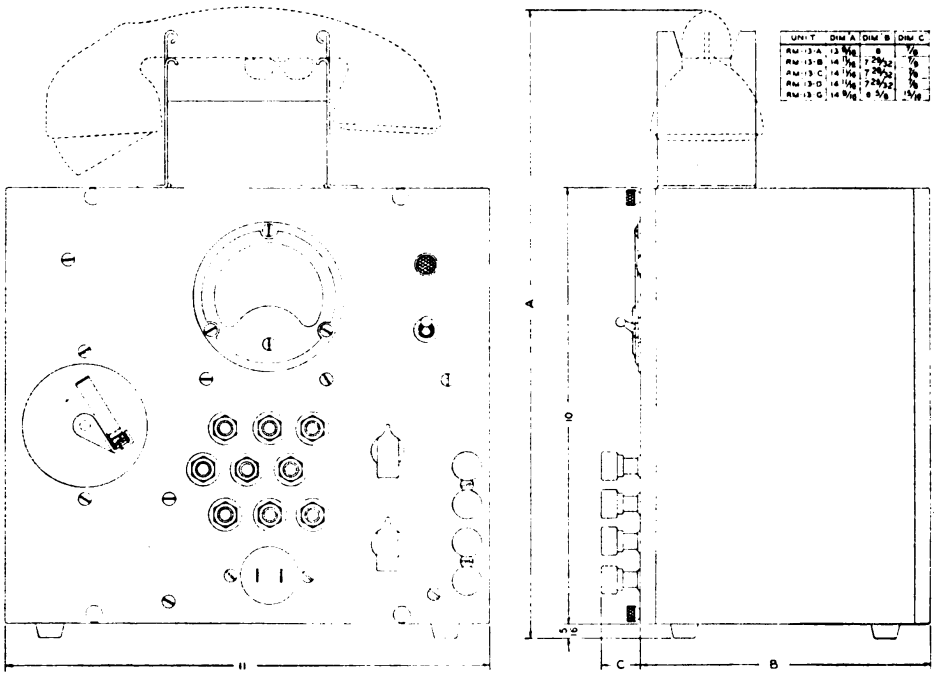


Fig. 12—*Remote Control Unit RM-13-(*)—outline dimensions*

Foot plate Mounting FT-294 is provided as a sub-base for mounting the unit in Chest CH-27-A. In addition, a base plate is provided on which are mounted four snap slide levers which engage the snap slide studs on the sub-base plate. The base plate is attached to the control unit by shock mountings to protect the equipment against excessive jars. A circuit label is attached inside the case.

b. ***Control Unit RM-13-(*)*** is also a self-contained unit, the dimensions of which are as shown in figure 12. All control and indicating equipment, switching, and provisions for external connections are panel mounted and consist of the following:

(1) 1 – Volume indicator meter (—10 to +6 db scale)
(2) 1 – Volume control switch
(3) 3 – Microphone jacks
(4) 3 – Key jacks
(5) 1 – Three-pole, three-position selector switch
(6) 1 – S.P. S.T. power switch

(7) 1 – Pilot indicating lamp
(8) 1 – Power Socket
(9) 4 – Binding posts (line connections)
(10) 1 – Telephone EE-8-B, crank

The primary power required for operating Control Unit RM-13-(*) is obtained from a 110-volt, 60 cycle source for which the equipment is normally connected. Windings are provided on the power transformer of the power supply equipment for 220-volt operation. Connections between the 110-volt supply and the control unit are made by a two-conductor, rubber-covered cable equipped with a receptacle at the control unit end and a molded rubber plug for connecting to the local 110-volt power supply outlet. A circuit label of this unit is attached to the back, inside the case.

16. Control Unit RM-12-(*)

a. ***Jacks***—Jacks for connecting a local microphone and key are provided on the front panel. Microphone jack 201 is a three spring (tip, ring, and sleeve) jack. Excitation current is connected to the microphone through the ring spring. The tip spring is used in the control circuit. The sleeve spring is grounded.

The KEY jack 202 is a two spring (tip and sleeve) jack. Current for keying is connected to the tip spring and the sleeve spring is grounded.

b. ***Transmitter input cords***—Control Unit RM-12-A is provided with two five feet plug ended cords for connecting the output of the control unit to the transmitter. One cord is used as the microphone cord and one cord as the key cord. For Control Units RM-12-B, RM-12-C, RM-12-D, and RM-12-G only one such cord is used between the transmitter and control unit and serves for either the microphone or key output.

c. ***LOCAL-REMOTE switch 205*** is a double-pole, double-throw switch used for the selection of either local or remote operation of the radio transmitter.

d. ***Keying relay 206*** is a direct current relay having a resistance of 2,000 ohms ±10%. It closes its contacts when the telegraph key is closed and puts ground on the tip of the KEY jack. When the telegraph key is opened, the relay releases. The circuit is from ground on the sleeve of the KEY jack, through the key plugged into the jack, over the tip spring of the KEY jack, through the selector switch (312) to the negative side of low voltage rectifier, through the rectifier to the mid-point of output

transformer 315, over line wires LINE 1 to the mid-point of transformer 210, through the relay winding to the mid-point of transformer 211, over line wires LINE 2 to transformer 316 and then to ground at the mid-point of transformer 316. Keying relay 206 responds to the open and closed conditions of the telegraph key and keys Radio Transmitter BC-191-(*).

e. ***Volume indicator meter 207*** shows the audio level or signal strength received over the line. It is a standard meter having a −10 to +6 db scale with zero level at midscale. The meter is calibrated on the basis of .0006 watts into 600 ohms or .600 volts at midscale (See Fig. 13).

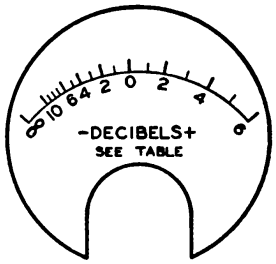


TABLE OF ZERO DB EQUIVALENTS

UNIT	VOLTS	OHMS	MILLIWATTS
RM-12-A	.548	500	0.6
RM-13-A	1.730	500	6.0
RM-12-B,C,D	0.600	600	0.6
RM-13-B,C,D	1.900	600	6.0
RM-12-G	.600	600	0.6
RM-13-G	1.897	600	6.0

Fig. 13—*Volume Indicator Meter Dial—Control Units RM-12-(*) and RM-13-(*)*

f. ***Blocking capacitor 208*** is a 10 μf capacitor used to isolate the d.c. microphone voltage, supplied from the transmitter, from the volume indicator meter.

g. ***Volume control 209*** is a variable resistance used to control the strength of the signal received from Control Unit RM-13-(*). If you turn the pointer knob to the right you will increase the audio level of the incoming signal, and if you turn the knob to the left you will decrease the level. Adjust the volume control switch until the volume indicator meter needle points to zero on peak swings.

h. ***Transformer 210*** is an impedance matching transformer having a 600 ohm primary impedance to match the characteristic impedance of the line wire and a secondary impedance of 150 ohms to match that of the microphone. On the line or primary side a center tap is provided for phantom keying.

i. ***Line terminating equipment 211*** consists of a transformer or a phantom bridge resistance connected in LINE 2 providing a center tap for phantom keying. Transformers are used in Control Units RM-12-A, RM-12-B, RM-12-C and RM-12-D. The phantom bridge resistor is used in Control Unit RM-12-G.

j. ***Capacitor 213 and resistor 214*** are wired across the contact of keying relay 206 and reduce the sparking at the relay contacts and consequent sticking of the contacts.

k. ***Resistor 215 or 215 & 216*** is a voltage attenuator resistor, which reduces the input into Radio Transmitter BC-191-(*) to 0.3 volt when the volume indicator meter indicates midscale. Without the attenuator in the circuit the input level to the transmitter is almost doubled. Control Unit RM-12-A doesn't use an attenuator. Control Units RM-12-B, RM-12-C, and RM-12-D use a network pad (215) as the attenuator and Control Unit RM-12-C uses two resistors (215 and 216) connected in tandem across the volume indicator meter.

17. Control Unit RM-13-(*)

a. ***Jacks***—Three sets of three jacks each for connecting local microphones, keys, and radio receivers are provided on the front panel. The microphone jacks (301) are three-spring jacks, the same as jack 201 on Control Unit RM-12-(*). The ring springs are used in the audio or voice circuit and the tip springs carry the excitation current through the microphone to ground on the sleeve springs.

The KEY jacks and receiver jacks 304 are two-spring jacks, the same as jack 202 on Control Unit RM-12-(*). All sleeve springs are grounded and the tip springs are used in the control circuit.

b. ***Plug receptacle 310*** is a two-conductor plug attached to the power cord for Control Unit RM-13-(*) and arranged for connecting to a standard 110-volt, 60-cycle power outlet.

c. ***Switch 311*** is a single pole, single throw switch used to turn the power on or off in the power supply circuit.

d. ***Switch 312*** is a three-pole, three-position, break-before-make, rotary type switch for selecting any one of three jack positions.

e. ***Rectifier 313*** is a low voltage selenium rectifier. It converts the a-c supply derived from one of the secondary windings of the power transformer to d-c supply required for the receiver

disabling, microphone excitation, and keying circuits associated with Control Unit RM-13-(*).

f. ***Transformer 314*** is an audio-input transformer for the amplifying equipment. It is an impedance matching transformer used between the microphone (150 ohms) and the grid circuit. The impedance of the grid circuit for Control Units RM-13-A, RM-13-B, RM-13-C, and RM-13-D is 75,000 ohms. For Control Unit RM-13-G the impedance is 100,000 ohms.

g. ***Transformer 315*** is an audio-output transformer for the amplifier. It serves as an impedance matching transformer between the plate circuit of the vacuum tube (15,000 ohms) and the line (600 ohms).

h. ***Line terminating equipment 316.*** See Line terminating equipment 211 described in paragraph 16*i*.

i. ***Transformer 317*** is a power transformer. The primary winding is designed for connection to a 110-220 volt, 60-cycle source. Four secondary windings provide the voltages for the filament of the amplifier tube (338), filament of the power tube (339), plates of the power tube (339), and low voltage rectifier (313).

j. ***Lamp 318*** is a miniature type indication lamp. It lights when the power transformer (317) is energized.

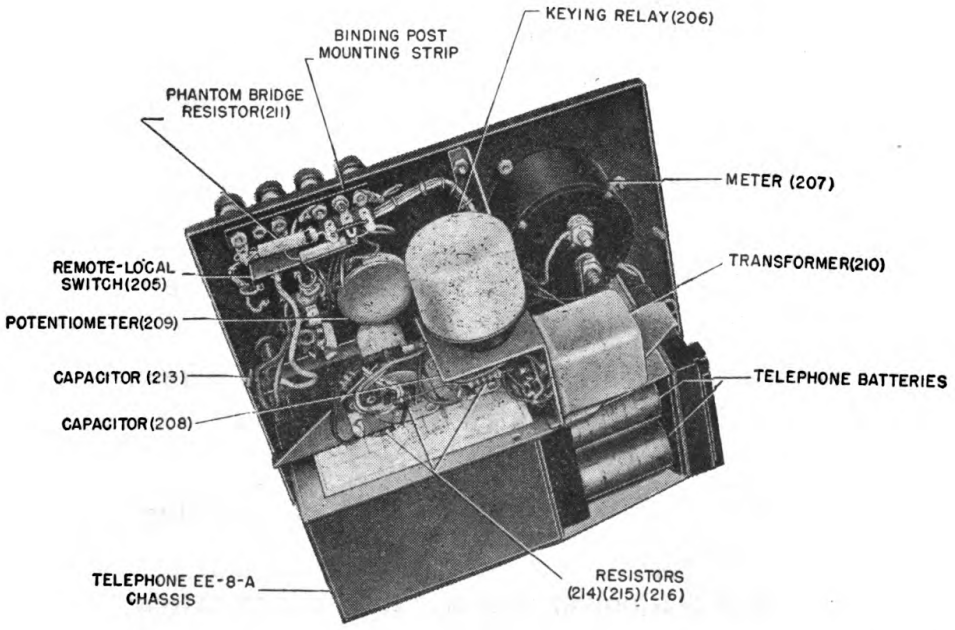


Fig. 14—*Control Unit RM-12-G—chassis equipment*

k. ***Capacitor 319*** is a by-pass capacitor for cathode bias resistor (327) and is used to reduce degeneration or the effect of imposing a-c speech current on the normally d-c biased cathode.

l. ***Capacitor 320*** is a plate return by-pass capacitor and keeps the a-c speech current out of the d-c plate circuit.

m. A high voltage filter in connection with the rectifier tube (339) is required to smooth out the ripple in the rectified current. This filter consists of capacitors and resistors or capacitors and choke coil connected in the output circuit of the vacuum tube.

(1) For Control Units RM-13-A, RM-13-B, RM-13-C, and RM-13-D this filter consists of resistors 329, 330, 336, and capacitor 321.

(2) For Control Unit RM-13-G the filter uses a capacitor 321 and choke coil 330.

n. A low voltage filter is used similarly to the high voltage filter in connection with selenium rectifier 313. For Control Unit RM-13-A this filter consists of resistors 331 and 335, capacitors 322, 323, 324, and 325 and choke 341.

(1) For Control Units RM-13-B, RM-13-C, and RM-13-D the filter consists of resistors 331 and 335, capacitors 322 and 324 and choke 341.

(2) For Control Unit RM-13-G, resistor 334, capacitors 322 and 324 and chokes 331 and 341 are used.

o. ***Potentiometer 326*** is a variable resistance used to adjust the amplifier gain to obtain the proper output level.

p. ***Resistor 327*** provides bias voltage to the cathode of tube (338).

q. ***Resistor 328*** is used with the volume indicator meter to extend the range of the meter.

r. ***Meter 337*** indicates the audio level being transmitted over the line. The meter is calibrated on the basis of .006 watt into 600 ohms or 1.9 volts midscale (See Fig. 13).

s. ***Tube 338*** is an audio amplifier which amplifies the microphone speech current.

t. ***Tube 339*** is a power rectifier tube which provides the rectified potential for the plate circuit of tube 338.

Section IV

MAINTENANCE

18. Inspection

a. Before placing the control units in operation and at regular intervals thereafter, inspect the equipment to see that proper working of parts is not delayed. Keep contact springs of jacks, plugs, switch contacts, and relay contacts free from dirt and grease. Check contact springs for proper pressure.

b. Batteries used with Telephone EE-8-B must give approximately 30 hours of intermittent operation. Since this figure is by no means exact, you must check batteries with a voltmeter, and replace when the voltage of each cell drops to 0.9 volt.

c. ***Test line wires frequently for shorts and grounds.*** Ringing current from Telephone EE-8-B and normal communication over each pair of line wires will indicate conditions. Turn the knob of the volume indicator switch to check the operation of the volume indicator meter during conversation.

d. Check the operation of the vacuum tubes in Control Unit RM-13-(*) by closing the power switch and noting whether the rectifier power tube lights up. Tap the amplifier tube lightly to check its operation. If the tube is functioning properly, you will hear a slight rushing sound together with microphonic noises when the tube is tapped and these sounds will become louder when the VOLUME switch is turned to the right.

e. ***Test vacuum tubes at least once a month and replace when necessary. When inserting tubes into vacuum tube sockets watch out that the key on the base of the tube is aligned with the key way of the tube socket.*** An indicator lamp on Control Unit RM-13-(*) will light when the power transformer is energized. This lamp has a screw type base and can be removed easily for replacement.

19. Servicing

a. Transformers, capacitors, resistors, lamp, switches, and volume control must be replaced only as necessary. To locate trouble in either of the control units, take the chassis out of the case, disengage the panel and swing it clear of the chassis. This allows you to reach easily the terminals on the rear of the panel and the parts that are mounted on the chassis for test purposes.

(1) Figures 14 to 18 show the arrangement of control unit equipment on their respective chassis.

(2) Schematic and wiring diagrams of the RM-12-(*) and

RM-13-(*) are shown in figures 19 to 28.

(3) Wiring of the vacuum tube sockets is shown in figure 29.

(4) The resistor color code is given in figure 30.

(5) Wire colors specified in the wiring diagrams are followed in the main; occasionally other colors are substituted. For instance green-white or blue-white may be used for the green wire connecting Telephone EE-8-B in Control Unit RM-12-G; yellow-white may be used for the yellow wire connecting Telephone EE-8-B in Control Unit RM-13-G; blue-slate may be used for the black-white wire in the main cable of Control Unit RM-13-G.

(6) Black braided wire is used for ground connections. The wiring diagrams show one method of looping the ground wire to the various terminals, but any other convenient method may be employed.

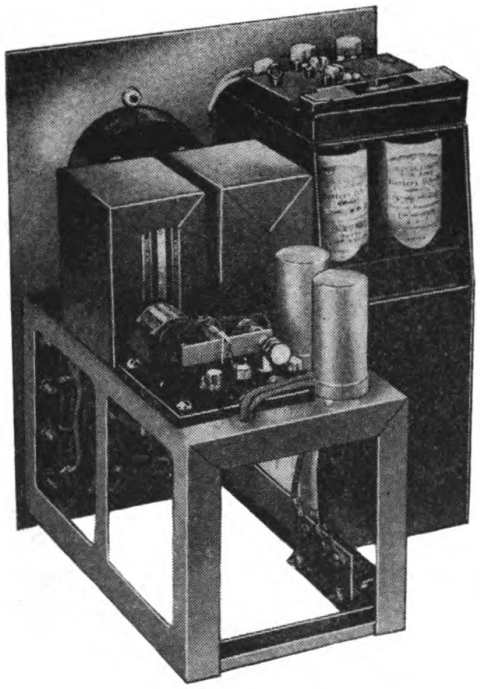


Fig. 15—*Control Units RM-12-A, RM-12-B, RM-12-C, RM-12-D—chassis equipment*

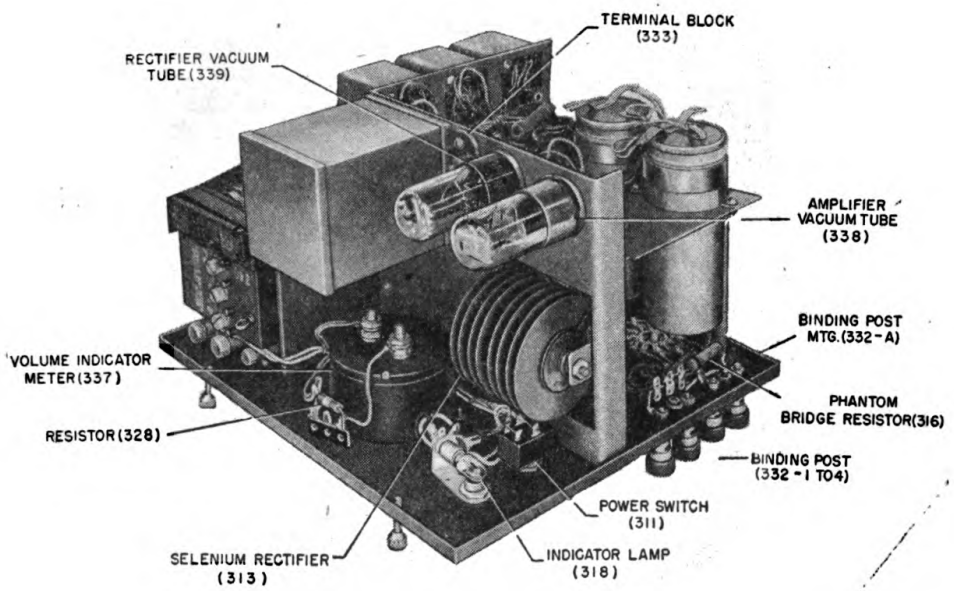


Fig. 16—*Control Unit RM-13-G—chassis equipment, top view*

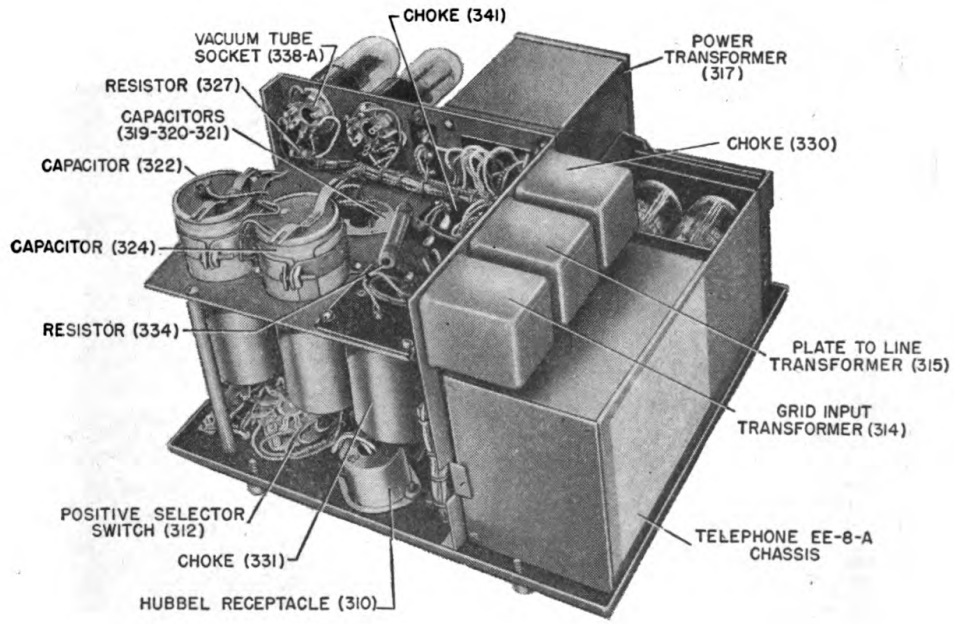
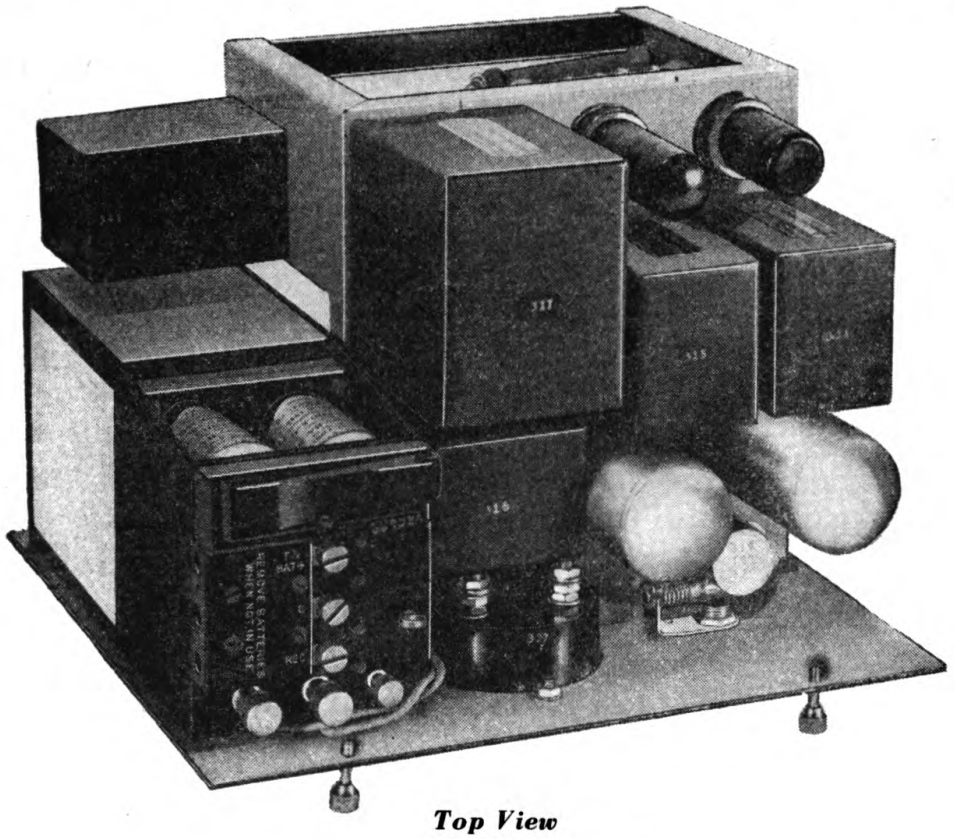
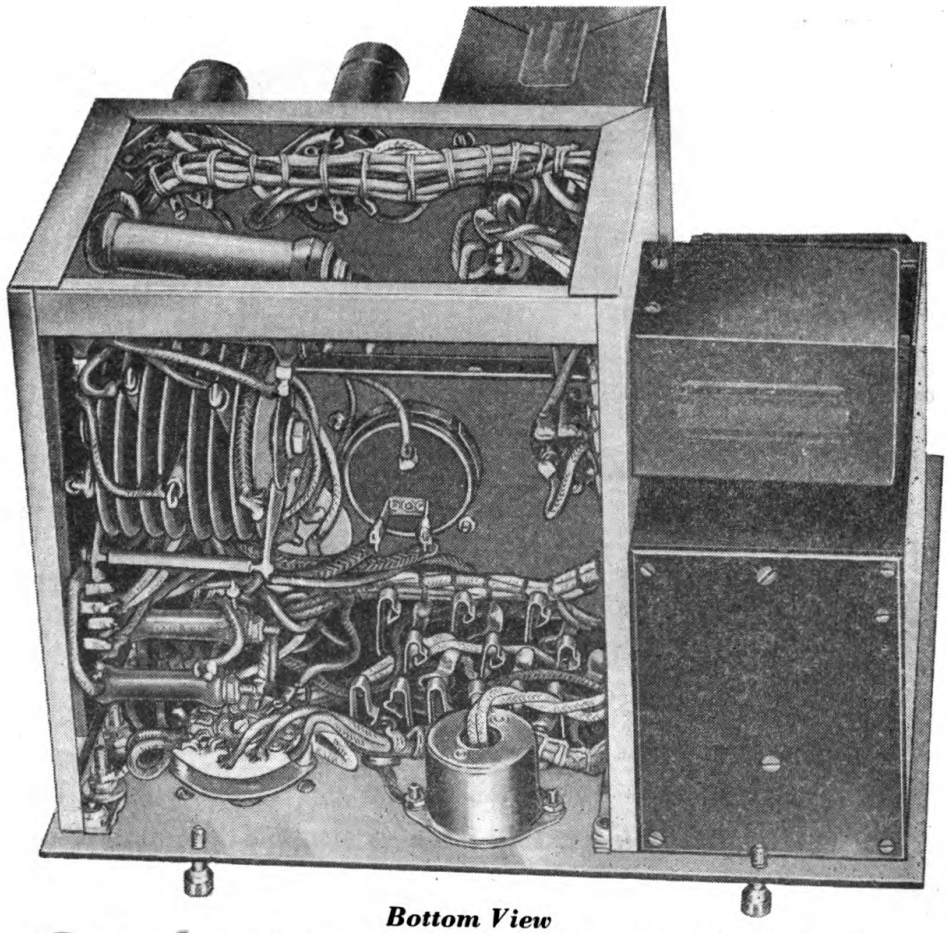


Fig. 17—*Control Unit RM-13-G—chassis equipment, bottom view*



Top View



Bottom View

Fig. 18—Control Units RM-13-A, RM-13-B, RM-13-C, RM-13-D—chassis equipment

20. Electrical and Mechanical Differences Between the Various Types of Control Units

a. Control Units, Type RM-12

Control Unit	Chassis & Panel	Transmitter Connections	Volume Control "T" Pad 209	Telephone Channel Terminal Equip. 211	Voltage Attenuator 215 or 215 & 216	Volume Switch 209 Calibration
RM-12-A	Aluminum	2	200/200 Ω	Transformer	None	None
RM-12-B	Steel	1	150/150 Ω *	Transformer	150/150 Ω	0 to 15
RM-12-C	Steel	1	150/150 Ω *	Transformer	150/150 Ω	0 to 15
RM-12-D	Steel	1	150/150 Ω *	Transformer	150/150 Ω	0 to 15
RM-12-G	Steel	1	300 Ω Potentiometer	Phantom bridge resistor	75 Ω and 200 Ω	0 to 10

b. Control Units, Type RM-13

Control Unit	Chassis & Panel	Volume Control Potentiometer 326	Telephone Channel Terminal Equip. 316	High Voltage Filter	Low Voltage Filter	Volume Switch 326 Calibration
RM-13-A	Aluminum	75,000 Ω	Transformer	Resistance input	Resistance input	None
RM-13-B	Steel	75,000 Ω	Transformer	Resistance input	Resistance input	None
RM-13-C	Steel	75,000 Ω	Transformer	Resistance input	Resistance input	None
RM-13-D	Steel	75,000 Ω	Transformer	Resistance input	Resistance input	None
RM-13-G	Steel	100,000 Ω	Phantom bridge resistor	Capacitor input	Choke input	0 to 10

* Being changed in field to a 500 Ω potentiometer.

21. Point to Point Resistance Measurements (Line Wires Disconnected)

a. Control Unit RM-12-(*)

From	Part	To	Part	Control and Position	Approx. D.C. Resistance Ohms RM-12-G	RM12-A to D
Top term. LINE 1	Binding post	Bottom term. LINE 1	Binding post		35	15.8
Top term. LINE 2	Binding post	Bottom term. LINE 2	Binding post		980	125
Top term. LINE 1	Binding post	Top term. LINE 2	Binding post		3,125	3,550
−Terminal of capacitor	213	Ground	Chassis		45	40
−Terminal of capacitor	208	Ground	Chassis	Volume control at 10 (ON)	68	8
−Terminal of capacitor	208	Ground	Chassis	Volume control 209 at 0	55	200

b. Control Unit RM-13-(*)

From	Part	To	Part	Control and Position	Approx. d.c. Resistance Ohms RM-13-A to D	RM-13-G
Across	310			Switch 311 at ON	8.65	23
Upper—LINE 1	Binding post	Lower—LINE 1	Binding post	No plugs in jacks	39.9	32
Upper—LINE 2	Binding post	Lower—LINE 2	Binding post		126	925
Upper—LINE 2	Binding post	Ground	Chassis		60	1,150
Lower—LINE 2	Binding post	Ground	Chassis		60	1,150
Ring MIC 1	301-1 or 301	+Terminal of capacitor	324	Switch 312 at 1	16.4	7.5
Ring MIC 1	301-1 or 301	+Terminal of capacitor	322	Switch 312 at 1	116.4	103
Ring MIC 2	301-2 or 302	+Terminal of capacitor	324	Switch 312 at 2	16.4	7.5
Ring MIC 2	301-2 or 302	+Terminal of capacitor	322	Switch 312 at 2	116.4	103
Ring MIC 3	301-3 or 303	+Terminal of capacitor	324	Switch 312 at 3	16.4	7.5
Ring MIC 3	301-3 or 303	+Terminal of capacitor	322	Switch 312 at 3	116.4	103

Socket term. 1	338	Ground	Chassis		0	0
Socket term. 2	338	Ground	Chassis		0	0
Socket term. 3	338	Ground	Chassis	Meter pointer kicks over and rises slowly to	80,000	2,000,000
Socket term. 4	338	Ground	Chassis		Infinite	Infinite
Socket term. 5	338	Ground	Chassis	Gain control 326, at max.	3,500	2,250
Socket term. 6	338	Ground	Chassis		Infinite	Infinite
Socket term. 7	338	Ground	Chassis		.6	.6
Socket term. 8	338	Ground	Chassis		1,000	800
Socket term. 1	339	Ground	Chassis		Infinite	Infinite
Socket term. 2	339	Ground	Chassis		Infinite	Infinite
Socket term. 3	339	Ground	Chassis		650	270
Socket term. 4	339	Ground	Chassis		Infinite	Infinite
Socket term. 5	339	Ground	Chassis		650	270
Socket term. 6	339	Ground	Chassis		Infinite	Infinite
Socket term. 7	339	Ground	Chassis		Infinite	Infinite
Socket term. 8	339	Ground	Chassis	Meter pointer kicks across scale and rises slowly to about (use high range of meter)	80,000	2,000,000
Socket term. 2	339	7	339		.6	.6
1 or F	314	Ground	Chassis		0	0
4 or P	315	5 or B	315		1,670	560
4 or P	315	+Terminal of capacitor	321		6,700	1,010
6 or (6.3−.45)	317	Ground	Chassis		.6	.6
11 or 500 (center)	317	Ground	Chassis		0	0
8 or 30 v	317	Ground	Chassis		Infinite	Infinite
8 or 30 v	317	9 or 30 v			2.7	2

22. Point to Point Voltages—(110 volt supply)

a. Control Units RM-13-A, RM-13-B, RM-13-C, & RM-13-D

From Terminal No.	Part	To Terminal No.	Part	Voltage	Remarks
Across	310			110 v. a.c.	
Terminal 0	317	Terminal 110	317	110 v. a.c.	
Terminal 30	317	Terminal 30	317	30 v. a.c. ±5%	Voltage for Rectifier 313
Terminal gnd	317	Terminal 500	317	250 v. a.c. ±5%	Plate voltage to 339
Lug No. 1	338	Ground	Chassis	0	Shell
Lug No. 2	338	Lug No. 7	338	6.3 v. a.c. ±5%	Heater 338
Lug No. 3	338	Ground	Chassis	170 v. d.c. ±20%	Plate 338
Lug No. 4	338				Not used
Lug No. 5	338	Ground	Chassis	0	Grid of 338
Lug No. 6	338				Not used
Lug No. 8	338	Ground	Chassis	4.5 v. d.c. ±20%	Cathode 338
Lug No. 1	339				Not used
Lug No. 2	339	Lug No. 7	339	6.3 v. a.c. ±5%	Heater 339
Lug No. 3	339	Lug No. 5	339	500 v. a.c. ±5%	Plates 339
Lug No. 4	339				Not used
Lug No. 5	339	Ground	Chassis	500 v. a.c. ±5%	Plate 339
Lug No. 6	339				Not used
Lug No. 8	339	Ground	Chassis	265 v. d.c. ±20%	Cathode 339
+Terminal rect.	313	−Terminal rect.	313	23.5 v. d.c. ±40%	Mic. key depressed
Across resistor	331			13.6 v. d.c.	Mic. key depressed
Across capacitor	324			4 v. d.c. ±40%	Mic. key depressed
Across capacitor	322			18 v. d.c.	Mic. key depressed
Across resister	336			170 v. d.c.	
Across capacitor	321			220 v. d.c.	

b. Control Unit RM-13-G

From Terminal No.	Part	To Terminal No.	Part	Voltage	Remarks
1	317	3	317	220 v. a.c. ±5%	
2	317	3	317	110 v. a.c. ±5%	
4	317	5	317	6.2 v. a.c. ±5%	
6	317	7	317	6.2 v. a.c. ±5%	
8	317	9	317	25 v. a.c. ±5%	
10	317	11	317	147 v. a.c. ±5%	
10	317	12	317	290 v. a.c. ±5%	
11	317	12	317	147 v. a.c. ±5%	
1	339				Not used
2	339	7	339	6.2 v. a.c. ±5%	
3	339	5	339	290 v. a.c. ±5%	
4	339				Not used
5	339	Ground	Chassis	147 v. a.c. ±5%	
6	339				Not used
8	339	Ground	Chassis	203 v. d.c. ±20%	
1	330	Ground	Chassis	198 v. d.c. ±5%	
+Terminal	313	−Terminal	313	22.3 v. d.c. ±5%	
2	341	1	341	5.5 v. d.c.	Mic. key depressed
2	331	1	341	21.8 v. d.c.	Mic. key depressed
2	331	2	341	16.3 v. d.c.	Mic. key depressed
1	338	Ground	Chassis	0	
2	338	7	338	6.2 v. a.c. ±5%	
3	338	Ground	Chassis	196 v. d.c. ±5%	
4	338				Not used
5	338	Ground	Chassis	0	
6	338				Not used
8	338	Ground	Chassis	5.6 v. d.c. ±20%	

23. Trouble Location and Remedy Chart

a. Control Unit RM-12-(*)

Indication	Probable Source of Trouble	Suggested Test	Remedy
	Transmitter microphone input plug 203 dirty or not properly inserted	Inspection	Clean plug and insert properly
	Transmitter key input plug 204 (used in RM-12-A only) dirty or not properly inserted	Inspection	Clean plug and insert properly
Armature on keying relay 206 operated from Control Units RM-13-A, B, C, D, or G, but doesn't key Radio Transmitter BC-191-(*)	Contacts on relay 206 are dirty	Short across relay contacts. If radio transmitter functions, the relay contacts are dirty	Clean and adjust contacts
	Switch 205 at LOCAL	Inspection	Throw switch to REMOTE
	Switch 205 defective	Short from center to bottom terminals of switch 205. If radio transmitter functions the switch is defective	Replace switch 205
Armature on keying relay 206 doesn't operate when Control Unit RM-13-A, B, C, D, or G is keyed	Contacts on relay 206 are adjusted too close	Back off on stationary contact adjustment screws	Readjust keying relay 206 contacts
	LINE-1 and LINE-2 not connected or open	Inspection	Connect tested lines
Excessive sparking and burning on Contacts of keying relay 206	Keying capacitor 213 defective	Check capacity	Replace capacitor 213
	Surge resistor 214 open	Check resistance	Replace resistor 214

	Switch 205 at LOCAL	Inspection	Throw switch to REMOTE
V.I. meter 207 indicates that radio transmitter is not modulated	Switch 205 defective	Short from center to bottom terminals of switch 205. If radio transmitter functions the switch is defective	Replace switch 205
	Plug 203 dirty or not properly inserted	Inspection	Clean and insert properly
	Open Modulator LINE-1	Check LINE-1 for open	Repair line
	Defective Volume Control 209	Open volume control over complete travel and check for open winding	Replace volume control 209
V.I. meter 207 does not function when Control Unit RM-13-A, B, C, D, or G is operated	Short between ring and ground in Plug 203 or in Radio Transmitter BC-191-(*)	Remove plugs from Radio Transmitter BC-191-(*). If meter functions then ground is in transmitter	Service transmitter
		If meter fails to function when plug is removed, failure is in Control Unit RM-12-A, B, C, D, or G	Check ring circuit of 203 for ground
	Defective meter 207	Substitute new meter	Replace meter 207
V.I. meter 207 indicates off scale with no incoming signal from Control Unit RM-13-A, B, C, D, or G	Capacitor 208 is shorted and d-c microphone supply from radio transmitter is leaking across 207	Check for d-c resistance of capacitor 208. Test should show open with switch 205 at LOCAL	Replace capacitor 208 if defective

b. Control Unit RM-13-(*) Cont'd

Indication	Probable Source of Trouble	Suggested Test	Remedy
Receiver disabling voltage does not appear at any jack tip terminals of 304-4, 304-5, 304-6 when Microphone T-32 is operated. (REC jacks are designated 307, 308, 309, in RM-13-A to D)	Open on switch 312	Push switch contact down with pencil	Replace 312 if it cannot be adjusted
	No receiver disabling voltage across 322. Voltage should be about 22 volts d-c in RM-13-G. Voltage should be about 12 to 18 volts d-c in RM-13-A to D	Check capacitor 322 for short	Replace 322
	331 open	Check 331 for open	Replace 331
	Rectifier 313 defective	Check a-c input volts to 313. RM-13-G should be 25 volts a-c. (In RM-13-A to D input voltage should be about 30 v.)	Replace 313. If a-c input is correct but no d-c is obtained
	Receiver jacks defective (304-4, 304-5, 304-6). (REC jacks are designated 307, 308, 309 in RM-13-A to D)	Check continuity to ground	Replace jacks
REC disabling relay voltage does not appear at one or two jack tip terminals of 304-4, 304-5, or 304-6 (designated as 307, 308, 309 in RM-13-A to D) but is normal in other positions	Open on switch 312	Push switch contacts down with pencil	Replace 312 if it cannot be adjusted
	Receiver disabling jacks defective, 304-4, 304-5, 304-6. (REC jack 307, 308, 309 in RM-13-A to D)	Check tip jack springs to ground. Should be open circuited	Replace jacks 304-4, 304-5, 304-6 (307, 308, 309 in RM-13-A to D) if test indicates defective jacks

24. Transformer and Choke Characteristics

a. Control Units RM-12-G and RM-13-G,-

(1) Audio Transformers

Reference No. and Name of Part	Winding	D.C. Resistance ±20% Ohms	Turns Ratio to Primary	Number of Turns
210 Line matching	1-2	17.5	1.0	319
	2-3	17.5	1.0	319
	1-3	35.4	2.0	638
	4-5 (Pri.)	14.2	1.0	319
314 Grid input	1-2	2250	25.8	7070
	3-4 (Pri.)	7.15	1.0	274
315 Plate to line	1-2	17	.1	274
	2-3	17	.1	274
	1-3	35	.2	548
	4-5 (Pri.)	560	1.0	2740

Reference No. and Name of Part	Primary Impedance	Secondary Load Impedance	Frequency Response Net Gain in db 300cps	500cps	1000 cps	3000 cps	5000cps
210 Line matching	600	150	−.19	0	0	0	−.05
314 Grid input	150	100,000	−.87	−.49	0	0	0
315 Plate to line	7,000	600	−.57	−.04	0	+.09	+.09

(2) Power Transformer and Filter Chokes

Reference No. and Name of Part	Winding	D.C. Resistance ±20% Ohms	Turns Ratio to Primary	Number of Turns
317 Power supply	1-2	22	1	520
	2-3 (Pri.)	22	1	520
	1-3	42	2	1040
	4-5	.641	.06	32
	6-7	.623	.06	32
	8-9	2.1	.24	123
	10-11	263.2	1.36	710
	11-12	266.7	1.36	710
	10-12	529.6	2.73	1420
330 H. V. filter	1-2	550		3500
331 L. V. filter	1-2	1.72		265½
341 L. V. filter	1-2	56		1400
	2-3	8		430

b. Control Unit RM-13-(*) Cont'd

Indication	Probable Source of Trouble	Suggested Test	Remedy
V.I. meter 337 fails to indicate when Microphone T-32 is operated in any position of selector switch	No plate voltage on tube 338	From 338 socket terminal #3 (plate) to ground. Voltage should be about 195 volts in RM-13-G. It should be 170 volts in RM-13-A to D	Check capacitor 320 for short
		From plus side of 321 to GND voltage should be about 210 volts	Check capacitor 321 for short
		From 339 socket terminal #8 to gnd, voltage should be about 205 volts in RM-13-G, about 240 volts in RM-13-A to D	Replace tube 339
		In RM-13-G from terminal #10 on 317 to terminal 12 on 317, voltage should be about 290 volts a-c. In RM-13-A to D from 500-500 terminal on 317, voltage should be 500 volts a-c	Replace transformer 317 if primary voltage is 110 and there is no secondary voltage
V.I. meter 337 fails to indicate when Microphone T-32 is operated in one or two switch positions but functions satisfactorily in remaining position	One or two MIC jacks are defective (301-1, 301-2, or 301-3). In RM-13-A, B, C, D the MIC jacks are designated 301, 302, 303	Check from ring to ground. Test should show open check from tip to ground. Test should show open	Replace jack
	Open on switch 312.	Push switch contact down with pencil	Replace switch 312 if contact cannot be adjusted

V.I. meter 337 indicates up scale with no audio input. Volume control 326 does not change meter reading	One side of LINE-1 is grounded	Check continuity between case and LINE-1. Should show open	Disconnect external line. If meter returns to normal the ground is on the line. If meter does not return to normal the ground is in control unit. Check circuit
	Poor contact on MIC plug	Check jack springs on 301-1, 301-2, 301-3 for tension (in RM-12-A to D jacks are designated as 301, 302, 303)	Clean plug. Adjust jack springs
V.I. meter 337 indicates irregularly when volume control 326 is operated	Defective volume control	Operate control knob. Observe irregular output reading on meter	Replace volume control 326
V.I. meter swings violently when key is operated	Ground on one side of LINE-1	Check for continuity between case and LINE-1. Test should show open circuit	Disconnect external line. If meter returns to normal ground is on line. If meter does not return to normal ground is in unit. Check circuit.
Choke 331 in RM-13-G or resistor 331 in RM-13-A to D overheats	Key plug placed in REC jack 304-4, 304-5, 304-6 (REC jacks are designated as 307, 308, 309 in RM-13-A to D)		Interchange plugs
	Capacitor 322 defective	Check continuity across capacitor	Replace

a. Control Unit RM-12-(*)

Indication	Probable Source of Trouble	Suggested Test	Remedy
V.I. meter 207 indicates off scale with no incoming signal from Control Unit RM-13-A, B, C, D, or G	Radio Transmitter BC-191-(*) incorrectly placed on TONE instead of VOICE	Inspection	Change radio transmitter modulation switch
V.I. meter 207 cannot be correctly "tracked" with V.I. meter in Control Unit RM-13-A, B, C, D, or G	Loss in modulation line too high		Reduce loss
	Input impedance to modulator of Radio Transmitter BC-191-(*) too low		Check radio transmitter
Radio Transmitter BC-191-(*) cannot be modulated or keyed to LOCAL position of switch 205	Plug 203 dirty or not properly inserted	Inspection	Clean and insert properly
	Plug 204 (used in RM-12-A only) not properly inserted or dirty	Inspection	Clean and insert properly
	Defective jacks 201 or 202	Check d-c resistance from tip and ring springs to ground with switch 205 at REMOTE. Test should show open	Replace defective jacks
	Switch 205 defective	Short from center to tap terminals. If Radio Transmitter BC-191-(*) functions the switch is defective	Replace switch 205

b. *Control Unit RM-13-(*)*

Pilot bulb 318 does not light	Power cord not properly inserted	Check and inspection	Plug into 110 v.
	Power cord open	Check for continuity	Replace cord
	Open indicator lamp 318 filament	Check for continuity	Replace 318
	Power switch 311 open or defective	Short switch terminals	Replace 311
	Power transformer 317 defective	Measure terminal voltages	Replace 317
V.I. meter 337 fails to indicate when Microphone T-32 is operated in any position of selector switch	Microphone T-32 defective	Check from tip to sleeve. Check from ring to sleeve. When PRESS-TO-TALK switch is open test should show open	Substitute a new Microphone T-32
	MIC jacks defective (301-1, 301-2, 301-3) *Note*: In RM-13 A to D MIC jacks are designated 301, 302, 303	Check from ring to ground. Check from tip to ground. Test must show open.	Replace jack
	Open on Switch 312	Push switch contact down with pencil	Replace switch 312 if contact cannot be adjusted
	Key plug placed in REC jack (304-4, 304-5, 304-6) *Note*: In RM-13-A to D REC jacks are designated 307, 308, 309	Inspection	Interchange plugs
	No microphone voltage	Voltage across 322 should be about 21 volts in RM-13-G and about 12 volts in RM-13-A to D with PRESS-TO-TALK microphone switch operated. Across capacitor 324 voltage should be about 4 v. to 5 v. with PRESS-TO-TALK switch operated	Check 331 for open. Check 313 for d-c output. Check 324 for short. In RM-13-A check also 325 for open or short. Check 341 for open

b. Remote Control Units RM-12-A, B, C, D, and RM-13-A, B, C, D-

(1) Audio Transformers

Reference No. and Name of Part	Winding	From Terminal	To Terminal	Resistance ±20% Ohms
210	Primary	600 left	Center Tap	9.3
Line matching	Primary	600 right	Center Tap	8.4
	Secondary	150 right	150 Left	7.8
211	Primary	600 left	Center Tap	73.1
Repeat coil	Primary	600 right	Center Tap	66.0
(Ringing)	Secondary	600 left	500 Right	110
314	Primary	Pri. left	Pri. Right	13.1
MIC to grid	Secondary	G	F	3,850
315	Primary	P	B	1,740
Plate to line	Secondary	600 left	Center Tap	19.1
	Secondary	600 right	Center Tap	22.0
316	Primary	600 left	Center Tap	73.1
Repeat coil	Primary	600 right	Center Tap	66.0
(Ringing)	Secondary	600 left	500 Right	110

Reference No. and Name of Part	Primary Impedance	Secondary Load Impedance	Performance Characteristics Frequency Response in db 300 cps	500 cps	1000cps	3000cps
210 Line matching	600	150	−.2	−.1	0	−.2
211 Repeat coil (Ringing)	600	600	+.1	+.1	0	−1.5
314 MIC to grid	40	75,000	−.1	−.1	0	−.2
315 Plate to line	15,000	600	−.1	−.1	0	−1.5
316 Repeat coil (Ringing)	600	600	+.1	+.1	0	−.2

(2) Power Transformer and Choke

Reference No. and Name of Part	Winding	From Terminal	To Terminal	Resistance ±20%
	Primary	0	110	18.5
	Secondary	6.3-.45 left	6.3-.45 right	.62
317	Secondary	6.3-.6 left	6.3-.6 right	.62
Power supply	Secondary	500 left	Center tap	715
	Secondary	500 left	Center tap	720
	Secondary	30 left	30 right	2.7
341 Filter choke		Left terminal	Right terminal	110

Section V

SUPPLEMENTARY DATA

25. Vacuum Tube Characteristics

*a. **Vacuum Tube 6C5 (VT-65)*** is a metal triode of the heater cathode type designed for use as detector amplifier or oscillator. It has a high trans-conductance together with a comparatively high amplification factor. The base fits the standard octal socket.

*b. **Vacuum Tube 6J5-GT (VT-94-D)*** is a glass triode answering the same general description.

(1) Characteristics	6C5	6J5-GT
Heater voltage (a.c. or d.c.)	6.3 volts	6.3 volts
Heater current	0.3 amperes	0.3 amperes
Grid plate capacitance	2.0 $\mu\mu$f*	
Grid cathode capacitance	3.0 $\mu\mu$f*	
Plate cathode capacitance	11 $\mu\mu$f*	

* Shell connected to Cathode.

(a) As Class A1 Amplifier

Plate voltage	300 max. volts	250 max. volts
Grid voltage	0 min. volts	0 min. volts
Plate dissipation	2.5 max. watts	2.5 max. watts

(b) Typical Operation (Transformer Coupled)

Plate voltage (volts)	250 volts	90 volts	250 volts
Grid voltage (volts)	−8 volts	0 volts	−8 volts
Plate current (milliamperes)	8 ma	10 ma	9 ma
Plate resistance (ohms)	10,000 ohms	67,000 ohms	7,700 ohms
Amplification factor	20	20	20
Trans-conductance (micromhos)	2,000	3,000	2,600

*c. **Vacuum Tube 6X5 (VT-126)*** is a metal type and 6X5-GT (VT-126B) a glass type full-wave, high-vacuum rectifier of the heater-cathode type. The base of either of these tubes fits the standard octal socket.

(1) Characteristics

Heater voltage	6.3 volts
Heater current	0.6 amperes
Peak increase voltage	1250 max. volts
Peak plate current	210 max. milliamperes per plate
D.C. heater-cathode potential	450 max. volts

(2) Typical Operation

(a) With Capacitor—Input Filter

A.C. plate voltage per plate (RMS)	325 max. volts
Total effective plate supply impedance per plate	150 min. ohms
D.C. output current	70 max. ma.

(b) With Choke—Input Filter

A.C. plate voltage per plate (RMS)	450 max. volts
Input choke inductance	8 min. henries
D.C. output current	70 max. ma.

26. Tabular List of Replaceable Parts for Remote Control Equipment RC-47-A, B, C, D, and G

Note: The list of stock numbers is intended to supplement the Signal Corps General Catalog until such time as the Catalog is revised to include the stock numbers herein. *Order replacement part by stock number and description.*

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
			CONTROL UNIT RM-12-A,B,C,D, AND G			
201	*1	2Z5533A	Jack JK-33-A—3 conductor, same as 301-1 G. Sleeve, ring & tip; with nut & washer; long frame type; 3½" lg.; 15/16" wide 3/8-32 thd.—designed to receive plug PL-68	Microphone input	Mal. SC-A2B	FTR W97-1
202	*1	2Z5534A	Jack JK-34-A—2 conductor, same as 304-1 G. Sleeve & ring; with nut & washer; long frame type; 3½" lg.; 15/16" wide, 3/8-32 thd.	Key input	Mal. SC-1A	FTR W97-2
203	1	2Z7168	Plug PL-68—3 conductor	Connect control unit to transmitter	S.C. Issue	**SC-D-375-F
204 A	1	2Z7155	Plug PL-55—2 conductor	Connect control unit to transmitter	S.C. Issue	**SC-D-339-H

Note: Letters appearing in "Reference No." column indicate the nomenclature of the control units in which the parts are used. Where no letter appears that part is applicable to all units.

*Available in depot stock.

*Furnished with equipment as running spare parts.

**Signal Corps drawing numbers.

205 G	#1	3Z9849.32	Switch—D.P. D.T. toggle; rear lug, 6 amp., 125 V; 15/32" x 11/16" x 21/32" deep, 15/32"-32 bushing, bakelite body	Remote & local Control	C. H. #8373	W21-4
205 A,B,C,D	#1	3Z8127	Switch—D.P. D.T. toggle	Remote & local Control	A. H. H. #20905DU	
206 G	#1		Relay—2,000 ohms; break-make contact adjustable tension; transparent snap-on cover; 2 3/16" diam. x 1 5/8" high body; 2 5/8" over-all height; bakelite mounting base for standard plug-in, 5 prong tube base	Keying	Sigma Type 4-A	W94-3
206 A,B,C,D	#1	2Z7657	Relay—1.2 volts	Keying	Dav. Type 220C38	A-1323-1
207 G	#1	3F3302	Meter— −10 to +6 db, zero power level 0.6 MW line impedance 600 ohm; internal resistance 1581 ohm; round, flush mounting; black bakelite case. Diam. 2 3/4", flange 3 1/4" diam.	Volume indicator	W. E. M. SI-159-987-NC-35	W68-1
207 A	#1	3F3302	Meter—general purpose −10 to +6 decibels, flush 3 1/2" bakelite case; 6 milliwatts, 500 ohms	Volume indicator	W. E. I. Model 301, Type 22	
207 B,C,D	#1	3F3304	Meter— −10 to +6 db, 3 1/2" flush type bakelite case	Volume indicator	W. E. I. Model 301, Type 23	
208	#1	3DB10-7	Capacitor—Dry electrolytic, 10μf 25 V., lug terminals twist prong mounting on Solar DYP3 mountplate, zinc can 2" x 1" diam.	Blocking	Solar DY-10	W3-36
209 G	#1		Potentiometer—300 ohm; wirewound 1/4" diam. shaft, 3/8-32 bushing	Adjust volume	Clar Type 58-300	W9-7
209 A	#1	2Z394.2	Volume Control—200/200 ohm, continued variable "T" pad or 500 ohm potentiometer	Adjust volume	IRC Variable T type	

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
209 B,C,D	#1	2Z7279	Volume control—150/150 ohm, variable "T" pad or 500 ohm potentiometer	Adjust volume	IRC Type W-500	
210 G	#1		Transformer—Audio, line to transmitter, 300 to 3,000 cycles; 0.6 milliwatt; turns ratio each half primary to secondary, 1/1 D.C. resistance primary 14.4 ohm, secondary 35.4 ohm, square case, approx. 1½" x 1½" x 2" deep; two mounting holes for diagonal 1.606" centers for #6-32 R.H.M. screws; 5 terminals	Impedance matching	FTR W15-37	WTA-1713
210 A	#1	2Z9986-1	Transformer—500/150 ohm impedance	Impedance matching	UTC #46797	
210 B,C,D	#1	2Z9986-7	Transformer—600/150 ohm impedance, primary center tapped	Impedance matching	UTC #62407	
211 G	#1		Resistance—Fixed, carbon, phantom bridge 4,000 ohms (two 2,000 ohms ±5%, 1 watt) center tapped, mounted on terminal strip; bakelite insulation; each resistor 7/32" diam. x 9/16" long; bare copper tinned leads. Same as 316 G	Phantom connection	FTR W92-87	WTA-5745
211 A	#1	2Z9986-5	Transformer—500/500 ohm impedance	Phantom connection	UTC #47764	
211 B,C,D	#1	2Z9986-8	Transformer—600/600 ohm impedance	Phantom connection	UTC #62406	
212	1	4B5008A	Telephone EE-8-A or EE-8-B chassis only. Same as 340	Local battery channel	S.C. Issue	**SC-D-1783-D

213	#1	3DB8-15	Capacitor — dry electrolytic, 8μf 250 V. d.c. lug terminals, twist prong mounting on Solar DYP3 mounting plate; zinc can 2″ x 1″ diam.	Key capacitor	Solar Type DY	W3-37
214 G	#1		Resistor—fixed, tubular, carbon, bakelite insulation, 43 ohms ±5%, ½ watt; 9/64″ diam. x 3/8″ long; bare copper tinned leads 1½″ long standard	Surge resistor	AB Type EB	W6-44
214 A,B,C,D	#1	3Z6004-13	Resistor—40 ohm ½ watt, wire wound	Surge resistor	IRC Type BW-½	
215 G	#1		Resistor—fixed, tubular carbon, bakelite insulation, 75 ohms ±5% ½ watt, 9/64″ diam. x 3/8″ long, 1½″ bare copper tinned leads	Voltage attenuator	AB Type EB	W6-56
215 B,C,D	#1	2C678C/R1	Resistor—150/150 ohms, 6DB	Voltage attenuator	Dav. #1353	
216 G	#1		Resistor—fixed, tubular carbon, bakelite insulation, 200 ohms ±5% ½ watt; 9/64″ diam. x 3/8″ long; bare copper tinned leads 1½″ long standard	Voltage attenuator	AB Type EB	W6-20
261	#1		Mounting strip — moulded black phenol plastic strip; 3.11″ lg., .485″ wide, .343″ thick; 4 holes .177″ with .875″ centers. Same as 361 G	Mount binding posts	Eby	W28-3 WTA-1323 Det. 1
262 G	#4		Binding post—rubber covered, 9/16″ stem, #8-32 thread-tumble nickel finish, heavy knurled base, height open 15/16″, closed ¾″. Same as 342 G	Terminal connectors	Eby TM-146-A	W27-2 WTA-1090 Det. 2

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
262 A,B,C,D	#4	3Z209	Binding post. Same as 342 A,B,C,D	Terminal connectors	Eby TM-109	**SC-D-530
265 G	#1		Strap—canvas, with buckle tip and webbing. Same as 353 G	Handset mounting	UEF	WTA-5780 W70-24
265 A,B,C,D	#1	4B1109E/30	Strap—buckle, tip and webbing. Same as 353 A,B,C,D	Handset mounting	Dav.	B-1322-1 Part 1
266 G	#1		Base assembly—metal plates with snap slide fasteners and studs	Mounting for RM-12-G	FTR W92-74	WTB-5772
269 A,B,C,D	#4	2C678C/S1	Thumb screw—knurled thumb screw $\frac{8}{32}$". Same as 352 A,B,C,D	Hold panel to case	Dav.	A-1314-1
269 G	#2		Knurled head thumb screw—$\frac{7}{32}$" diam. x $\frac{1}{2}$" lg. under cut $\frac{13}{32}$", head $\frac{3}{8}$" lg. x $\frac{11}{32}$" lg., 8-32 USF thread, nickel plated. Same as 352 G	Hold panel to case	U.B.	WTA-5709 W53-90
292 A,B,C,D	#1	2Z5820	Knob—black moulded rubber covered, arrow, 2 set screws. Same as 345 A,B,C,D	Operate volume control	Eby Type 2	A-1220-1P2
292 G	#1		Knob—black phenolic, bar pointer type, $1\frac{1}{2}$" lg. $\frac{3}{4}$" diam. through center hole, $\frac{5}{8}$" high, #8-32 x $\frac{1}{4}$" fil. hd. machine set screw; same as 344 G	Operate volume control	Eby	WTA-1666 W26-4
293 G	#2	2Z8687	Socket—relay, 5 prong bakelite with steel retaining ring	To hold relay	Amph S5M	W17-19
294 G	1		Clamp—.031 sheet steel	To hold transmitter cable	FTR W50-16	WTA-5734
295 G	#4		Shock Mounting—rubber with steel mounting	Shock absorber	Lord 102P-8	W49-18
296	1		Circuit label—vinylite sheet		SM	W63-23

CONTROL UNIT RM-13-A,B,C,D, AND G

301-1 G	*3	2Z5533A	Jack JK-33A—3 conductor; same as 201, 301-2 G, 301-3 G, 301 A, B,C,D;302 A,B,C,D;303 A,B,C,D	Microphone input to control unit	Mal. SC-A2B	**SC-D-2332-E W97-1
301-2 G	—		Jack—same as 301-1 G	Microphone input to control unit	Mal. SC-A2B	**SC-D-2332-E W97-1
301-3 G	—		Jack—same as 301-1 G	Microphone input to control unit	Mal. SC-A2B	**SC-D-2332-E W97-1
301 A,B,C,D	*3	2Z5533A	Jack—same as 301-1 G	Microphone input to control unit	Mal. SC-A2B	**SC-D-2332-E
302 A,B,C,D	—	2Z5533A	Jack—same as 301-1G	Microphone input to control unit	Mal. SC-A2B	**SC-D-2332-E W97-1
303 A,B,C,D	—	2Z5533A	Jack—same as 301-1G	Microphone input to control unit	Mal. SC-A2B	**SC-D-2332-E W97-1
304-1 G	*6	2Z5534A	Jack JK-34-A—2 conductor; same as 202, 304-2 G to 304-6 G, 304 A,B,C,D;305 A,B,C,D; 306 A,B, C,D; 307 A,B,C,D; 308 A,B,C, D; 309 A,B,C,D	Key input to control unit	Mal. SC-1A	**SC-D-2339-E W97-2
304-2 G	—	2Z5534A	Jack—same as 304-1 G	Key input to control unit	Mal. SC-1A	**SC-D-2339-E W97-2
304-3 G	—	2Z5534A	Jack—same as 304-1 G	Key input to control unit	Mal. SC-1A	**SC-D-2339-E W97-2
304-4 G	—	2Z5534A	Jack—same as 304-1 G	Receiver disabling	Mal. SC-1A	**SC-D-2339-E W97-2
304-5 G	—	2Z5534A	Jack—same as 304-1 G	Receiver disabling	Mal. SC-1A	**SC-D-2339-E W97-2

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
304-6 G	—	2Z5534A	Jack—Same as 304-1 G	Receiver disabling	Mal. SC-1A	**SC-D-2339-E W97-2
304 A,B,C,D	#6	2Z5534A	Jack—Same as 304-1 G	Key input to control unit	Mal. SC-1A	**SC-D-2339-E W97-2
305 A,B,C,D	—	2Z5534A	Jack—Same as 304-1 G	Key input to control unit	Mal. SC-1A	**SC-D-2339-E W97-2
306 A,B,C,D	—	2Z5534A	Jack—Same as 304-1 G	Key input to control unit	Mal. SC-1A	**SC-D-2339-E W97-2
307 A,B,C,D	—	2Z5534A	Jack—Same as 304-1 G	Receiver disabling	Mal. SC-1A	**SC-D-2339-E W97-2
308 A,B,C,D	—	2Z5534A	Jack—Same as 304-1 G	Receiver disabling	Mal. SC-1A	**SC-D-2339-E W97-2
309 A,B,C,D	—	2Z5534A	Jack—Same as 304-1 G	Receiver disabling	Mal. SC-1A	**SC-D-2339-E W97-2
310	#1	6Z7589	Plug receptacle—15 amp. 125 V.; flush type motor plug; two .136 mounting holes $1\frac{3}{4}$″ centers metal shell 1.375″ diam. x 1.062″ high	Power input	Hub. #6808	W17-12
311 G	#1	3Z9849.30-1	Switch—D.P. S.T. toggle; used as S.P. S.T. with terminals strapped; rear lug type; 6 amp.; 125 V.; $\frac{15}{32}$″ x $\frac{11}{16}$″ x $\frac{21}{32}$″ deep; $\frac{15}{32}$″-32 bushing; bakelite body	Power	C.H. #8360	W21-5
311 A,B,C,D	#1	3Z8015	Switch—S.P. S.T. toggle	Power	Hub. #20994-BQ	

312 G	✱1	3Z9827.11	Switch—3 pole 3 position, rotary; 1 gang bakelite wafer; shaft ¼″ diam.; ⅜″-32 bushing	Position selector	Oak Type H	W20-20 WTA-5756
312 A,B,C,D	✱1	3Z9827-1	Switch—3 pole 3 position, rotary (ceramic)	Position selector	Oak	
313 G	✱1	3H4856-3	Rectifier—selenium; low volt, 8 disc, 2″ stack; 3½″ lg. mounting shaft, 2⅝″ diam. discs	D.C. supply	FTR 9D0775R	WTB-5788
313 A,B,C,D	✱1	2C679A1/R2	Rectifier—selenium, low volt, 8 disc	D.C. supply	FTR 9D0191	
314 G	✱1		Transformer—audio input; 300 to 3,000 cycles; 2 milliwatt; turns ratio 25.8/1; d.c. resistance primary 7.15 ohms, secondary 22.62 ohms; square case 1½″ x 1½″ x 2″ deep; two mounting holes, diagonal 1.606″ centers for ✱6-32 R.H.M. screws; 4 terminals	Grid input	FTR W15-35	WTA-1707
314 A	✱1	2Z9986-2	Transformer—40/75,000 ohm impedance	Grid input	UTC ✱46799	
314 B,C,D	✱1	2Z9986-2	Transformer—40/75,000 ohm impedance	Grid input	UTC ✱68819	
315 G	✱1		Transformer—audio output; 300 to 3,000 cycles 150 milliwatt; turn ratio .2; d.c. resistance—primary 32.5 ohms, secondary 541 ohms; square case 1½″ x 1½″ x 2″ deep; two mounting holes, diagonal 1.606″ centers for ✱6-32 R.H.M. screws, 5 terminals	Amplifier output	FTR W15-36	WTA-1710
315 A	✱1	2Z9986-4	Transformer—15,000/500 ohm impedance	Amplifier output	UTC ✱46800	
315 B,C,D	✱1	2Z9986-9	Transformer—15,000/600 ohm impedance	Amplifier output	UTC ✱62408	

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
316 G	#1		Resistor—fixed, phantom bridge; 4,000 ohms (two 2,000 ohm ±5% 1 watt) center tapped, tubular carbon; bakelite insulation; each resistor 7/32" diam. x 9/16" lg.; 1½" lg. bare copper tinned leads mounted on terminal strip; same as 211G	Phantom connection	FTR W92-87	WTA-5745
316 A	#1	2Z9986-5	Transformer—500/500 ohm impedance	Phantom connection	UTC #47764	
316 B,C,D	#1	2Z9986-8	Transformer—600/600 ohm impedance, primary center tapped	Phantom connection	UTC #62406	
317 G	#1		Transformer—power; primary 115/230 v., secondary 6.3v. @ .6 amp.; 6.3v. @ .45 amp., 29 v. @ .5 amp. 300 v.; center tapped; rectangular case 2¾" x 2⅞" x 3½" lg.; 4 mounting holes for #6-32 R.H.M. screw; 12 terminals	Power	FTR W15-38	WTA-1719
317 A,B,C,D	#1	2Z9985-4	Transformer—power, primary 110/220 v., secondary 6.3 v., 6.3 v., 30 v., and 500 v. center tapped	Power	UTC #46801	
318	#1	2Z5925.2	Lamp—pilot; 6.3 v. 0.15 amp. miniature screw base	Power indicator	Tung or GE Type 40	W72-33
319			Condenser block—fixed, dry	Bias bypass	Solar DY	W3-38
320	#1	3DB2.6	electrolytic one 2 μf 25 v., two	Plate bypass		
321			10 μf 450 v., lug terminals, twist prong mounting on Solar DYP3 mounting plate, zinc can 2" x 1" diam.	High voltage filter		

322 G	#2		Capacitor—2,000 μf, 50 v. dry electrolytic; lug terminals, metal clamp mounting; can 4½" x 1¾" diam., same as 324 G	Low voltage filter	Solar G-3	W2-6
324 G	—		Capacitor—Same as 322 G	Low voltage filter	Solar G-3	W2-6
322 A 323 A	#2	3DB1200	Condenser block—two section, dry electrolytic 1,200/1,200 μf 50 v.; same as 324 A-325 A	Low voltage filter	Solar	
324 A	—	3DB1200	Capacitor—Same as 322 A-323 A	Low voltage filter	Solar	
325 A	—	3DB1200	Capacitor—Same as 322 A-323 A	Low voltage filter	Solar	
322 B,C,D	#2	3DB2400	Capacitor—2,400 μf 50 v.; same as 324 B,C,D	Lower voltage filter	Solar Type DFM	
324 B,C,D	—		Capacitor—same as 322 B,C,D	Low voltage filter	Solar Type DFM	
326 G	#1		Potentiometer—100,000 ohm; carbon; 3 terminals, ½" shaft ¼" diam.; ⅜-32 bushing	Volume control	AB Type J	W7-7 WTA-5779
326 A,B,C,D	#1	2Z7298	Potentiometer—75,000 ohm	Volume control	IRC Type CS	
327G	#1		Resistor—fixed, carbon tubular; bakelite insulation; 820 ohm ±5%; ½ watt, 25/64" diam. x ⅜" lg.; 1½" bare copper tinned leads standard	Bias	AB Type EB	W6-29
327 A,B,C,D	#1	3Z6100-9	Resistor—1,000 ohm ½ watt	Bias	IRC Type BT-½	
328 G	#1		Resistor—fixed, carbon tubular, bakelite insulation 20,000 ohm ±5% ½ watt	Meter multiplier	AB Type EB	W6-7

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
328 A	#1	3Z6613A5-1	Resistor—fixed, 13,500 ohms ±5%, ½ watt	Meter multiplier	IRC Type BT-½	
328 B,C,D	#1	3Z6615-16	Resistor—fixed, 15,500 ohms ±5%, ½ watt	Meter multiplier	IRC Type BT-½	
329 A,B,C,D	#2	3Z6500-16	Resistor—fixed, 5,000 ohms, 10 watt, same as 330 A,B,C,D	High voltage filter	IRC Type AB	
330 G	#1		Choke "B"—filter; 10 henries, 10 milliamperes d.c., square case 1½" x 1½" x 2" deep, two mounting holes, diagonal 1.606" centers for #6—32 R.H.M. screw, two terminals	High voltage	FTR W12-8	WTA-1716
330 A,B,C,D	—	3Z6500-16	Resistor—fixed, 5,000 ohm, 10 watt, same as 329 A,B,C,D	High voltage filter	IRC Type AB	
331 G	#1		Choke "A1"—filter, 45 millihenries, 1.8 ohms, d.c. resistance, 16.5 impedance at 60 cycles; round case 2" diam. x 2¾" deep square top 2¼"; 4 mounting holes 1.875" centers; 2 numbered terminals	Low voltage filter	FTR W12-2	WTA-1675
331 A,B,C,D	#1	3Z6002-D4	Resistor—fixed, 24 ohm, 25 watt	Low voltage filter	IRC Type DJ	
333 G	#1		Terminal block—bakelite, 3 terminals	Voltage change	Jones Type 3-50XP	W28-24
334 G	#1		Resistor, fixed—wire wound, 91 ohm ±5%; 3 watt ⅜" diam. x 1¾" lg.; 1½" tinned copper wire leads	Voltage drop	Clar. Type C	W6-53
335 A,B,C,D	#1	3Z6005-18	Resistor—fixed, 50 ohm, 30 watt	Low voltage filter	IRC Type DJ	

336 A	*1	3Z6665	Resistor—fixed, 65,000 ohm, ½ watt	High voltage filter	IRC Type BT	
336 B,C,D	*1	3Z6665-1	Resistor—fixed, 65,000 ohm, 1 watt	High voltage filter	IRC Type BT	
337 G	*1	3F3300	Meter—(−10"to"±6"db) 6MW, zero power level line impedance 600 ohm; internal resistance, 5,000 ohm black bakelite case, round, flush mounting, body diam. 2¾", flange 3¼"	Volume indicator	W.E.M. Type SI-159-985-NC-35	W68-2
337 A	*1	3F3303	Meter——10 to ±6 db, flush 3½" bakelite case, 6 milliwatts, 500 ohm; internal resistance 5,000 ohms	Volume indicator	W.E.I. Model 301, Type 20	
337 B,C,D	*1	3F3302	Meter——10 to±6 db, flush 3½" bakelite case 0.6 milliwatts, 1.9 volt, 600 ohm	Volume indicator	W.E.I. Model 301, Type 21	
338 G	1		Vacuum tube—VT-94-D	Audio amplifier	K.R. 6J5-GT	W72-34
338 A,B,C,D	1	2T65	Vacuum tube—VT-65 or VT-65-A	Audio amplifier	RCA 6C5 or 6C5-GT	
338 G*	*1		Vacuum tube—VT-94-D; same as 338 G	Audio amplifier (spare)	K.R. 6J5-GT	W72-34
338 A,B,C,D*	*1		Vacuum tube—VT-65 or VT-65-A ;same as 338 A,B,C,D	Audio amplifier (spare)		
339	*1	2T126	Vacuum tube—VT-126-B or VF-126	Rectifier (spare)	K.R. 6X5-GT	W72-35
339	1	2T126	Vacuum tube—VT-126-B or VT-126	Rectifier	K.R. 6X5-GT or 6X5	W72-35
340	1	4B5008A/C1	Telephone EE-8-A or EE-8-B—Chassis only. Same as 212	Local battery channel	S.C. Issue	**S-CD-1783-D

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
341 G	#1		Choke—"A-2"—filter, winding 1-2, 1 henry 400 ohm impedance; winding 2-3, 30 millihenries 100 ohm impedance	Low voltage filter	FTR W12-9	WTA-1724
341 A,B,C,D	#1		Choke—10 henry, 100 ohm d.c. resistance	Low voltage filter	UTC #49852	
342 G	#4		Binding Post—rubber covered, 9/16" stem, 1/2" head, same as 262 G	Line wire terminal	Eby TM-146-A	WTA-1090 Det. 2
342 A,B,C,D	#4	3Z209	Binding Post—bakelite, knurled cap and base, 3/4" stud with #10-32 threads; same as 262, A,B,C,D	Line wire terminal	Eby Admiral P3 TM-109	**SC-D-530
343 A,B,C,D	1	2Z5999	Lamp mounting—miniature screw base with jewel red	For mounting lamp	SIC Type 510F	
343 G	1		Lamp mounting—miniature screw base with jewel	For mounting lamp	Mal. Type 301R	W17-17
344 G	#2		Knob—Black, phenolic, bar pointer type, 1 1/4" lg. 3/4" diam. 5/8" high, #8-32 x 1/4" fil. head, machine set screw; same as 292 G	Operate control switches	Eby	WTA-1666 W26-4
345 A,B,C,D	1	2Z5820	Knob—black bakelite, "curved arrow" with 2 set screws; same as 292 A,B,C,D	Operate volume	Dav. Type 2	A-1220-1
346 A,B,C,D	1	2Z5821	Knob—black bakelite, "straight arrow" with 2 set screws	Operate position switch	Dav. Type 4	A-1220-1 Part 3
350 G	2	2Z8637	Socket vacuum tube—octal; low loss mica filled bakelite; secured by Amphenol #4 steel retainer ring; phosphor bronze contacts, silver plated; same as 351 G	Holds tube VT-94-D	Amph. Type S8TM	W17-1

351 G	—	2Z8637	Same as 350 G	Holds tube VT-126B	Amph. Type S8TM	W17-1
350	*2	2Z8637	Socket vacuum tube—octal; same as 350 G above	Holds tube VT-94D (spare)	Amph. Type S8TM	W17-1
351	*—	2Z8637	Socket vacuum tube—octal	Holds tube VT-126B (spare)	Amph. Type S8TM	W17-1
350 A	*2	2C679A.1/SA	Socket vacuum tube—octal; silver plated springs, rustproof mounting; same as 351 A	Holds tubes VT-65 & VT-126	Amph. M1P-8 Special	
351 A	—	2C679A.1/SA	Same as 350 A	Holds tubes VT-65 & VT-126	Amph. M1P-8 Special	
350 B,C,D	*1	2C679A/1/S1	Socket—silver plated springs, 8 prong	Holds tubes VT-65	Amph. M1P-8	
351 B,C,D	*1	2C679A.1/S2	Socket—silver plated springs, 8 prong	Holds tubes VT-125	Amph. M1P-8	
352 G	*4		Thumb screws—8-32 knurled head; same as 269 G	Holds panel to case	U.B.	WTA-5709 W53-90
352 A,B,C,D	*4	2C678C/S1	Thumb screw—8-32 knurled head; same as 269 A,B,C,D	Holds panel to case	Dav.	A-1314-1
353 G	*1		Strap—buckle, tip and webbing; same as 265 G	Strap telephone to cradle	U.E.F.	WTA-5780
353 A,B,C,D	*1	4B1109E/30	Strap—buckle, tip and webbing; same as 265 A,B,C,D	Strap telephone to cradle	Dav.	B-1322-4 Part 1
361 G	*1		Mounting strip—black phenol plastic, 4 holes, same as 261	Mount binding posts	Eby	WTA-1323 Det. 1
362	2	2Z2626-1	Mounting rings—1¾" diameter metal ring	To support condensers	Solar	W95-2
363 G	1		Panel—.050 sheet steel, engraved	To mount controls and meters	El. Ch.	WTD-5752

Reference No.	Quan. in Equip.	Signal Corps Stock No.	Name and Description of Part	Function	Mfr. Code and Type No.	Contractor's Drawing No.
364 G	1		Bracket—.050 sheet steel, painted	To support telephone	FTR 43-75	WTA-5744
365 G	1		Tie bracket—.050 sheet steel, painted	To support chassis	FTR 43-79	WTA-5797
366 G	1		Circuit label—vinlite sheet	Reference	SM	W63-24
367 G	#1		Power cord—6′ 2 conductor, # 18 rubber covered with Hubbel plugs —#7257 and #9972	Power supply	FTR W65-33	WTA-5793
367 A,B,C,D	#1	3E1370	Power cord CD-370	Power supply Wire laying and recouery	BM Petroff	**SC-D-1697-E
393	1	6H227	Axle—RL-27-A			W66-7
394	1	2Z25554	Chest—CH-54, wood	Protect RM-13	S.S.T.C.	WTF-5757 W71-6
395	1	2Z2555	Chest—CH-55, wood	Protect & house spare parts	S.S.T.C.	WTF-5769 W71-8
397	*#4	3A30	Battery—flash light and telephone switchboard battery, BA-30	Low voltage d.c. supply	S.C. Issue	**SC-A-535
398	6	2B830	Headset—HS—30 -(*) (see note 1)	Receiver	S.C. Issue	
399	2	2B1632	Microphone—T-32	To transmit voice	Kellogg	W66-8
400	*3	3Z3447	Key—J-47	To transmit code	S.C. Issue	**SC-D-2836
401	2		Plug—PL-58, 3 conductor	Connect handset to telephone	S.C. Issue	**SC-D-1053

402		3	3E1133	Cord—CD-133-A, 2 conductor cable with plug, style A and tips	Connect to key jacks	S.C. Issue	**SC-D-1372 Group 2
403		6	3E1366	Cord—72″ long, 2 conductor, CD-366	Connect to receiver disabling jacks	S.C. Issue	**SC-D-4194 W65-22
405		6	3E1605-6.5	Cord—CD-605 (see note 1)	To connect Headset HS-30-(*)	S.C. Issue	
406	[illegible]	17′		Cordage CO-145, 3 conductor	Connect microphones to jacks	S.C. Issues	
407		2		Handset—TS-9	To send and receive over telephone EE-8-A	S.C. Issue	
408		1		Reel wire—W-110-B on Reels DR-4	Line wire	S.C. Issue	S.C. Spec. 71-478

Note 1: Headset P-17 may be used in place of Headset H.S.-30 and Cord CD-605.

Note: Letters appearing in "Reference No." column indicate the nomenclature of the control units in which the parts are used. Where no letter appears that part is applicable to all units:
Available in depot stock.
* Furnished with equipment as running spare parts.
** Signal Corps drawing numbers.

Table of Standard Nuts, Bolts, Screws, and Washers Control Units RM-12-G & RM-13-G

Quan.	Description	Size	Length	Thread	Where Used
4	Binder Head Machine Screw	.138	5/16"	USS 32	Case Assembly RM-12
4	Flat Head Machine Screw	.164	3/4"	USS 32	Case Assembly RM-12
4	Hex Nut	.164		USS 32	Case Assembly RM-12
6	Flat Washer	#4			Case Assembly RM-12
4	Round Head Machine Screw	.138	3/8"	USS 32	Case Assembly RM-13
3	Oval Head Machine Screw	.138	3/8"	USS 32	Chassis Assembly RM-12
6	Round Head Machine Screw	.138	1/4"	USS 32	Chassis Assembly RM-12
5	Oval Head Machine Screw	.138	5/16"	USS 32	Chassis Assembly RM-12
2	Oval Head Machine Screw	.138	1/2"	USS 32	Chassis Assembly RM-12
1	Round Head Machine Screw	.138	5/16"	USS 32	Chassis Assembly RM-12
2	Hex Nut	.138		USS 32	Chassis Assembly RM-12
4	Hex Nut	.164		USS 32	Chassis Assemlby RM-12
8	Lockwashers	#6			Chassis Assembly RM-12
16	Round Head Machine Screw	.138	1/4"	USS 32	Chassis Assembly RM-13
2	Round Head Machine Screw	.138	5/16"	USS 32	Chassis Assembly RM-13
9	Round Head Machine Screw	.138	3/8"	USS 32	Chassis Assembly RM-13
2	Oval Head Machine Screw	.138	1/4"	USS 32	Chassis Assembly RM-13
4	Oval Head Machine Screw	.138	3/8"	USS 32	Chassis Assembly RM-13
1	Oval Head Machine Screw	.138	5/8"	USS 32	Chassis Assembly RM-13
3	Round Head Machine Screw	.164	5/16"	USS 32	Chassis Assembly RM-13

6	Oval Head Machine Screw	.164	5/16"	USS 32	Chassis Assembly RM-13
31	Lockwasher	#6			Chassis Assembly RM-13
3	Lockwasher	#8			Chassis Assembly RM-13
2	Washer	15/32"			Chassis Assembly RM-13
3	Hex Nut	15/32"		USS 32	Chassis Assembly RM-13
5	Hex Nut	.138		USS 32	Chassis Assembly RM-13
4	Hex Nut	.164		USS 32	Chassis Assembly RM-13
1	Washer	3/8"			Chassis Assembly RM-13

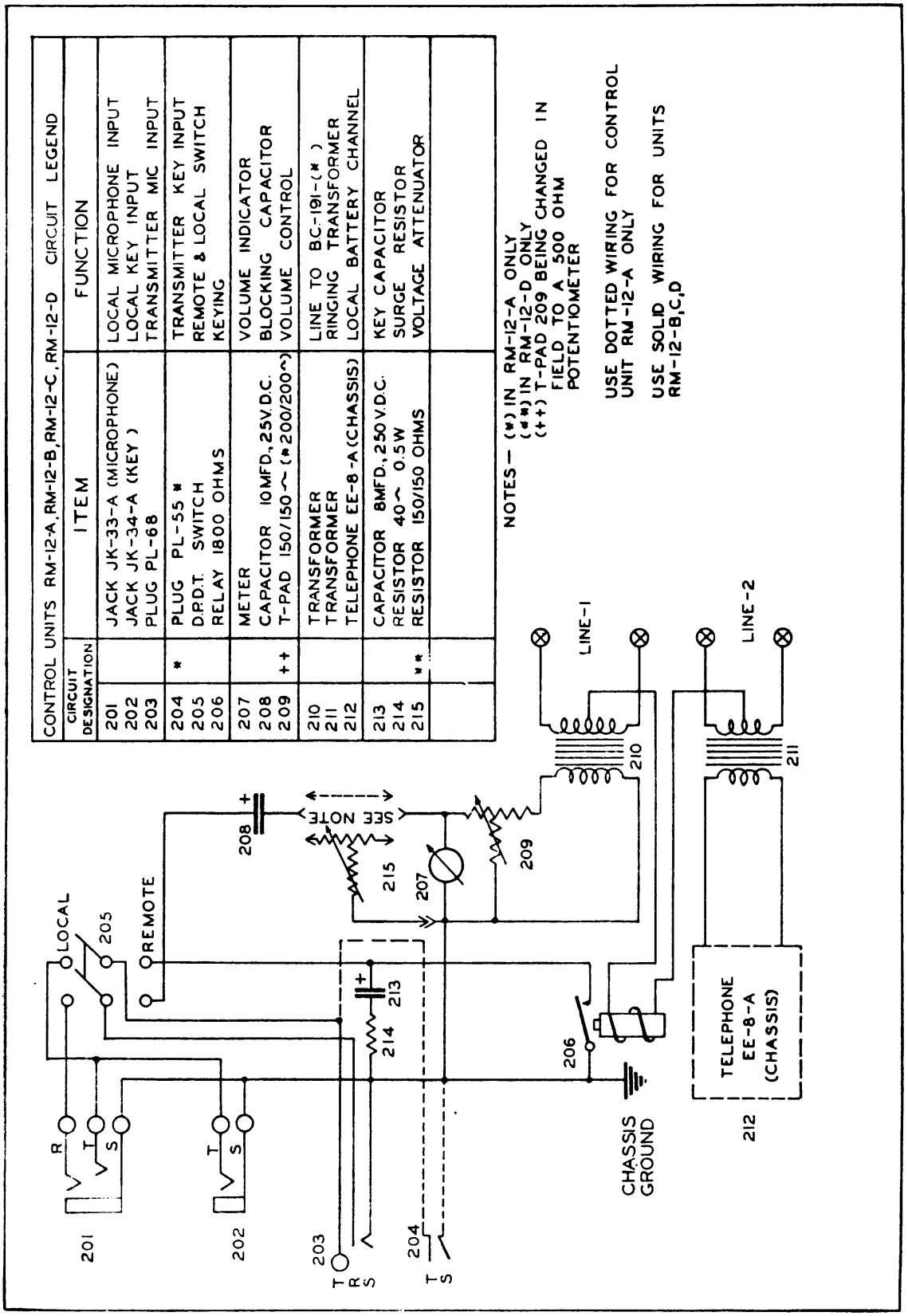


Fig. 19—*Schematic Diagram, Control Units RM-12-A, RM-12-B, RM-12-C, & RM-12-D*

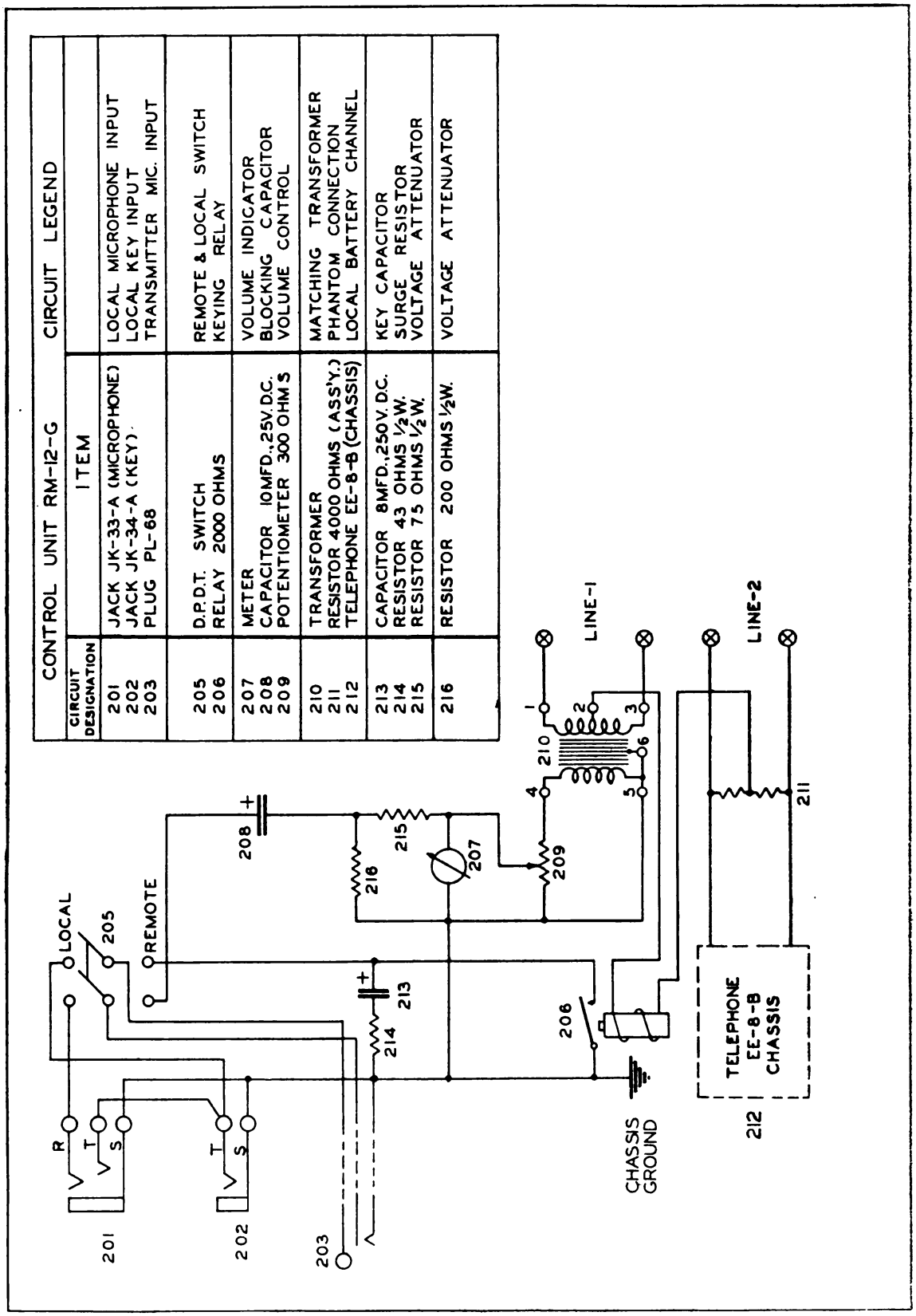


Fig. 20—*Schematic Diagram, Control Unit RM-12-G*

CONTROL UNITS RM-13-A, RM-13-B, RM-13-C, RM-13-D CIRCUIT LEGEND		
CIRCUIT DESIGNATION	ITEM	FUNCTION
301	JACK JK-33-A (MICROPHONE)	REMOTE MIC. INPUT
302	JACK JK-33-A (MICROPHONE)	REMOTE MIC INPUT
303	JACK JK-33-A (MICROPHONE)	REMOTE MIC INPUT
304	JACK JK-34-A (KEY)	REMOTE KEY INPUT
305	JACK JK-34-A (KEY)	REMOTE KEY INPUT
306	JACK JK-34-A (KEY)	REMOTE KEY INPUT
307	JACK JK-34-A (RECEIVER)	RECEIVER DISABLING
308	JACK JK-34-A (RECEIVER)	RECEIVER DISABLING
309	JACK JK-34-A (RECEIVER)	RECEIVER DISABLING
310	PLUG	POWER INPUT
311	S.P.S.T. SWITCH	POWER SWITCH
312	SWITCH 3POLE 3POSITION	POSITION SELECTOR
313	RECTIFIER	L.V. SELENIUM TYPE
314	TRANSFORMER	GRID INPUT
315	TRANSFORMER	PLATE TO LINE
316	TRANSFORMER	RINGING TRANSFORMER
317	TRANSFORMER	POWER TRANSFORMER
318	LAMP 6.3V.-0.15 AMP	INDICATOR LAMP
319	CAPACITOR 2MFD. 25V.-SECT.1	BIAS BYPASS-SECT.1 or 3
320	CAPACITOR 10MFD. 450V.-SECT.2	BIAS BYPASS-SECT.2 or 3
321	CAPACITOR 10MFD., 450V.-SECT.3	H.V. FILTER-SECT. 3 or 3
322	CAPACITOR 2400MFD. (1200 MFD.*) 50V	L.V. FILTER-
323*	CAPACITOR 1200 MFD., 50V.	L.V. FILTER-
324	CAPACITOR 2400MFD (1200MFD.*)	L.V. FILTER-
325*	CAPACITOR 1200MFD., 50V.	L.V. FILTER-
326	POTENTIOMETER 75000Ω TAPER	VOLUME CONTROL
327	RESISTOR 1000 OHMS ½ W.	BIAS RESISTOR
328	RESISTOR 15500 OHMS ½ W.	METER MULTIPLIER
329	RESISTOR 5000 OHMS 10 W.	H.V. FILTER RESISTOR
330	RESISTOR 5000 OHMS 10 W.	H.V. FILTER RESISTOR
331	RESISTOR 24 OHMS 25 W.	L.V. FILTER RESISTOR
335	RESISTOR 50 OHMS 25 W.	L.V. FILTER RESISTOR
336	RESISTOR 65000 OHMS 1 W.	H.V. FILTER RESISTOR
337	METER	VOLUME INDICATOR
338	VT-65 (6C5)	AUDIO AMPLIFIER
339	VT-126 (6X5)	RECTIFIER
340	TELEPHONE EE-8-A CHASSIS	LOCAL BATTERY CHANNEL
341	CHOKE 8HENRYS, 100 OHMS	L.V. FILTER

NOTE;
* USED IN RM-13-A ONLY

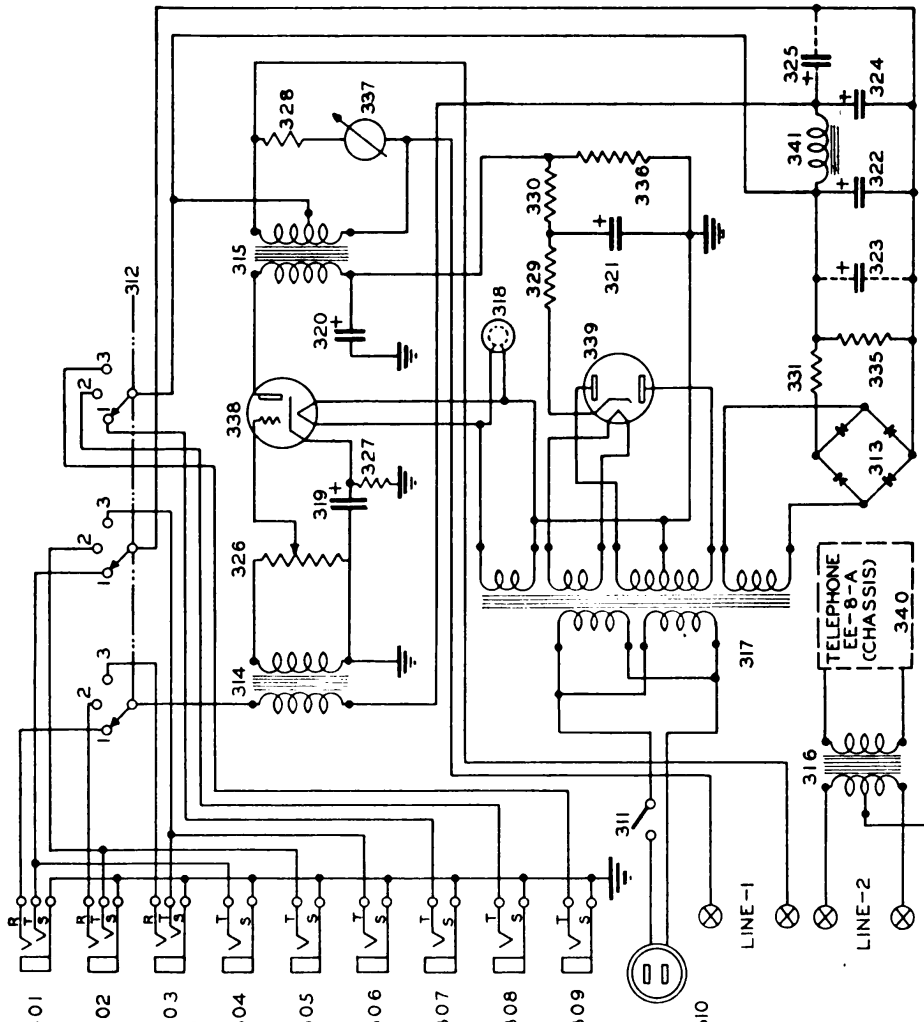
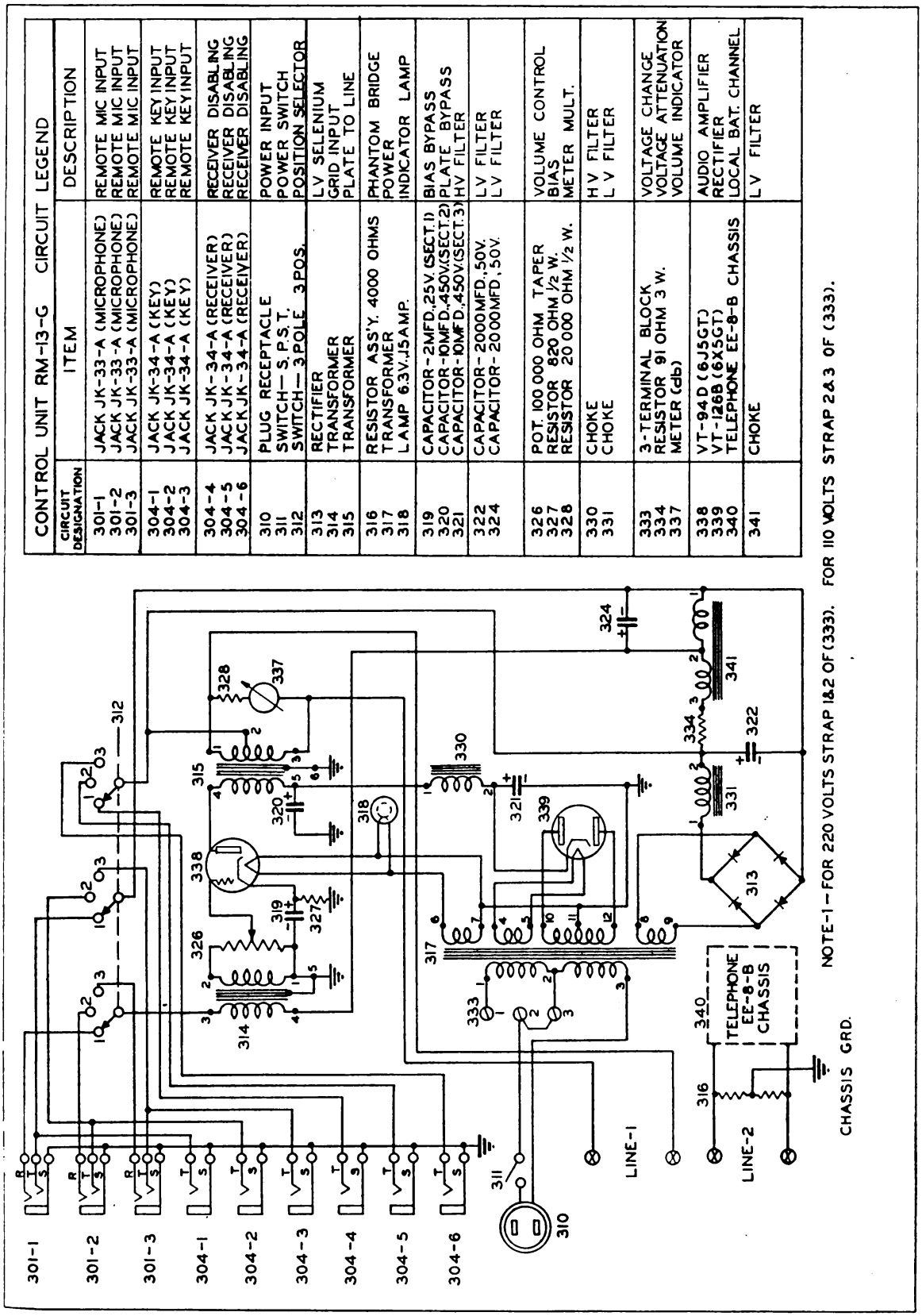


Fig. 21—Schematic Diagram, Control Units RM-13-A, RM-13-B, RM-13-C, & RM-13-D



CONTROL UNIT RM-13-G CIRCUIT LEGEND		
CIRCUIT DESIGNATION	ITEM	DESCRIPTION
301-1	JACK JK-33-A (MICROPHONE)	REMOTE MIC INPUT
301-2	JACK JK-33-A (MICROPHONE)	REMOTE MIC INPUT
301-3	JACK JK-33-A (MICROPHONE)	REMOTE MIC INPUT
304-1	JACK JK-34-A (KEY)	REMOTE KEY INPUT
304-2	JACK JK-34-A (KEY)	REMOTE KEY INPUT
304-3	JACK JK-34-A (KEY)	REMOTE KEY INPUT
304-4	JACK JK-34-A (RECEIVER)	RECEIVER DISABLING
304-5	JACK JK-34-A (RECEIVER)	RECEIVER DISABLING
304-6	JACK JK-34-A (RECEIVER)	RECEIVER DISABLING
310	PLUG RECEPTACLE	POWER INPUT
311	SWITCH—S.P.S.T.	POWER SWITCH
312	SWITCH—3 POLE 3 POS.	POSITION SELECTOR
313	RECTIFIER	LV SELENIUM
314	TRANSFORMER	GRID INPUT
315	TRANSFORMER	PLATE TO LINE
316	RESISTOR ASS'Y. 4000 OHMS	PHANTOM BRIDGE
317	TRANSFORMER	POWER
318	LAMP 6.3V. .15 AMP.	INDICATOR LAMP
319	CAPACITOR-2 MFD. 25V. (SECT. 1)	BIAS BYPASS
320	CAPACITOR-10 MFD. 450V. (SECT. 2)	PLATE BYPASS
321	CAPACITOR-10 MFD. 450V. (SECT. 3)	HV FILTER
322	CAPACITOR-2000 MFD., 50V.	LV FILTER
324	CAPACITOR-2000 MFD., 50V.	LV FILTER
326	POT. 100 000 OHM TAPER	VOLUME CONTROL
327	RESISTOR 820 OHM ½ W.	BIAS
328	RESISTOR 20 000 OHM ½ W.	METER MULT.
330	CHOKE	HV FILTER
331	CHOKE	LV FILTER
333	3-TERMINAL BLOCK	VOLTAGE CHANGE
334	RESISTOR 91 OHM 3 W.	VOLTAGE ATTENUATION
337	METER (db)	VOLUME INDICATOR
338	VT-94 D (6J5GT)	AUDIO AMPLIFIER
339	VT-126B (6X5GT)	RECTIFIER
340	TELEPHONE EE-8-B CHASSIS	LOCAL BAT. CHANNEL
341	CHOKE	LV FILTER

NOTE-1—FOR 220 VOLTS STRAP 1&2 OF (333). FOR 110 VOLTS STRAP 2&3 OF (333).

Fig. 22—*Schematic Diagram, Control Unit RM-13-G*

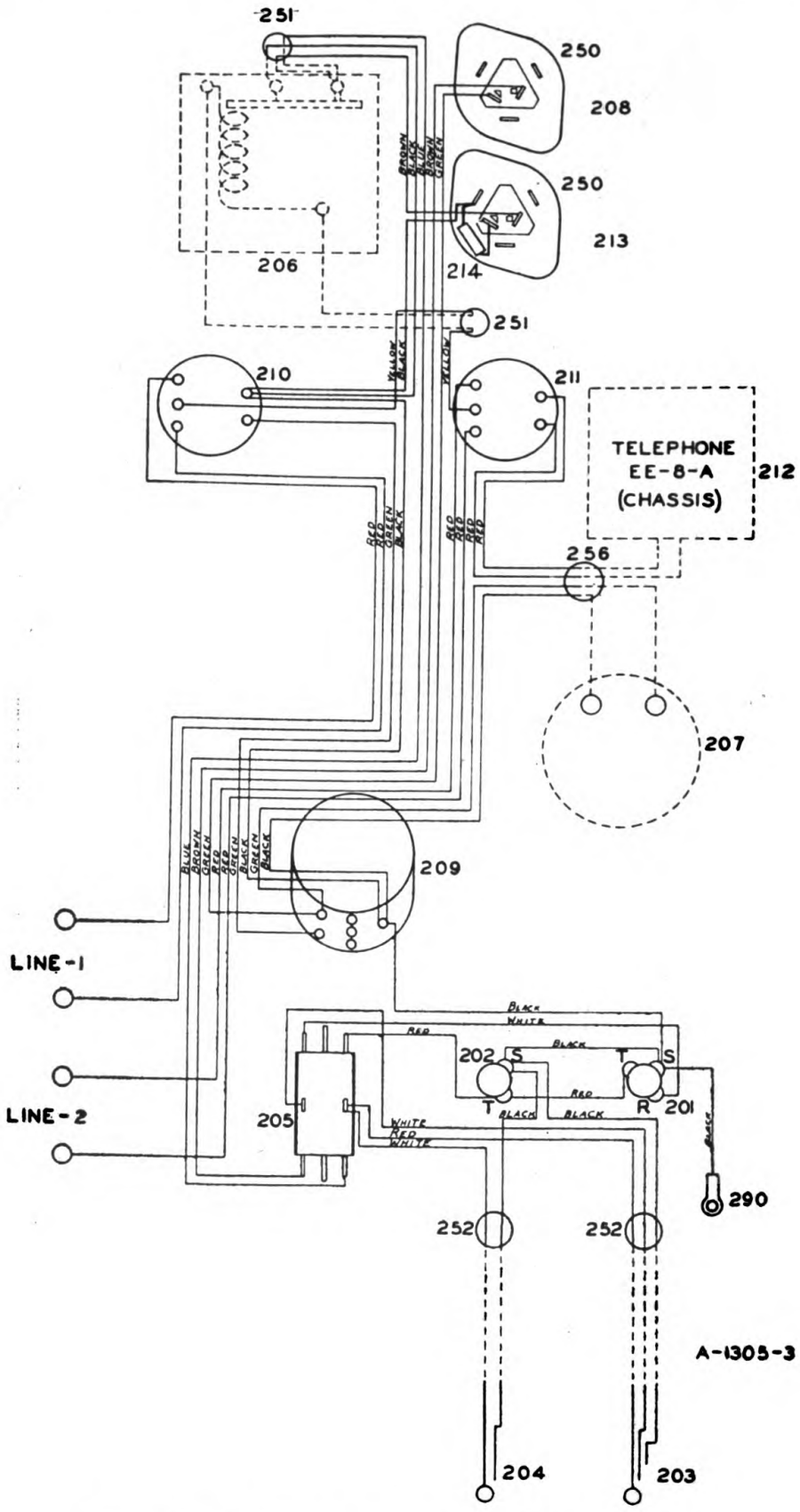


Fig. 23—*Wiring Diagram, Control Units RM-12-A*

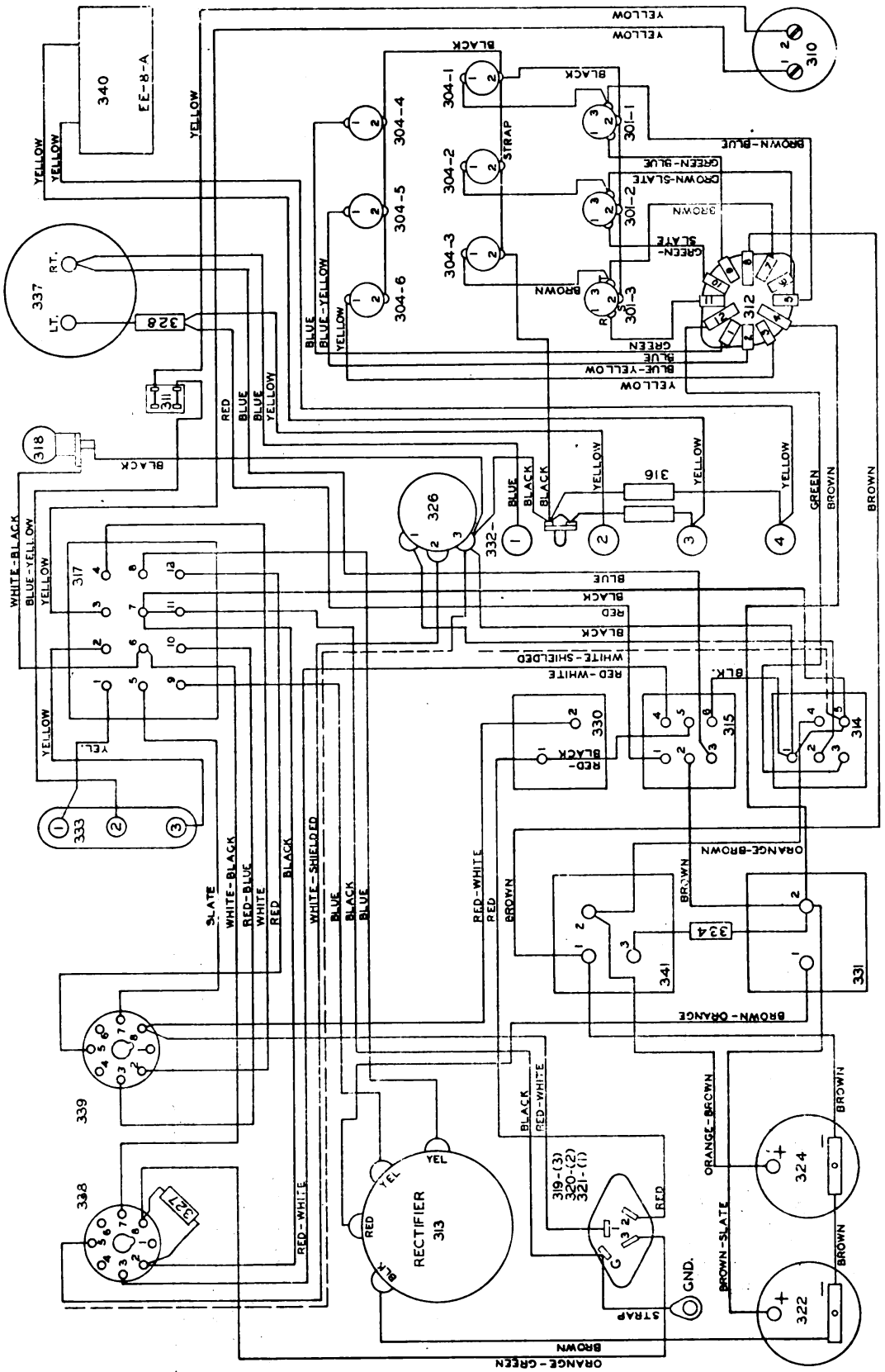


Fig. 28—*Wiring Diagram, Control Unit RM-13-G*

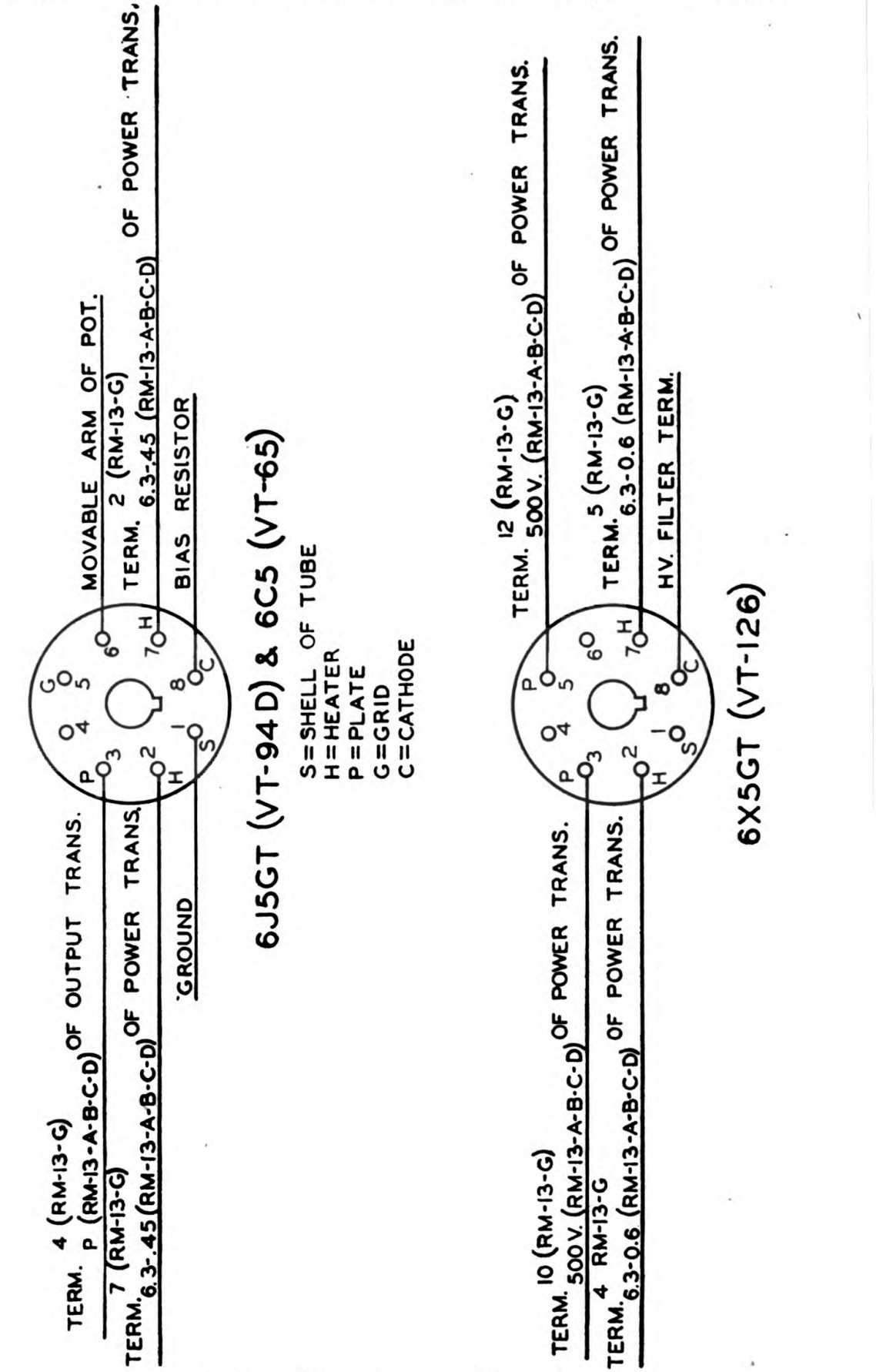
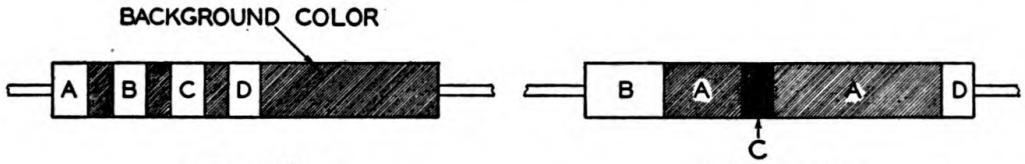


Fig. 29—*Wiring of vacuum tube sockets*

27. List of Manufacturers

Code	*Name*	*Address*
Mal.	P. R. Mallory	New York, N. Y.
Hub.	Harvey Hubbel Incorporated	Bridgeport, Conn.
C.H.	Cutler Hammer	Milwaukee, Wis.
Oak	Oak Manufacturing Company	Chicago, Ill.
FTR	Federal Telephone & Radio Corp.	East Newark, N. J.
Tung	Tung Sol Lamp Works	Newark, N. J.
Solar	Solar Manufacturing Company	Bayonne, N. J.
Clar	Clarostat Manufacturing Co.	Brooklyn N. Y.
AB	Allen Bradley	Milwaukee, Wis.
Jones	Howard B. Jones	Chicago, Ill.
W.E.M.	Westinghouse Electric Mfg. Co.	Newark, N. J.
K.R.	Ken-Rad	Owensboro, Ky.
Eby	Hugh H. Eby	Philadelphia, Penn.
Amph	American Phenolic Corporation	Chicago, Ill.
UEF	United Elastic Fabric	Easthampton, Mass.
EL.CH.	Electro-Chemical Engraving	New York, N. Y.
SM	Sillcocks Miller	Maplewood, N. J.
Lord	Lord Manufacturing	Erie, Penn.
Sigma	Sigma Instrument	Boston, Mass.
UTC	United Transformer Corp.	New York, N. Y.
G.E.	General Electric Company	Schenectady, N. Y.
IRC	International Resistance Corp.	Philadelphia, Penn.
W.E.I.	Weston Electrical Instrument Co.	Newark, N. J.
RCA	Radio Corporation of America	Harrison, N. J.
SIC	Signal Indicator Corporation	New York, N. Y.
Dav.	Daven Company	Newark, N. J.
UB	Universal Brass Turning	New York, N. Y.
BM	Belden Manufacturing Company	Chicago, Ill.
S.S.T.C.	Singer Mfg. Co.	New York, N. Y.
	Spanjes Mfg. Co.	Newark, N. J.
	Tanisian Co.	New York, N. Y.
Petroff	Petroff Mfg. Co.	New York, N. Y.
Kellogg	Kellog Mfg. Co.	Chicago, Ill.
AHH	Arrow-Hart & Hegeman Elec. Co.	Hartford, Conn.

RMA COLOR CODE FOR RESISTORS



METHOD I

COLOR BANDS A, B, AND C GIVE VALUE.
GOLD OR SILVER BAND D, USUALLY OMITTED, INDICATES TOLERANCE.
BLACK BACKGROUND - UNINSULATED.
TAN BACKGROUND - INSULATED

METHOD II

BODY COLOR (A), END COLOR (B), AND DOT OR BAND COLOR (C) GIVE VALUE.
GOLD OR SILVER BAND D, USUALLY OMITTED, INDICATES TOLERANCE.

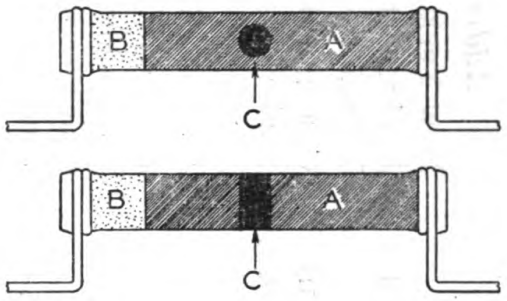


Fig. 30—Resistor color code

COLOR	FIGURE
BLACK	0
BROWN	1
RED	2
ORANGE	3
YELLOW	4
GREEN	5
BLUE	6
VIOLET	7
GRAY	8
WHITE	9

COLOR A GIVES FIRST FIGURE OF RESISTOR VALUE.

COLOR B GIVES SECOND FIGURE OF RESISTOR VALUE.

COLOR C GIVES NUMBER OF CIPHERS FOLLOWING THE FIRST TWO FIGURES.

COLOR D: GOLD BAND INDICATES ±5% TOLERANCE.
SILVER BAND INDICATES ±10% TOLERANCE.
NO BAND INDICATES STANDARD ±20% TOLERANCE.

EXAMPLES

RESISTANCE OHMS	COLOR CODE			
	A	B	C	D
43000 ±5%	YELLOW	ORANGE	ORANGE	GOLD
3900 ±10%	ORANGE	WHITE	RED	SILVER
68 ±20%	BLUE	GRAY	BLACK	NONE