DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TM 11-624A
TO 31R2-2MRC2-11

RADIO SETS AN/MRC-2C AND AN/MRC-2D

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

SEPTEMBER 1955

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

DON'T TAKE CHANCES!
EXTREMELY DANGEROUS VOLTAGES
EXIST IN THE FOLLOWING UNITS:

Radio Transmitter BC–610–I	2,600-volt circuits
Amplifier AM–141(*)/MRC	3,320-volt circuits

TECHNICAL MANUAL
No. 11-624A
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DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *15 September 1955*

RADIO SETS AN/MRC-2C AND AN/MRC-2D

358551—55——1

CHAPTER 1
DESCRIPTION AND DATA

Section I. INTRODUCTION

1. Scope

a. This technical manual contains instructions for the installation, operation, and maintenance of Radio Sets AN/MRC–2C and AN/MRC–2D (fig. 1). Detailed theory and field maintenance instructions are included for Amplifiers AM–141A/MRC and AM–141B/MRC and Junction Boxes JB–70–A and JB–70–B. In addition to these instructions, there is an appendix containing a table of components.

b. Forward comments on this publication directly to Commanding Officer, the Signal Corps Publications Agency, Fort Monmouth, New Jersey, ATTN: Standards Division.

c. The following components are part of Radio Sets AN/MRC–2C and AN/MRC–2D and are discussed in separate manuals. Refer to these manuals for detailed theory and maintenance instructions.

Component	Manual	Title
Frequency Meters BC–221–B, –M, –N, –O, –P, –Q, –R, –T, –AA, –AC, –AE, –AF, –AG, –AH, –AJ, –AK, –AL, –AN.	TM 11–300	Frequency Meter Sets SCR–211–A, B, C, D, E, F, J, K, L, M, N, O, P, Q, R, T, AA, AC, AE, AF, AG, AH, AJ, AK, AL, AN.
Rectifier Power Units RA–133, RA–133–A, and RA–133–B.	TB 11–300–3	Rectifier Power Units RA–133, RA–133–A, and RA–133–B.
Telephone EE–8–B	TM 11–333	Telephones EE–8, EE–8–A, and EE–8–B.
Frequency Shift Exciters O–39B/TRA–7 and O–39C/TRA–7.	TM 11–257	Frequency Shift Exciters O–39/TRA–7, O–39A/TRA–7, O–39B/TRA–7, and O–39C/TRA–7.
Dual Diversity Converter CV–31D/TRA–7	TM 11–261	Dual Diversity Converters CV–31/TRA–7, CV–31A/TRA–7, CV–31B/TRA–7, CV–31C/TRA–7, and CV–31D/TRA–7.
Control Unit C–292B/TRA–7	TM 11–262	Control Units C–292/TRA–7, C–292A/TRA–7, and C–292B/TRA–7.
Radio Transmitter BC–610–I and Antenna Tuning Unit BC–939–B.	TM 11–826	Radio Transmitters BC–610–E, –F, –G, –H, –I and Radio Transmitter T–213/GRC–26 and Antenna Tuning Units BC–939–A and –B.
Radio Receivers BC–312, –A, –C, –D, –E, –F, –G, –J, –L, –M, –N, –HX, and –NX.	TM 11–850	Radio Receivers BC–312, –A, –C, –D, –E, –F, –G, –J, –L, –M, –N, –HX, and –NX; BC–342, –A, –C, –D, –F, –J, –L, –M, and –N; BC–314, –C, –D, –E, –F, and –G; BC–344, and –D and Radio Receiver Assembly OA–65/MRC–2, and OA–65A/MRC–2.
Radio Receiver R–388/URR	TM 11–854	Radio Receiver R–388/URR.
Power Units PE–95–G, –H, and –I	TM 11–904	Power Units PE–95–A, –B, –C, –F, –G, –H, –I and –K.
Rectifier RA–87–A	TM 11–957A	Rectifier RA–87–A.
Rectifier RA–63–E	TM 11–962E	Rectifier RA–63–E.
Teletypewriter TT–4A/TG	TM 11–2234	Teletypewriter TT–4/TG.
Antenna Support AB–38B/CR	TM 11–2620A	Antenna Support AB–38B/CR.
Speech Amplifier BC–614–I	TM 11–5054	Speech Amplifier BC–614–E, –F, –H, and –I.
Perforator-Transmitter TT–56/MGC	TM 11–2201	Reperforator Teletypewriter Sets TC–16 and TC–17.
	TM 11–2222	Receiving Transmitter Distributors TT–12/FGQ–1, TT–13/FGQ–1 and Transmitter Distributors TT–21/FG, TT–25/FG, TT–26/FG, TT–52/FG.
	TM 11–2223	Typing and Nontyping Reperforators, Teletype Model 14.

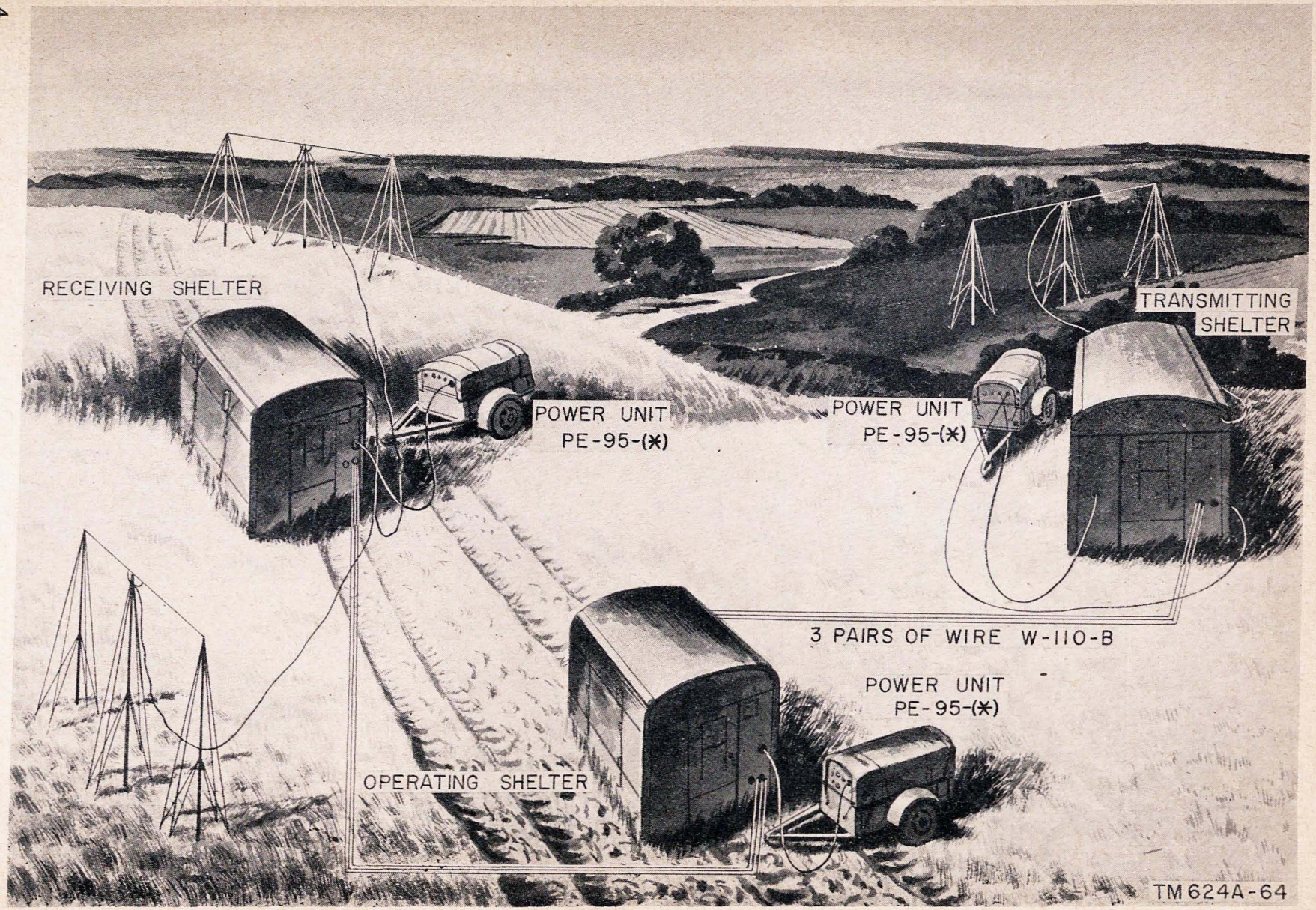


Figure 1. Radio Set AN/MRC–2(*).

2. Nomenclature

a. Official nomenclature followed by (*) is used to indicate the following models of equipment covered in this manual:

Radio Set AN/MRC–2(*): C and D models.
Amplifier AM–141(*)/MRC: A and B models.
Shelter HO–17–(*): A and B models.
Power Unit PE–95–(*): G, H, and I models.
Junction Box JB–70–(*): A and B models.
Frequency Shift Exciter O–39(*)/TRA–7: B and C models.
Frequency Meter BC–221–(*): B, M, N, O, P, Q, R, T, AA, AC, AE, AF, AG, AH, AJ, AK, AL, and AN models.
Rectifier Power Unit RA–133–(*): Basic, A, and B models.
Radio Receiver BC–312–(*): Basic, A, C, D, E, F, G, J, L, M, N, HX, and NX models.

b. A list of common usage names for various components of Radio Set AN/MRC–2(*) is given below.

Nomenclature	*Common name*
Radio Set AN/MRC–2(*)	radio set
Shelter HO–17–(*)	shelter
Amplifier AM/141(*)/MRC	amplifier
Junction Box JB–70–(*)	junction box
Frequency Meter BC–221–(*)	frequency meter
Telephone EE–8–B	telephone
Frequency Shift Exciter O–39 (*)/TRA–7.	exciter unit
Dual Diversity Converter CV–31D/TRA–7.	converter
Control Unit C–292B/TRA–7	control unit
Radio Transmitter BC–610–I	transmitter
Antenna Tuning Unit BC–939–B.	antenna tuning unit
Power Unit PE–95–(*)	power unit
Perforator-Transmitter TT–56/MGC.	perforator-transmitter
Teletypewriter TT–4A/TG	teletypewriter
Speech Amplifier BC–614–I	speech amplifier
Loudspeaker LS–3	loudspeaker
Headset HS–30–U	headset
Multimeter TS–297/U	multimeter
Typewriter MX–322/U	typewriter

3. Forms and Records

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

a. DD Form 6 (Report of Damaged or Improper Shipment) will be filled out and forwarded as prescribed in SR 754–45–5 (Army); Navy Shipping Guide, Article 1850–4 (Navy); and AFR 71–4 (Air Force).

b. DA Form 468 (Unsatisfactory Equipment Report) will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in SR 700–45–5.

c. DD Form 535 (Unsatisfactory Report) will be filled out and forwarded to Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700–45–5 and AF TO OO–35D–54.

d. DA Form 11–238 (Operator First Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar)) will be prepared in accordance with instructions on the back of the form (fig. 53).

e. DA Form 11–239 (Second and Third Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar)) will be prepared in accordance with instructions on the back of the form (fig. 54).

f. Use other forms and records as authorized.

Section II. SYSTEM DATA

4. Purpose of Equipment

a. Radio Set AN/MRC–2(*) is a high-powered radioteletype station with a transmitter power output of approximately 2 kilowatts (kw) and capable of operating over a frequency range of 2 to 18 megacycles (mc). Figure 1 shows this radio set arranged for use as a semipermanent station.

b. The complete radio set is transportable and requires three 2½-ton, 6 by 6, cargo trucks. Each truck carries a Shelter HO–17–(*), one of which contains the transmitting equipment, another shelter contains the receiving equipment, and the third contains the teletypewriter operating equipment. A fourth truck may be provided to transport transmitting antenna masts and some of the accessories for the operation and maintenance of the radio set. When packed for shipment, these components are stored in the operating shelter. Three Power Units PE–95–(*) with trailers are furnished with the radio set.

c. The radio set provides radioteletype communication in either net or point-to-point operation. Radioteletype operation is on a frequency-shift basis on either a full-duplex, a half-duplex, or a one-way reversible circuit. The radio set will

provide emergency continuous-wave (cw) communications at ranges up to 1,000 miles. Voice operation within the range of 100 miles or more may be achieved by disconnecting the amplifier and connecting the transmitter directly to the transmitting antenna. On an emergency basis, a whip or long-wire transmitting antenna may be used with the C model of the radio set. In this operation, the output of the transmitter is connected to the antenna tuning unit and the antenna tuning unit is connected to the whip or long-wire antenna. The antenna tuning unit is supplied only with the C model of the radio set.

5. System Application

The radio set provides high-speed, point-to-point, radioteletype circuit facilities for handling large volumes of both tactical and administrative traffic. The radio set also operates as part of a net of three or more similar radio sets or as a point-to-point facility for cw telegraph, manual frequency shift, or voice transmission. The latter types of operation usually are used as emergency measures or when the radio set must be used to communicate with other stations having that type of operation. Figure 2 shows typical system application of the radio set in communication (by radioteletype) with a mobile Radio Set AN/GRC–26A, and maintaining periodic contact (when not in actual communication with Radio Set AN/GRC–26A) with a mobile Radio Set AN/GRC–38 by manual cw and voice. The radio set can serve also as an intermediate radio relay station, to supplement any point-to-point station that might be unable to communicate with its outlying station (par. 33, 73).

6. Technical Characteristics

a. Transmission.

Frequency range	2 to 18 mc.
Distance range	1,000 miles or more depending on conditions of terrain, ionosphere, atmosphere, and frequency.
Type of modulation	Normal: fsk (F1), 850 cycles. Emergency: amplitude modulation; cw (A1); and telephony (A3).
Rf output	2 kw (approx.).
Antenna	Normal: doublet or rhombic. Emergency: whip or long wire in AN/MRC–2C only.

b. Reception.

Frequency range	0.5 to 30.5 mc (receiving shelter).
Type of modulation	Normal: frequency modulation; frequency-shift keying (F1), 850 cycles. Emergency: amplitude modulation; cw (A1), and telephony (A3).
Antenna	Normal: two doublets on a dual diversity basis. Emergency: whip on a single-channel basis, receiving cw or voice.

c. Power Requirements.

Input:	
Transmitting shelter	7.5 kw (approx.).
Receiving shelter	2.5 kw (approx.).
Operating shelter	2 kw (approx.).
Source	115 volts, 60 cycles ac, commercial power or one Power Unit PE–95(*) per shelter.

7. Packaging Data

When packed for shipment, the radio set consists of six wooden crates; each unit of the set is packed complete with equipment in separate boxes. Two packing lists are attached to each box, one on the outside and one on the inside. The table below shows the weights, dimensions, and volume of each crate when packed for shipment.

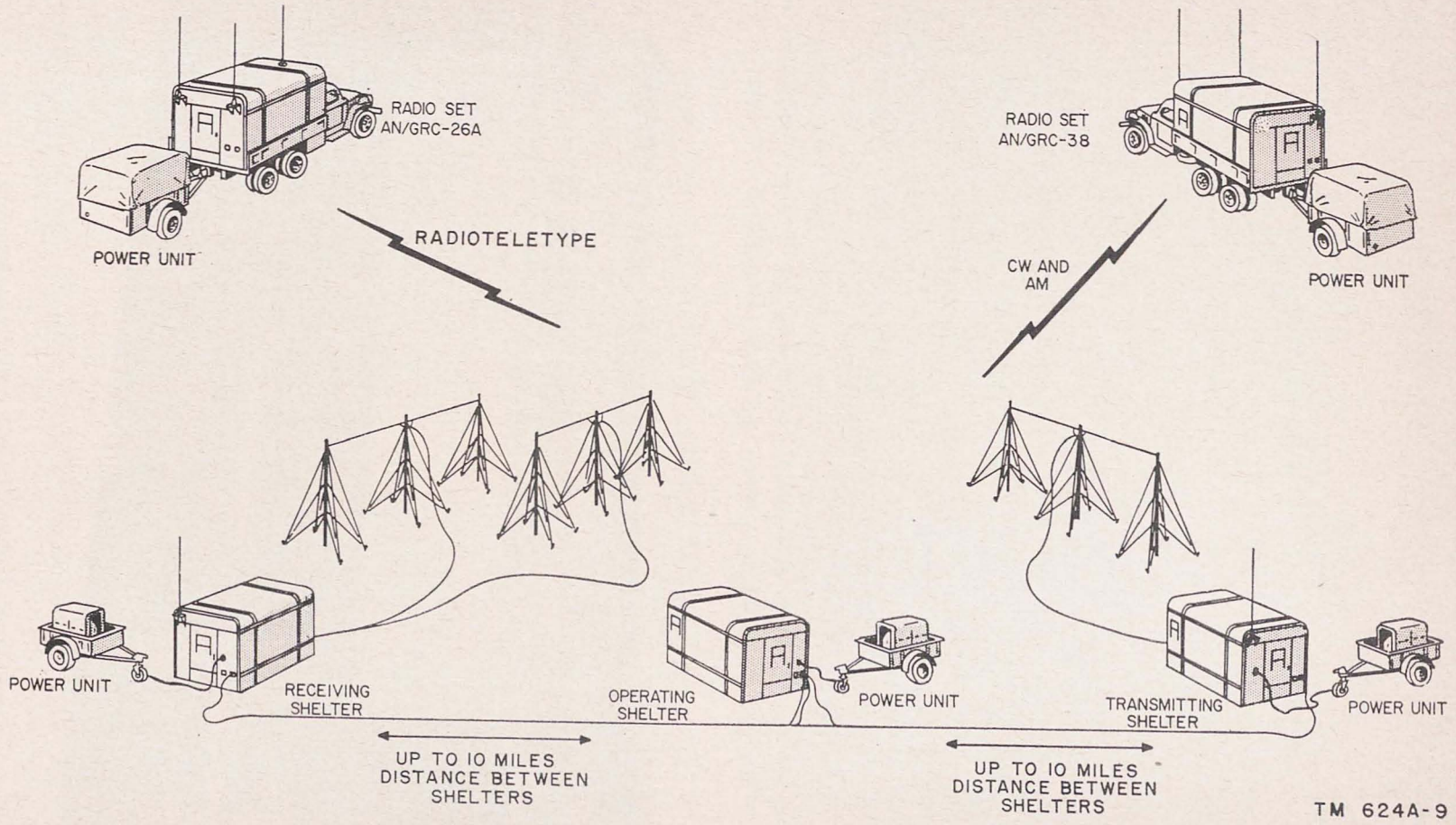


Figure 2. System application.

Crate No.	Height	Width	Depth	Volume (cu ft)	Unit weight (lb)	Contents
1 of 6	7′ 6½″	6′ 5″	13′ 2″	643. 5	8, 800	Shelter HO–17–(*), transmitting.
2 of 6					7, 200	Shelter HO–17–(*), receiving.
3 of 6					7, 200	Shelter HO–17–(*), operating.
4 of 6						
5 of 6	6′ 4½″	6′ 4½″	9′	362. 75	4, 965	Power Unit PE–95–(*).
6 of 6						
Total weight (lb)					38, 095	

a. Shelters. Each shelter is mounted on a heavy, wooden, shipping crate platform around which is built the protecting crate (fig. 4). The shelters are secured to their platforms by four corner bolts. The openings (doors, windows, ventilator, etc.) in the shelter are covered with adhesive tape, over which a sealing compound has been placed (fig. 3.) The shelter is protected against extreme humid conditions by a waterproof wrapping. Bags of activated desiccant (silica gel) are placed at random throughout the shelter to absorb moisture. All components and containers of components within the shelter are wrapped in waterproof paper, which is sealed with water-resistant tape or adhesive, and are blocked, braced, or strapped securely to the shelter.

b. Trailer K–52 and Power Unit PE–95–(*). Trailer K–52, in which Power Unit PE–95–(*) is installed prior to shipment, and all the necessary running spare parts are packed as a unit in a large wooden crate. Trailer K–52 is bolted and strapped to a shipping crate platform, around which a crate is built. All projecting parts are cushioned against shock. Bags of activated desiccant are placed throughout the box to absorb the moisture. For detailed information on packaging of Power Unit PE–95–(*), refer to TM 11–904.

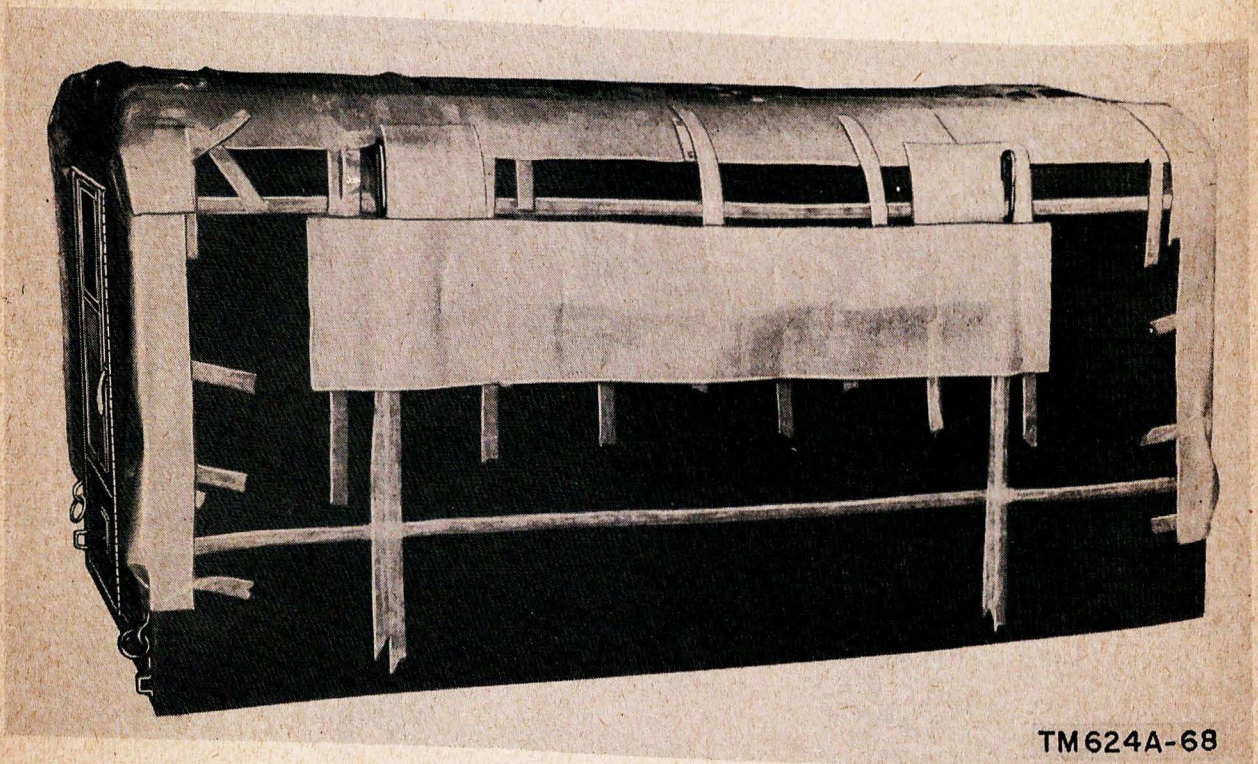


Figure 3. Shelter HO–17–(*), partially weatherproofed.

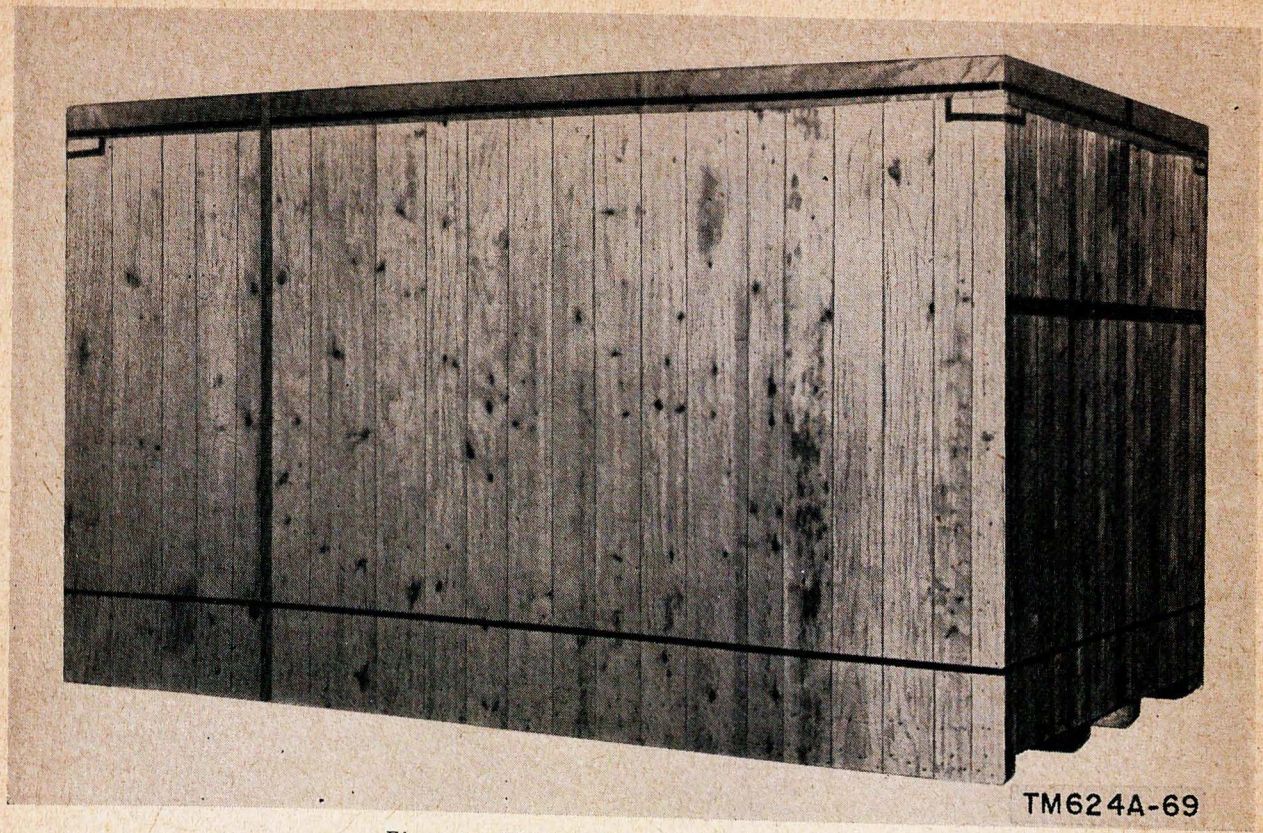


Figure 4. Shelter HO–17–(*) in shipping crate.

Section III. DESCRIPTION

8. Transmitting Shelter

The transmitting shelter houses the equipment necessary for the transmission of radioteletype signals from polar teletypewriter signals received on a wire line from the operating shelter. Transmission normally is by a fixed doublet or rhombic antenna installation. The following is a general description of the transmitting shelter and of the components housed within it. A complete list of components can be found in the appendix.

a. Housing. Shelter HO–17–(*) houses all transmitting shelter equipment (figs. 5 and 6). The shelter is a steel and plywood structure which may be mounted on a standard 2½-ton, 6 by 6, cargo truck when transportation is required. Windows, protected by blackout blinds, are provided in the rear door, the roadside door, and the front wall. The front wall is fitted with a built-in louver assembly for ventilation. Lighting is provided by four ceiling fixtures. In Radio Set AN/MRC–2C, Chest CH–120–B is located along the roadside wall (fig. 5). It houses some of the components and opens up to provide an operating table. In Radio Set AN/MRC–2D, an operating table with built-in storage compartments extends along the roadside wall (fig. 6).

b. Junction Box JB–70–(*) (fig. 7). In Radio Set AN/MRC–2C, Junction Box JB–70–A is located in Chest CH–120–B (fig. 5). In Radio Set AN/MRC–2D, Junction Box JB–70–B is located on the operating table (fig. 6). Power for the transmitting shelter is connected by a cable through a feedthrough receptacle in the rear wall to Junction Box JB–70–(*), which is the power distribution point and control center for the shelter components.

c. Speech Amplifier BC–614–I (fig. 7). The speech amplifier is shock-mounted directly to the top of Junction Box JB–70–(*) (figs. 5 and 6). Four hasps on the sides of the amplifier cabinet anchor it securely to the shock mount. The speech amplifier raises the microphone output voltage to a level suitable to drive the input of the audio circuit in the transmitter. It also provides sidetone for monitoring cw transmission at Junction Box JB–70–(*).

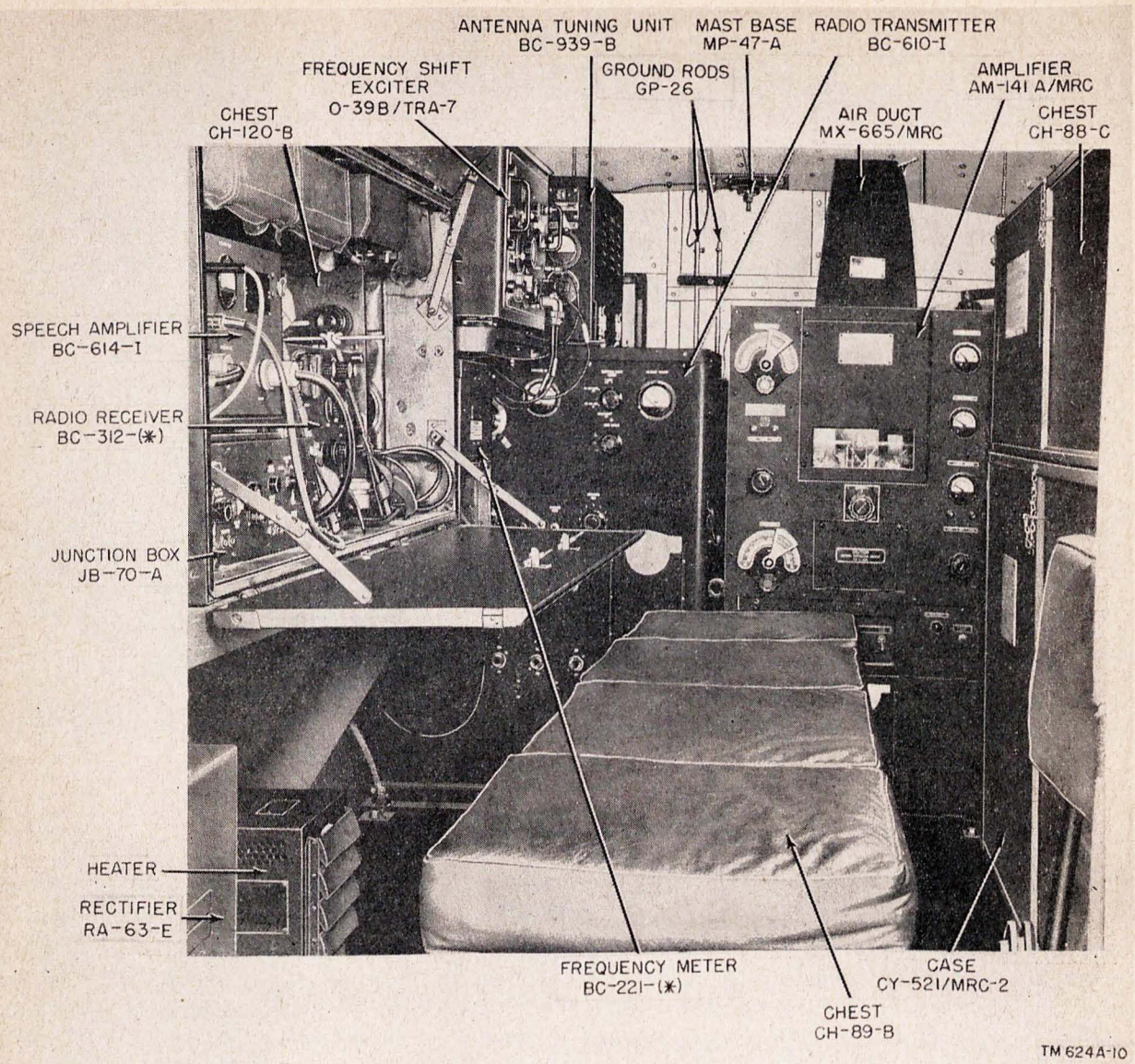


Figure 5. Radio Set AN/MRC–2C, interior view of transmitting shelter.

d. Radio Receiver BC–312–(*). Radio Receiver BC–312–(*) is supplied only with Radio Set AN/MRC–2C. It is shock-mounted to Chest CH–120–B and located to the right of Junction Box JB–70–A and the speech amplifier (fig. 5). This receiver operates from a 12-volt direct-current (dc) source and is used to receive cw or voice signals over a frequency range of 1.5 to 18 mc on a two-way emergency communication basis. A dynamotor, located in the radio receiver, provides the required B+ voltage necessary for operation of the receiver circuits. The ALT. SIG. ANT. connector is connected by electrical lead CX–2141/U to Mast Base AB–15/GR mounted on the shelter wall.

e. Radio Receiver R–388/UUR. Radio Receiver R–388/URR is supplied with Radio Set AN/MRC–2D. It is located on the operating table adjacent to the speech amplifier (fig. 6). The unit is assembled on a single chassis, which slides into Cabinet CY–1213/U. The receiver is used for the reception of voice and cw signals over a frequency range of .5 to 30.5 mc, for two-way communication from the transmitting shelter. The receiver is connected to the whip antenna, mounted at the rear of Shelter HO–17–(*).

f. Frequency Shift Exciter O–39(*)/TRA–7. In Radio Set AN/MRC–2C, Frequency Shift Exciter O–39B/TRA–7 is shock-mounted to a shelf on the roadside wall and located to the right of

Chest CH–120–B (fig. 5). In Radio Set AN/MRC–2D, Frequency Shift Exciter O–39C/TRA–7 is shock-mounted on the operating table (fig. 6). The unit is assembled on a single chasis and inclosed in a steel case. The frequency-shift exciter unit becomes the oscillator stage of the transmitter, providing the basic radio frequency (rf) and the frequency shift desired on the transmitted *mark* and *space* signals. The frequency range of the exciter unit is 2 to 6 mc.

g. Radio Transmitter BC–610–I.

(1) Radio Transmitter BC–610–I is secured to a cradle-frame shock-mounting base which is bolted to the shelter floor. It is located in the front end of the shelter with the front panel controls facing toward the rear (figs. 5 and 6). The transmitter consists of three decks enclosed in a sheet metal housing. Two hinged doors on the top of the transmitter provide access to the tuning unit and plate coil compartments.

(2) This radio transmitter is a medium-power transmitter for voice, cw, and radioteletype signals operating over a frequency range of 2 to 18 mc. The

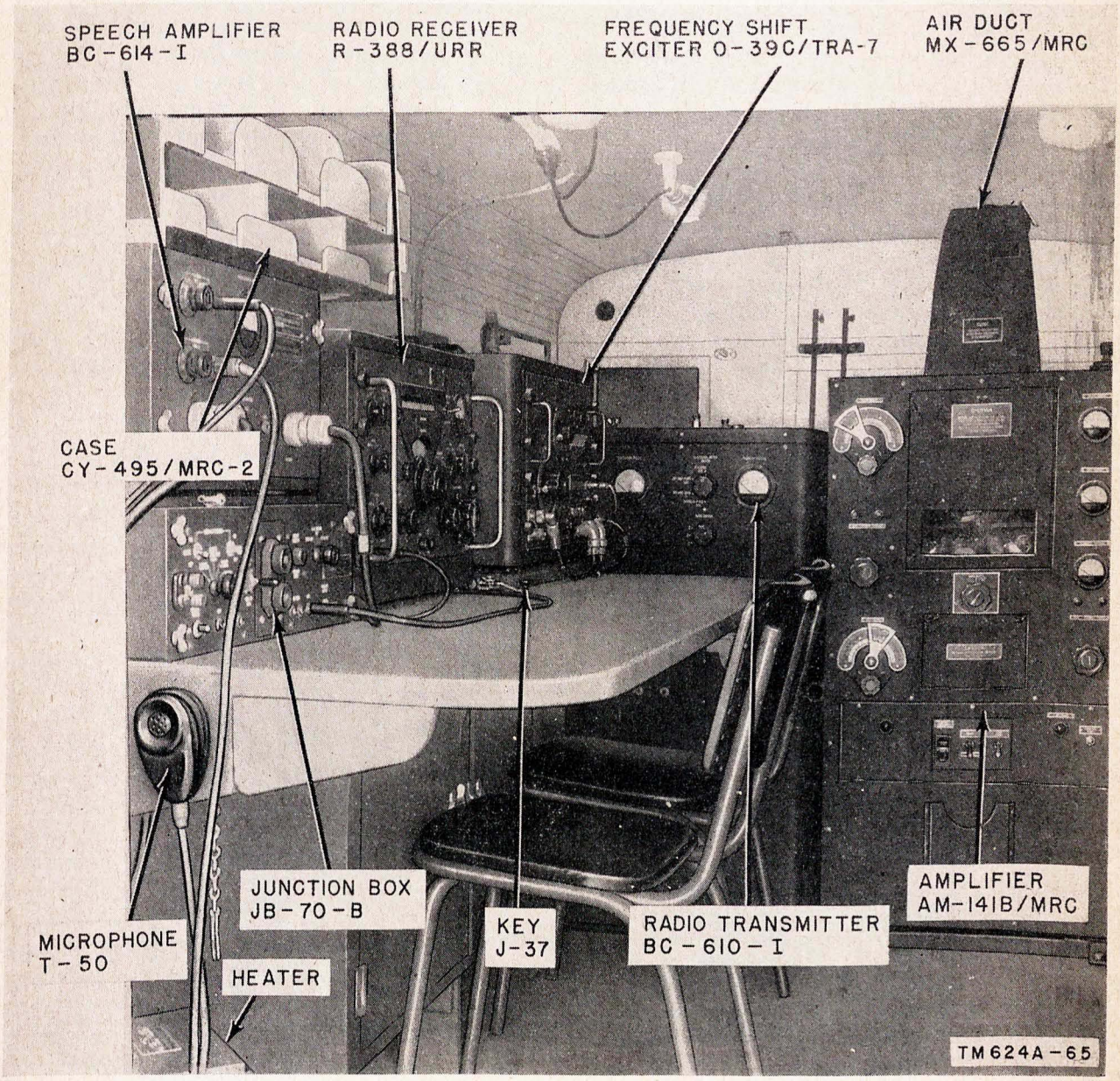


Figure 6. Radio Set AN/MRC–2D, interior view of transmitting shelter.

frequencies developed by the exciter unit (2 to 6 mc.) are amplified straight through or doubled or quadrupled in the transmitter to a range of 2 to 18 mc. In emergency, the transmitter may be operated with its own master oscillator or crystal oscillator for cw operation with Amplifier AM–141(*)/MRC or for voice or cw operation without the amplifier.

(3) Normal operation is the transmission of radioteletype signals in conjunction with the amplifier. When voice communication is desired, the transmitter must be used without the amplifier (par. 75). The transmitter output is fed directly to a transmitting doublet or with Antenna Tuning Unit BC–939–B (C model of the radio set only) to a whip or long-wire antenna.

h. Antenna Tuning Unit BC–939–B. The antenna tuning unit is supplied only with Radio Set AN/MRC–2C. It is mounted and secured to the top of the transmitter by four wing nuts (fig. 5). The output of the transmitter is connected to the antenna tuning unit by a coaxial cable, and the output of the antenna tuning unit is connected to a whip or long-wire antenna. This component is used to match the impedance of the antenna to the impedance of the transmitter rf output circuit.

i. Amplifier AM–141(*)/MRC (fig. 8).

(1) The amplifier is bolted to a cradle-frame shock-mounting base which is anchored to the floor beside the radio transmitter (figs. 5 and 6). Air Duct MX–665/MRC (fig. 5) extends from the amplifier to an opening through the front wall. The component items of the amplifier are inclosed in a sheet metal housing. Interlock switches are provided on the panels and on the access doors to remove the danger of shock from high voltage. A metal bar, actuated by the plate coil access door, shorts the plate circuit to ground and discharges the filter capacitors when the door is opened. Power is brought in directly from the power unit by a cable through a feedthrough connector in the rear wall.

(2) The rf amplifier is used to amplify the power output of the transmitter to 2 kw. The frequency range is 2 to 18 mc, which is obtained by two sets of plug-in coils. The output of the amplifier is coupled to a doublet or rhombic transmitting antenna.

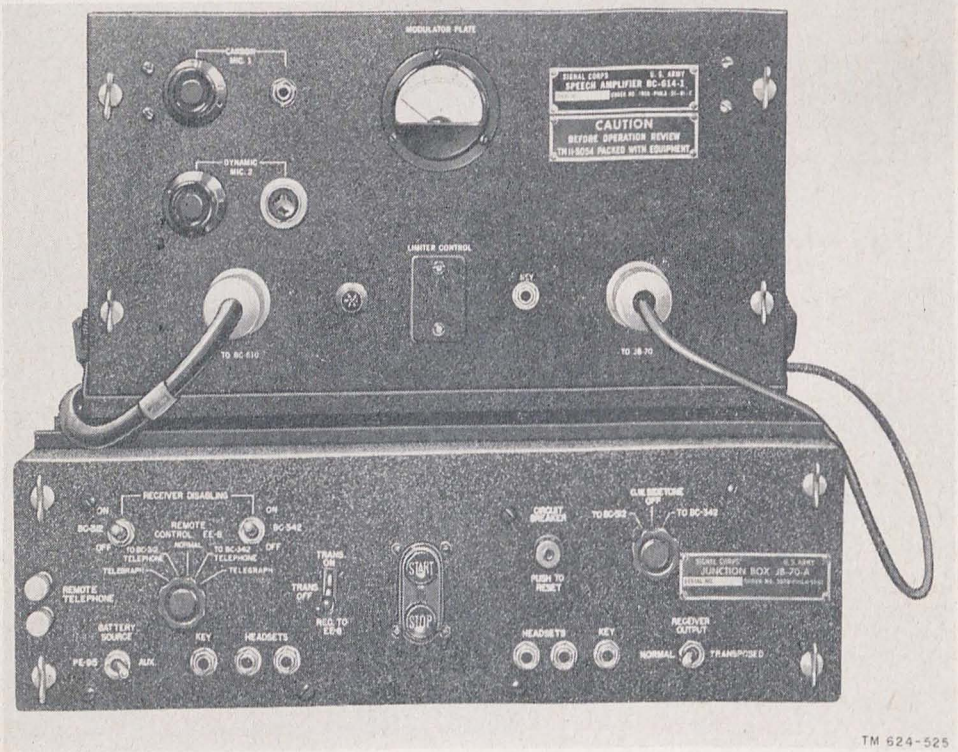


Figure 7. Junction Box JB–70–A and Speech Amplifier BC–614–I.

(3) Air Duct MX–665/MRC vents unwanted hot air generated in the amplifier. A control allows the air to be exhausted either inside or outside the shelter, according to the operator's choice.

j. Rectifier RA–63–E (fig. 5). Rectifier RA–63–E is supplied only with Radio Set AN/MRC–2C. It is located under Chest CH–120–B and is connected to Junction Box JB–70–A (fig. 5). Alternating current (ac) from the junction box is converted to dc, which supplies a charging current to the batteries in Chest CH–109–A. When the BATTERY SOURCE switch on Junction Box JB–70–A is in the AUX. position, the rectifier supplies 12 volts dc for operating the keying relay in the junction box and for the antenna shorting (disabling relay) in Radio Receiver BC–312–(*).

k. Frequency Meter BC–221–(*). The frequency meter is supplied only with Radio Set AN/MRC–2C. It is inclosed in a metal or wooden housing and is located on a shelf to the right of Chest CH–120–B, directly beneath the frequency-shift exciter unit (fig. 5). This component is used to help set the frequency-shift exciter and the transmitter to the assigned frequency and to check the frequency shift of the transmitter. Radio Receiver R–388/URR performs this function in Radio Set AN/MRC–2D.

l. Rectifier Power Unit RA–133–(*). Rectifier Power Unit RA–133–(*) is supplied only with Radio Set AN/MRC–2C. The rectifier power unit chassis is mounted in the battery compartment of the frequency meter case. This unit supplies the necessary voltages for the operation of the frequency meter. The power cord enters a metal line-control box mounted on the side of the frequency meter case. This metal box contains a neon indicator lamp and an ON–OFF switch.

m. Power Supply PP–886/G (fig. 9). Power Supply PP–886/G is supplied only with Radio Set AN/MRC–2D. It is secured directly to the rear shelter wall. An ON–OFF switch, a fuse receptacle, and a power indicating lamp are mounted on the side of the chassis. The chassis is inclosed in a sheet-steel cover. The rectifier unit is an auxiliary power supply to the 12-volt battery source available from Power Unit PE–95–(*) for operation of the disabling relay in Radio Receiver R–388/URR and a keying relay in Junction Box JB–70–B.

n. Typewriter MX–322/U. This is a standard military model portable typewriter supplied for typing messages and logs. Letters appear in upper case only.

o. Junction Box J–199/MRC–2. Junction Box J–199/MRC–2 is installed in the rear corner of the roadside shelter wall. Six binding posts are provided for connecting the telephone, control, and teletypewriter signal lines from the operating shelter. Lightning protector blocks and a ground strap provide line protection.

p. Junction Box J–207/MRC–2. In Radio Set AN/MRC–2C, Junction Box J–207/MRC–2 is located on the roadside shelter wall, under the shelf below the frequency-shift exciter unit. In Radio Set AN/MRC–2D, the junction box is located at the front end of the operating table. This junction box provides jacks and connectors for a control cable, telephone, cords to the frequency-shift exciter unit, and a telegraph key.

q. Loudspeaker LS–3. Loudspeaker LS–3 is a permanent-magnet speaker, housed in a steel case. An impedance-matching transformer (voice coil to 8,000 ohms impedance), mounted inside the case, matches the output impedance of the radio receiver to the impedance of the voice coil. In Radio Set AN/MRC–2C, the speaker is mounted, baffle down, in the upper right-hand section of Chest CH–120–B. In Radio Set AN/MRC–2D, it is mounted on the roadside wall at the rear of the shelter.

r. Microphones. The following microphones are used for voice modulation of the transmitter through the speech amplifier.

(1) *Microphone T–17–D* (fig. 10). Microphone T–17–D is an antinoise, carbon-button, hand microphone. It is provided with a three-wire cord terminating in a telephone-type plug at one end and permanently connected to the microphone through a push-to-talk switch on the handle. Operation of the switch closes the microphone circuit and connects the third wire to a common ground. The microphone matches a 35- to 90-ohm circuit.

(2) *Microphone T–45* (fig. 10). Microphone T–45 is a lightweight, noise-canceling, single-button microphone. The T–45 is equipped with a harness that loops around the ears of the user and positions the microphone directly in front of the lips. Microphone T–45 is for use under a gas mask, for voice transmission in noisy locations, and for any application

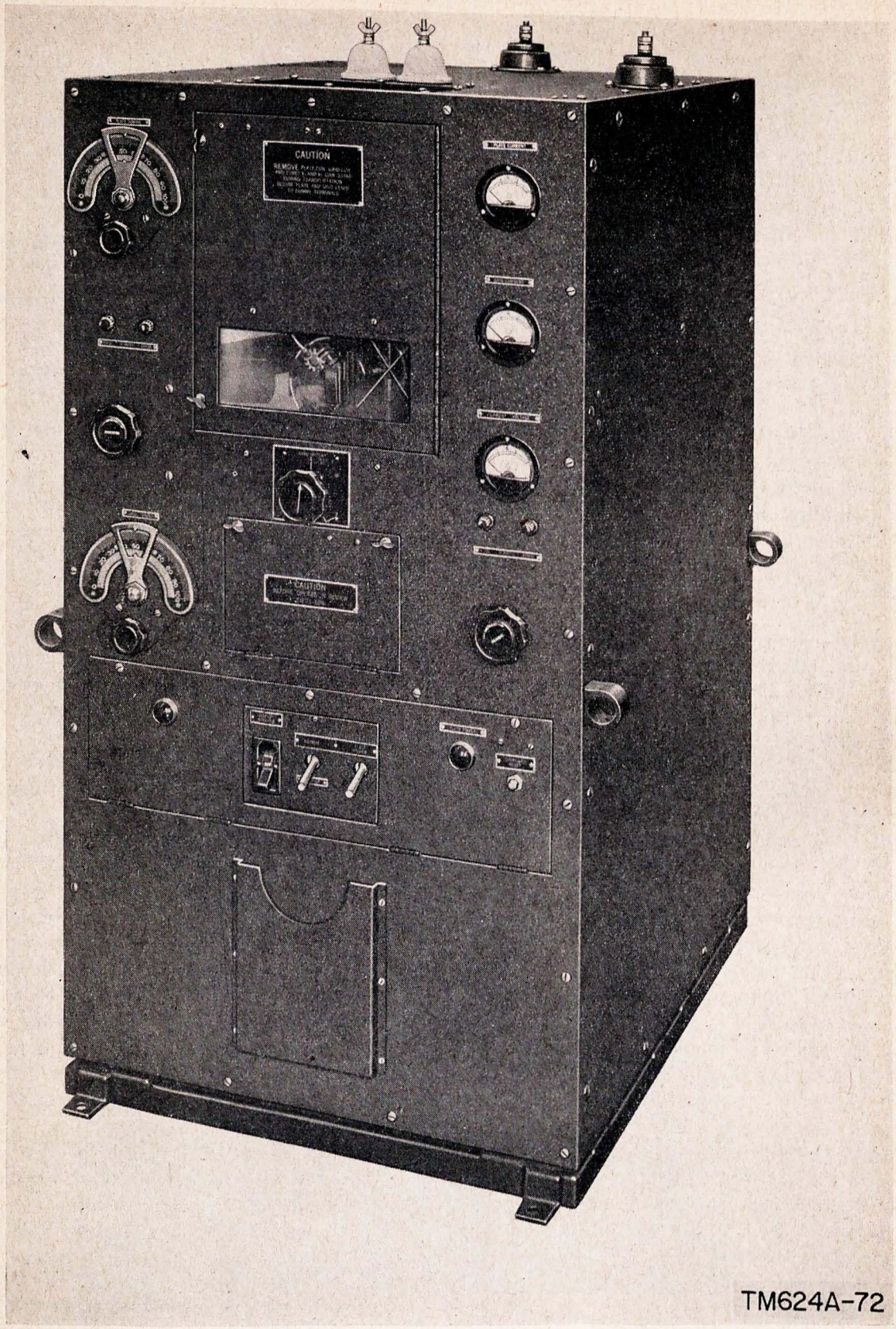


Figure 8. Amplifier AM–141(*)/MRC.

where free use of the hands is necessary. Its impedance is between 50 and 125 ohms.

(3) *Microphone T–50.*(fig. 10). Microphone T–50 is a dynamic, high-impedance (21,000 ohms), hand microphone. It has a 6-foot cord that terminates in a three-pin connector. The microphone is equipped with a press-to-talk switch which, when operated, removes a shorting contact from across the microphone and connects the third wire to a common ground.

s. Telephone EE–8–B. Telephone EE–8–B is inclosed in an olive-drab weatherproofed canvas case. In Radio Set AN/MRC–2C it is installed in a bracket in Chest CH–120–B. In Radio Set AN/MRC–2D, it is installed in a bracket on the operating table. The handpiece, with a switch for talking or listening, is connected by a cord to the terminals at the top of the telephone proper. Turning a handle on the side generates the power for ringing. Two 1½-volt Batteries BA–30 (not supplied with the telephone) are set in position when the handpiece is removed from the case. Each cell is held in place by a coil spring. Telephone EE–8–B is used to communicate with the operating shelter.

t. Headset HS–30–U (fig. 11). Headset HS–30–U is a lightweight headset of 256 ohms impedance. Cord CD–605, which includes a coil, is used with the set to increase the impedance to 8,000 ohms. Special soft-rubber earpieces snapped to the receivers of the headset are designed to fit snugly into the ear cavities and exclude outside noises. The head band is adjustable to the contour of the operator's head. The headset is used mainly in setting up and adjusting the frequency-shift exciter unit. It also may be used at the PHONES output of the radio receiver.

u. Key J–37. Key J–37 is a manually operated telegraph key with a three-way adjustable lever and two binding posts. Keying positions are at the speech amplifier, Junction Box JB–70–(*), and Junction Box J–207/MRC–2.

v. Storage Facilities. The following provisions are made in the transmitting shelter for systematic storage of accessory equipment.

(1) *Case CY–521/MRC–2.* Case CY–521/MRC–2 is installed on the floor and secured by hasps to the curbside wall (fig. 5). It contains the articles listed under Case CY–521/MRC–2 in the table of components in the appendix. Most of the items stored in this case are spares and operating components for the rf amplifier.

(2) *Chest CH–88–C.* Chest CH–88–C is mounted directly on Case CY–521/MRC–2 and is secured to the curbside wall by hasps. Two sliding doors on the front of the chest provide access to

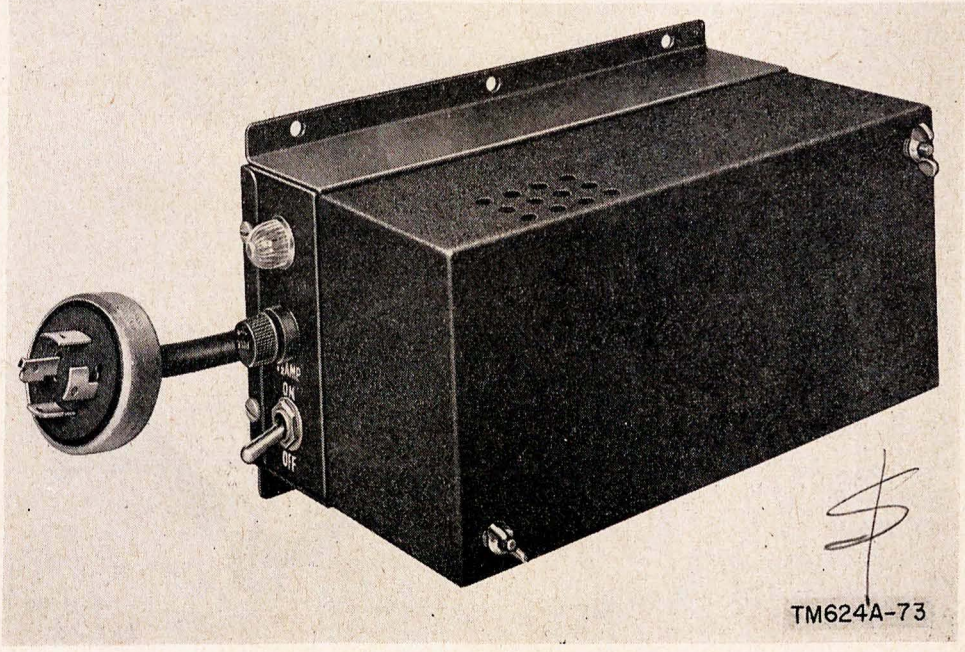


Figure 9. Power Supply PP–886/G.

the interior compartments where transmitter tuning units, coil units, amplifier coil units, and other items are stored. A complete listing of the contents is given under Chest CH–88–C in the table of components in the appendix.

(3) *Chest CH–89–B.* This chest is supplied only with Radio Set AN/MRC–2C (fig. 5). The top of the chest is covered with four seat cushions for the convenience of the operators. Under each cushion is a compartment used for storing spare parts and equipment. A label attached to the chest indicates the contents of the compartments. A complete list of the items stored is found in the appendix.

(4) *Chest CH–120–B.* This chest is supplied only with Radio Set AN/MRC–2C. It is mounted on the roadside wall and houses Junction Box JB–70–A, Speech Amplifier BC–614–I, Radio Receiver BC–312–(*), Loudspeaker LS–3, and Telephone EE–8–B (fig. 5). It also contains some storage shelves. The lower hinged door folds down and provides an operating table.

(5) *Case CY–520/MRC–2.* Case CY–520/MRC–2 is stored on the operating shelter floor. The contents of the case, mostly technical manuals and transmitter antenna accessories are listed under Case CY–520/MRC–2 in the table of components in the appendix.

(6) *Case CY–495/MRC–2.* Case CY–495/MRC–2 is a six-compartment shelf, mounted on the roadside wall of Radio Set AN/MRC–2D. The case serves as a file for message forms.

(7) *Chest CH–109–A.* This chest is supplied only with Radio Set AN/MRC–2C. It contains two 6-volt storage batteries connected in series and is located under Chest CH–120–B near the transmitter. This 12-volt dc source supplies power to Junction Box JB–70–A for operating the keying relay in the junction box and power for operating Radio Receiver BC–312–(*) when the BATTERY SOURCE switch on the junction box is in the AUX position.

w. Multimeter TS–297/U. Multimeter TS–297/U is a multirange test instrument for measuring ac or dc voltage, dc milliamperes, and resistance. By adding a capacitor, it also may be used as an output meter. Two Cords CX–529/U (including four alligator clips) and one Cord CX–468/U (when multimeter is used as an output meter) are supplied with the multimeter. Multimeter TS–297/U is used for organizational maintenance and repair of electronic equipment.

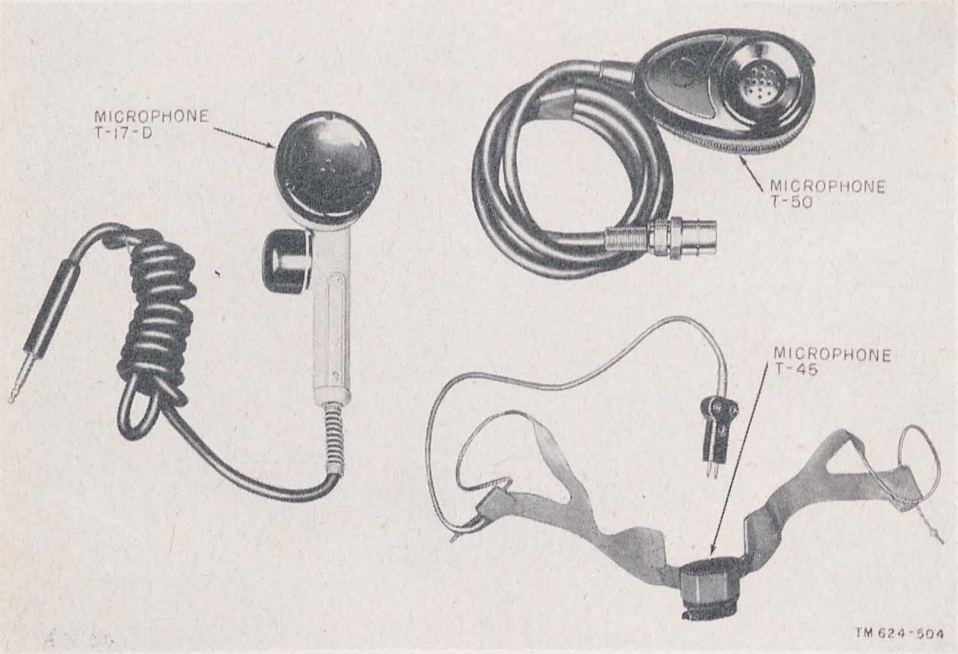


Figure 10. Microphones.

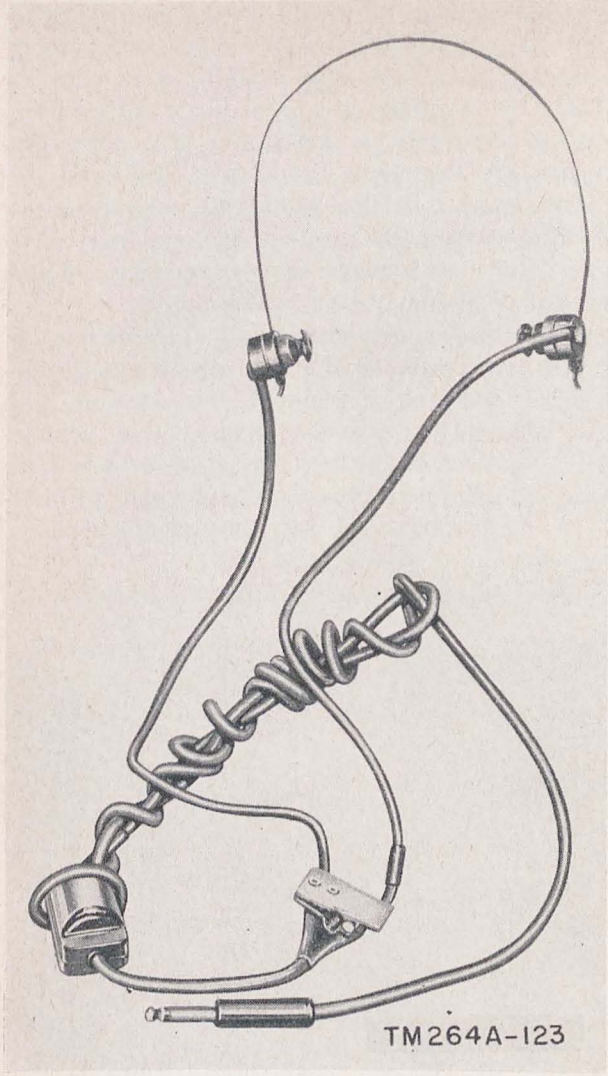


Figure 11. Headset HS–30–U and Cord CD–605.

x. Clock. This is an 8-day, aircraft-type clock, mounted in a black wrinkle-finished metal case. A mounting frame secures the clock to the rear wall of the shelter.

y. Heater (figs. 5, 6). An electric heater is located near the front door and is secured to the floor by four captive wing nuts. It operates on 115-volt, 60-cycle ac, with a power consumption of 1,500 watts. A fan mounted in back of the heater element circulates the heated air. A three-position switch allows the fan to be operated independently of the heat, but the heat cannot be turned on without placing the fan in operation. An adjustable thermostat provides a means for regulating the heat.

z. Blower. A blower assembly mounted on the rear wall provides forced air ventilation for the shelter. Air is drawn out of the shelter at a rate determined by the setting of an adjustable vent extending through the rear wall.

aa. Fire Extinguisher. A fire extinguisher, with a 4-pound charge of carbon dioxide, is set in a holder mounted on the rear shelter wall.

ab. Tools. A special tool box containing tools for servicing Frequency Shift Exciter O–39(*)/TRA–7 is located inside the operating table storage compartment. Additional maintenance equipment also is stored in the same compartment.

9. Receiving Shelter

The receiving shelter houses the equipment necessary for the reception of radioteletype signals. The receivers operate in conjunction with two doublet receiving antennas spaced approximately 3 wave lengths or 1,000 feet apart to provide space diversity reception. The following is a general description of the receiving shelter and of components housed within it (figs. 12 and 13). A complete list of components is furnished in the appendix.

a. Housing. Shelter HO–17–(*) is used as the basic housing structure for all receiving shelter equipment. This shelter is identical with the one used as the transmitter shelter housing (par. 8*a*). The operating table in the receiving shelter extends along the curbside wall.

b. Power Distribution. A cable carrying the power for receiving shelter operation is connected to a circuit breaker through a feedthrough receptacle in the rear wall. The two-pole circuit breaker is wired to provide independent protection and control for an operating table conduit line on one pole, and all branch conduit lines on the other pole.

c. Radio Receiver R–388/URR. Two Radio Receivers R–388/URR, identical with the receiver located in the transmitting shelter (par. 8*e*), are placed one above the other in Cabinet CY–1214/U on the operating table (fig. 12). For identification purposes, the bottom receiver is designated as channel A and the top receiver as channel B. The receiver assembly is used for the reception of cw, amplitude-modulated (am) voice, and dual diversity frequency-shift teletypewriter signals. A third Radio Receiver R–388/U, mounted in Cabinet CY–1213/U and located on a shelf by the rear door (fig. 13) is maintained as a spare or is used as a monitor of channels other than the operating channel.

d. Dual Diversity Converter CV–31D/TRA–7 (fig. 12). Dual Diversity Converter CV–31D/TRA–7 is made up of Rectifier Power Unit PP–193A/TRA–7, Oscillator 0–41A/TRA–7, and a dual diversity converter unit. All three are assembled on a single chassis and mounted in a metal cabinet. The cabinet is equipped with shock mounts and is located on the operating table. The dual diversity converter provides polar and neutral dc pulses for operating teletypewriters.

e. Teletypewriter TT–4A/TG (fig. 12). Teletypewriter TT–4A/TG is a standard communication, page-printing teletypewriter capable of sending and receiving printed messages. The unit is constructed mostly of magnesium alloys, and has an olive-drab crackle finish. The teletypewriter in the receiving shelter is used for monitoring only. The unit is located on the operating table.

f. Operating Table FN–23/MRC–2. Operating Table FN–23/MRC–2 extends along the curbside wall of the receiving shelter (fig. 12). Compartments are provided underneath the table for storing extra rolls of paper for the teletypewriter. Built into the table, and considered a part of it, are various jack panels and connectors. These consist of the following:

(1) *Shelter junction box E1.* Junction box E1, mounted on the front end of the operating table below the removable end section, provides binding post connections for three pairs of wire lines from the operating shelter. One pair of binding posts is for the telephone lines,

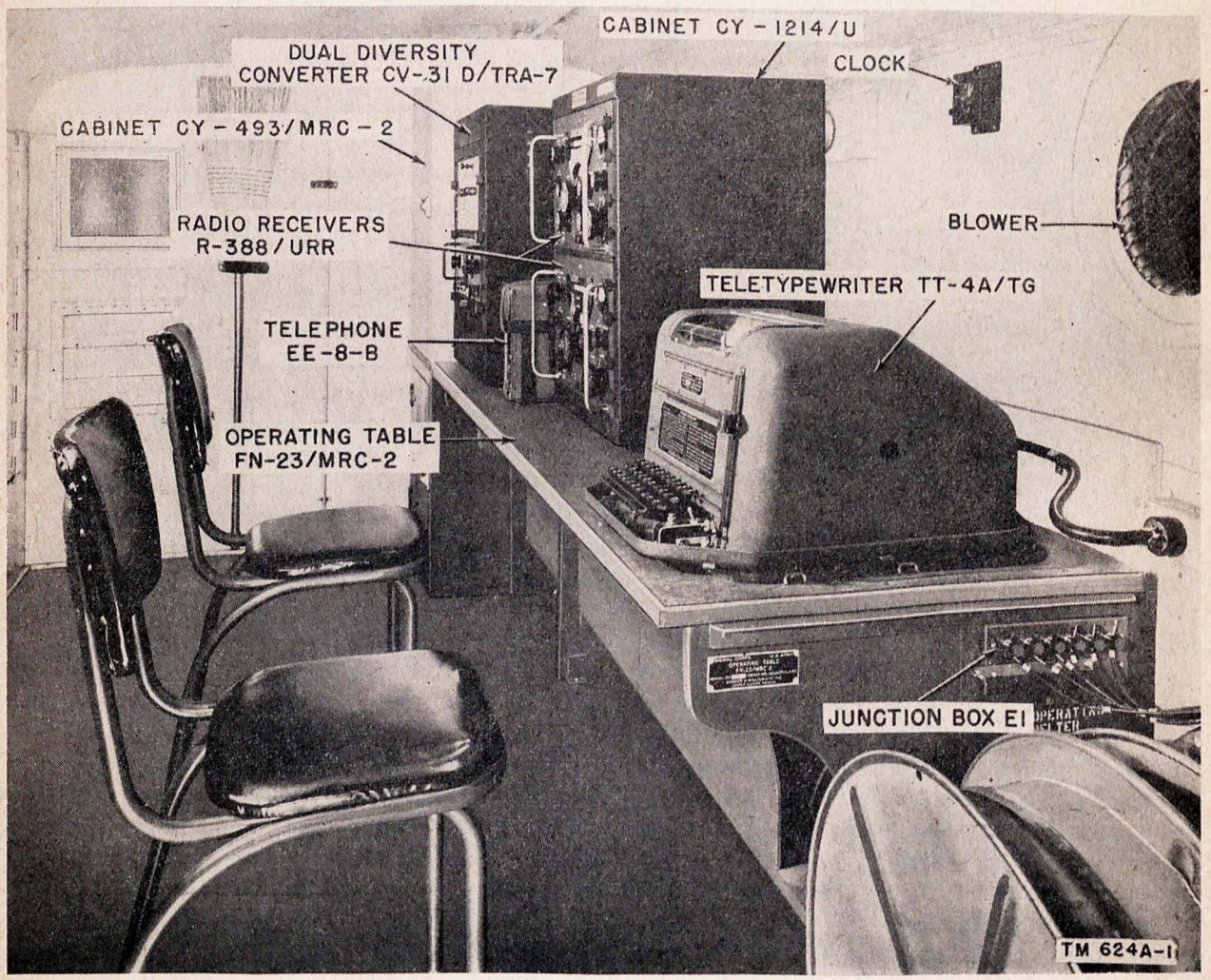


Figure 12. Radio Set AN/MRC–2(*), interior view of front of receiving shelter.

another pair is for the control lines, and the third pair is for the signal line. They are protected against lightning by carbon blocks and a ground strap.

(2) *Converter and EE–8 jack panel.* A bakelite panel is mounted on the operating table top. This panel is located between the dual diversity converter and the radio receiver assembly. The RED connector is used to connect the control line and a keying circuit from the dual diversity converter, and the BLUE connector is used to connect the polar and neutral signal line from the converter. The EE–8 jack is used to connect the telephone to the telephone line from the operating shelter.

(3) *Monitoring teletypewriter and key jack panel.* This bakelite panel is mounted the operating table top and is located between the radio receiver assembly and the monitoring teletypewriter. One jack provides a means of connecting a hand telegraph key and the other two provide a means of connecting the monitoring teletypewriter to the neutral signal circuit from the converter.

(4) *Ac power outlets.* The power outlets, mechanically connected by conduit, are mounted on the back panel of the operating table. These outlets are connected in parallel. The outlet closest to the ac power source is connected to a rubber-covered cord terminating in a plug. This is plugged into the outlet connected to the line from the circuit breaker. This arrangement permits the operating table to be removed from the shelter.

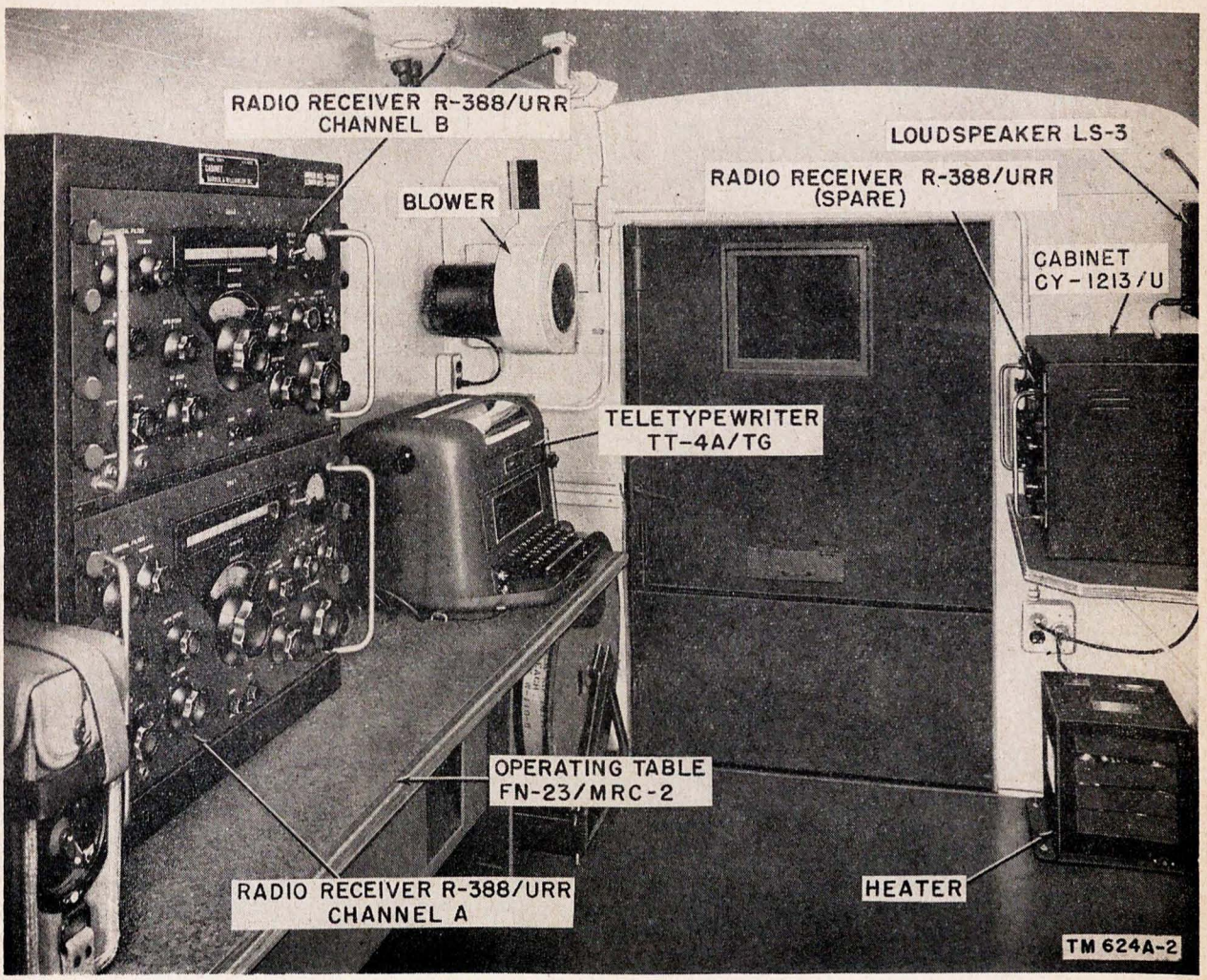


Figure 13. Radio Set AN/MRC–2(*), interior view of rear of receiving shelter.

g. Cabinet CY–493/MRC–2. Cabinet CY–493/MRC–2 is installed between the operating table and the front wall of the shelter (fig. 12). The contents of this cabinet (tools, spare parts, and operating accessories) are listed under Cabinet CY–493/MRC–2 in the table of components in the appendix.

h. Telegraph Keys. The following telegraph keys are used for emergency hand keying of the radio set in lieu of radioteletype operation.

(1) *Key J–45* (fig. 14). Key J–45 is a manually operated telegraph key with a leg clip that slips over the thigh of the operator. It has a three-way adjustable lever and two binding posts.

(2) *Key J–37.* Key J–37 is a manually operated telegraph key with a three-way, adjustable lever and two binding posts.

i. Accessory Equipment. The following equipment is identical with corresponding articles already described for transmitting shelter use.

(1) *Loudspeaker LS–3.* Two Loudspeakers LS–3, with their cases removed, are mounted inside Cabinet CY–1214/U, which contains the channel A and channel B receivers. A third Loudspeaker LS–3 is secured to the roadside wall of the shelter directly above the spare radio receiver (fig. 13, par. 8*q*).

(2) *Telephone EE–8–B.* In the receiving shelter, this telephone is mounted in a bracket between the dual diversity converter and the channel A and channel B receiver assembly (fig. 12, par. 8*s*).

(3) *Headset HS–30–U.* Refer to paragraph 8*t* for a description of the headset.

(4) *Multimeter TS–297/U.* Refer to paragraph 8*w* for a description of the multimeter.

(5) *Clock.* This clock is located on the curbside wall above the operating table (fig. 12, par. 8*x*).

(6) *Heater* (fig. 13). Refer to paragraph 8*y* for a description of the heater.

(7) *Blower.* Refer to paragraph 8*z* for a description of the blower.

(8) *Fire extinguisher.* The fire extinguisher is mounted on the roadside wall, at the rear of the shelter. (par. 8*aa*).

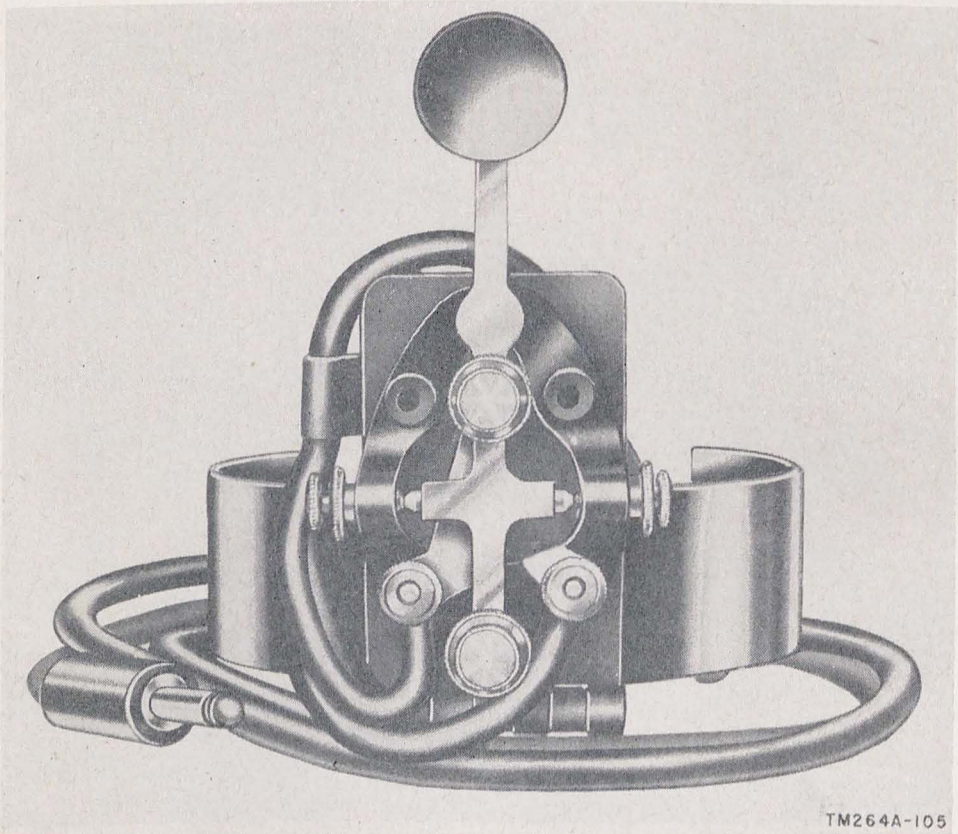


Figure 14. Key J–45 and Cord CD–201–A.

10. Operating Shelter

The operating shelter is the control center of the station system. It may be located up to 10 miles from both the transmitting and receiving shelters, with interconnections made by wire lines. The following is a general description of the operating shelter and of components housed within it (fig. 15). A complete list of components can be found in the appendix.

a. Housing. Shelter HO–17–(*) houses all operating shelter components. The shelter is identical with that used as the transmitting shelter (par. 8*a*). In the operating shelter, the operating table extends along the curbside wall.

b. Power Distribution. Power is supplied to the operating shelter exactly as in the receiving shelter (par. 9*b*).

c. Control Unit C–292B/TRA–7 (figs. 15 and 16). Control Unit C–292B/TRA–7 is located on a shelf directly above the center of the operating table. The unit is inclosed in a black, crackle-finished, metal cabinet, which is shock-mounted on the shelf. The control unit converts polar telegraph signals received from the dual diversity converter into neutral signals for operation of a receive teletypewriter. It also converts the neutral signals from a send teletypewriter into polar signals for transmission over a wire line to the frequency-shift exciter unit. The control unit also provides facilities for establishing full-duplex, half-duplex, one-way reversible, or emergency operation.

d. Teletypewriters TT–4A/TG (fig. 15). Two Teletypewriters TT–4A/TG are located on the

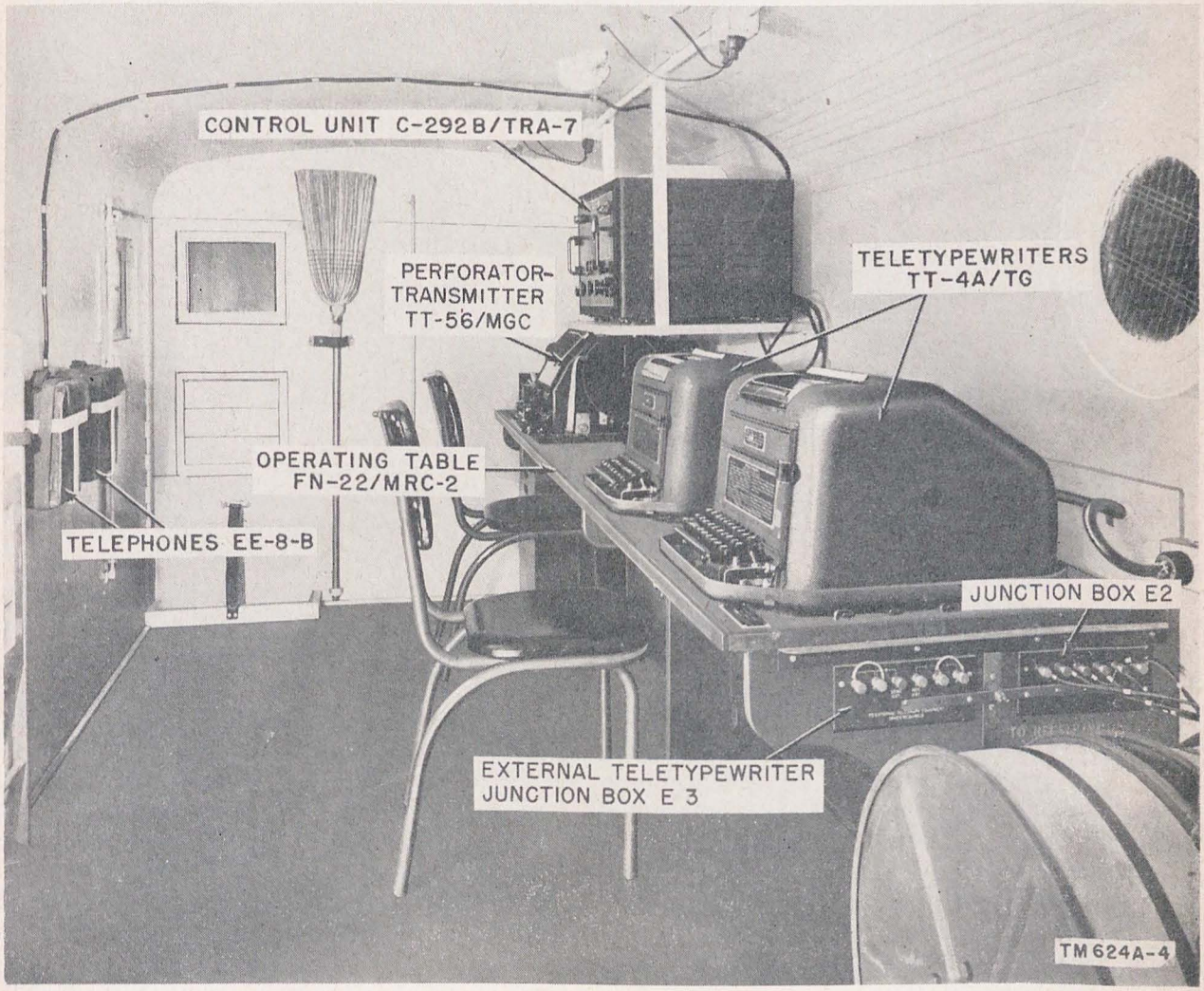


Figure 15. Radio Set AN/MRC–2(*), interior view of operating shelter.

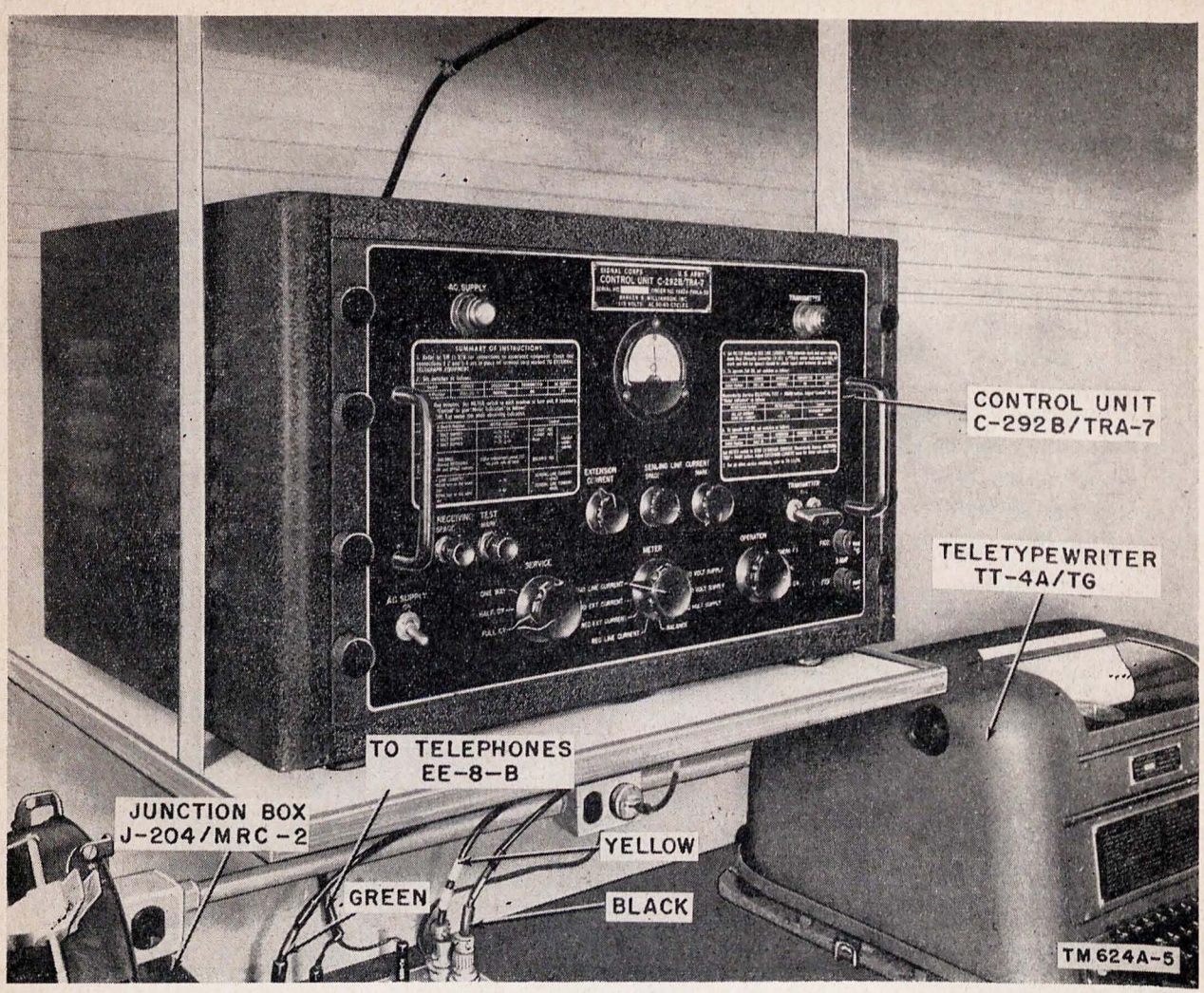


Figure 16. Control Unit C–292B/TRA–7.

operating table. Each is identical with the unit located in the receiving shelter (par. 9*e*). One teletypewriter is used for sending, the other for receiving.

e. Perforator-Transmitter TT–56/MGC (fig. 17). This equipment is located on the operating table near the front wall of the shelter (fig. 17). The complete assembly consists of two associated units, a typing reperforator and a transmitter-distributor.

(1) *Typing reperforator.* This is a motor-driven device for receiving or transmitting messages in the form of electrical impulses and recording the messages both in code perforations and in typewritten characters on the same paper tape. Operation of the keyboard sets up electrical impulses that activate a simultaneous dual action: The impulse goes out over a line for transmission to a distant station; at the same time, the impulse actuates the perforating mechanism of the home station, and records the outgoing message on perforated tape. The typing reperforator also may be operated without the transmission feature; it then is used only as a source of perforated tape for later transmission by the transmitter-distributor.

(2) *Transmitter-distributor.* This unit is a motor-driven device that translates code perforations recorded in a paper tape into neutral electrical impulses suitable for transmission. The unit is designed for high-speed automatic operation when large amounts of traffic must be handled without delay. The transmitter-distributor may be used to replace keyboard transmission, and thus the typing reper-

forator keyboard may be used for perforating additional message tapes without interfering with the message being transmitted.

f. Perforator Connection Box (fig. 17). This is a rectangular box of sheet-steel construction; it is mounted in back of the perforator transmitter assembly. The connection box supplies power and protective fusing to the motors of the reperforator transmitter and the transmitter-distributor. It also provides connections for dc power, jacks for local operation of the typing reperforator, and jacks for the operation of external telegraph equipment using line units.

g. Rectifier RA–87–A. Rectifier RA–87–A is located on a shelf below the operating table. The rectifier chassis base, which mounts all parts and connections, is inclosed at the top and bottom with sheet-steel covers. Dc power of 115 volts is supplied by the rectifier to the perforator connection box for use by the typing reperforator and the transmitter-distributor.

h. Operating Table FN–22/MRC–2 (fig. 15). Operating Table FN–22/MRC–2 extends along the curbside wall of the operating shelter. Compartments are provided underneath the table for storing extra rolls of paper for the two teletypewriters. Built into the table, and considered a part of it, are various jack panels and connectors. These consist of the following:

(1) *Shelter junction box E1.* This is a terminal board fitted with six binding posts for connecting telephone, control, and teletypewriter signal lines to the transmitting shelter. The unit is built into the side section of the operating table near the front wall of the shelter and is marked TO TRANSMITTING SHELTER.

(2) *Shelter junction box E2* (fig. 15). This is a unit similar to junction box E1. Telephone, control, and teletypewriter signal lines connect from junction box E2 to the receiving shelter. Installation is

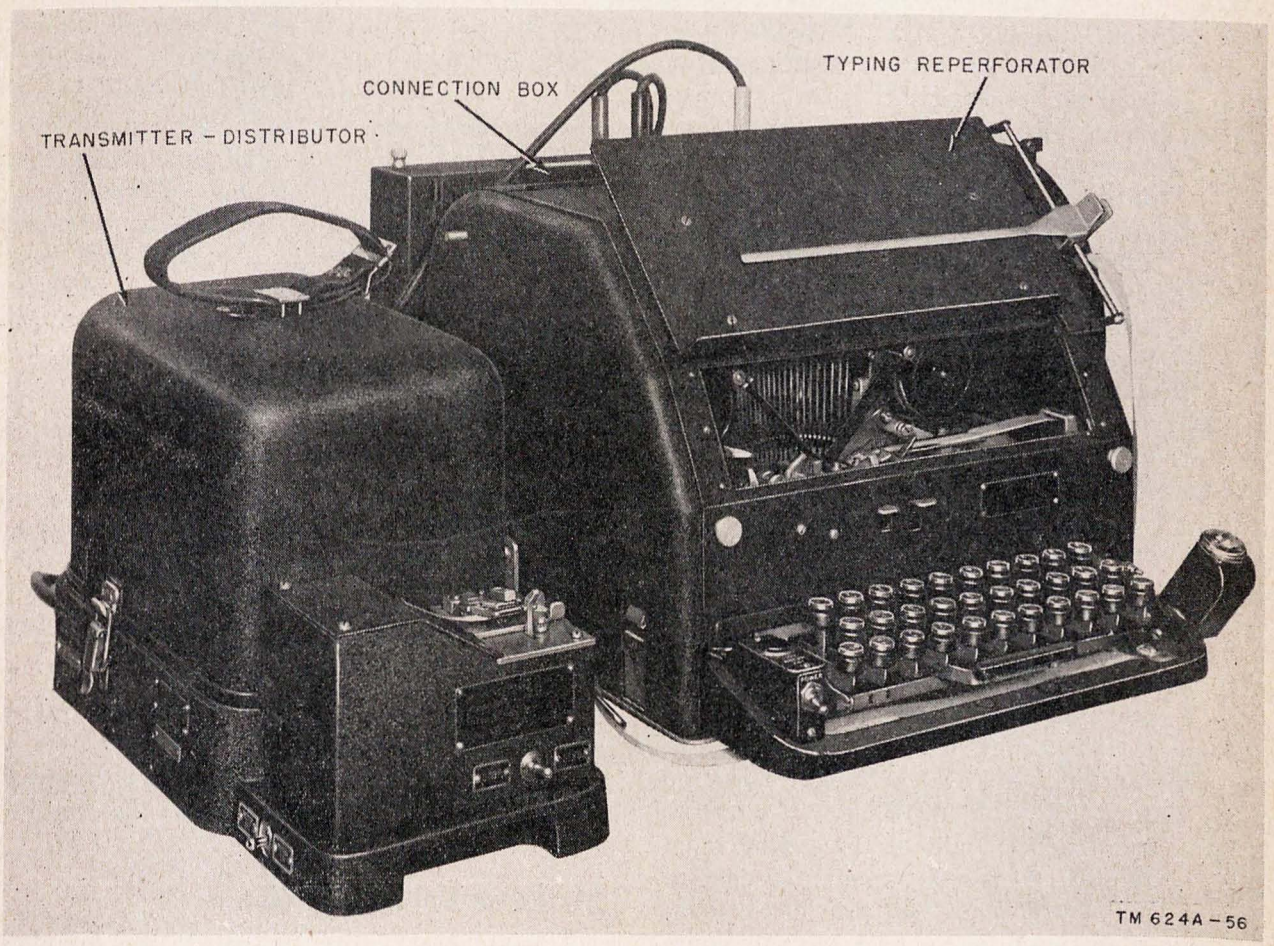


Figure 17. Perforator-Transmitter TT–56/MGC.

made on the rear side section of the operating table at a position marked TO RECEIVING SHELTER.

(3) *External junction box E3.* (fig. 15). This is a terminal board provided with six binding posts for connecting external telegraph equipment. The terminal board is installed on the rear side section of the operating table. TO EXTERNAL TELEGRAPH EQUIPMENT WHEN REQUIRED is marked on the board.

(4) *Teletypewriter jack panel.* This bakelite panel has four jacks and is mounted on the operating table top between the two teletypewriters. Each jack is connected in series with a similarly labeled jack in Junction Box J–204/MRC–2.

(5) *Telephone and control jack panels* (fig. 34). These two bakelite panels, mounted on the operating table top, are located to the right of Junction Box J–204/MRC–2. The left-hand panel is provided with a jack labeled GREEN. This jack connects the control and the polar signal line from the receiving shelter to the control unit. The jack labeled EE–8 is connected to the telephone line to the transmitting shelter, and to the switch on the jack panel. The switch position determines whether each telephone is connected separately to the receiving shelter and the transmitting shelter, or connected together for communication between the shelters from any telephone.

(6) *Ac power outlets.* The power outlets, mounted on the back panel of the operating table, are connected physically by conduit and electrically by wire. The end outlet is connected to a power cord terminating in a plug. This provides a means for connecting power from the circuit breaker to the operating table outlets. This arrangement permits the operating table to be removed from the shelter.

(7) *Junction Box J–204/MRC–2.* This junction box is mounted on the operating table to the right of the typing reperforator. It is a sheet-metal box containing several jacks that provide flexibility of operation for the teletypewriter equipments. The equipments used are determined by the patching cord connections. It is the distribution point for neutral signals produced by the teletypewriter equipments and for received neutral signals from the control unit.

i. Storage Facilities. The following provisions are made in the operating shelter for systematic storage of accessory equipment.

(1) *Cabinet CY–494/MRC–2.* Cabinet CY–494/MRC–2 is installed on the rear shelter wall and contains technical manuals, stationery supplies, tools, and operating spares. These articles are listed under Cabinet CY–494/MRC–2 in the table of components in the appendix.

(2) *Case CY–495/MRC–2.* Case CY–495/MRC–2 is a six-compartment shelf assembly mounted on the curbside wall above the operating table. The case serves as a file for message forms.

(3) *Case CY–496/MRC–2.* Case CY–496/MRC–2 is a pull-out case located under the operating table by the front shelter wall. It serves as a receptacle for perforated tape coming out of the Perforator-Transmitter TT–55/MGC.

j. Stamp MC–181–A (fig. 18). Stamp MC–181–A is a manually operated time stamp that prints the word MSG CENTER followed by the name of the organization, month, date, year, and time. The time is indicated on a 24-hour basis (0000 to 2359) by a key-wound mechanical clock. The stamp is stored in a compartment of the operating table.

k. Accessory Equipment. The following equipment is identical with corresponding articles described for transmitting shelter use.

(1) *Telephone EE–8–B.* In the operating shelter, two telephones are mounted in brackets on the roadside wall (fig. 15, par. *8r.*)

(2) *Heater.* Refer to paragraph *8y* for a description of the heater.

(3) *Blower.* Refer to paragraph *8z* for a description of the blower.

(4) *Fire extinguisher.* Refer to paragraph *8aa* for a description of the fire extinguisher.

11. Power Units and Trailers

Three Power Units PE–95–(*) are supplied with Radio Set AN/MRC–2–(*). Each of the

three power units is mounted on a two-wheel Trailer K–52. Power Unit PE–95–(*) is a complete, self-contained, generating unit. The unit consists of an ac generator with a built-in dc exciter. It is driven by a four-cylinder, liquid-cooled gasoline engine, which is coupled directly to the generator. All necessary meters, terminals, and controls are mounted on a control panel at one end of the unit. Chest CH–112, containing Cord CO–316, Cord CO–313, and a flexible nozzle, is stored on the trailer in front of the control panel. The complete assembly is mounted on a welded-steel skid base and is inclosed within a sheet-metal housing. The housing is provided with doors and removable panels for access to any part of the equipment.

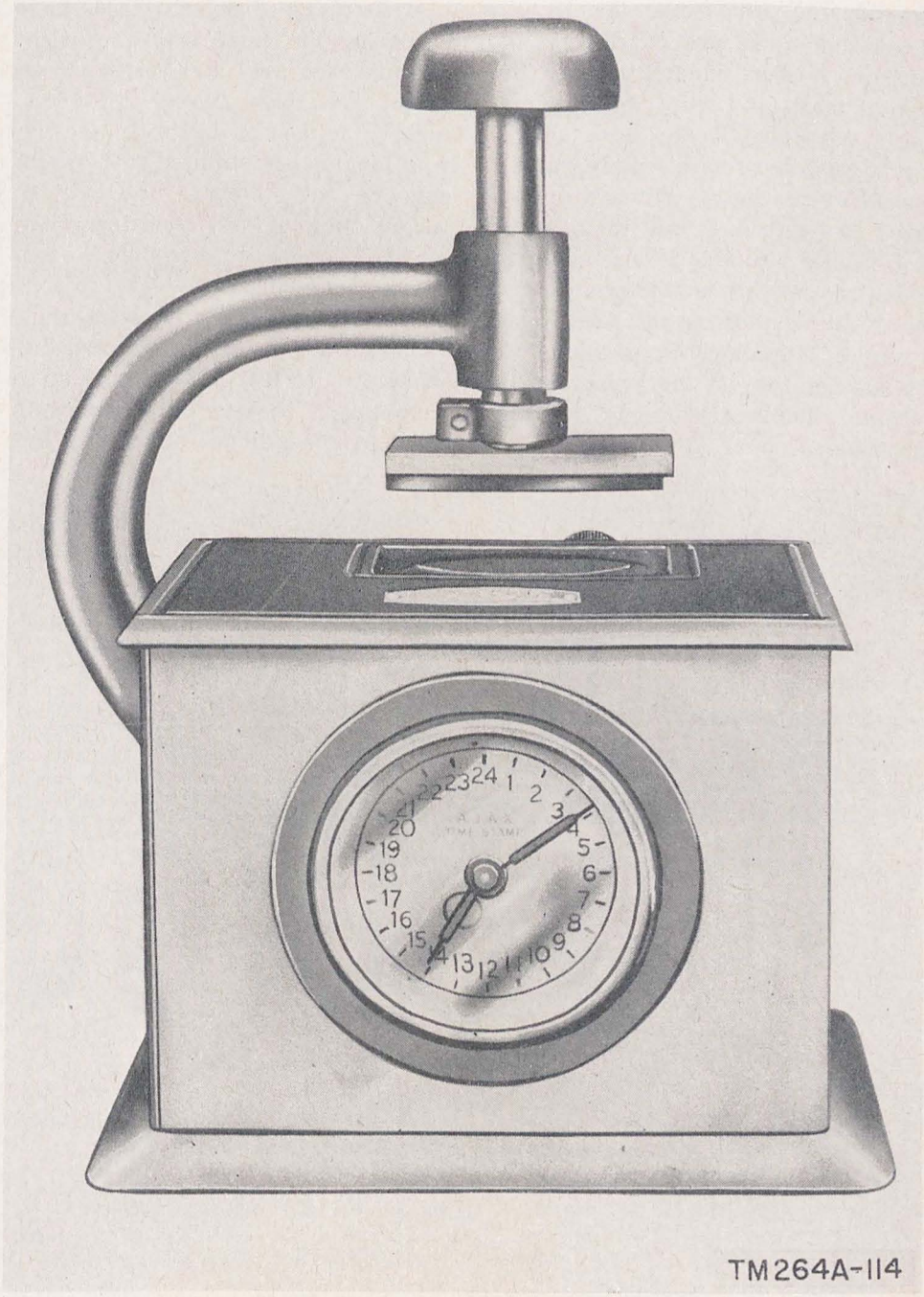


Figure 18. Time Stamp MC–181–A.

12. Antenna Equipment

a. Transmitting Antennas.

(1) A single half-wave doublet antenna is used for transmitting. The antenna wire is cut to the length required for the frequency of transmission. At lower frequencies (2 to 4 mc), the wire is supported by three antenna supports approximately 50 feet high. At higher frequencies (4 to 18 mc), the length of the antenna is short enough to omit the the center mast, and only two Antenna Supports AB–38B/CR are used. Each mast is an eight-section assembly, pivot-supported at the base. When properly adjusted and guyed, it will maintain a fixed vertical position. This mast is designed to support a 140-pound antenna under conditions of ½-inch ice load and a 70-mile-per-hour wind. A pulley at the top of the mast and a halyard are used for raising and lowering the antenna.

(2) Antenna Kit MX–852/MRC–2 is used for constructing a rhombic transmitting antenna in the 2- to 18-mc range. A rhombic antenna constructed from this kit gives high signal gain in one direction and substantially improves communication at locations where the doublet transmitting antenna does not provide sufficient signal strength.

b. Receiving Antenna. Two doublet receiving antennas, the same length as the transmitting antenna, are used and are supported 40 feet in height by three Masts AB–155A/U. At the higher frequencies (4 to 18 mc) where shorter wire lengths are required, two masts are used to support each doublet. The mast equipment for the erection of two receiving antennas consists of the necessary components for six 40-foot masts (three masts to each receiving antenna). The equipment for each mast (fig. 19) consists essentially of eight tubular Mast Sections MS–44 which can be fitted together easily, a mast base, rope guys, the necessary stakes to fasten the guys to the ground, a hammer for driving the

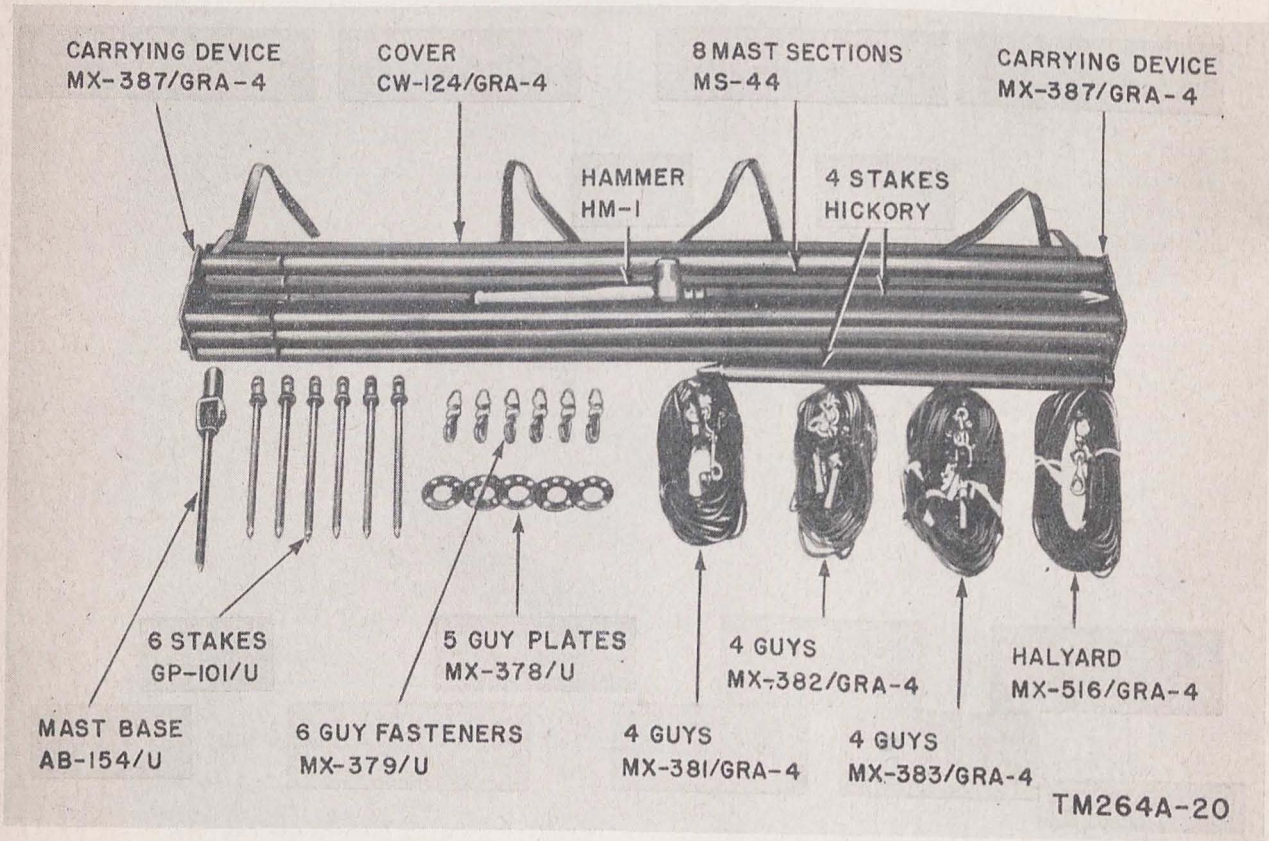


Figure 19. Mast AB–155A/U, components.

stakes, a halyard for raising the antenna, and a carrying device for transporting the components. A complete listing of the component parts of Mast AB–155A/U is given in the appendix.

c. Whip Antennas. A whip antenna is used for each monitoring radio receiver; one is located in the receiving shelter and the other is in the transmitting shelter. Each whip antenna is constructed of individual Mast Sections MS–116–A, MS–117–A, and MS–118–A.

13. Differences in Models

The equipment in the operating and receiving shelters is interchangeable in both models. The main difference between Radio Sets AN/MRC–2C and AN/MRC–2D is found in the components of the transmitting shelter; these components are listed in the following chart:

Radio Set AN/MRC–2C	Radio Set AN/MRC–2D
Shelter HO–17–A	Shelter HO–17–B.
Junction Box JB–70–A	Junction Box JB–70–B.
Radio Receiver BC–312–(*)	Radio Receiver R-388/URR.
Frequency Shift Exciter O–39B/TRA–7.	Frequency Shift Exciter O–39C/TRA–7.
Antenna Tuning Unit BC–939–B.	Not supplied.
Amplifier AM–141A/MRC, late model, Order No. 19624–Phila–50.	Amplifier AM–141B/MRC.
Rectifier RA–63–E	Power Supply PP–886/G.
Frequency Meter BC–221–(*)	Not supplied.
Rectifier Power Unit RA–133–(*).	Not supplied.
Chest CH–89–B	Not supplied.
Chest CH–120–B	Not supplied.
Chest CH–109–A	Not supplied.

CHAPTER 2

INSTALLATION

14. General

The information contained in this chapter deals with the instructions necessary for properly installing Radio Set AN/MRC–2–(*). This section presents the siting requirements of the radio set to obtain the best results during transmission and reception of signals. Uncrating, unpacking, and checking equipment, connections and interconnections in the three shelters, and construction and installation of antennas are also dealt with.

15. Siting

a. The three shelters that comprise Radio Set AN/MRC–2–(*) are located within 10 miles of each other with normal wire facilities. The shelters may either be mounted on 2½-ton cargo trucks (fig. 20) or may be set directly on the ground (fig. 1). Sufficient wire is provided with each radio set to provide for a separation of a ½-mile between shelters. If greater spacing is desired, additional wire must be requisitioned.

b. Sufficient clear level ground should be available for the installation of the transmitting and receiving antennas. Where possible, place receiver antennas where an obstacle, such as a hill or a building, is between the antenna and enemy jammers. Each doublet antenna will require a relatively level area approximately 200 feet by 400 feet, the long dimension of this area being at right angles to the direction of transmission and reception. The rhombic antenna, if used, will require a relatively level area approximately 400 feet by 800 feet, the long dimension of this area being in the direction of transmission (fig. 38). The shelter should be located within 70 feet of the center mast of the transmitting antenna. The areas selected for the two receiving antennas should not be separated by more than 1,000 feet. Locate the receiving shelter midway between the two antennas (fig. 21). Whenever

Figure 20. Radio Set AN/MRC–2(*), siting.

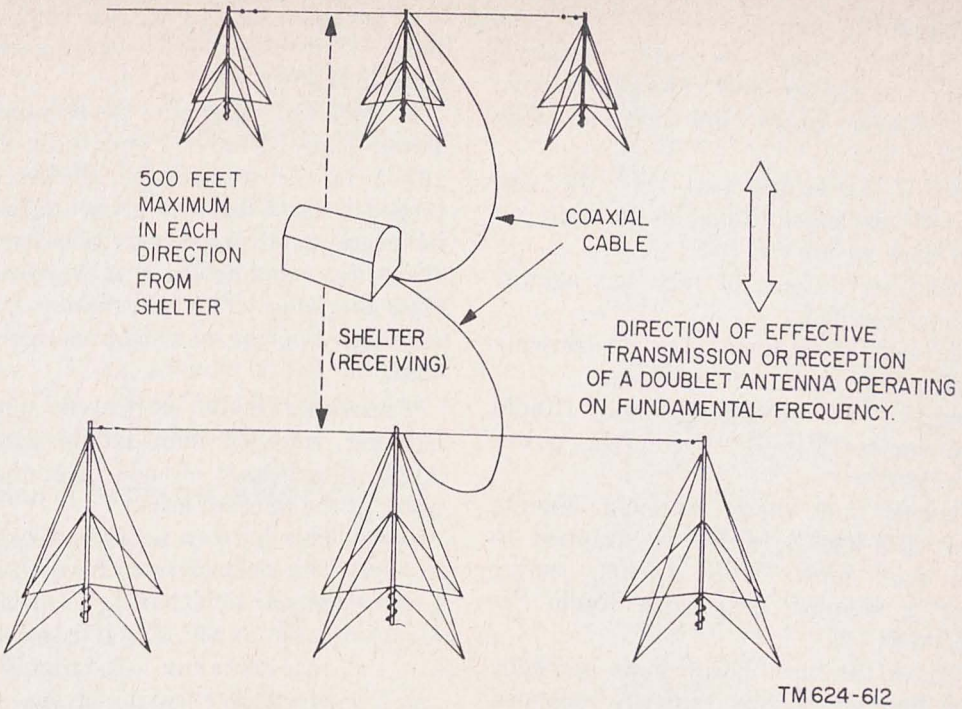


Figure 21. Orientation of receiving antennas

possible, the receiving antennas should be erected off the ends rather than in the transmission path of the transmitting antenna. The exact location for the erection of the antennas depends on tactical considerations. For best operating results, select a location away from power lines, tall trees, steel bridges, underpasses, or other obstructions. Intervening objects between the receiving antenna and the distant transmitter should not be more than 10° above a horizontal plane as viewed from the antenna. Necessity for cover, however, will not always permit the selection of the best location.

c. The shelters may be removed from the vehicles and operated on the ground. The equipment in the receiving and operating shelters is designed for easy removal if operation in a permanent-type building is desired. The operating benches in the receiving and operating shelters may be removed intact, complete with all wiring. It is only necessary to connect the bench to the power source and to the wire lines when removed from the shelter. To remove the operating benches, remove the screws painted red that hold the benches to the shelter and slide the benches forward from the wall. Removal of the equipment from the transmitting shelter is also possible but not considered practical because of the weight of some of the components.

16. Uncrating, Unpacking, and Checking

Unpack the equipment carefully and inspect it for possible damage during shipment. Check all components against the packing list packed with the equipment to determine whether quantities and types are correct. Each of the three shelters is packed with 200 pounds of silica gel for moistureproofing.

a. Transmitting Shelter. The proper procedure for uncrating, unpacking, and checking the transmitting shelter is as follows:

(1) Use nail pullers and pry bars to remove the top of the crate containing Shelter HO–17–(*). The top must be removed first so that the sides are free for the next step.

(2) Attach one end of a steel cable or strong rope to the rear of the truck. Fasten the hook to the other end of the cable and catch this hook over the top edge of the shelter crate. Use the truck to pull the side from the crate.

(3) Repeat the procedure described in (2) above to remove the other side and the ends of the crate. (If a truck is not available, use a nail puller and crowbar.)

(4) Carefully remove the vapor barrier bag from the shelter.

(5) Remove the four corner bolts to free the shelter from the crate platform.
(6) Enter the shelter and carefully remove the wooden props and bags of silica gel.
(7) Remove the straps that hold the separately packaged items in position on the floor of the shelter.
(8) Check the contents of each box against the packing list.
(9) Open each chest and check its contents against the chart on the chest.
(10) Remove all wrappings from Radio Transmitter BC–610–I and the power amplifier.
(11) Unpack and check Antenna Tuning Unit BC–939–B, which is strapped to the seat chest. The antenna tuning unit is supplied only with Radio Set AN/MRC–2C.
(12) Unpack the mast bases, mast brackets, and bumper clamps that are strapped to the seat bench in Radio Set AN/MRC–2C and in the operating bench in Radio Set AN/MRC–2D.

b. Receiving Shelter. To unpack the receiving shelter, follow the same procedure used for the transmitting shelter in *a* above.

(1) Remove the chests strapped to the floor of the shelter and unpack them.
(2) Open the chests and cabinets and remove all the packing.
(3) The receiving antenna mast and accessories are strapped to the floor of the receiving shelter. Unpack the antenna equipment and if the antenna is not going to be installed immediately, place the equipment in a separate vehicle.

c. Operating Shelter. To unpack the operating shelter, follow the same procedure as outlined in *a* above.

(1) Remove the transmitting antenna equipment packed for export shipment in the operating shelter. This equipment should be dropped off at the antenna site or placed in a separate vehicle.
(2) Unstrap and remove the chests from the floor of the shelter and unpack the teletypewriter equipment and control unit.
(3) Open the chests and cabinets and remove all the packing.

d. Power Unit PE–95–(*). Three Power Units PE–95–(*) are supplied with each radio set and are packed separately. Uncrate and unpack Power Unit PE–95–(*) according to the instructions in TM 11–904.

e. Batteries. Examine the storage batteries for Power Unit PE–95–(*) and those in Chest CH–109–A in the transmitting shelter. A card attached to each battery gives the manufacturer's instructions for preparing the battery for service. *Read the manufacturer's instructions and follow them carefully.* The information in (1) through (6) below appears on a manufacturer's instruction card.

Caution: Should electrolyte spill on skin or clothing, wash off immediately with cold water. Apply bicarbonate of soda or ammonia, if available, to the affected area.

(1) This battery is of the dry-charged type.
(2) The electrolyte to be used is diluted sulphuric acid having a specific gravity of 1.256 at 80° F. It is packed in a separate container. In tropical climates, use electrolyte having a specific gravity of 1.200, produced by mixing 10 parts 1.256 electrolyte with 3 parts of water. Use distilled water, or water known to be suitable for use in lead-acid storage batteries.

Caution: Never add the water to the acid.

(3) Remove the vent caps. Remove and destroy the scotch tape that covers the vent holes. Fill each cell with the correct electrolyte to a level ⅜-inch above the tops of the separators. Replace the vent caps and tighten them securely.

Caution: Do not put cold electrolyte in a warm battery, or warm electrolyte in a cold battery; severe damage will result.

(4) When the battery is filled with 1.200 electrolyte for tropical use, stamp the number 1 on top of the positive (+) lead connector, for the information of anyone servicing the battery in the future.
(5) Before placing the battery in service, allow it to stand from 4 to 12 hours after filling.

Note. In an emergency, the battery may be placed in service 1 hour after filling with the proper electrolyte. This practice is for emergency use only.

(6) When possible, give the battery a freshening charge at 6 amperes for 16 to 20

hours before placing it in service. It will give satisfactory results without this charge if the battery temperature is above 50° F. When the battery temperature is below 50° F., this freshening charge must be given.

f. Transmitting Antenna. The transmitting antenna is shipped packed in four canvas bags, each containing antenna gear. The bags are located in the operating shelter when packed for shipment. Unpack the bags carefully; be sure that no small parts are lost. If the antenna is not to be installed immediately, place it in a separate truck along with the receiving antennas.

17. Installation of Radio Set AN/MRC–2(*)

If the radio set is to be used in a semifixed installation, the shelters are carried on a 2½-ton, 6 by 6, cargo truck. The following procedure is used for setting up the radio set in this installation.

a. Transmitting Shelter.

(1) Remove the canvas cover, roof bows, and side framing from the truck; drop the tail gate.

(2) If a hoist is available, lift Shelter HO–17–(*) by its four lifting straps and place it on the truck body so that the entrance door is towards the rear. If no hoist is available, provide some other means of lifting the shelter onto the body.

(3) Two oak skids (part of Skid Equipment MX–157/U) are provided with each shelter for sliding the shelter onto the truck. Hook the skids to the back of the truck platform and pull the shelter up the skids by using a second truck connected to the shelter with heavy ropes fed through the front gate of the truck, one on each side of the cab. If the second truck is not available, the winch on the truck carrying the shelter may be used by attaching a pulley to a near-by tree and then running the cable back through the front gate of the truck body. Connect the bumper bracket to the left rear bumper and clamp Cord CO–335 to the bumper bracket. Hook one Trailer K–52 containing Power Unit PE–95–(*) to the transmitter truck and connect Cord CO–316 to the receptacle in the bumper bracket.

(4) Attach the hold-on clamps (two on each side of the shelter) to the truck body sides to hold the shelter firmly in place. If the cargo truck has a wooden platform, bolt on the four clamp anchors.

(5) Mount Antenna Tuning Unit BC–939–B on top of the transmitter. Secure it in place with the four wing nuts. The antenna tuning unit is supplied only with Radio Set AN/MRC–2C.

(6) Mount Frequency Shift Exciter O–39B/TRA–7 in position on the upper shelf next to Chest CH–120–B on Radio Set AN/MRC–2C (fig. 5). In Radio Set AN/MRC–2D, Frequency Shift Exciter O–39C/TRA–7 is already mounted on the operating bench next to Radio Receiver R–388/URR (fig. 6).

(7) The components located in Chest CH–120–B of Radio Set AN/MRC–2C and on the operating bench of Radio Set AN/MRC–2D already are installed.

(8) Place two Batteries BA–30 in Telephone EE–8–B.

(9) Bolt Mast Base Bracket MP–50–A with Mast Base AB–15/GR to the shelter with the hardware provided. Assemble Mast Sections MS–116–A, MS–117–A, and MS–118–A by screwing Mast Section MS–116–A into Mast Section MS–117–A. Use two pairs of gas pliers to tighten the joint. Screw Mast Section MS–117–A into Mast Section MS–118–A; use two pairs of gas pliers to tighten the joint. Tape back joints with ½-inch friction tape. Screw Mast Section MS–118–A into Mast Base AB–15/GR.

(10) In Radio Set AN/MRC–2C, bolt Mast Base MP–47–A in place on the roof of the shelter. If a whip or long-wire antenna is to be used for transmission, assemble Mast Sections MS–49, MS–50, MS–51, MS–52, and MS–53. Use two pairs of gas pliers to tighten each joint. Tape the joint with ¾-inch friction tape.

Note. Any mast section with a lower number is above that with a higher number. Carry the assembled mast sections to the roof of the shelter and screw Mast Section MS–53 into Mast Base MP–47–A.

(11) Remove the cartons containing two tubes type 833–A from Case CY–521/MRC–2. Remove the tubes from the

cartons and install them in Amplifier AM–141(*)/MRC. Loosen the knurled fasteners on the filament connectors and gently insert the tubes into the filament connectors with the flat milled side of the pin at the top. When the filament caps are seated firmly, tighten the knurled fasteners fingertight. *Do not use pliers or wrenches to make these tight.* Loosen the plate and grid connectors and slide them into place over the corresponding top cap. The grid connector, attached to the neutralizing capacitor C8 or C9 (fig. 82) bracket, fastens to the lower tube cap (grid). The other connector fastens to the upper cap (plate). Use the knurled fasteners to make the grid and plate connectors fingertight. Do not use pliers or a wrench to make them tight.

(12) Remove two tubes type 3B28 and two tubes type 4B32 from Chest CH–88–C and Case CY–521/MRC–2, respectively, and install them in the amplifier (fig. 22).

(13) Remove two tubes type 3B28, two tubes type 100TH, one tube type 250TH, and two tubes type 807 from the operating bench and install them in Radio Transmitter BC–610–I. The tubes for the remaining components are shipped installed. Be sure that all vacuum tubes are properly seated in the proper locations. Refer to the tube location diagrams in the applicable manuals (par. 1*b*).

(14) Be sure that all the components in the transmitting shelter have the proper value fuses inserted in the fuse holders. Excitation and filament fuses F1 and F2 (fig. 44) of the amplifier are 8-ampere fuses. For the proper fuse value of other components, refer to the applicable manuals.

(15) Secure the heater to the shelter floor with the wing nuts provided.

b. Receiving Shelter. Install the components of the receiving shelter as follows:

(1) Install the components in place on Operating Table FN–23/MRC–2 (fig. 12). In some radio sets, these components may be shipped already installed.

(2) Mount Mast Base Bracket MP–50–A with Mast Base MP–65–A in place on the outside shelter wall.

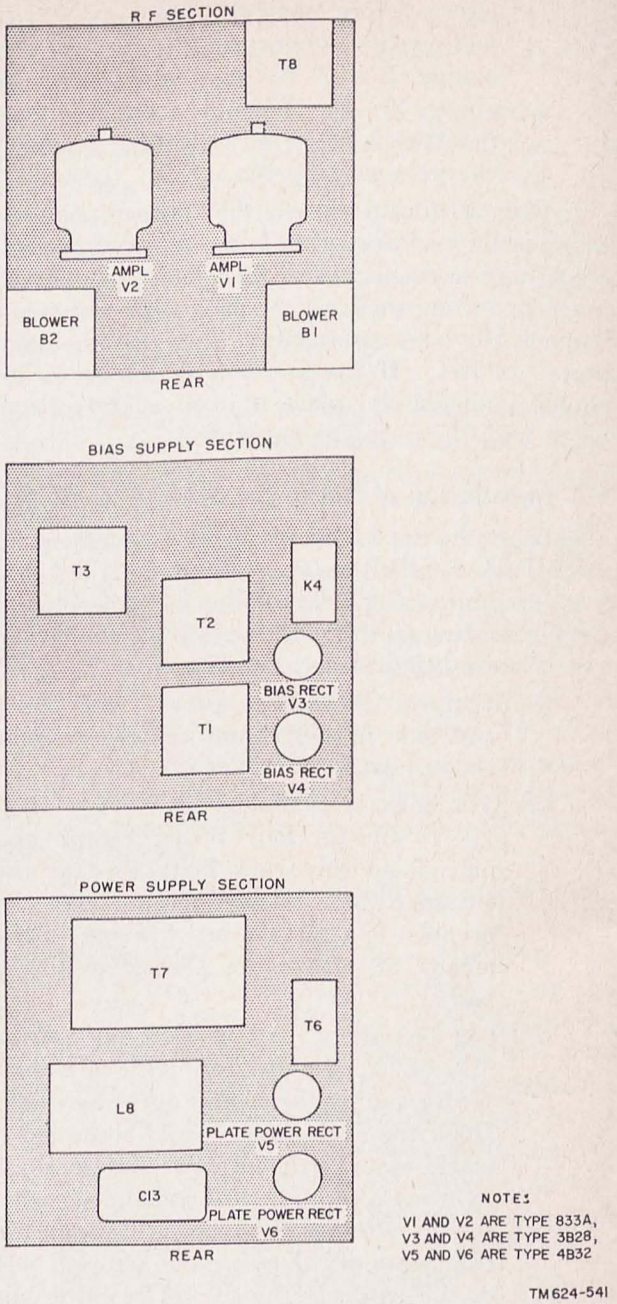


Figure 22. Amplifier AM–141(*)/MRC, tube location.

(3) Assemble Mast Sections MS–116–A, MS–117–A, and MS–118–A and screw the assembly into Mast Base MP–65–A as described in *a*(9) above.

(4) Install the heater on the floor of the shelter with the wing nuts provided. If mobility is desired, place the shelter on a 2½-ton, 6 by 6, cargo truck and attach Power Unit PE–95–(*) as described in *a*(1) through (4) above.

(5) Check to see that vacuum tubes in all components in the receiving shelter are seated properly. Refer to the tube location diagrams in the appropriate manuals (par. 1*b*).

(6) Check to see that all the components in the receiving shelter have the proper value fuses in their fuse holders. Consult the appropriate component manuals.

c. Operating Shelter. The components in the operating shelter may be already installed when the shelter is shipped. If they are not, proceed as follows:

(1) Mount the teletypewriter equipment on the operating table and install the control unit on the shelf (fig. 15).

(2) Remove Rectifier RA–87–A from the carton and install it on the shelf under the table.

(3) Remove the teletypewriter typing units from Chest CH–62–B and install them on the teletypewriter keyboard. Check to see that the serial numbers on the typing unit and the keyboard of each unit are identical. To do this, follow the instructions in TM 11–2234.

(4) Install the heater on the floor of the shelter with the wing nuts provided.

(5) If mobility is desired, place the shelter on a 2½-ton, 6 by 6 cargo truck and attach a trailer and Power Unit PE–95–(*) as described in *a*(1) through (4) above.

(6) Check to see that vacuum tubes in all components in the operating shelter are seated properly. Refer to the tube location diagrams in the applicable manuals.

(7) Check to see that all the components in the operating shelter have the proper value fuses inserted in fuse holders. Consult the manuals of the control unit, Rectifier RA–87–A, Perforator-Transmitter TT–56/MGC, and the teletypewriter.

18. General Connections and Interconnection Data

(figs. 23 through 35)

With the radio set unpacked and the components mounted in the appropriate shelters, the equipment is ready for cabling. If the equipment has been cabled for operation before shipment, check the condition of the cables and the tightness of the cable connectors and plugs before operating the equipment. The following charts list the cords and their connections to the components in the three shelters.

a. Transmitting Shelter Cords (figs. 27, 28).

Item No.	Cord or cable	Required No.	Length	Connects	
				From	To
1	Cord CD–764	1	14 ft 11 in.	Speech amplifier, TO BC–610 socket.	Transmitter, SO 5 (fig. 23).
2	Cord CD–1019	1		Speech amplifier, CARBON MIC. 1.	Junction Box J–207/MRC–2, DISABLING (fig. 24).
3	Cord CX–141/MRQ–2	1	2 ft 5 in.	Speech amplifier, TO JB–70 socket.	Junction Box JB–70–(*), TS–200 (fig. 25, 26).
4	Cord CO–335	1	14 ft	Junction Box JB–70–(*), SO 200.	Cord CD–652.
5	Cord CD–652	1	100 ft	Cord CD–335	Cord CO–316.
6	Cord CO–316	1	8 ft 4 in.	Cord CD–652	Power Unit PE–95–(*) terminal board.
7	Ac power cord	1		Junction Box JB–70–(*), SO 207 (fig. 25, 26).	Ac outlet in shelter wall.
8	Cord CX–142/MRQ–2	1		Junction Box JB–70–(*), SO 203 (fig. 25, 26).	Rectifier RA–63–E (AN/MRC–2C) (fig. 25). Power Supply PP–886/G (AN/MRC–2D) (fig. 26).
9	Ac power cord	1		Heater	Junction Box JB–70–(*), SO 202.
10	Cord CD–763	1	13 ft	Transmitter SO 6	Junction Box JB–70–(*), SO 201 (fig. 23, 25, 26).

a. Transmitting Shelter Cords (figs. 27, 28)—Continued.

Item No.	Cord or cable	Required No.	Length	Connects	
				From	To
11	Ac power cord	1		Junction Box JB–70–(*), SO 209.	Radio Receiver R–388/URR in Radio Set AN/MRC–2D only (fig. 28). Lamp in Chest CH–120–B in Radio Set AN/MRC–2C only.
12	Cord CX–2155/U (in Radio Set AN/MRC–2D only).	1		Receiver R–388/URR, REMOTE terminal strip.	Junction Box JB–70–B, SO 205.
13	Cord CX–2152/U (AN/MRC–2D only).	1		Junction Box JB–70–B, TS 200.	Loudspeaker LS–3, Telephone EE–8–B, and Radio Receiver R–388/URR, AUDIO terminal board (fig. 28).
14	Cord CX–143/MRQ–2 (AN/MRC–2C only).	1		Junction Box JB–70–A, TS–200.	Loudspeaker LS–3, Telephone EE–8–B, and Radio Receiver BC–312–(*), SPEAKER 2ND AUDIO (fig. 27).
15	Cord CD–1251	1		Telephone EE–8–B, terminals L1 and L2.	Junction Box J–207/MRC–2, EE–8 jack (fig. 24).
16	Cord CG–389/U	1	6 ft	Frequency-shift exciter unit, RF OUTPUT NORMAL (fig. 23).	Transmitter tuning unit, XTAL socket (fig. 24).
17	Cord CD–605			Headset HS–30–U	Frequency-shift exciter unit, PHONES 850 TEST (fig. 24).
18	Cord CX–961/TRA–7 (blue).	1	4 ft	Frequency-shift exciter unit, SEND AND CONTROL.	Junction Box J–207/MRC–2, BLUE (fig. 24).
19	Cord CX–961/TRA–7 (red)	1	4 ft	Frequency-shift exciter unit, LOCAL CW CONTROL.	Junction Box J–207/MRC–2, RED (fig. 24).
20	Cord CX–962/TRA–7	1	4 ft	Frequency-shift exciter unit, AC SUPPLY.	Ac outlet (fig. 24).
21	Ac power cord			Junction Box JB–70–(*), SO 207.	Ac outlet.
22	Cord CG–390/U	1		Frequency-shift exciter unit, FREQUENCY METER IN.	Receiver, SPEAKER (in Radio Set AN/MRC–2D only). Frequency Meter BC–221–(*) in Radio Set AN/MRC–2C only.
23	Cord CG–67/MRQ–2 (AN–MRC–2D).	1	7 ft	Receiver R–388/URR, ANTENNA.	Antenna mast base.
24	Cord CX–2141/U (AN–MRC–2C).	1	7 ft	Radio Receiver BC–312–(*), ALT. SIG. ANT.	Antenna mast base.
25	Cord CD–201–A	1		Junction Box J–207/MRC–2, KEY.	Key J–37.
26	Power Cable Assembly CX–1165/U.	1	12 ft	Power Unit PE–95–(*)	Power Cable Assembly CX–1166/U.
27	Power Cable Assembly CX–1166/U.	1	100 ft	Power Cable Assembly CX–1165/U.	Power input feedthrough receptacle.
28	Ac power cord	1		Blower	Ac outlet.
29	Cord CG–145A/MRC–1	1	100 ft	Amplifier AM–141(*)/MRC	Doublet antenna (fig. 23).
30	Ac power cord	1		Blower	Amplifier AM–141(*)/MRC, BLOWER (fig. 23).
31	Cord CX–911/U	1	6 ft	Amplifier AM–141(*)/MRC, TO BC–610 socket.	Radio Transmitter BC–610–I, TS–15 (fig. 23).
32	Cord CG–65A/MRC–1	1		Radio Transmitter BC–610–I, rf output.	Amplifier AM–141(*)/MRC, EXCITATION INPUT.
33	Cord CX–135/MRC–1	1	15 ft	Amplifier AM–141(*)/MRC, AC socket.	Power input feedthrough receptacle.

a. Transmitting Shelter Cords (figs. 27, 28)—Continued.

Item No.	Cord or cable	Required No.	Length	Connects	
				From	To
34	Ac power cord (AN/MRC–2C only).	1	6 ft	Frequency Meter BC–221–(*).	Ac outlet.
35	Cord CD–659 (AN/MRC–2C only).	1		Junction Box JB–70–A	Chest CH–109–A, SO 600.
36	Cord CD–565 (AN/MRC–2C only).	1	3 ft	Socket SO 1 of Radio Receiver BC–312–(*).	Junction Box JB–70–A, SO 204.
37	Pick-Up Antenna AT–137/MRQ–2 (AN/MRC–2C only).	1		Frequency Meter BC–221–(*).	Clip on wall near transmitter.
38	Individual braid straps			Each equipment	Bench bus ground terminal (figs. 27, 28).
39	Wire braid			Bench bus ground terminal (AN/MRC–2D) or Chest CH–120–B common ground (AN/MRC–2C).	Shelter ground strap.
40	No. 7 AWG braid cord	1	10 ft	Transmitting shelter ground terminal.	Ground Rod GP–26 in earth close to shelter.

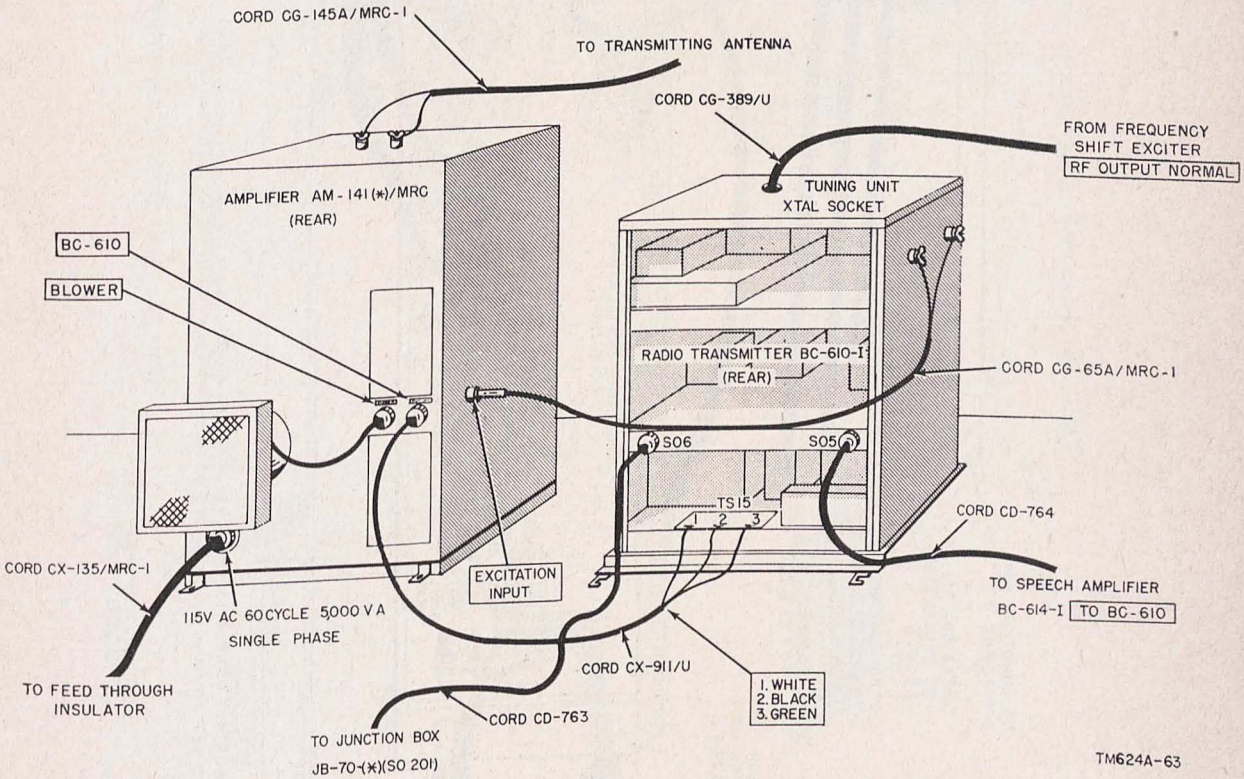
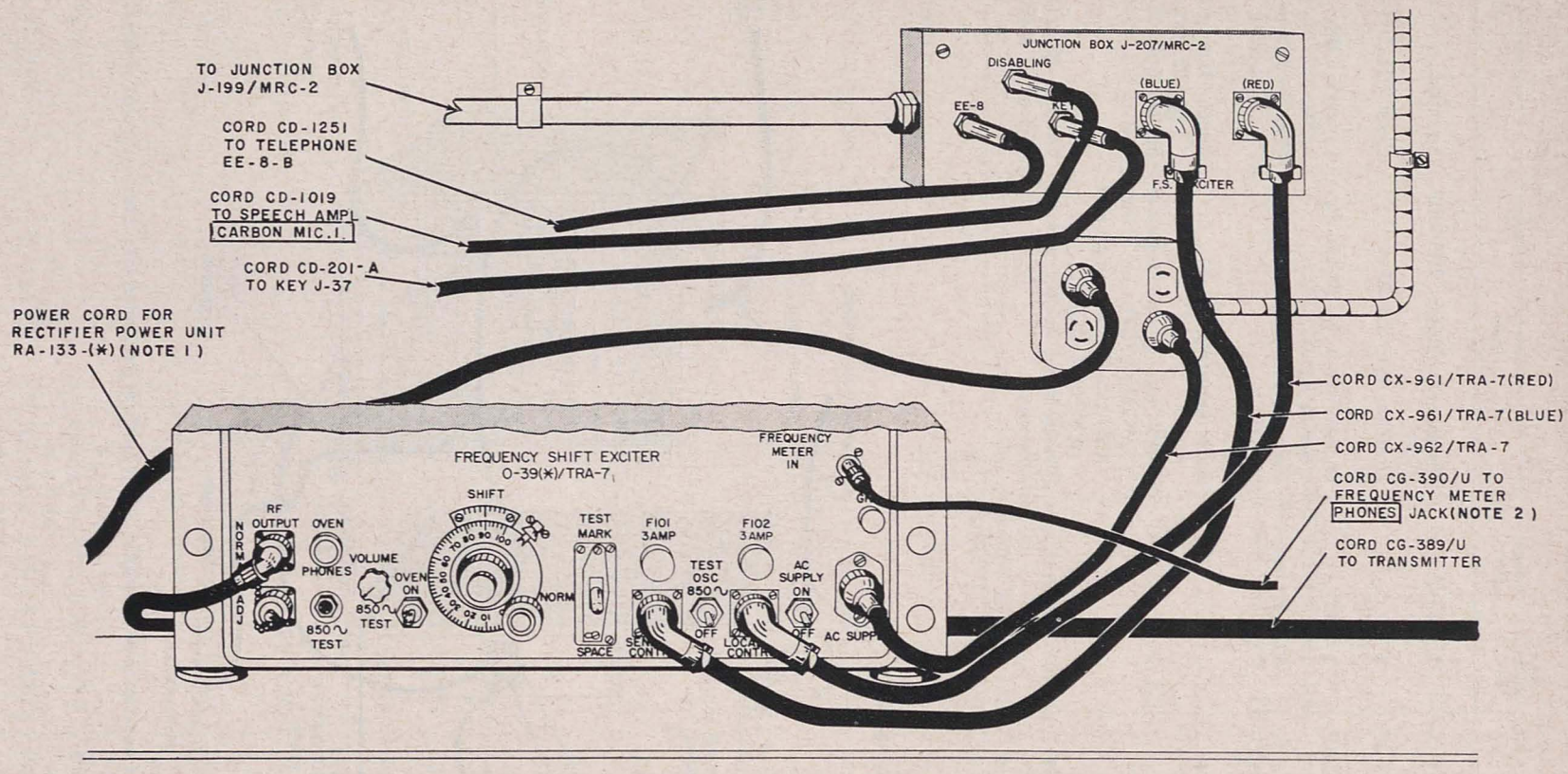


Figure 23. Connections to Amplifier AM–141(*)/MRC and Radio Transmitter BC–610–I.



NOTE:
1. THIS CABLE NOT USED WITH RADIO SET AN/MRC-2D
2. IN RADIO SET AN/MRC-2D TO RADIO RECEIVER R-388/URR SPEAKER JACK.

Figure 24. Connections to frequency shift exciter unit.

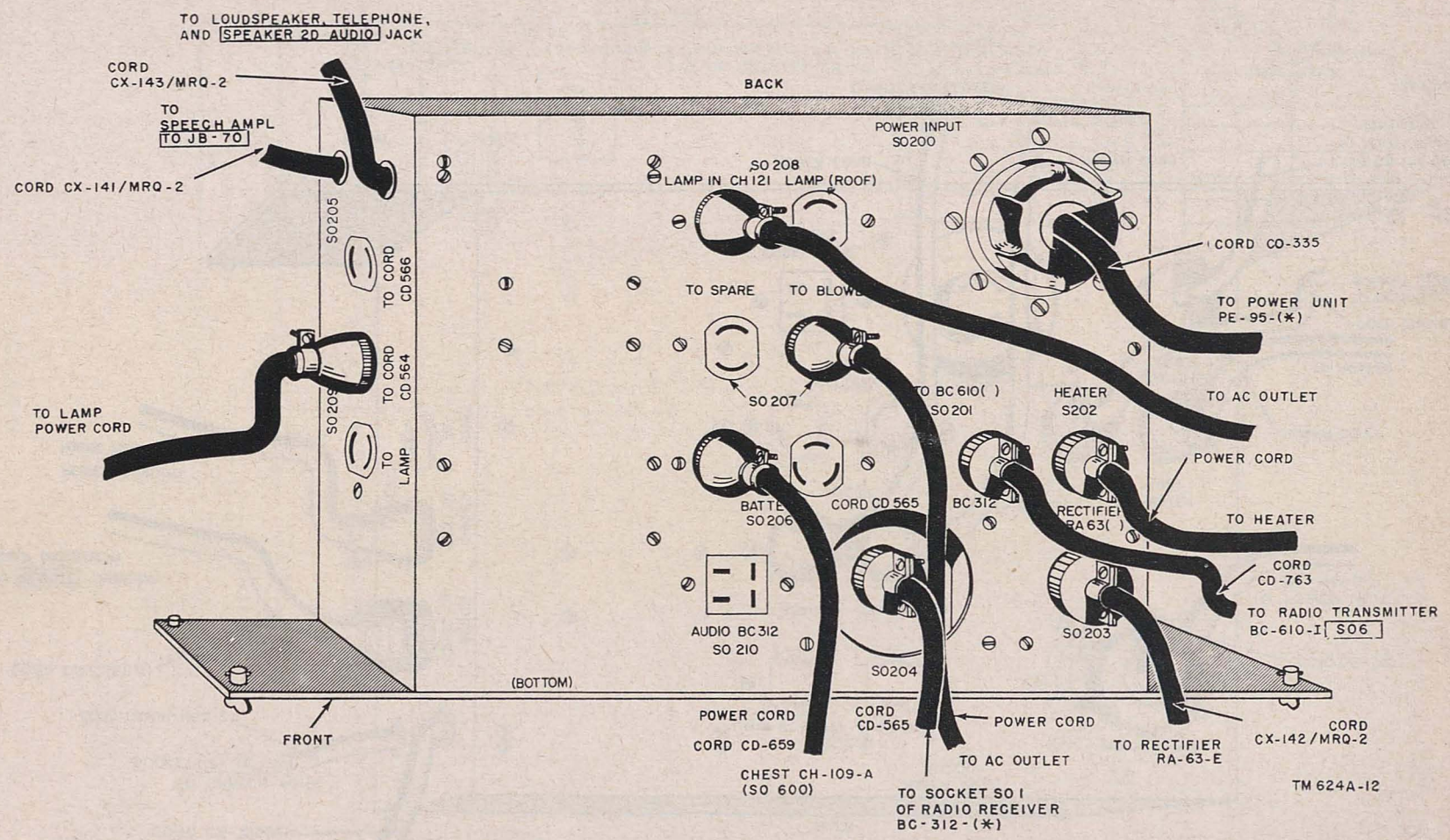


Figure 25. Connections to Junction Box JB–70–A, AN/MRC–2C.

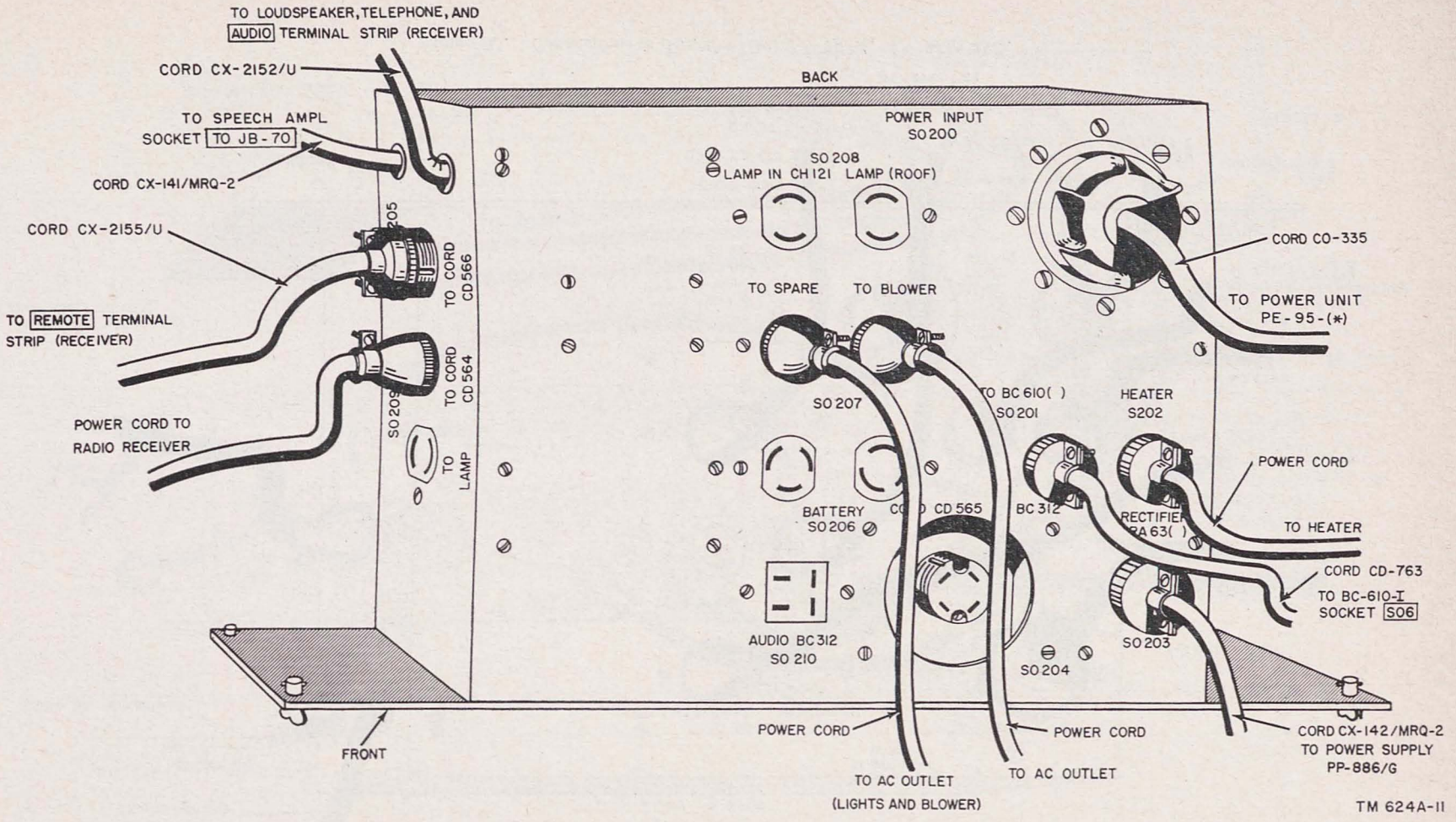


Figure 26. Connections to Junction Box JB–70–B, AN/MRC–2D.

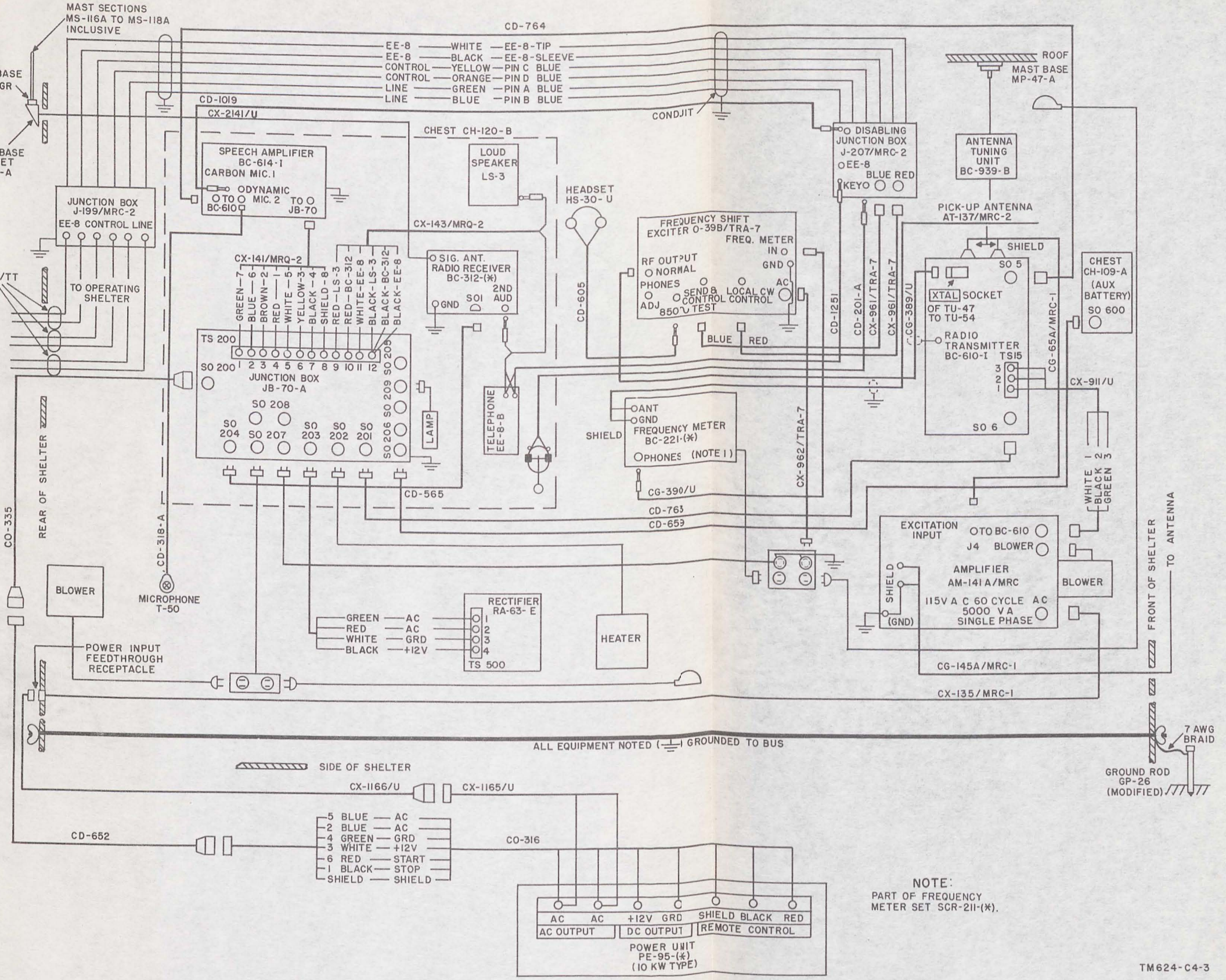


Figure 27. Radio Set AN/MRC–2C transmitting shelter, cording and wiring diagram.

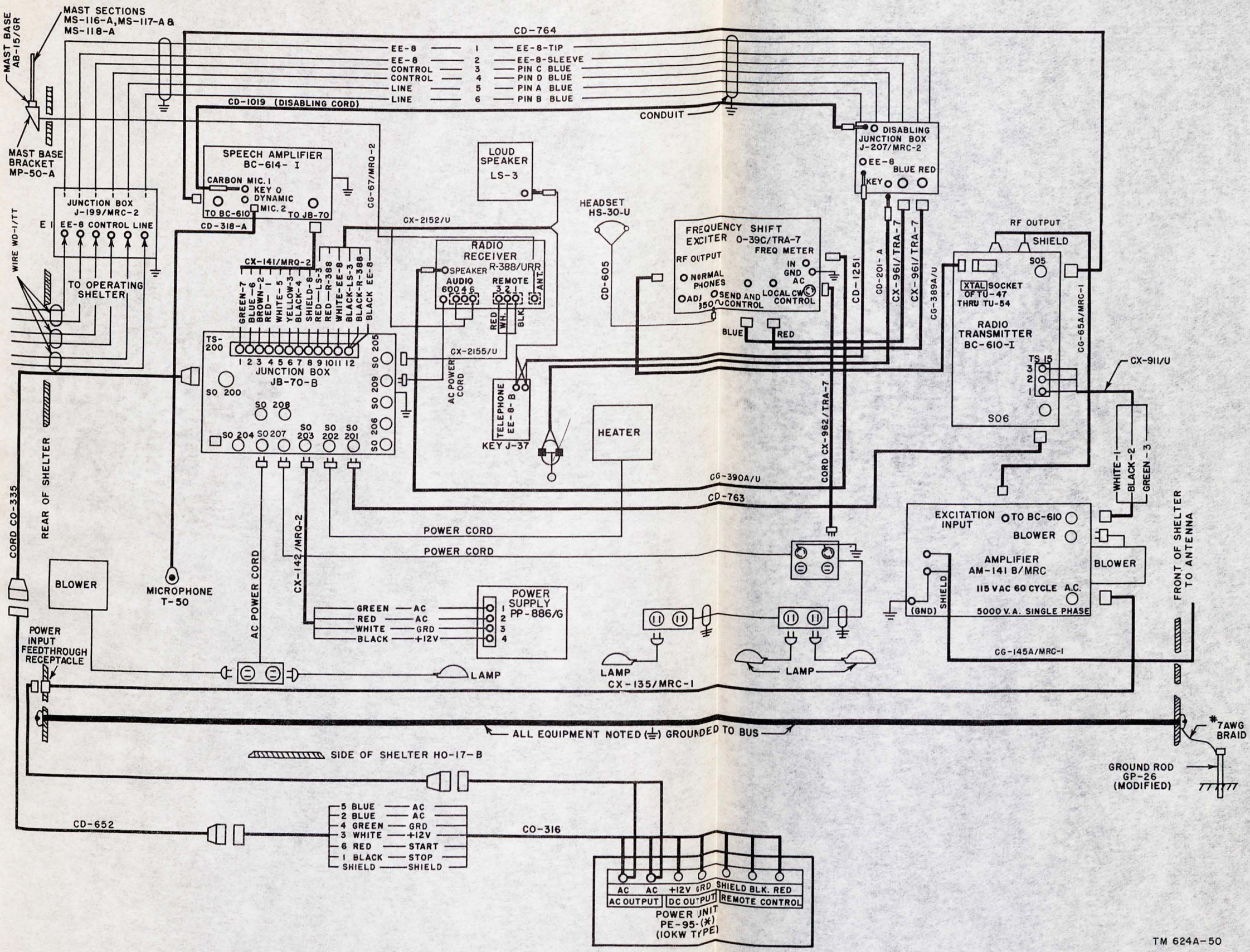
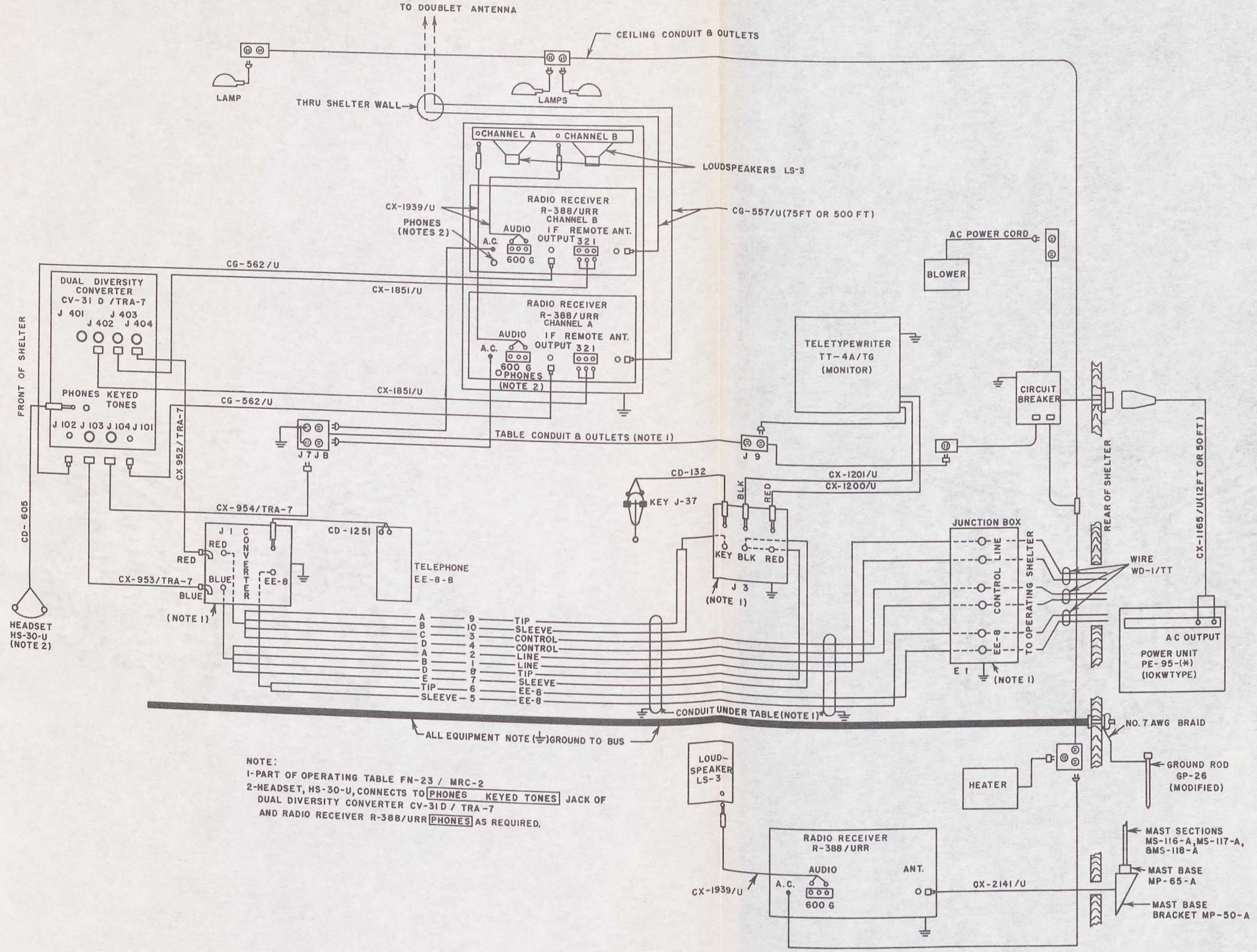


Figure 28. Radio Set AN/MRC–2D transmitting shelter, cording and wiring diagram.



NOTE:
1-PART OF OPERATING TABLE FN-23 / MRC-2
2-HEADSET, HS-30-U, CONNECTS TO PHONES KEYED TONES JACK OF DUAL DIVERSITY CONVERTER CV-31D / TRA-7 AND RADIO RECEIVER R-388/URR PHONES AS REQUIRED.

Figure 29. Receiving shelter, wiring and cording diagram.

b. Receiving Shelter Cords (fig. 29).

Item No.	Cord or cable	Required No.	Length (ft)	Connects	
				From	To
1	RF Cable Assembly CG–562/U.	1	8	Dual diversity converter J102	Channel B receiver, IF OUTPUT.
2	RF Cable Assembly CG–562/U.	1	8	Dual diversity converter J101	Channel A receiver, IF OUTPUT.
3	Electrical Special Purpose Cable Assembly CX–1851/U.	1	8	Dual diversity converter J403	Channel B receiver, REMOTE terminal board.
4	Electrical Special Purpose Cable Assembly CX–1851/U.	1	8	Dual diversity converter J402	Channel A receiver, REMOTE terminal board.
5	Cord CX–952/TRA–7	1	6	Dual diversity converter J404	Connection plate (converter) jack J1, RED (fig. 30).
6	Cord CX–953/TRA–7	1	6	Dual diversity converter J103	Connection plate (converter) jack J1, BLUE (fig. 30).
7	Cord CX–954/TRA–7	1	6	Dual diversity converter J104	Ac outlet J7.
8	Cord CD–1251	1	4	Connection plate (CONVERTER), EE–8 jack.	Telephone EE–8–B, terminals L1 and L2 (fig. 30).
9	Ac power cord	2		Receivers, channel A and channel B.	Ac outlet.
10	RF Cable Assembly CG–557/U.	2	75 or 500	Receivers channel A and channel B, ANTENNA.	Doublet antennas.
11	Electrical Power Cable Assembly CX–1939/U.	2	5	Receivers channel A and channel B, AUDIO terminal strip.	Loudspeakers LS–3.
12	Ac power cord	1		Teletypewriter	Ac outlet J9.
13	Special Purpose Cable Assembly CX–1201/U.	1		Teletypewriter	Jack panel J3, BLK (fig. 31).
14	Special Purpose Cable Assembly CX–1200/U.	1		Teletypewriter	Jack panel J3, RED (fig. 31).
15	Cord CD–132	1		Key J–37	Jack panel J3, KEY.
16	Ac power cord	1		Blower	Ac outlet.
17	Ac power Cord	1		Heater	Ac outlet.
18	Electrical Power Cable Assembly CX–1939/U.	1	5	Receiver (spare), AUDIO terminal strip.	Loudspeaker LS–3.
19	Electrical lead CX–2141/U	1		Receiver (spare), ANTENNA	Antenna Mast Base MP–65–A (fig. 29).
20	Ac power cord	1		Receiver (spare)	Ac outlet.
21	Power Cable Assembly CX–1165/U.	1	12 or 50	Power input feedthrough receptacle.	Commercial ac source or Power Unit PE–95–(*).
22	Cord CD–605 w/headset	3		Headset HS–30–U	PHONES KEYED TONE jack or PHONES jack of Radio Receiver R–388/URR.
23	Braid straps			Individual equipments	Ground bus of Operating Table FN–23/MRC–2.
24	Wire braid			Operating table ground bus	Shelter ground terminal.
25	No. 7 AWG braid cord	1	10	Shelter ground terminal	Ground Rod GP–26 in earth close to shelter.

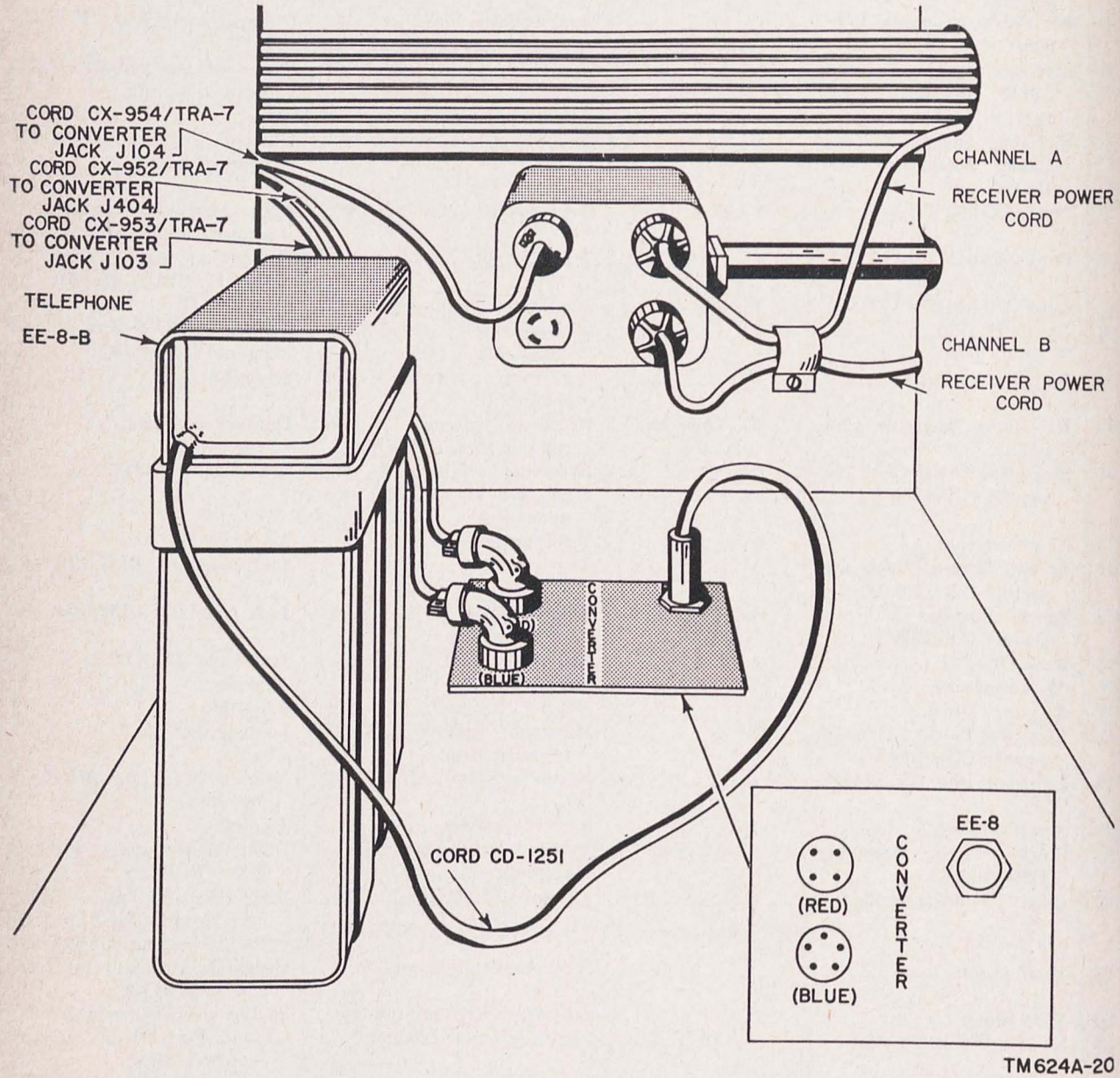


Figure 30. Converter plate connections to dual diversity converter and telephone.

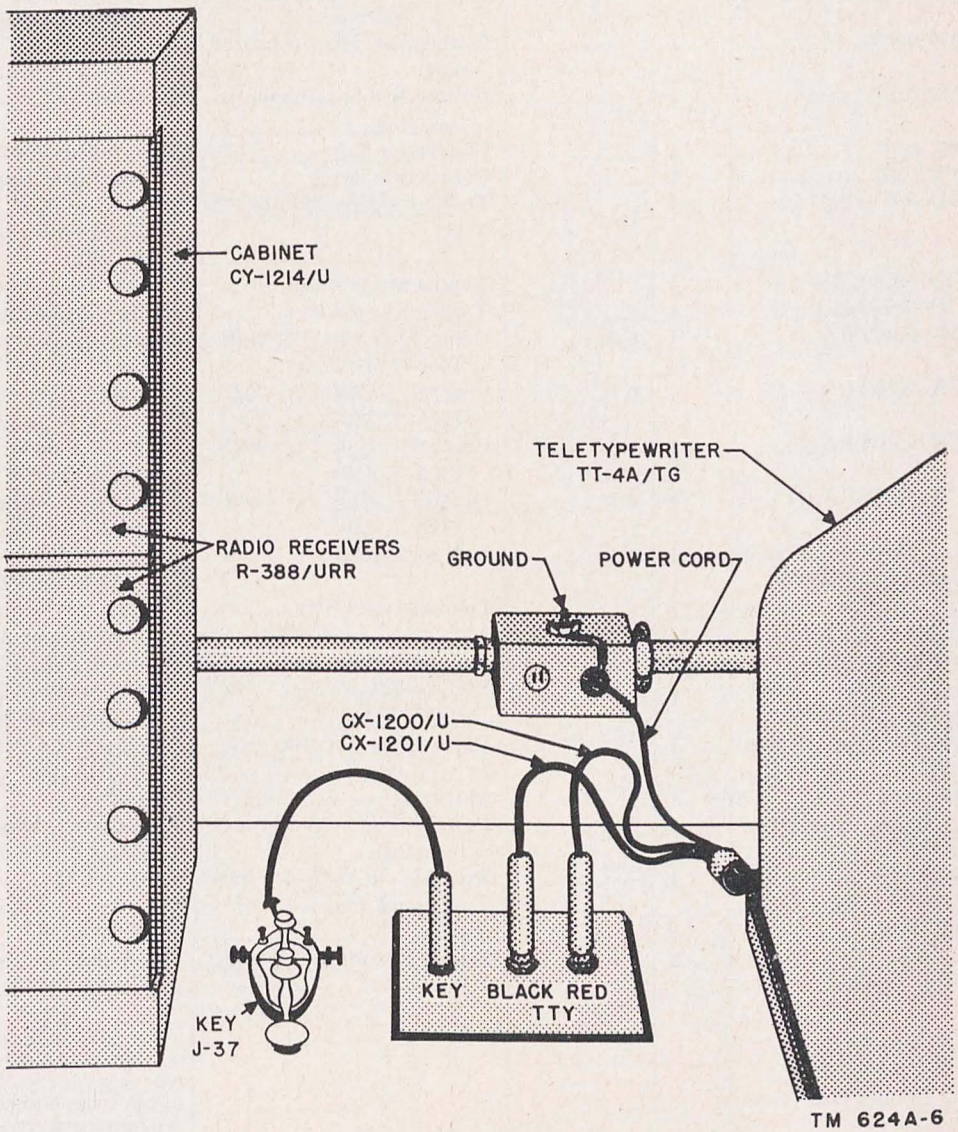


Figure 31. Monitoring teletypewriter connections in receiving shelter.

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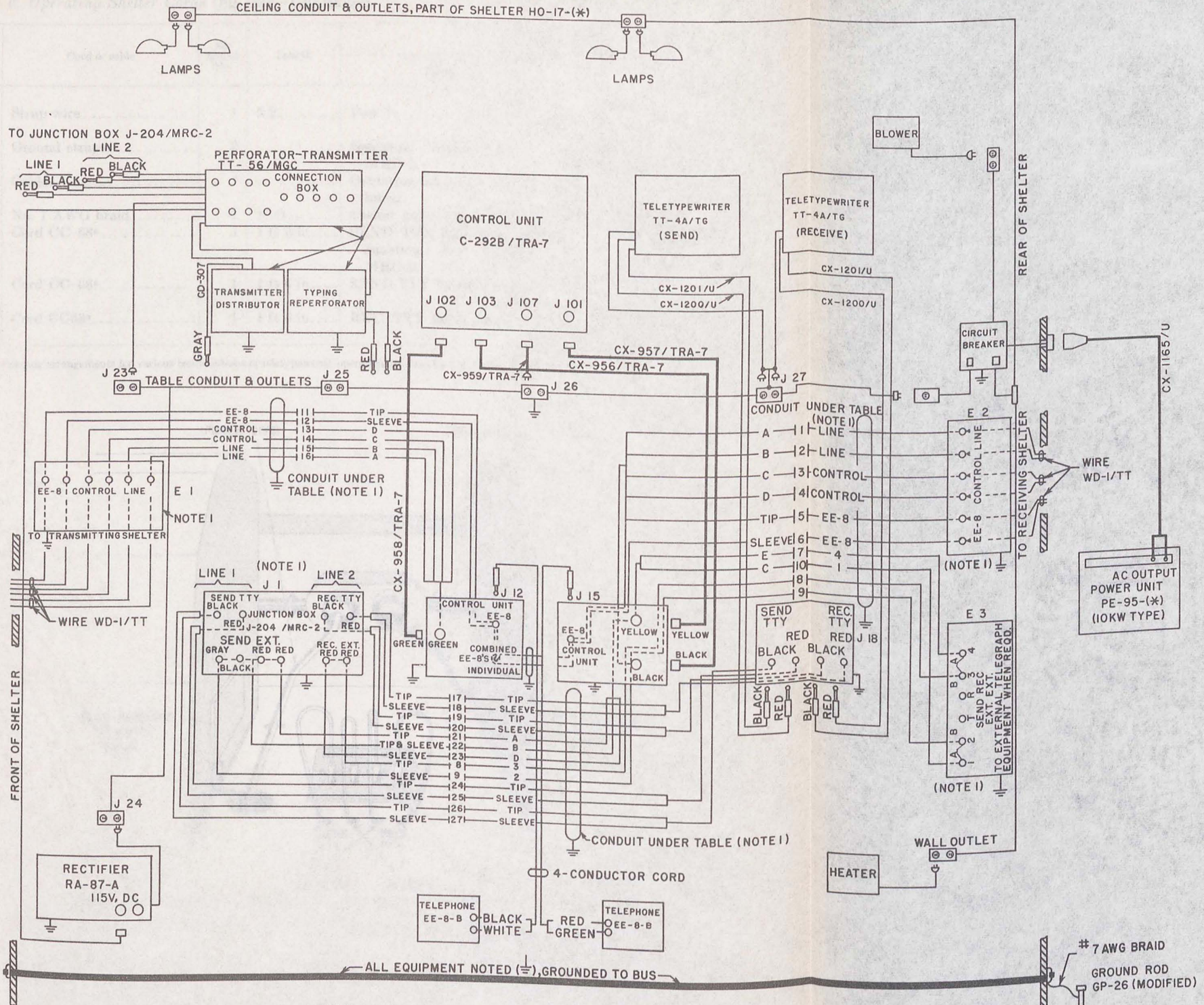
c. Operating Shelter Cords (fig. 32).

Item No.	Cord or cable	Required No.	Length	Connects	
				From	To
1	Cord CD–307 (black)	2		Connection box	Junction Box J–204/MRC, BLACK jack (when used).
2	Cord CD–307 (red)	2		Connection box	Junction Box J–204/MRC, RED jack (when used).
3	Dc power cord	1		Connection box, polarized plug.	Rectifier RA–87–A, 115 V. DC.
4	Ac power cord	1		Connection box, nonpolarized plug.	Ac outlet J23.
5	Ac power cord	1		Connection box	Transmitter-distributor.
6	Ac power cord	1		Connection box	Typing reperforator.
7	Cord CD–307 (gray)	1		Transmitter-distributor	Junction Box J–204/MRC–2, GRAY jack of SEND EXT. (fig. 34).
8	Cord CD–307 (red)	1		Typing reperforator	Connection box, circuit 2 (fig. 34).
9	Cord CD–307 (black)	1		Typing reperforator	Connection box, circuit 2 (fig. 34).
10	Cord CX–958/TRA–7	1	6 ft	Control Unit C–292B/TRA–7, J102.	Left jack panel J12, GREEN socket (fig. 34).
11	Cord CX–959/TRA–7	1	6 ft	Control Unit C–292B/TRA–7, J107.	Ac outlet J26.
12	Cord CX–956/TRA–7	1	6 ft	Control Unit C–292B/TRA–7, J103.	Right jack panel J15, YELLOW socket (fig. 34).
13	Cord CX–957/TRA–7	1	6 ft	Control Unit C–292B/TRA–7, J101.	Right jack panel J15, BLACK socket (fig. 34).
14	Special Purpose Cable Assembly CX–1200/U.	1		Left teletypewriter	Teletypewriter jack panel J18, RED jack of SEND TTY.
15	Special Purpose Cable Assembly CX–1201/U.	1		Left teletypewriter	Teletypewriter jack panel J18, BLACK jack of SEND TTY.
16	Ac power cord	2		Each teletypewriter	Ac outlet J27.
17	Special Purpose Cable Assembly CX–1200/U.	1		Right teletypewriter	Teletypewriter jack panel J18, RED jack of REC. TTY.
18	Special Purpose Cable Assembly CX–1201/U.	1		Right teletypewriter	Teletypewriter jack panel J18, BLACK jack of REC. TTY.
19	Ac power cord	1		Blower	Ac outlet.
20	Power Cable Assembly CX–1165/U.	1	50 ft	Power input feedthrough receptacle.	Commercial ac source or Power Unit PE–95–(*).
21	Ac power cord	1		Rectifier RA–87–A, nonpolarized plug.	Ac outlet J24.
22	Ac power cord	1		Heater	Ac wall outlet.
23	Cord	2		Either Telephone EE–8–B	EE–8 jack on right or left jack panels (fig. 34).
24	Strap wire	1	3 in	Post 1	Post 2 of TO EXTERNAL TELEGRAPH EQUIPMENT (fig. 15).

Note. The left-hand EE–8 jack is wired to the transmitting shelter and the right-hand EE–8 jack is wired to the receiving shelter. With the EE–8's toggle switch in the COMBINED position, the telephone lines of the transmitting and receiving shelters are connected together. With the EE–8's toggle switch in the INDIVIDUAL position the telephone line from the transmitting shelter is connected to one of the EE–8–B telephones, and the telephone line from the receiving shelter is connected to the other Telephone EE–8–B in the operating shelter.



NOTES:
1. PART OF OPERATING TABLE FN-22/MRC.
2. BRACKETED NUMERALS EG: -122- ARE WIRE MARKERS. WIRES MARKED -111-, -129- & -15- ARE COMMON; WIRE MARKED -112-, -128- & -16- ARE COMMON.

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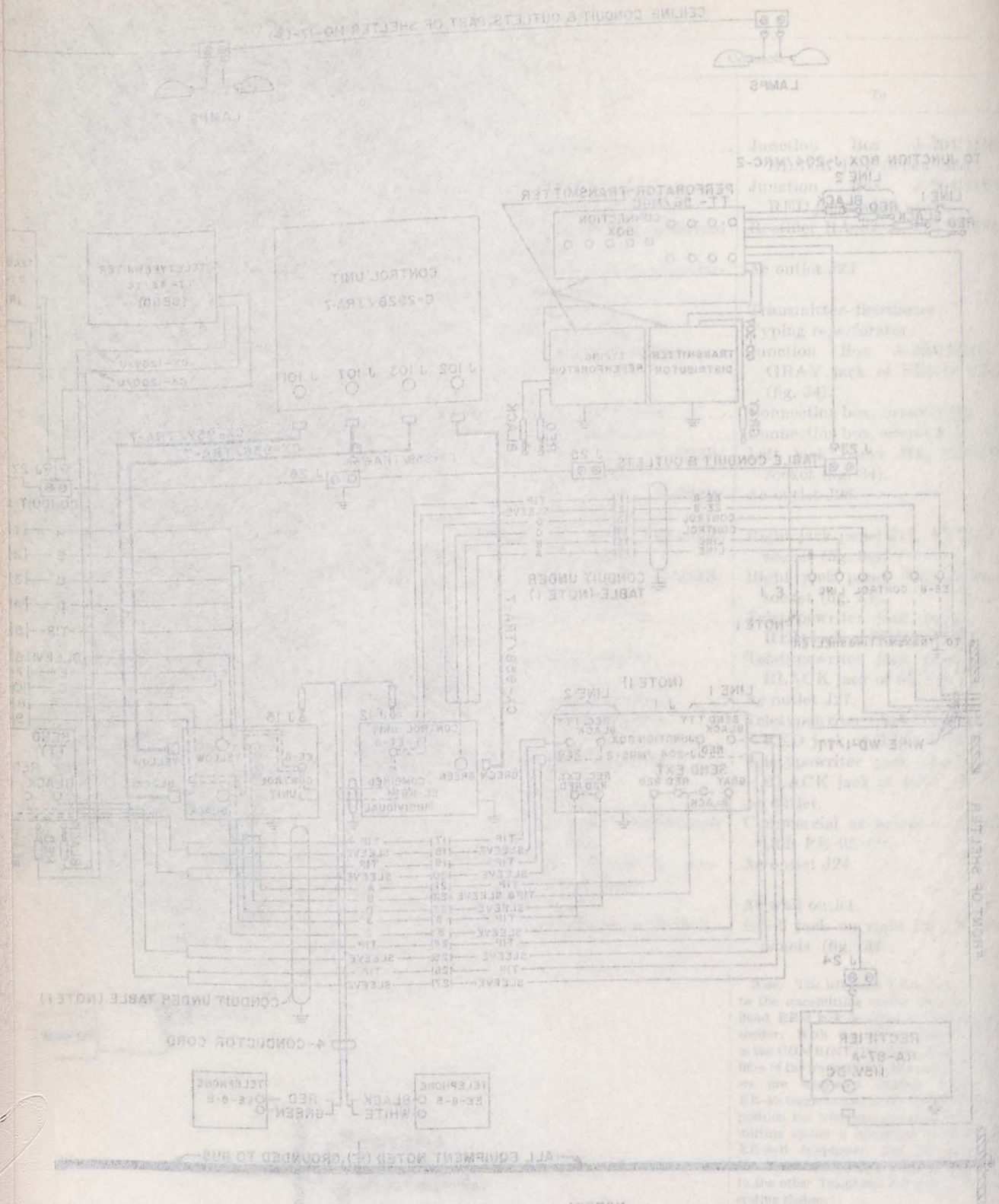
Figure 32. Operating shelter, wiring and cording diagram.


CONTROL UNIT
PERFORATOR-TRANSMITTER
TRANSMITTER DISTRIBUTOR
CONDUIT UNDER TABLE (NOTE 1)
4-CONDUCTOR CORD
RECTIFIER
TELEPHONE
LAMPS
NOTES:

c. Operating Shelter Cords (fig. 32)—Continued.

Item No.	Cord or cable	Required No.	Length	Connects	
				From	To
25	Strap wire	1	3 in	Post 3	Post 4 of same junction strip (fig. 15).
26	Ground straps	6		Operating Table FN–22/MRC–2.	Nearest mounting bolt of each equipment on table.
27	Cable	1		Operating table ground terminal.	Shelter ground strap (fig. 32).
28	No. 7 AWG braid	1	10 ft	Shelter grounding terminal	Ground Rod GP–26 in earth.
29	Cord CC–68[a]	1	1 ft 6 in	SEND TTY RED jack of Junction Box J–204/MRC–2.	SEND EXT. RED jack (fig. 35).
30	Cord CC–68[a]	1	1 ft 6 in	SEND TTY BLACK jack	SEND EXT. BLACK jack (fig. 35).
31	Cord CC68[a]	1	1 ft 6 in	REC. TTY RED jack	REC. EXT RED Jack (fig. 35).

[a] Cording arrangements for various combinations of teletypewriter operation are described in paragraphs 69 through 71.

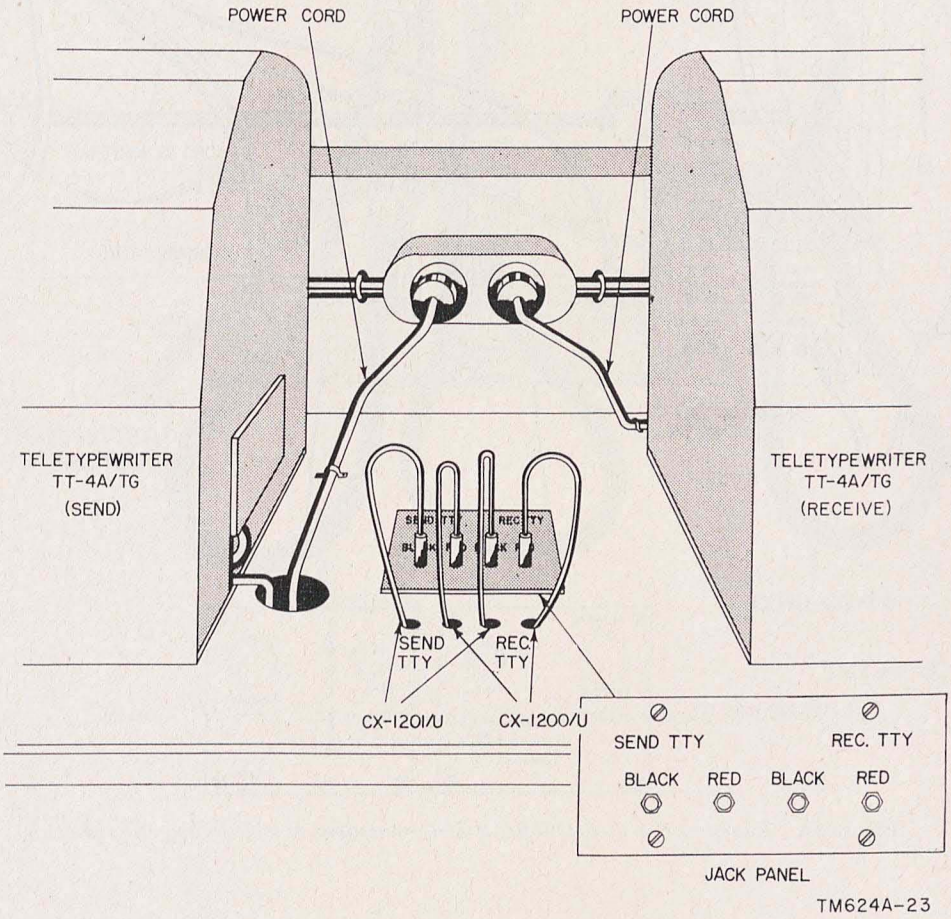


Figure 33. Operating shelter, connections to the teletypewriters.

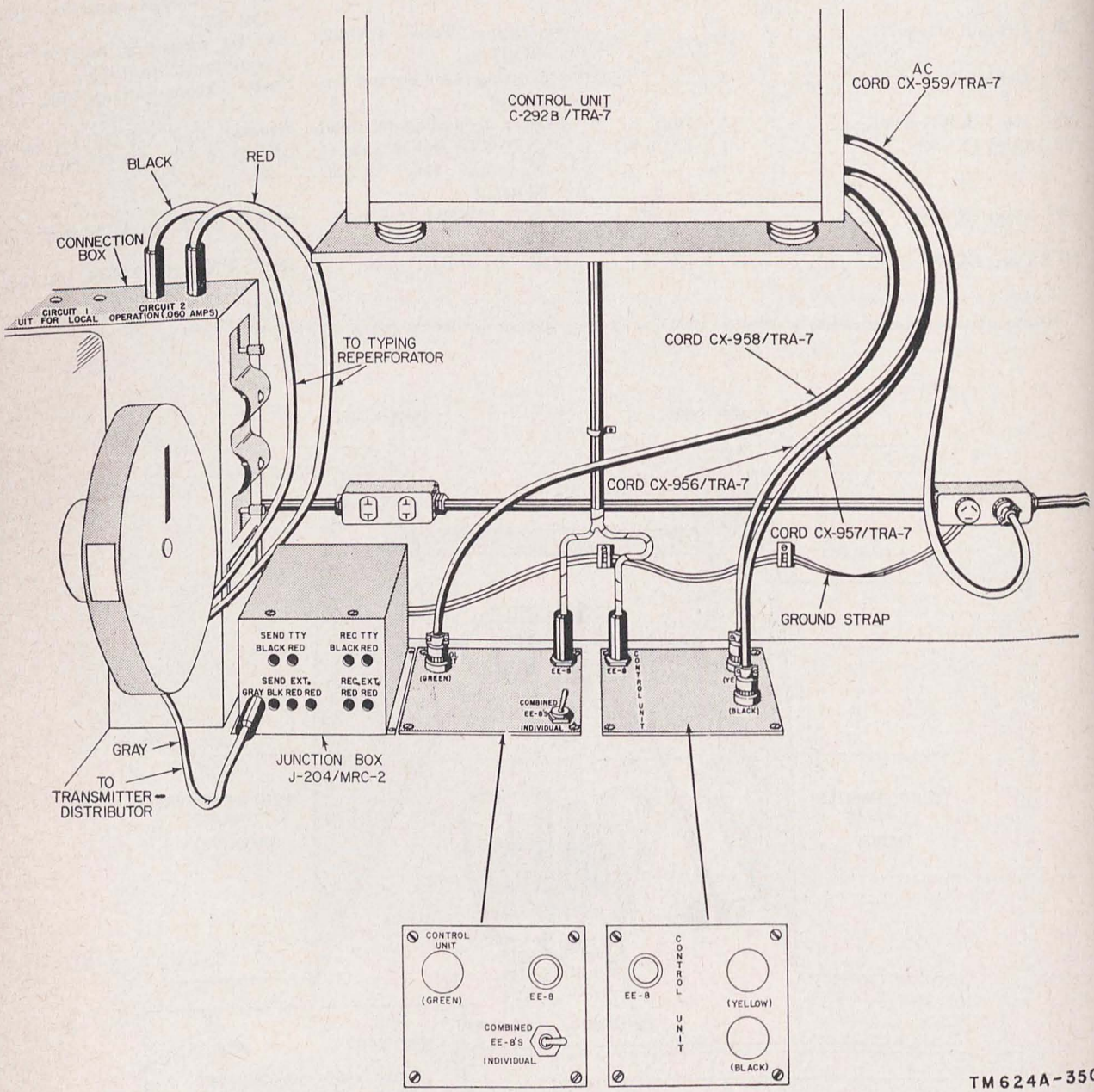


Figure 34. Junction Box J–204/MRC–2 and connections to table in operating shelter.

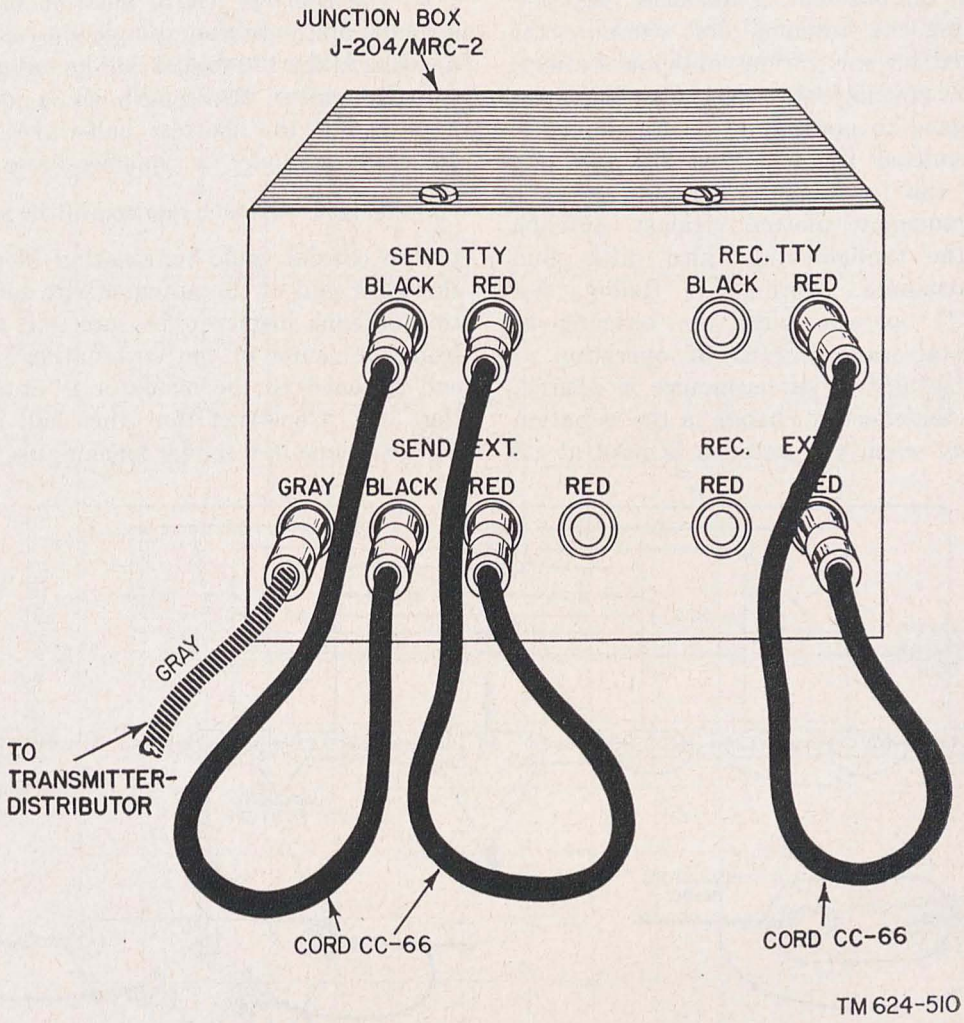


Figure 35. Normal patching arrangement on Junction Box JB-207/MRC-2.

19. Construction of Doublet Transmitting Antenna

a. Four 50-foot Antenna Supports AB–38B/CR and the necessary wire, insulators, connectors, and coaxial feed line are provided to construct a doublet transmitting antenna. Three antenna supports are used for the antenna, with the fourth support maintained as a spare. The antenna wire is made up of sections that can be connected by jumpers, allowing preselection of various lengths for operating on different frequencies (fig. 36). Before erecting the antenna, first compute the lengths desired for the various antenna sections.

b. The transmitting antenna is a half-wave doublet designed to operate at the fundamental of the transmitted frequency, or on any odd harmonic of the fundamental. Figure 37 is a graph of frequency plotted against antenna length for the fundamental, third, fifth, and seventh harmonics. Normally, Radio Set AN/MRC–2(*) operates with the antenna at its fundamental wave length. If operation of the antenna at any of its harmonics is desired, first consider the effective change in the radiation pattern. Only when the antenna is used at its fundamental length with regard to frequency will the radiation pattern be broadside.

c. Refer to figure 36 and select the proper antenna lengths for operating frequencies to be used when transmitting.

Example: Assume that operation is desired on frequencies of 2,500, 2,650, 2,900, and 3,900 kilocycles (kc). The graph (fig. 37), shows that these frequencies require antenna lengths of 187, 177, 161, and 120 feet, respectively.

d. The shortest length antenna must be constructed first. In the example above, the shortest antenna is the 120-foot, 3,900-kc antenna.

e. Determine the length of a quarter-wave antenna for the shortest half-wave to be used. In this example, a quarter-wave would be $\frac{120}{2}$=60 feet. Attach one end of the antenna wire to the coaxial cable terminating block. Attach the other end of the antenna wire to a transmitting antenna insulator; be sure that the distance from the center of the terminating block to the end fastened to the insulator is exactly 60 feet (fig. 36). Construct the other half of the half-wave antenna in a similar fashion; use the remain-

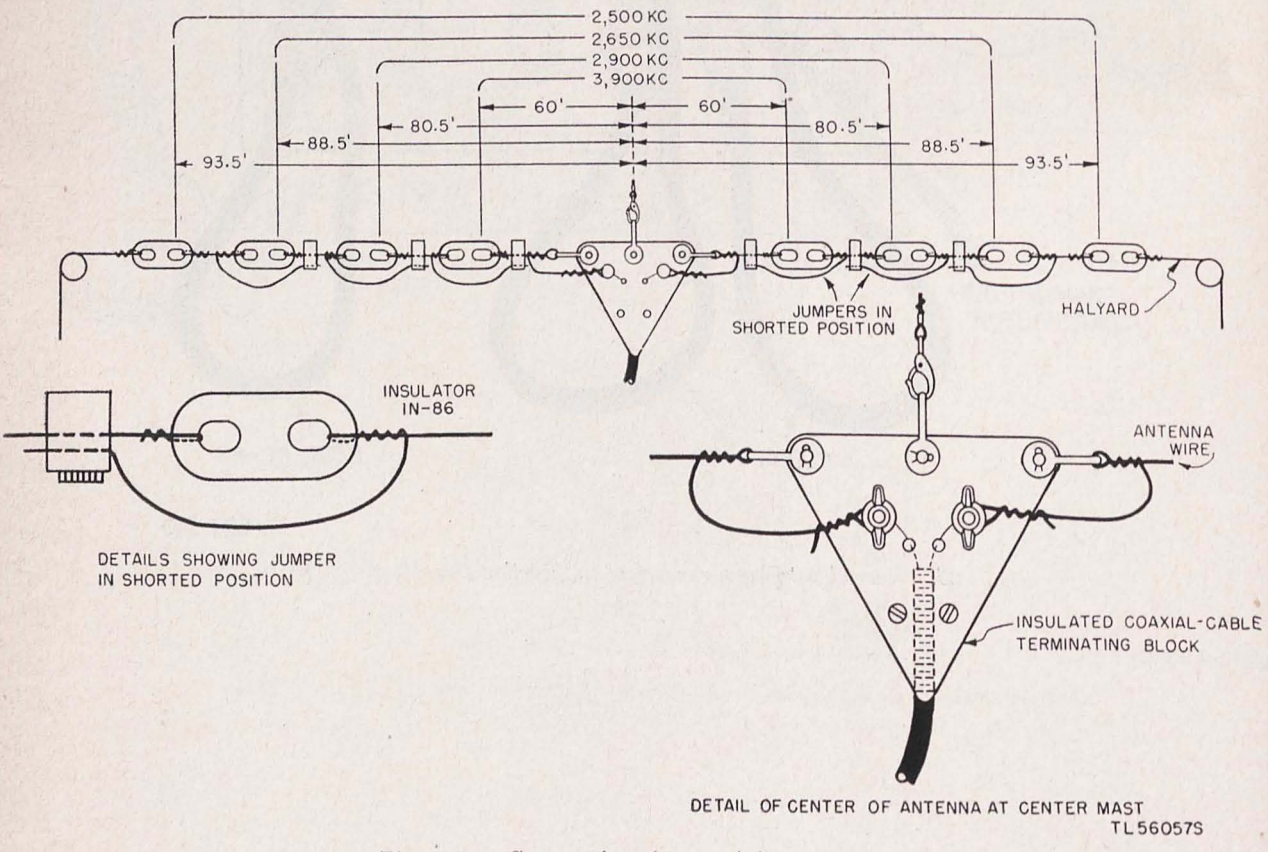


Figure 36. Construction of transmitting antenna.

ing terminal on the terminating block as a starting point.

f. Select the next shortest length of antenna desired, in this case the 161-foot, 2,900-kc antenna. Attach a piece of antenna wire to the unused end of the insulator of the 3,900-kc antenna already constructed. Allow enough free wire for a jumper connection. Follow the procedure already outlined to arrive at the proper length for a quarter-wave for 2,900 kc: $\frac{161}{2}$=80.5 feet. Run out enough wire to bring the total length of one side of the antenna to 80.5 feet as measured from the center of the terminating block to the end of the antenna; include in this measurement the length of the insulators. The other side of the antenna is made up in the same manner.

g. Each additional lower-frequency antenna is constructed by adding more wire to the antenna already formed. Each antenna length is calculated from the center of the terminating block to the end of the antenna being constructed.

h. After the various lengths have been determined and constructed, connect the correct jumpers in place (fig. 36). Each antenna selected will operate on the fundamental and approximately at odd harmonics of the frequency to which it is cut. In the example given above, the an-

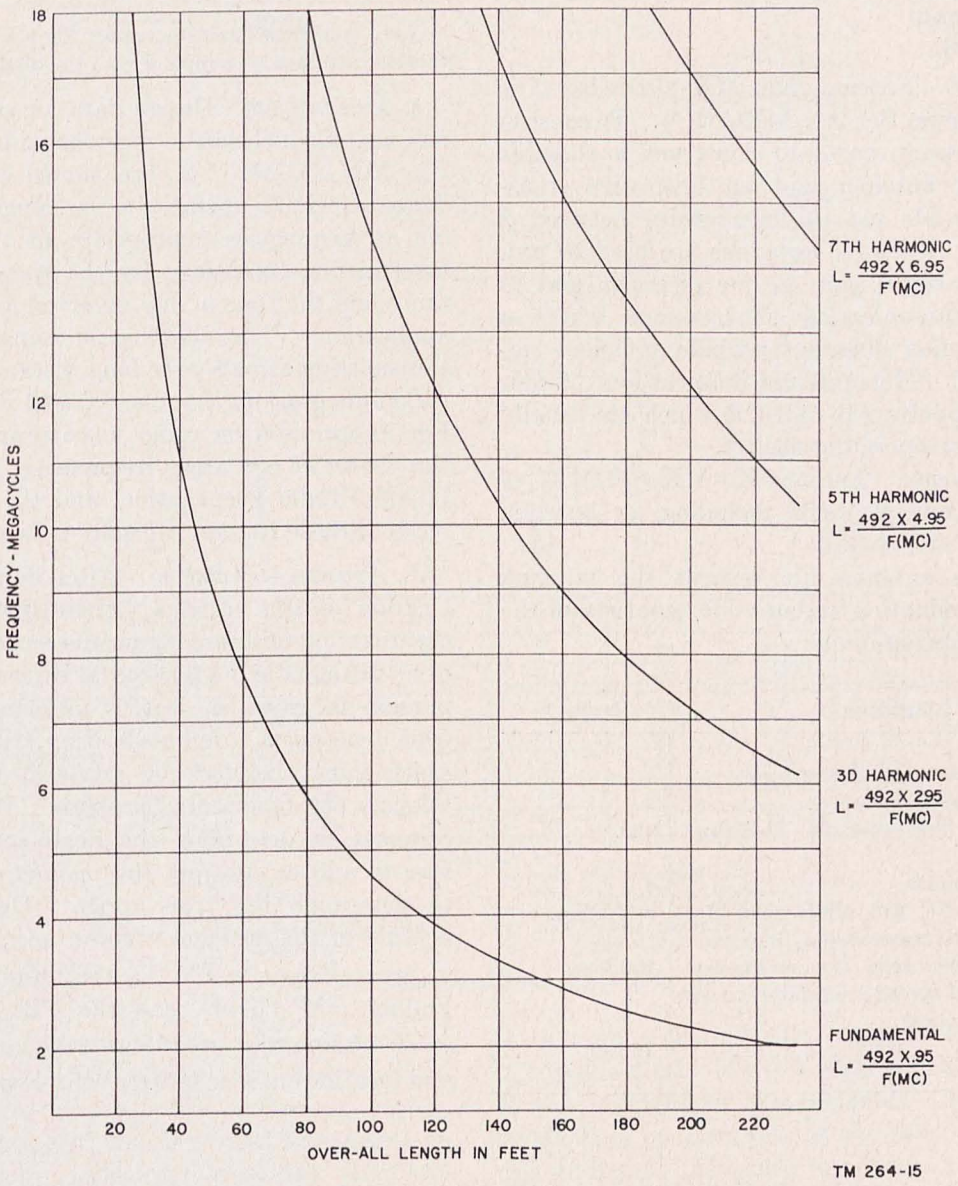


Figure 37. Frequency versus antenna length chart.

tenna will be the correct length for the following frequencies:

Fundamental (kc)	Third harmonic (kc) (approximate)	Fifth harmonic (kc) (approximate)
2, 500	7, 800	13, 300.
2, 650	8, 250	14, 300.
2, 900	9, 000	15, 200.
3, 900	12, 100	Above 18, 000.

Note. Refer to figure 37 to calculate harmonics versus length of antenna wire.

20. Construction of Rhombic Transmitting Antenna

(fig 38)

a. General. Antenna Kit MX–852/MRC–2 is a part of Radio Set AN/MRC–2(*). It consists of the necessary parts to construct a rhombic transmitting antenna and an open-wire transmission line for use on frequencies between 2 and 18 mc. Rhombic antennas are used to provide a high signal gain in one direction and to improve communication at locations where a doublet antenna does not provide sufficient signal strength. This antenna requires four 50-foot Antenna Supports AB–38B/CR which are usually packed in the operating shelter.

b. Components. Antenna Kit MX–852/MRC–2 consists of several items including an antenna terminating resistor kit.

(1) The antenna kit (except the antenna terminating resistor kit) consists of the following items:

Description	Quantity
4-ounce bottle of gasket compound	1.
Feedthrough insulators	2.
Transmission line spreader insulators (6″ x ¾″).	100.
Soldering terminals	4.
Copperweld wire, #16 AWG solid (for antenna and transmission line)	3,000 feet.
Wire, #18 AWG solid (for mechanical connection of spreader insulators to the transmission line).	200 feet.
Wire W–128	20 feet.

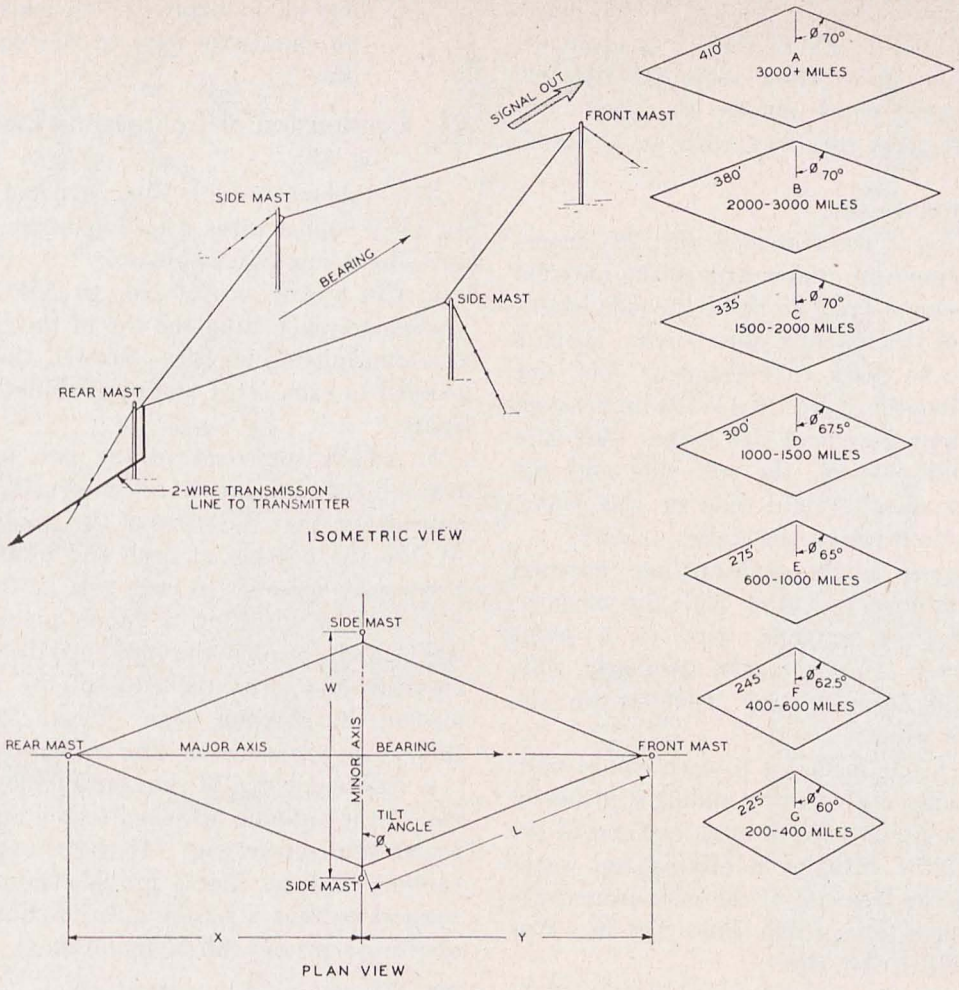
(2) The antenna terminating resistor kit consists of the following items:

Description	Quantity
Fuse clip	24.
Plastic panel for mounting the resistors (12″ x 12″ x 3/16″).	1.
Hexagonal nut	12.
Machine screws, 10–32 x ½″ long	12.
Fixed, noninductive resistor, 250 ohms, 86 watts.	12.
Terminals	12.
Wire, #10 AWG bare copper	2 feet.
Lock washers for No. 10 screws	12.

Note. Additional items necessary for the erection of the rhombic antenna are supplied with the doublet antenna.

c. Design Data. Design data for several antennas, any of which can be constructed from Antenna Kit MX–852/MRC–2, are shown in figure 38. These antennas operate in the range of 2 to 18 mc at frequencies appropriate to the sky-wave transmission conditions for the transmission distance and the time of day involved in a particular application. The rhombic antenna is best for transmitting signals over long distances when the maximum working frequency is 10 mc or higher. For information on radio wave propagation and the choice of operating frequencies, refer to TM 11–499, Radio Propagation, and the TB 11–499-series of Basic Radio Propagation Predictions.

d. Antenna Orientation. After determining the location of the antenna, orient the antenna to the direction of desired transmission. The bearing of an antenna or its horizontal direction of transmission is given in degrees measured clockwise from true north. A line bearing true north and south must therefore be established before the antenna can be oriented properly. When using a compass to determine the north-south line, be sure to add or subtract the magnetic declination to determine the true north. Determine the bearing of the antenna with an accuracy of ±5° of arc. Refer to TM 11–476, Radio Direction Fnding, TM 11–499, and the TB 11–499-series to determine the great circle distance bearings and locations of transmitter control points.



TYPE	RANGE (MILES)	L (FT)	Ø (°)	H (FT)	W (FT)	X (FT)	Y (FT)
A	3000+	410	70	50	286	386	388
B	2000 - 3000	380	70	50	266	358	360
C	1500 - 2000	335	70	50	236	316	318
D	1000 - 1500	300	67.5	50	236	278	280
E	600 - 1000	275	65	50	238	250	252
F	400 - 600	245	62.5	50	232	218	220
G	200 - 400	225	60	50	231	196	198

LEGEND

L - LENGTH OF SIDE.
Ø - TILT ANGLE.
H - AVERAGE HEIGHT OF ANTENNA ABOVE AVERAGE GROUND LEVEL.
W - POLE SPACING - MINOR AXIS.
X - POLE SPACING - REAR END POLE DIVISION OF MAJOR AXIS.
Y - POLE SPACING - FRONT END POLE DIVISION OF MAJOR AXIS.

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Figure 38. Rhombic antenna design data.

e. Locating Antenna Masts. To construct a rhombic antenna, drive stakes into the ground at the point where the masts will be erected. Determine the location of the front and rear masts of the antenna by measuring with the standard steel tape along the major axis (bearing line of the antenna) (fig. 38). To determine the locations of the side masts, locate a stake on the major axis at the midpoint of the antenna. Lay off perpendiculars on each side of the bearing line from this midpoint. Measure the distance to the side masts on the minor axis of the antenna. Figure 38

gives mast-to-mast lengths (X plus Y) and mast-to-mast widths (W). (Note that Y is always 2 feet longer than X to allow room for the terminating resistor panel shown in figure 39.) Determine the mast locations with an accuracy of ±1 foot.

f. Layout of Antenna.

(1) Starting at the rear mast (fig. 38), measure along the major axis of the antenna a distance equal to twice the side length (L) of the antenna plus 1 foot. Drive a stake to mark this distance. Lay out two lengths of No. 16 AWG wire between the rear mast and this stake. One wire should pass on the left side and the other on the right side of this stake. Cut the wires at the stake.

(2) Place a single transmitting antenna insulator on one wire. Slide the insulator down the antenna wire to a point between the side masts. Similarly, slide another transmitting insulator on the other wire.

(3) Fasten one insulator to each end of both the antenna wires by sliding 6 inches of the antenna wire through one end of the insulator, bringing it around and warpping the free end of the wire around the antenna four or five times (fig. 39). Cut off the excess wire.

(4) Repeat the procedure as indicated in (3) above at the other end of the transmitting antenna wire.

g. Assembly and Installation of Resistor Board (fig. 39).

(1) Attach the 20 fuse clips to the plastic terminal board; use the 10–32 x ½″ long machine screws, hexagonal nuts, and washers.

(2) Mount the 12 noninductive resistors in the fuse clips and wire them series-parallel.

(3) Cut two lengths of Wire W–128 and connect each parallel bank of resistors on the resistor terminal board to the two legs of the antenna wire. Make a good sound mechanical connection. Then make a good electrical connection by soldering the joints.

(4) Mechanically support the resistor terminal board by threading a piece of Rope RP–5 through the two holes at the top end of the board and tie each end to the antenna wire next to the insulator (fig. 39).

21. Construction of Transmission Line

(fig. 39)

The transmission line is constructed of two No. 16 AWG copper wires spaced apart by the steatite spreader insulators, as follows:

a. Cut two pieces of No. 16 AWG wire long enough to reach from the top of the rear mast to the transmitting shelter. Stretch the two wires parallel to each other and approximately 6 inches apart.

b. Attach spreaders to the two wires of the transmission line at 5-foot intervals. Place the spreader so that the wires of the transmission line fit into the notches at each end of the spreader. Secure the spreader to each wire of the transmission line by inserting a 6-inch piece of No. 18 AWG wire through the hole near the end of the spreader and twist the ends of the wire tightly around the antenna wire. Figure 39 shows details of the transmission line construction.

c. Splice one end of the transmission line to the end of the antenna attached to the rear mast and solder the connections. If the transmission line cannot be kept short, provide some means of support so that a height of approximately 7 feet above the ground can be maintained.

22. Erection of Transmitting Antennas

a. Half-wave Doublet. Erect the three antenna masts as described in TM 11–2620A, which is packed with them. Erect the two end masts approximately 20 to 30 feet farther apart than the maximum antenna length desired. Erect the center mast midway between the two end masts, but offset it 3 feet from the line between the two end masts so that the center of the doublet antenna will clear the center mast (fig. 40). Orient the masthead caps so that the pulley on each end mast will be directed toward the center of the antenna, and the pulley on the offset center mast will be directed toward the transmitting shelter. Lead-in coaxial Cord CG–145A/MRC–1 is 100 feet long. The center mast should be located not more than 70 feet from the transmitting shelter. Be sure the antenna wires are connected and secured to the terminating block before hoisting the antenna, then hoist the antenna wires up the end masts and the coaxial terminating block up the center mast.

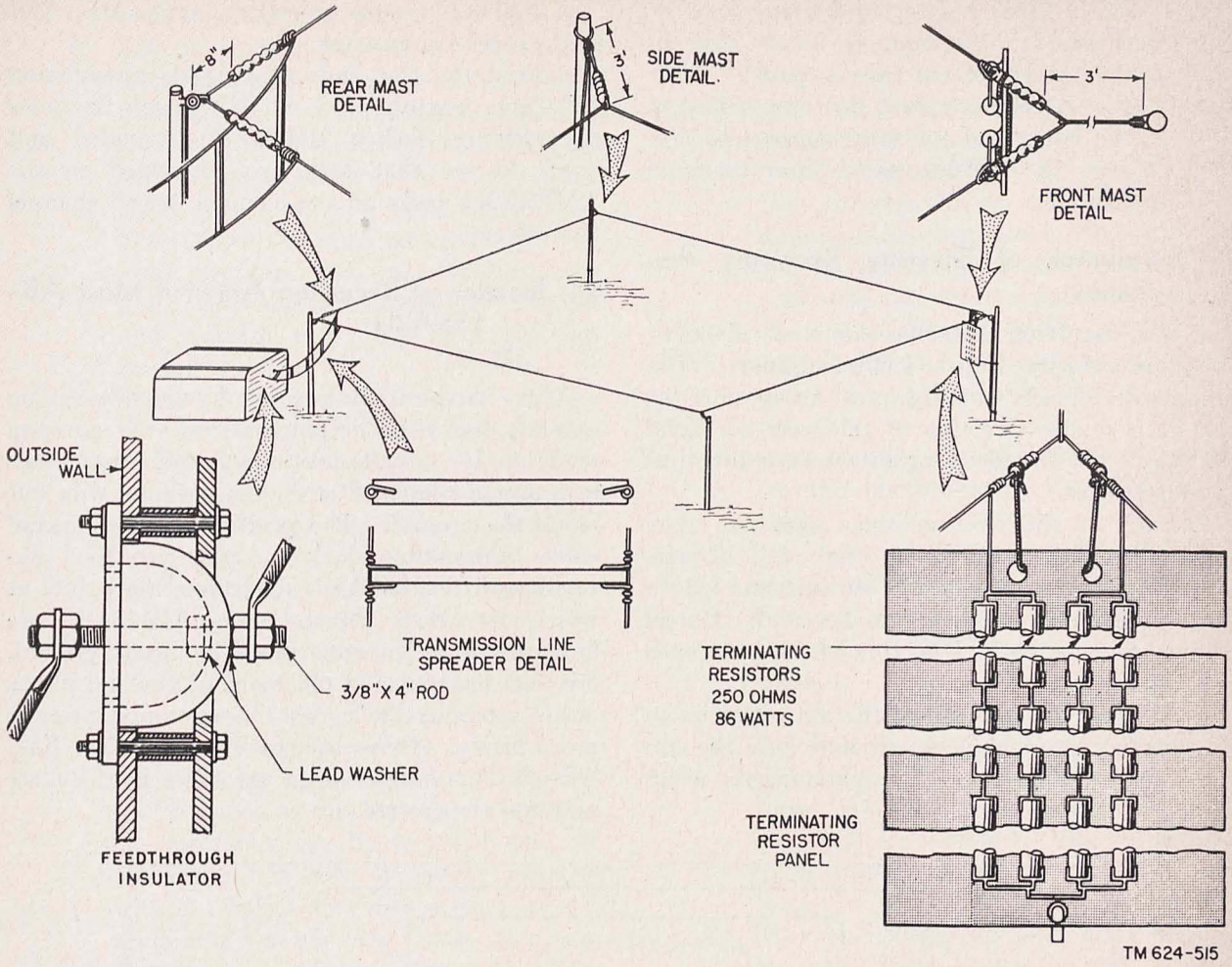


Figure 39. Rhombic antenna construction details.

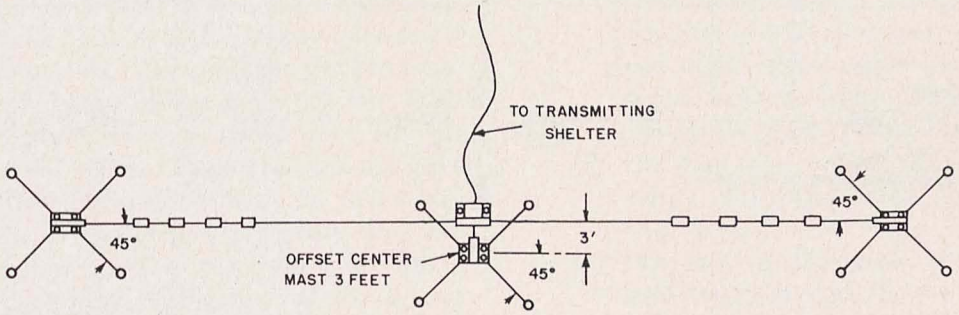


Figure 40. Top view of transmitting antenna.

b. Rhombic. Erection of the mast supports is described in TM 11–2620A. Before raising the four mast supports for a rhombic antenna, proceed as follows:

(1) Feed one end of a piece of No. 16 AWG copper wire through the hole in the end of the two transmitting antenna insulators attached to the antenna wire and wrap it around the wire five or six times. Securely tie the 2 free ends of the 2 wires to the halyard at the rear mast support.

(2) Repeat the procedure above for the other 2 ends of the antenna wire at the front mast and the two insulators on the 2 side mast supports.

(3) Tie the free end of the halyard rope at the front mast support to the hole in the bottom of the resistor panel. After the antenna is raised, this rope is tied to the bottom of the mast support to prevent the resistor panel from swinging free.

23. Installation of Diversity Receiving Antennas

a. The receiving antennas for dual diversity reception are spaced up to 1,000 feet apart. The broad side of each antenna must be oriented so that it is in the direction of the received signal (fig. 21). The two receiving antennas are identical in construction.

b. Each of the two antennas uses two Reel Assemblies RL–122/GRA–4 (fig. 41). Determine from the chart (fig. 37) the antenna length for the assigned frequency to be used. Unreel enough wire for one-half of this length from each of the two reels.

c. Connect the free end of the antenna wire to the coaxial terminating block and lock the antenna wire at the reel end by tightening the wingnut.

d. Follow the same procedure for the other half of the receiving antenna.

e. Feed the free ends of coaxial transmission RF Cable Assembly CG–557/U through the holes in receiving Shelter HO–17–(*) provided and check to see that they are connected to the ANTENNA jacks on the channel A and channel B receivers.

24. Erection of Receiving Antenna Mast AB–155A/U

(fig. 42)

After the position for the diversity receiving antenna has been determined and the antenna made up, lay out the positions for the mast bases in a straight line. Stretch the antenna wire out along the ground. The positions of the coaxial cable terminating block and the two Reel Assemblies RL–122/GRA–4 determine the points at which the three Mast Bases AB–154/U are located. If the location is soft or sandy ground, level off the spot and place one of the end plates of the carrying device on this spot and press it down firmly. Drive the stake end of Mast Base AB–154/U through one of the holes in the plate and into the ground.

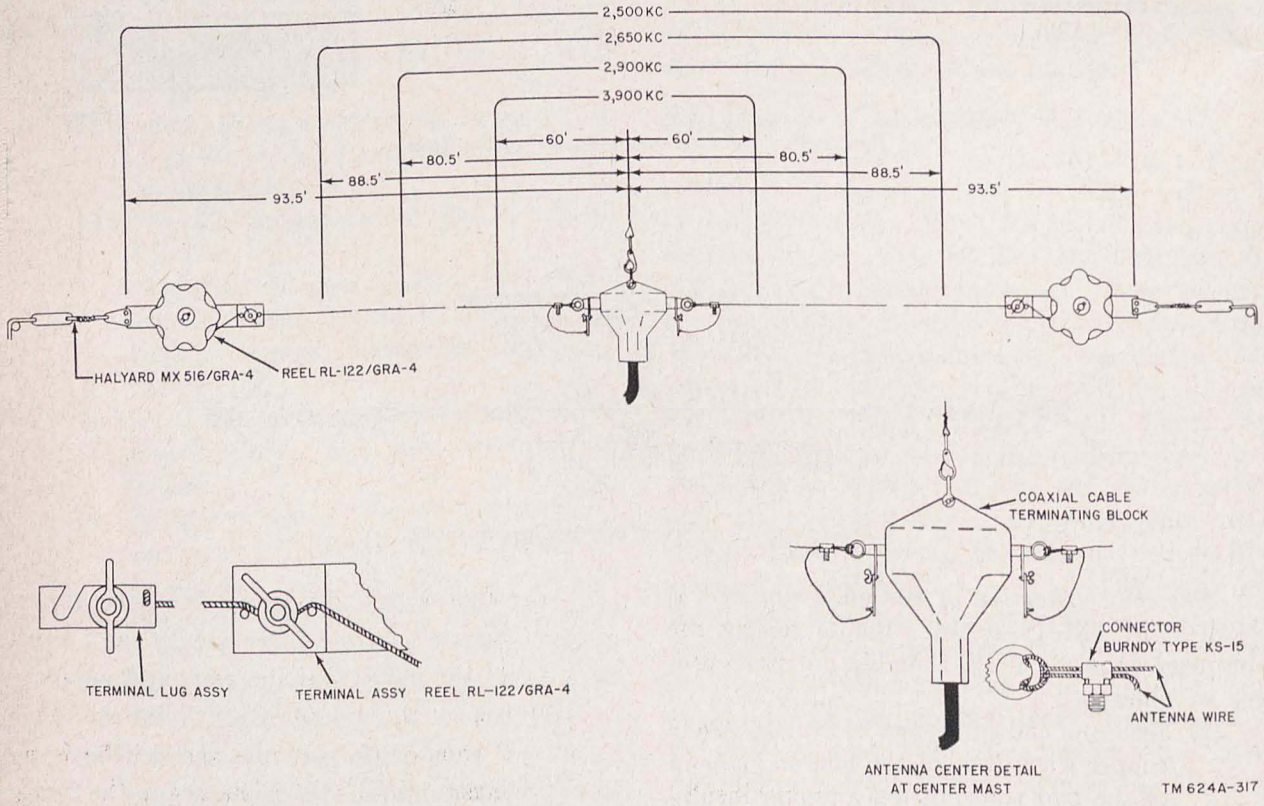


Figure 41. Construction of receiving antenna.

a. Assembling the Mast Sections.

(1) Lay the eight mast sections out in a line with the female end of the section toward the mast base. Slide the end of the first section into the mast base. Slide the end of the second section into the first section and place a Guy Plate MX–378/U over the third section. Add two more sections and then another guy plate; then add three more mast sections and a third guy plate over the last section.

(2) Remove four Stakes GP–101/U and four Guy Fasteners MX–379/U from the carrying device. Slip a guy fastener over each stake before it is driven into the ground. Drive one stake (called the back stake) as close as possible to the junction of the fifth and sixth mast sections (approximately 25 feet from the base). Using a guy rope, measure the distance between the back stake and the mast base. Using this measurement, position the other three stakes. Set them at a 90° angle on a horizontal plane with respect to the adjoining stake; use the mast base as the central point. If the ground is soft or sandy, use the wooden stakes provided instead of the aluminum stakes and omit the guy fasteners. In this case, the guys should be looped over the stakes.

(3) Guys MX–381/GRA–4, MX–382/GRA–4, and MX–383/GRA–4 are color-coded at one end. The top guys (50 feet long) are red, the center guys (40 feet long) are white, and the lowest guys (31 feet long) are blue. Fasten the four red guys to Guy Plate MX–378/U, the four white guys to the center guy plate, and the four blue guys to the bottom guy plate by snapping the fastener at the end of each guy into one of the four holes which are spaced 90° apart on the guy plate (fig. 42). Next, carry the free ends of the three back guys to a side stake to determine their correct length. Fasten these guys to the back stake by means of Guy Fastener MX–379/U. Connect both sets of side guys to their respective side stakes and remove slack by adjusting slide Fasteners FT–9. Do not make them too tight because the mast may bend. Tie the three front guys together and stretch them along the last toward the front stake.

(4) Remove Halyard MX–516/GRA–4 from the carrying device and fasten it by means of the snap fastener to the unused hole in the top guy plate. Slip the halyard robe through the pulley and tie the free end of the robe to the mast to prevent the rope from running out of the pulley during the erection of the mast (fig. 42).

(5) Assemble the additional masts by repeating the operations in (1) through (4) above.

(6) If a center mast is used, fasten the center coaxial cable connector to the halyard.

(7) Fasten the halyard at each end of the antenna to Reel Assembly RL–122/GRA–4.

b. Raising the Center Mast.

(1) Two men are required to raise the masts. One man takes a position near Mast Base AB–154/U and holds the front guys and the halyard. The other man takes a position near the top end of the mast.

(2) The man holding the guys pulls steadily on them, keeping slightly more tension on the top guy in such a manner that the mast bows slightly while being raised. Simultaneously, the man at the other end of the mast raises the end up and walks toward Mast Base AB–154/U, raising the mast as he walks.

(3) The man who walked the mast up then assists the other man to adjust the front guys.

(4) The rest of the guys are given final adjustment so that the mast is perfectly vertical (fig. 43). If one guy is taken up, the opposite one must be loosened slightly so that the mast will not bow.

c. Raising the End Masts. Raise the two end masts; repeat the procedure described in *b* above. Pull the antenna into position by means of the halyards. Tie the halyards to the mast to prevent the weight of the antenna wire from pulling the halyard back through the halyard pulley.

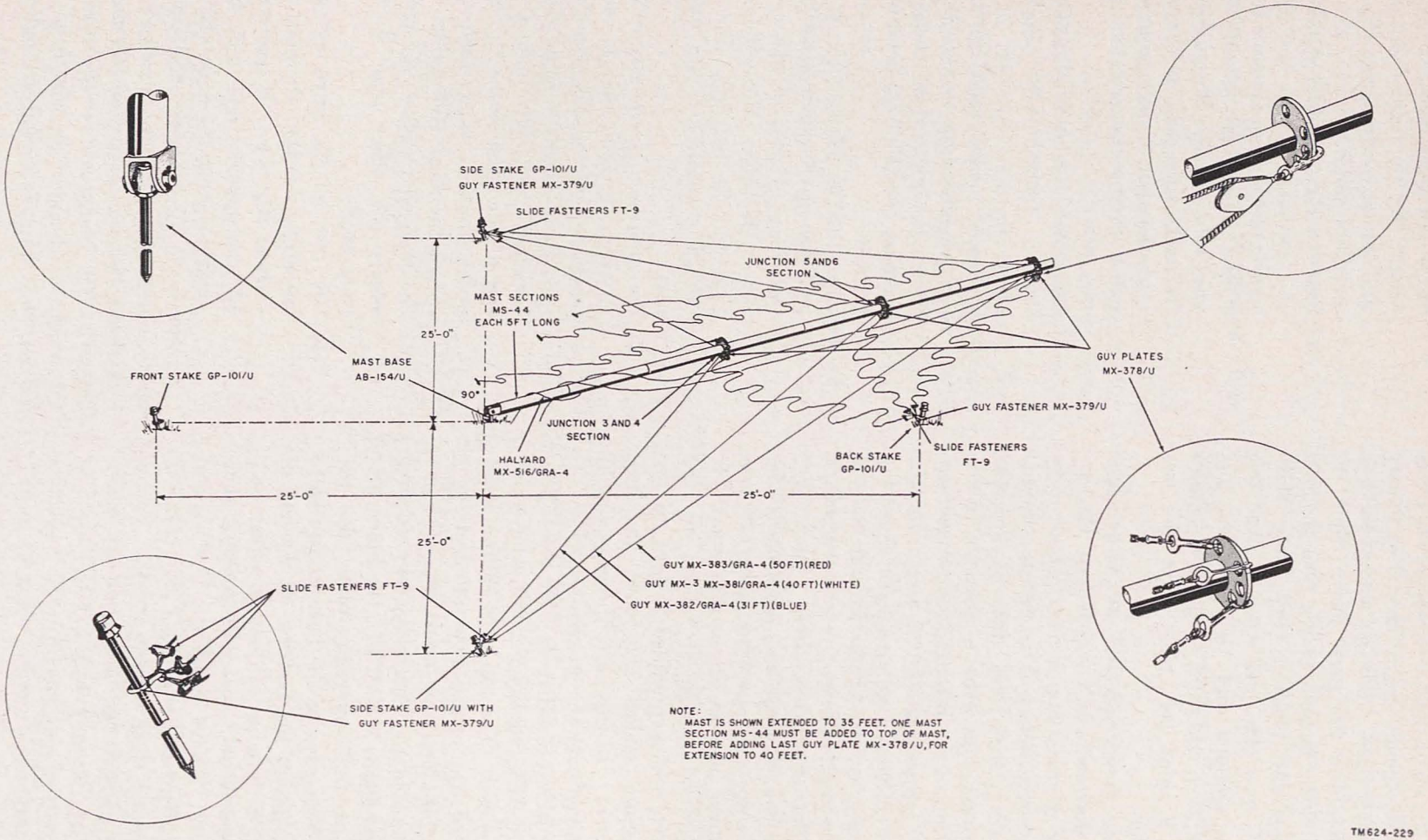


Figure 42. Assembly of Antenna Mast AB–155A/U.

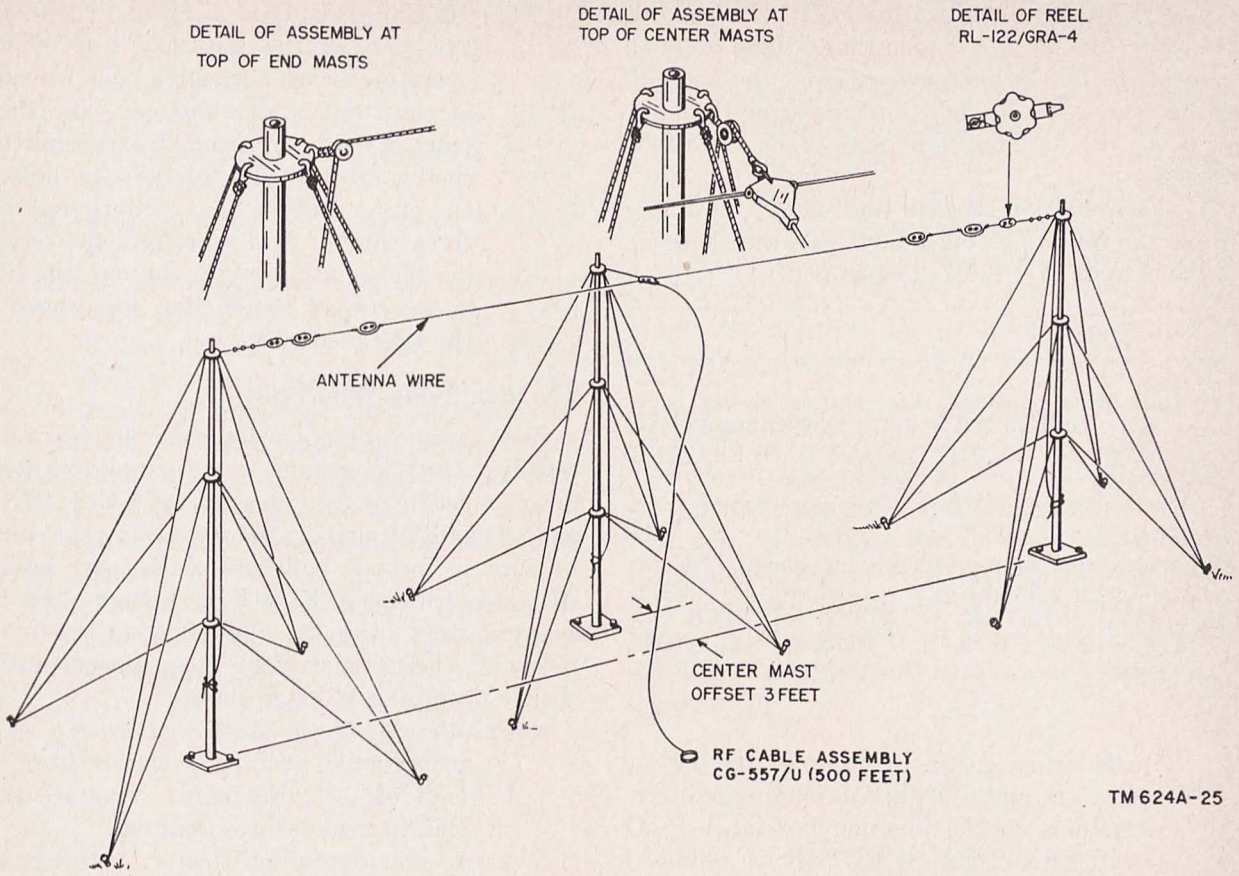


Figure 43. Receiving antenna, erection completed.

25. Interconnections Between Shelters

(figs. 28, 29, and 32)

Three pairs of field Wire W–110–B, or equal, interconnect the operating and the transmitting shelters. Another three pairs of field Wire W–110–B, or equal, interconnect the operating and the receiving shelters. One pair of wires is used for telephone communication between shelters by means of Telephone EE–8–B; this pair is terminated at the EE–8 binding posts on the shelter junction boxes. The second pair of wires provides for control between shelters; this pair is terminated at the CONTROL binding posts on the shelter junction boxes. The third pair of wires is used to carry teletypewriter signals between shelters; this pair terminates at the LINE binding posts of the shelter junction boxes.

a. Aerial and Ground Lines. In general, pole-line construction is preferable to laying the wire on the ground. Trouble is less likely to occur and is easier to find in aerial lines. Short circuits to ground are far less frequent. With insulated pairs, especially field wire pairs, ground-laid lines are reliable for only a short period of time.

b. Weather Conditions. The operation ranges of field wires are considerably shorter in wet weather. Moisture seeps into and around the wires and causes corrosion on splices resulting in poor connections. Weatherproof wires and rubber-covered cables will give satisfactory results so long as all splices and cable connections are well taped to keep moisture from entering and causing corrosion and leakage.

c. Jungle Lines. An exception to the practice of pole-line construction occurs in lines passing through jungle areas. Aerial construction fails to afford its usual amount of insulation from the ground because of the impossibility of keeping the lines clear of damp vines and trees. An objectionably high noise level is caused by branches and leaves or trees and vines continually swinging against the overhead wire.

d. Alternate Control Lines. It is good practice to lay an additional set of control lines over a different physical route than that followed by the original lines. If one of the regular lines becomes inoperative, an alternate set of lines is available, and communication will not be inter-

rupted. Alternate control lines often are run at the same time as the original lines. The original inoperative line is disconnected, and the ends of the alternate line brought into the same terminal strip as the original line and made available for use.

e. Connections at Shelters (figs. 28, 29, and 32). Make the following connections between shelters; use field Wire W–110–B or equivalent:

From—	To—
Operating shelter junction box E1 labeled TO TRANSMITTING SHELTER. EE–8 LINE CONTROL.	Transmitting shelter junction box J–199/MRC–2 labeled TO OPERATING SHELTER. EE–8 LINE CONTROL.
Operating shelter junction box E2 labeled TO RECEIVING SHELTER. E–8 LINE CONTROL.	Receiving shelter junction box labeled TO OPERATING SHELTER. EE–8 LINE CONTROL.

(1) *Receiving shelter.* Access to the EE–8, LINE, and CONTROL binding post terminals on the junction box labeled TO OPERATING SHELTER is obtained by removing the section of the top of the operating table nearest the rear doors. A wing nut beneath the top section holds the bench top in place. The three pairs of field wire are brought to the junction box terminals through the hole provided in the rear of Shelter HO–17–(*). This hole is located just ahead of the wire reels.

(2) *Transmitting shelter.* Access to the EE–8, LINE, and CONTROL binding post terminals on the junction box marked TO OPERATING SHELTER is obtained by routing the three pairs of field wire through the hole on the rear shelter wall, directly ahead of the wire reels, and running them across the rear shelter floor to the junction box.

(3) *Operating shelter.* The EE–8, LINE, and CONTROL binding post terminals on the junction box are accessible easily since the junction box is located on the roadside wall above the operating table. The EE–8, LINE, and CONTROL bind posts on the junction box marked TO TRANSMITTING SHELTER are available at the left side top of the operating bench through a hole provided at the front of the shelter. The three pairs of field wire from the transmitting shelter are brought through the hole in the front end of the shelter, and the three pairs of field wire from the receiving shelter are brought through the hole in the rear of the shelter, just ahead of the wire reels.

26. Identifying Wire Pairs

Over short distances, wire pairs are identified readily. Over long runs, some simple electrical means must be used to identify the EE–8, LINE, and CONTROL pairs. Before cutting the wires, be sure to provide sufficient slack after laying. After the wire pairs have been brought into the shelters, work from the operating shelter to the receiving shelter and then from the operating shelter to the transmitting shelter.

a. Operating Shelter to Receiving Shelter.

(1) Strip about 1 inch of insulation from the ends of the wire pairs. Separate each lead to avoid short-circuiting.

(2) At the operating shelter, connect one lead from each of the three pairs to terminal L1 and the other lead from each of the three pairs to terminal L2 of Telephone EE–8–B.

(3) At the receiving shelter, connect one lead of any wire pair to terminal L1 and the other lead to terminal L2 of Telephone EE–8–B.

(4) Ring through and establish telephone contact.

(5) At the operating shelter, remove one lead at a time from terminal L1 of Telephone EE–8–B until the removal of a lead interrupts the telephone contact. Tie a knot at this lead and remove the other lead of this pair from terminal L2 of Telephone EE–8–B. Connect this pair of leads to the LINE binding posts.

(6) At the receiving shelter, remove the two leads from terminals L1 and L2 of Telephone EE–8–B and connect them to the LINE binding posts. Connect the two leads from one of the remaining two pairs of wires to terminals L1 and L2 of Telephone EE–8–B.

(7) If necessary, connect one lead from each of the remaining pairs of wires in the operating shelter to terminal L1 and connect the other leads from each of the remaining pairs to terminal L2 of Telephone EE–8–B.

(8) Ring through and establish telephone contact.

(9) At the operating shelter, remove one wire at a time from terminal L1 of Telephone EE–8–B while maintaining telephone contact. One of the two leads will interrupt the telephone contact. Tie two knots at the lead which interrupts the telephone contact and connect this lead and the other lead of this pair to the two CONTROL binding posts.

(10) At the receiving shelter, remove the two leads from terminals L1 and L2 of Telephone EE–8–B and connect them to the two CONTROL binding posts. Connect the remaining pair of wires to the two EE–8 binding posts.

(11) At the operating shelter, connect the remaining pair of wires to the two EE–8 binding posts.

b. Operating Shelter to Transmitting Shelter. Identify the wire pairs between the operating shelter and the transmitting shelter by following the procedures outlined in *a*(1) through (11) above except that the transmitting shelter is substituted for the receiving shelter.

27. Mounting Canopy CY–53/U

Remove Canopy CY–53/U stowed in each of the three shelters. These are mounted above the rear door of each of the three shelters. Unroll the canopies, and at each shelter fasten one side to the roof board provided with fasteners for this purpose. The metal tubes sewed into the canvas, when positioned properly, provide a canopy above the door.

CHAPTER 3
OPERATION

Section I. MODES OF OPERATION

28. Full Duplex

The simultaneous reception and transmission of radioteletype signals is called full duplex. This type of operation requires that the frequencies of reception and transmission be different by at least 400 kc and that one frequency is not a harmonic of the other. One of the teletypewriters is used for reception and is called the receive teletypewriter. The other is used for transmission and is called the send teletypewriter. Either one can be used as a send or receive teletypewriter. The transmitter-distributor can be substituted for the send teletypewriter, and the typing reperforator can be used instead of the send teletypewriter or the receive teletypewriter.

29. Half Duplex

The reception and transmission of radioteletype signals in one direction at a time is called half duplex. As in full duplex, the frequency separation is 400 kc. In this type of operation, the same teletypewriter is used for transmission and reception. The perforator transmitter can be substituted for the teletypewriter.

30. One-Way Reversible

One-way reversible operation is similar to half duplex. Radioteletype signals are transmitted and received, in one direction at a time, but only one frequency is used. In this type of operation, the transmitter is disabled during reception and the receivers are disabled during transmission. The mark-hold level feature of the dual diversity converters in both the local and distant stations must be used to keep the teletypewriters from running open.

31. Dual Diversity Reception

To minimize the effects of selective fading in one location, two antennas and two receivers are used. These antennas are spaced approximately 3 wave lengths, or a maximum of 1,000 feet, apart. The output of each receiver is applied to two separate input circuits in the dual diversity converter. In some locations, it is possible to use one or the other receiver alone.

32. Transmission Other Than Radioteletype

The following modes of operation are available to the operator when radioteletype communication is not practical or cannot be achieved:

a. Cw transmission from the transmitting shelter.

b. Emergency cw transmission from the transmitting shelter.

c. Cw transmission from the receiving shelter.

d. Emergency frequency-shift transmission from the receiving shelter.

e. Voice operation.

33. Radioteletype Relay Operation

If the distance between two stations is too great to provide satisfactory teletypewriter operation, Radio Set AN/MRC–2(*) can be located between the two stations and act as a relay. Under these conditions, the received teletypewriter signals are retransmitted to the other station without operating the teletypewriter equipment in the operating shelter of the relay station. However, the monitoring teletypewriter in the receiving shelter will print page copy of the received message.

Section II. CONTROLS AND INSTRUMENTS

34. General

Haphazard operation or improper settings of the controls can cause damage to electronic equipment. For this reason, it is important to know the function of every control. The controls and instruments of the following equipments are discussed in their respective manuals (par. 1*b*):

Frequency Meter BC–221–(*)
Frequency Shift Exciter O–39(*)/TRA–7
Dual Diversity Converter CV–31D/TRA–7

Control Unit C–292B/TRA–7
Radio Transmitter BC–610–I and Antenna Tuning Unit BC–939–B
Radio Receiver BC–312–(*)
Radio Receiver R–388/URR
Power Unit PE–95–(*)
Rectifier RA–87–A
Rectifier RA–63–E
Teletypewriter TT–4A/TG
Speech Amplifier BC–614–I

35. Amplifier AM–141(*)/MRC Controls

(fig. 44)

The following table lists the controls of the amplifier and indicates their functions:

Control	Function
CIRCUIT BREAKER ON-OFF switch.	ON-OFF switch for entire amplifier. In the ON position, an abnormally high current breaks the circuit to the amplifier.
Filament indicator lamp.	Glows green when power is applied and CIRCUIT BREAKER switch is in the ON position.
PLATE POWER switch.	In the up position, plate power is applied to the power amplifier tubes.
PLATE POWER indicator lamp.	Glows red when PLATE POWER switch applies ac to the plate power transformer.
NORMAL-TUNE UP switch.	In the NORMAL position, maximum power is supplied to rectifier tubes V5 and V6. In the TUNE UP position, reduced power is supplied to tubes V5 and V6. This position is used during the tuning procedures.
OVERLOAD RESET switch.	Permits resetting of the overload relay after an abnormally high plate current cuts off the plate power.
FILAMENT INCREASE control.	Varies the voltage supplied to the filaments of all tubes.
FILAMENT VOLTAGE meter.	Indicates the voltage supplied to the filament of tubes V1 and V2.
EXCITATION INCREASE control.	Varies the plate voltage supplied to the pa stage in the transmitter. The grid excitation voltage supplied to tubes V1 and V2 in the amplifier is thereby varied.
GRID TUNING control.	Tunes the grid circuit of the amplifier to the frequency of the transmitter.
GRID CURRENT meter.	Indicates the grid current of tubes V1 and V2.
PLATE TUNING control.	Tunes the plate tank circuit.
PLATE CURRENT meter.	Indicates the current in the tuned plate circuit of tubes V1 and V2.
NEUT. SWITCH (located inside the plate coil compartment).	In the ON position, removes power from the high-pressure blower and the plate transformer for tubes V5 and V6. This position is used when neutralizing the pa stage. In the OFF position, power is reconnected to the high-pressure blower and the plate transformer for V5 and V6.
BAND SWITCH	Selects the tuning range of the amplifier. Position 1 is used when tuning the mid-frequency range of the pa. Position 2 is used when tuning the high-frequency range and position 3 when tuning the low-frequency range.

36. Junction Box JB–70–(*) Controls

(fig. 45)

The following chart lists the front panel controls of the junction box and indicates their functions:

Control	Function
BATTERY SOURCE switch.	In the PE–95 position, connects +12-volts dc from Power Unit PE–95–(*) to the +12-volt circuits. In the AUX. position, connects the battery in Chest CH–109–A and Rectifier RA–63–E (AN/MRC–2C) or Power Supply PP–886/G (AN/MRC–2D) to the +12-volt dc circuits.
RECEIVER DISABLING switches.	In Radio Set AN/MRC–2C: *a.* The BC–312 switch in the ON position connects 12 volts dc to disable the antenna circuit of the BC–312–(*) receiver.

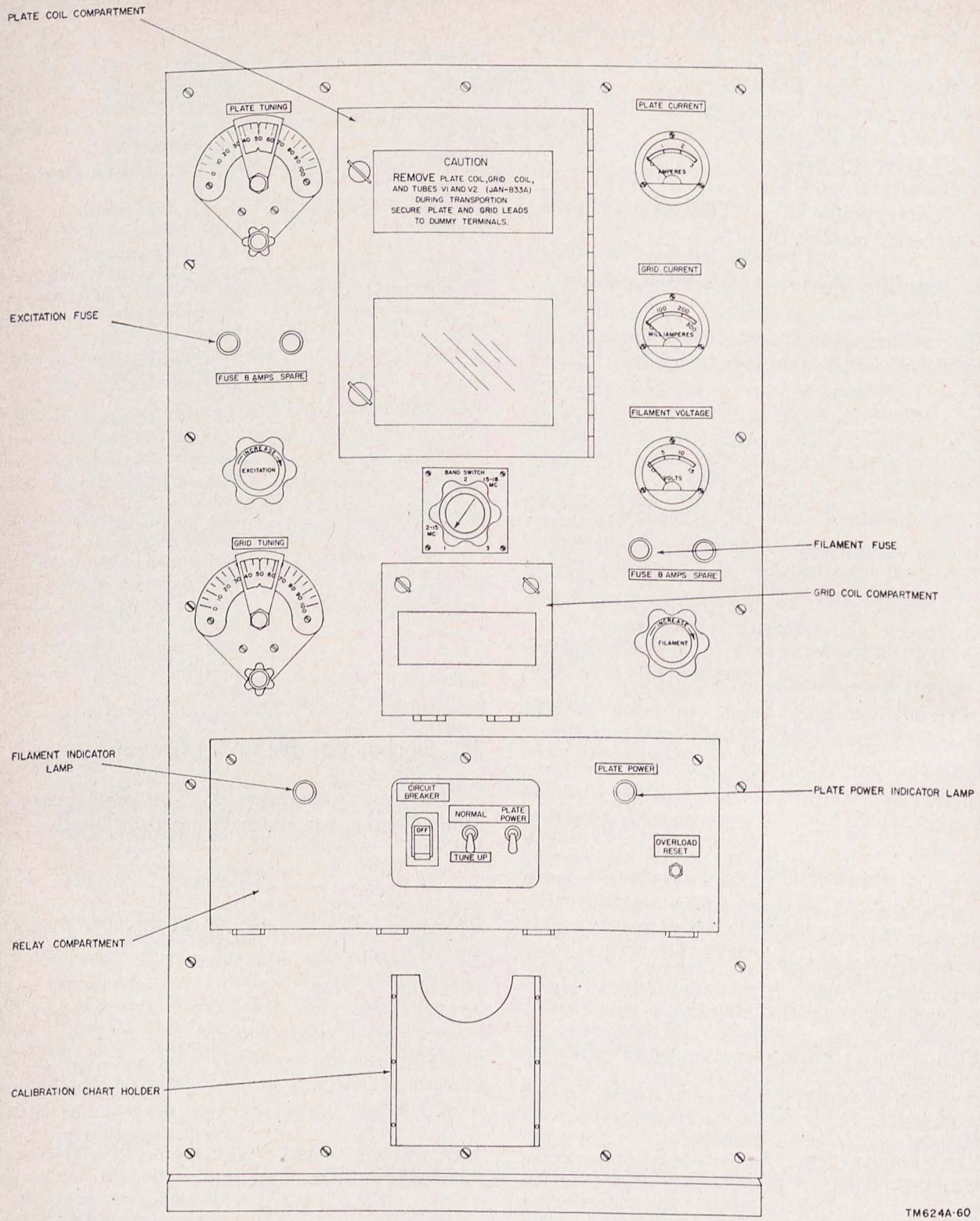


Figure 44. Amplifier AM-141(*)/MRC, front panel controls.

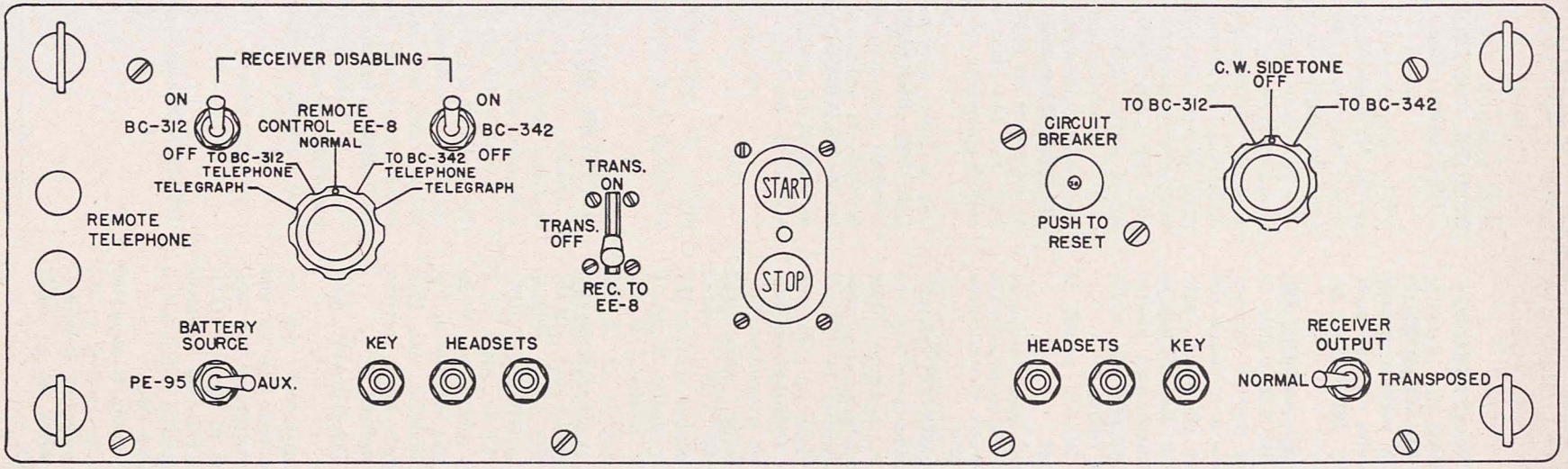


Figure 45. Junction Box JB–70–(*) controls.

Control	Function
RECEIVER DISABLING switches.—Continued	In Radio Set AN/MRC–2C—Continued *b.* The BC–342 switch in the ON position grounds the audio output circuit of the BC–312–(*) receiver. In Radio Set AN/MRC–2D: *a.* The BC–342 switch in the ON position connects 12 volts dc to disable the antenna circuit of Radio Receiver R–388/URR in the transmitting shelter *and* grounds the audio output circuit. *b.* The BC–312 switch is not used. *Note.* These disabling actions are effective *only* while the transmitter is on the air. Leave the disabling switches ON at all times.
Transmitter switch	In the TRANS. ON position, the transmitter may be keyed or modulated from either the operating or transmitting shelter or from a remote location. In the TRANS. OFF position, keying of the transmitter may occur only when the TRANSMITTER switch of the control unit in the operating shelter is set to the ON position, or the TEST key is set in the MARK or SPACE position on the exciter unit. In the REC. TO EE–8 position (with the REMOTE CONTROL EE–8 switch in a position other than NORMAL), the operator at the remote location can hear the signals being received in the shelter.
REMOTE CONTROL EE–8 switch.	In the TELEGRAPH positions: The transmitter can be keyed from the far end of a telephone line connected to the REMOTE TELEPHONE terminals (transmitter switch set to TRANS. ON). The af output is connected from the receiver to the telephone line (transmitter switch set to REC. TO EE–8).
REMOTE CONTROL EE–8 switch—Con.	In the TELEPHONE positions: The operator at the remote station can voice-modulate the transmitter by speaking into Telephone EE–8–B at the remote station (transmitter switch set to TRANS. ON). The af output of the receiver is connected to the telephone line (transmitter switch set to REC. TO EE–8). In the NORMAL position all remote connections are disconnected.
START-STOP switch	In the START position, closes the relay in Power Unit PE–95–(*) to start the engine. In the STOP position, stops the engine.
CIRCUIT BREAKER switch.	Protects circuits of transmitting shelter from effects of overload.
C. W. SIDETONE switch.	In the TO BC–312 position, connects the sidetone signal developed in the speech amplifier to the two left-hand HEADSETS jacks. In the TO BC–342 position, connects the sidetone signal developed in the speech amplifier to the two right-hand HEADSETS jacks.
RECEIVER OUTPUT switch.	In the NORMAL position, the receiver output is heard in Loudspeaker LS–3 and in the right-hand HEADSETS jacks. In the TRANSPOSED position, the receiver output is heard only in the left-hand HEADSETS jacks.
KEY jacks	Provides a connection for a telegraph key. Closing the telegraph key inserted in either jack, when the transmitter switch is in the TRANS. ON position, operates the transmitter for cw operation.
HEADSETS jacks (four)	Provide a connection for hearing the receiver output or the sidetone signal from the speech amplifier in accordance with switch settings described above.

37. Perforator-Transmitter TT–56/MGC Controls

a. Connection Box Controls (fig. 46). The following chart lists the controls and indicates their functions:

Control	Function
Power selector switch	Allows operation of the motors on various sources of power.
Local circuit 1 and local circuit 2 jacks.	Provides connections whereby perforated and printed tape may be prepared by use of the local circuits. This tape may be used for transmission at the same time by using the transmitter-distributor on a single line. The current in each circuit is approximately 60 ma.
Line 1 and line 2 REC.-SEND jacks.	Provide connections for operating over two individual lines.
Line 1 and line 2 REC.-SEND cords.	These cords are terminated in black shell and red shell plugs for connection to line units.
MOTOR cord	Connects to ac outlet to provide power for motor.
EARTH CONNECTION binding post.	Grounds equipment to lessen the possibility of electrical shock to operating personnel and reduces interference to radio receivers from the motor circuits.

b. Typing Reperforator Controls (fig. 47). The following chart lists the controls and indicates their functions:

Control	Function
POWER switch	In the up position, connects power from the connection box to the drive motor.
LINE BREAK KEY	When the key is depressed, the signal circuit is open and the machine runs open. In the normal position, the signal line is closed and the machine runs closed.
End-of-line indicator lamp.	Indicates when carriage should be returned to starting position.

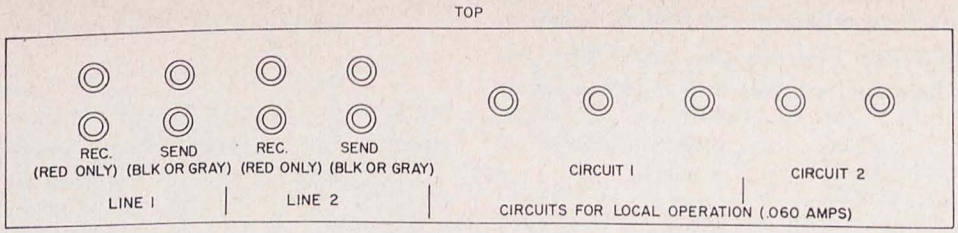
c. Transmitter-distributor Controls (fig. 47).

Control	Function
MOTOR ON-MOTOR OFF switch.	In the MOTOR ON position, connects ac power to the drive motor. In the MOTOR OFF position, disconnects ac power to the drive motor.
SEND-STOP switch	In the SEND position, signals are transmitted from the perforated tape. In the STOP position, transmission is stopped.
Tape stop lever	Transmission may be stopped manually by pushing lever. Transmission will stop automatically if tape becomes tangled or if all the slack is taken up in the tape.

38. Operating Table FN–22/MRC–2 Controls (figs. 33 and 34)

The following chart lists the operating table controls and indicates their functions:

Control	Function
REC. TTY jacks	Provide connections to the teletypewriter used for receiving.
SEND TTY jacks	Provide connections to the teletypewriter used for sending.
EE–8's COMBINED-INDIVIDUAL switch.	In the INDIVIDUAL position, permits each telephone to be connected separately to telephones in the transmitting and receiving shelters. In the COMBINED position, permits both telephones in the operating shelter to be connected to the telephone in the receiving shelter and transmitting shelter simultaneously.



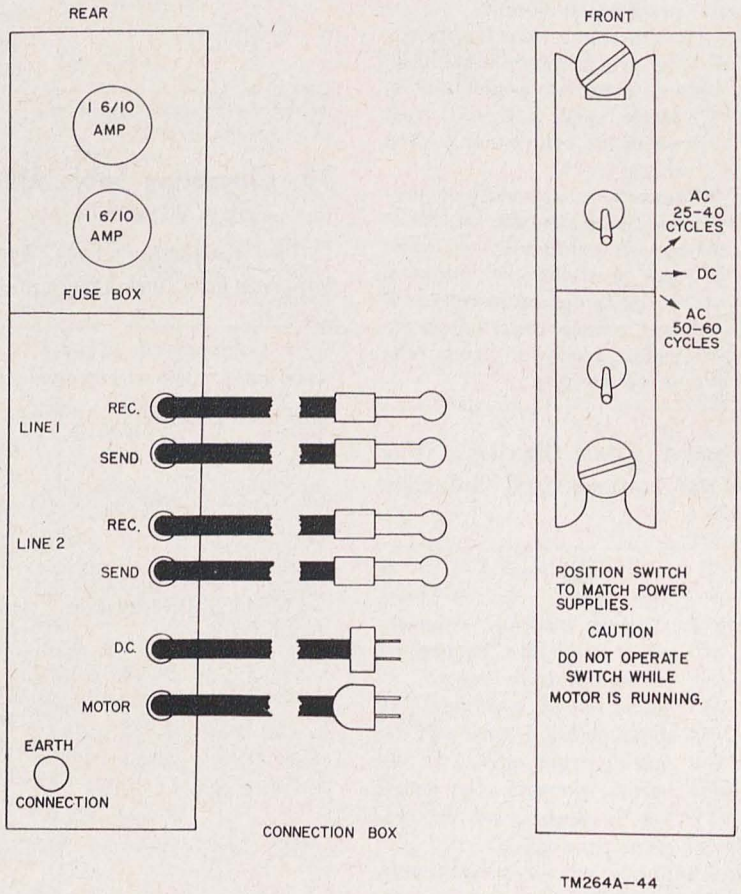


Figure 46. Connection box controls.

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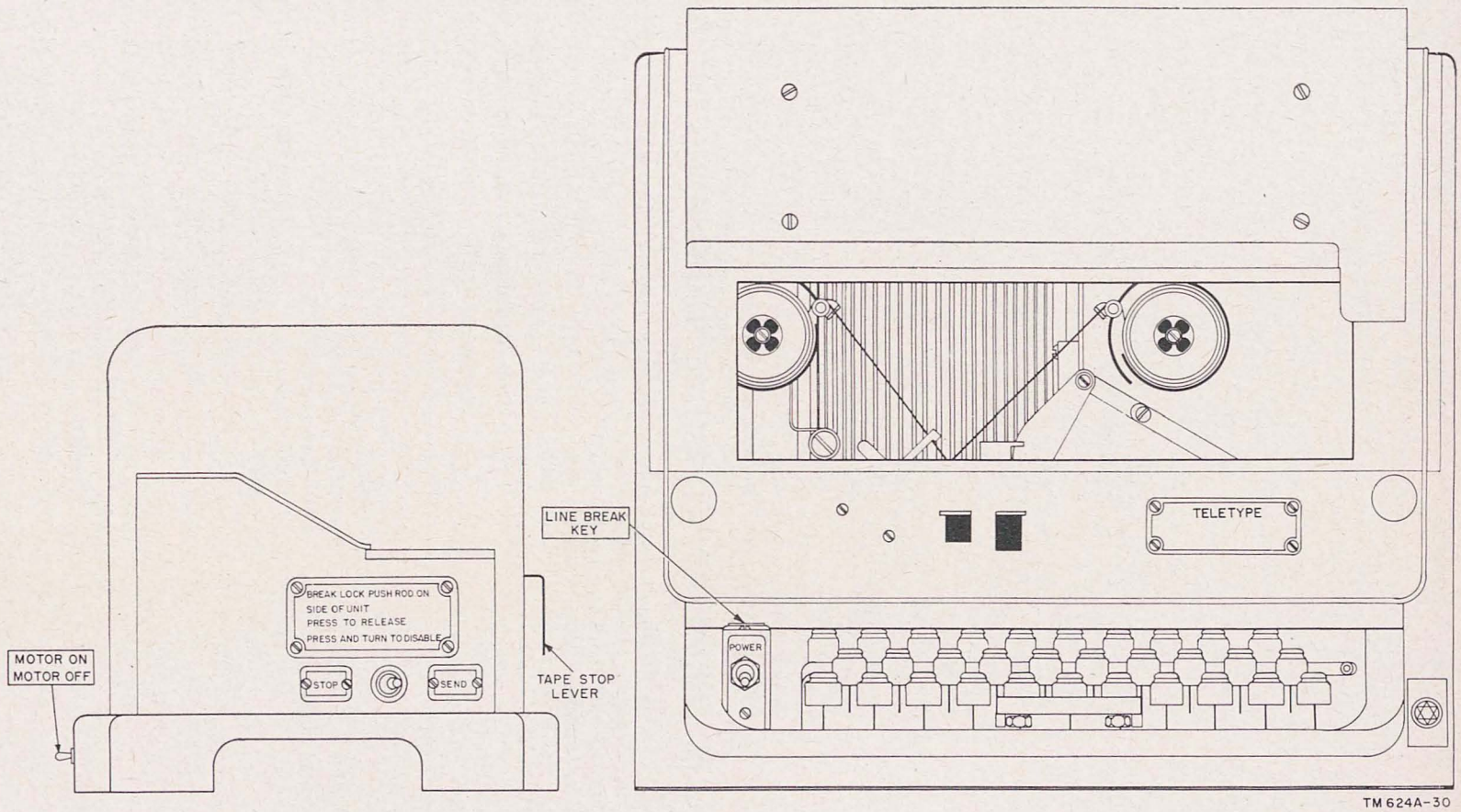


Figure 47. Typing-reperforator and transmitter-distributor, controls.

39. Junction Box J–204/MRC–2 Controls
(fig. 34)

Control	Function
SEND TTY jacks	BLACK jack provides a connection for patching neutral signals originated by the sending teletypewriter to the control unit. RED jack provides a connection patching neutral signals originated by either teletypewriter to the send teletypewriter.
REC. TTY jacks	BLACK jack provides a connection for patching neutral signals originated by the receive teletypewriter to the control unit. RED jack provides a connection for patching neutral signals originated by either teletypewriter to the receive teletypewriter.
SEND EXT. jacks	GRAY jack provides a connection to the control unit sending circuit for signals originated in the transmitter-distributor. BLACK jack provides a connection to the control unit sending circuit for signals originated by the send teletypewriter, the receive teletypewriter, or the typing-reperforator. Two RED jacks provide a connection to the send teletypewriter, the receive teletypewriter, or the typing reperforator for neutral signals originated by the send teletypewriter, the receive teletypewriter, or the typing reperforator.
REC. EXT. jacks	Two RED jacks provide a connection to the control unit receiving circuit for neutral signals originated in either teletypewriter or the typing reperforator.

Section III. INITIAL ADJUSTMENT AT TRANSMITTING SHELTER

Note. Personnel who are to perform the procedures described in this section should be familiar with the use of controls and instruments and with the operating procedure described in this chapter. The initial adjustments in each shelter can be performed individually and then the three shelters will be ready for final overall adjustments.

40. Control Settings

Check the switch and control settings of the components in the transmitting shelter before starting Power Unit PE–95–(*). Application of power to some circuits before they have been made ready will damage the circuit components. Use the following chart to make sure the shelter is ready for the application of power:

Component	Control	Position
Junction Box JB–70–(*)	BATTERY SOURCE switch	AUX.
	REMOTE CONTROL EE–8 switch	NORMAL
	RECEIVER DISABLING switches	OFF
	Transmitter control switch	TRANS. OFF
	C. W. SIDETONE switch	OFF
	RECEIVER OUTPUT switch	NORMAL
Frequency Shift Exciter 0–39(*)/TRA–7.	AC SUPPLY switch	Off (down)
	OVEN switch	Off (down)
	TEST OSC switch	OFF
	TEST key	NORM
Radio Receiver R–388/URR (AN/MRC–2D).	OFF-STAND BY-ON switch	OFF
	AVC switch	OFF
	BFO switch	OFF
	LIMITER switch	OFF
	CALIBRATE switch	OFF
	CRYSTAL FILTER SELECTIVITY switch	0
	RF GAIN	0
	AUDIO GAIN	0

Component	Control	Position
Radio Receiver BC–312–(*) (AN/MRC–2C).	OFF–M. V. C.–A. V. C. switch	OFF
	C. W.–OSC	OFF
	REC.–SEND	SEND
	VOL	Full counterclockwise
Radio Transmitter BC–610–I	FILAMENT POWER switch	Off (down)
	FILAMENT VOLTAGE control	Full counterclockwise
	EXCITER PLATE POWER switch	NORMAL (down)
	HIGH VOLTAGE PROTECT switch	NORMAL (down)
	PLATE POWER switch	Off (down)
	PHONE–CW switch	CW
	EXCITATION METER SWITCH	INT. AMP. GRID XI
	BAND SWITCH	To correspond with channel to be used for tuning unit
Amplifier AM–141(*)/MRC	CIRCUIT BREAKER	OFF
	NORMAL-TUNE UP switch	TUNE UP
	PLATE POWER switch	Off (down)
	NEUT. SWITCH (S14, fig. 83)	OFF
	INCREASE EXCITATION control	Fully counterclockwise
	INCREASE FILAMENT control knob	Fully counterclockwise
Power Supply PP–886/G (AN/MRC–2D).	Power switch	OFF
Power Supply RA–63–E (AN/MRC–2C).	Power switch	OFF
Frequency Meter BC–221–(*) (AN/MRC–2C only).	OFF - WARM - UP - CRYSTAL - OPERATE - MODULATE-CHECK switch.	OFF
Rectifier RA–133–(*) (Part of Frequency Meter BC–221–(*)).	Power switch	OFF

41. Transmitting Shelter Starting Procedure

a. Power Source. After determining that the connections to Power Unit PE–95–(*) have been made properly and that the unit is in good running order, set the CIRCUIT BREAKER of the power unit to the ON position and press the START button on Junction Box JB–70–(*). Check the output voltage and, if necessary, make adjustments at the power unit to obtain between 115 and 120 volts at the shelter. For additional information on the operation of Power Units PE–95–(*), see TM 11–904.

b. Frequency Shift Exciter O–39(*)/TRA–7. Throw the OVEN and AC SUPPLY switches on the front panel to the ON position at least 1 hour before beginning the initial adjustments and operations. The OVEN and AC SUPPLY lamps should light.

Note. If operation is required before the 1-hour period is completed, the transmitted frequency must be checked every few minutes until a stable condition is obtained. When a readjustment of the transmitted frequency is made, the receiving terminal at the other end of the circuit should be notified to avoid interruption of service.

c. Radio Transmitter BC–610–I. Set the FILAMENT POWERswitch to the ON (up) position. Rotate the FILAMENT VOLTAGE control in a clockwise direction until an indication of 5 to 5.3 volts is noted on the FILAMENT VOLTAGE meter. The filaments of the transmitter tubes always should be allowed a warmup period of not less than 1 minute before plate power is applied. In cold weather operation, a warmup period of 5 to 10 minutes is required.

d. Amplifier AM–141(*)/MRC. Set the CIRCUIT BREAKER switch on the front panel to the ON position and rotate the FILAMENT INCREASE control in a clockwise direction until an indication of 10 volts is noted on the FILAMENT VOLTAGE meter. After approximately 1 minute, the high-pressure blower on the rear of

the amplifier should operate. The blower will not operate if any of the door interlock switches are open. During the warmup period, disable the plate and bias power supplies by opening the grid coil access door.

Note. The ventilator at the rear of the shelter above the power amplifier should be opened at this time. The warm air may be exhausted inside or outside the shelter, depending on the operator's preference. When the equipment is shut down, this ventilator must be closed.

e. Radio Receiver R–388/URR in Radio Set AN/MRC–2D. Turn the OFF-STAND BY-ON switch of the radio receiver to the STAND BY position. In Radio Set AN/MRC–2C, move the OFF–M. V. C.–A. V. C. switch of Radio Receiver BC–312–(*) to the M. V. C. position.

f. Power Supply PP–886/G in Radio Set AN/MRC–2D. Turn the power switch to the ON position.

g. Rectifier RA–63–E in Radio Set AN/MRC–2C. Set the HI–CHG.–OFF-TR. CHG. switch to the TR. CHG. position.

h. Frequency Meter BC–221–(*). Plug in a headset into the PHONES jack. Turn the OFF-WARM-UP-CRYSTAL-OPERATE-MODULATE-CHECK switch to the WARMUP position and the GAIN control to its approximate midpoint position. The frequency meter should be allowed a warmup period of not less than 10 minutes before using.

Note. Throughout this manual, OFF-WARMUP-CRYSTAL-OPERATE-MODULATE-CHECK switch will be referred to as the operation switch.

42. Initial Adjustment of Frequency-Shift Exciter Unit

The frequency of the exciter unit is either the assigned operating frequency of the transmitter, one-half, or one-fourth of the assigned frequency as shown in the chart below. With the frequency to be transmitted known, determine the frequency range required for the frequency-shift exciter unit and the required frequency shift from the chart below. It will be noted from this chart that the frequency shift from mark to space signals changes from 850 to 425 cycles when the frequency of the exciter unit is one-half the transmitter frequency, and to 212.5 cycles when the exciter frequency is one-fourth the transmitter frequency. The frequency shift of the transmitter radio-frequency (rf) carrier is always 850 cycles.

Transmitter frequency (mc)	Multiplication factor	Exciter frequency (mc)	Frequency shift (cycles)
2 to 4	1	2 to 4	850
4 to 12	.5	2 to 6	425
12 to 18	.25	3 to 4.5	212.5

a. Turn the OSCILLATOR RANGE knob to the frequency range required as shown on the calibration chart furnished in the lid of the exciter unit or in the chart above.

b. Set the OSCILLATOR TUNING dial, the SHIFT dial, and the BUFFER TUNING dial to the required settings in accordance with the calibration chart. These are only approximate settings.

c. Operate the TEST key to the MARK position and adjust the BUFFER TUNING control for maximum brilliance on the BUFFER INDICATOR.

d. Return the TEST key to the NORM position.

43. Adjustment of Radio Transmitter

After the exciter unit has been set to the proper frequency in accordance with the chart, adjust the radio transmitter.

a. Radio Transmitter Initial Adjustment.

(1) Select the tuning unit covering the desired frequency range from Chest CH–88–C. Lift the right-hand cover door at the top of the transmitter and firmly insert the tuning unit into one of the three channels (marked 1, 2, or 3). Locate the tuning unit so that the switch marked M. O.–XTAL faces the front panel of the transmitter. The table below shows the proper tuning unit to use over any particular operating frequency range.

Transmitter tuning unit	Frequency range (mc)	Transmitter tuning unit	Frequency range (mc)
TU–47	2.0 to 2.5	TU–51	5.0 to 6.35
TU–48	2.5 to 3.2	TU–52	6.35 to 8.0
TU–49	3.2 to 4.0	TU–53	8.0 to 12.0
TU–50	4.0 to 5.0	TU–54	12.0 to 18.0

(2) Set the BAND SWITCH on the transmitter front panel to the position corresponding to the channel number into which the tuning unit was plugged. Insert the plug end of Cord CG–389/U

into the crystal socket of the tuning unit to be used. The M. O.–XTAL switch should be set to the XTAL position.

(3) Select a coil unit covering the desired frequency and plug it into position under the left-hand door in the top of the transmitter. Adjust the rotatable link for maximum coupling. Maximum coupling is obtained when the half loop with the greater number of wires is set toward the top of the outer coil. The table below shows the proper coil unit to use when operating at a particular frequency.

Note. Better efficiency at higher frequencies is possible by reducing coupling to a point where the required grid excitation current is obtained at comparatively lower transmitter P. A. PLATE meter readings.

Coil unit	Frequency range (mc)	Coil unit	Frequency range (mc)
C–387–D[a]	2.0 to 2.5	C–390–C	5.7 to 8.0
C–387–D	2.5 to 3.5	C–447–B	8.0 to 11.0
C–388–C	3.5 to 4.5	C–448–B	11.0 to 14.0
C–389–C	4.5 to 5.7	C–449–B	14.0 to 18.0

[a] Coil Unit C–387–D is used with vacuum capacitor CA–423 in the 2.0- to 2.5-mc frequency range.

(4) Adjust the following controls in accordance with the tuning charts furnished with the transmitter.
(*a*) DOUB. knob (on tuning unit).
(*b*) INT. AMP. knob (on tuning unit).
(*c*) P. A. PLATE TUNING dial.

(5) Set the GRID TUNING and the PLATE TUNING dials of Amplifier AM–141(*)/MRC to the approximate settings as obtained from the calibration chart. Set the amplifier BAND SWITCH to the correct position as given by the chart.

b. Radio Transmitter Temporary Operating Adjustments. The transmitter must be temporarily aligned to the assigned operating frequency. In Radio Set AN/MRC–2D the transmitter output frequency is checked against Radio Receiver R–388/URR. In Radio Set AN/MRC–2C, the transmitter output frequency is checked against Frequency Meter BC–221–(*) with pick-up Antenna AT–137/MRC–2.

(1) Operate the TEST key on the frequency-shift exciter unit to the MARK position and adjust the DOUB. knob on the tuning unit in the transmitter for maximum indication on the EXCITATION METER (1 to 8 milliamperes (ma)) with the EXCITATION METER SWITCH at INT. AMP. GRID XI position.

(2) Adjust the INT. AMP. knob in the transmitter tuning unit for maximum indication on the EXCITATION METER (60 to 100 ma) with the EXCITATION METER SWITCH at the P. A. GRID XIO position.

(3) Rotate the EXCITATION INCREASE knob on Amplier AM–141(*)/MRC about ½ turn in a clockwise direction.

Warning: Do not exceed 100 ma on the transmitter P. A. PLATE meter at this point of initial adjustments.

(4) Adjust the P. A. PLATE TUNING dial on the transmitter for resonant dip on the P. A. PLATE meter (minimum current).

44. Adjustment of Frequency Meter

When presetting the frequency meter to the desired transmitter output frequency, be very careful while performing the operations given below because they determine the relative accuracy of the mark and space output frequency of the transmitted signal. The frequency meter should be turned on for a period of at least 10 minutes before operating.

a. Set the operation switch to the CHECK position.

b. Check to see that the plug of Cord CG–390/U is inserted in the PHONES jack of the frequency meter.

c. After determining the transmitter output frequency to be measured, consult the calibration book on the front of the meter; note the nearest crystal check-point frequency at the bottom of the page.

d. Set the FREQ. BAND HIGH-LOW switch to the HIGH position. Loosen the main tuning dial lock on the front panel and set the dial to the crystal-check frequency previously noted.

e. Connect the headset to the PHONES 850~ TEST jack on the exciter unit, then adjust the CORRECTOR control on the frequency meter until a zero beat is obtained. Readjust the GAIN control on the frequency meter and the VOLUME 850~ TEST control on the exciter unit, if necessary. The frequency meter now is calibrated properly.

f. Again consult the calibration chart, and set the main tuning dial to the correct setting for the frequency to be checked; lock the dial. Set the operation switch to the OPERATE position. Transmitting components requiring a frequency check now may be tuned to the exact operating frequency, as determined by the setting of the frequency meter, by adjusting them until a zero beat is obtained (par. 43*b*).

Note. Where the assigned frequency is not recorded in the calibration book, interpolation is necessary. Refer to TM 11–300.

45. Adjustment of Radio Receiver R–388/URR as a Frequency Standard (Radio Set AN/MRC–2D

a. Remove Rf Cable Assembly CX–2141/U from the ANTENNA jack of the radio receiver.

b. Turn the OFF-STAND BY-ON switch to the ON position.

c. Check to see that the plug at one end of Cord CG–390/U is inserted into the PHONES jack of the radio receiver and the plug at the other end is inserted into the FREQUENCY METER IN jack of the exciter unit.

d. Turn the RF GAIN control to 10.

e. Turn the AUDIO GAIN control to 5. Loudspeaker LS–3 will monitor the audio tone.

f. Set the CRYSTAL FILTER SELECTIVITY control to 0.

g. Set the BFO switch to ON.

h. Set the BFO PITCH control to the white line.

i. Set the CALIBRATE switch ON.

j. Set the AVC switch to OFF.

k. Set the LIMITER switch to OFF.

l. Turn the BAND CHANGE switch until the assigned frequency falls within range of frequencies appearing behind the window above MEGACYCLES.

m. Turn the tuning control located below the the KILOCYCLES window until the indicator behind the MEGACYCLES window indicates the 100-kc check point nearest the assigned frequency.

n. Slowly adjust the tuning control until a zero beat is obtained.

o. Turn the ZERO ADJ. control to set the tuning control division marker to coincide with zero on the red or black kilocycle dial.

p. Turn the CALIBRATE switch to OFF. The radio receiver is now ready to be used as a frequency standard.

q. Accurately set the tuning control to the assigned frequency.

Note. Do not change the setting of the tuning control or the BFO PITCH control.

46. Final Adjustments of Exciter Unit

a. Adjust the OSCILLATOR TUNING dial on the exciter unit front panel to obtain a zero beat in the loudspeaker. Tune for the zero beat of the strongest signal heard. If a great change in oscillator dial setting is required on the exciter unit, retune the BUFFER TUNING dial at the same time. Check to see that the shadow on the 850~ TEST tuning indicator is practically stationary or changes very slowly at the zero-beat point. A stationary shadow indicates that the frequency of the oscillator in the exciter unit is correct.

b. Readjust the BUFFER TUNING dial for maximum illumination of the BUFFER INDICATOR, and lock the dial. Any further readjustments of this dial will affect the oscillator frequency.

c. Repeat adjustments of DOUB., INT. AMP., and P. A. PLATE TUNING controls on the transmitter if any change is noticed on the EXCITATION METER readings. Check for zero beat again. Readjust the OSCILLATOR TUNING dial if necessary.

d. Insert the plug at the end of the cord from Headset HS–30–U into the PHONES 850 ~ TEST jack on the frequency-shift exciter unit. If necessary, adjust the VOLUME 850 ~ TEST control. Throw the TEST key to the SPACE position and the TEST OSC switch to the 850 ~ position. With these switches in their respective positions, it is possible to adjust accurately the output frequency of the transmitter on space signals to obtain exactly an 850-cycle shift from the mark frequency. When the SHIFT dial on the exciter unit is adjusted properly, a zero beat will be obtained in the headset. This zero beat is the result of the 850-cycle frequency difference between the receiver intermediate frequency (if.) and the receiver beat-frequency oscillator (bfo) beating with the 850-cycle signal from the tone oscillator in the frequency-shift exciter unit.

e. Adjust the SHIFT dial to obtain zero beat between the two 850-cycle tones. Check the 850 ~ TEST indicator tube for zero-beat indication. If the SHIFT dial is moved more than a few divisions, an erroneous frequency shift may result.

f. Since any change of the SHIFT dial will affect the oscillator frequency, it is necessary to readjust the OSCILLATOR TUNING dial. Set the TEST OSC switch to the OFF position and the TEST key to the MARK position. Readjust the OSCILLATOR TUNING dial as outlined in *a* above. To prevent a frequency change when the dial lock is tightened, make the final adjustment with the lock partially tightened.

g. Throw the TEST key to the SPACE position and the TEST OSC switch to the 850 ~ position, and repeat the adjustment of the SHIFT dial as given in *d* above.

h. Communicate by telephone with the operator at the operating shelter and have him set the TRANSMITTER switch on the control unit to ON and send a space signal. Listen to the tone in the headset and then restore the TEST key to the NORM position. The tone in the headset should not change more than a few cycles. If the tone disappears or becomes very low, reverse the Wire W–110–B leads on the LINE binding posts and again check for the 850-cycle tone. Have the operator at the operating shelter restore the TRANSMITTER switch on the control unit to the off position.

47. Amplifier AM–141(*)/MRC, Preliminary Adjustments

a. Select the proper plate and grid coils for the amplifier from Chest CH–88–C. The table below shows the proper plate and grid coils to use for a given band of frequencies.

Frequency (mc)	Grid coil	Frequency (mc)	Plate coil	BAND SWITCH position
2.0 to 2.3[a]	2353	2.0 to 2.6	1684–1	1
2.3 to 3.5	2353	2.6 to 3.6	1685–1	1
3.5 to 4.5	2354	3.6 to 5.0	1686–1	1
4.5 to 5.7	2355	5.0 to 7.0	1687	1
5.7 to 7.2	2356	7.0 to 9.0	1688	1
7.2 to 11.0	2357	9.0 to 12.0	1689	1
11.0 to 12.6	2358	12.0 to 15.0	1909	1
12.6 to 18.0	2359	15.0 to 18.0	1909	2

[a] Use with plug-in vacuum capacitor at these frequencies.

Warning: Before attempting to place the grid and plate coils in the amplifier, make sure that the PLATE POWER switch of the transmitter is set to the off (down) position. If the TRANSMITTER switch is ON at the operating shelter, the transmitting shelter operator can remove the plug temporarily from the DISABLING jack on Junction Box J–207/MRC–2 to disable the transmitter.

b. Open the gird and plate coil compartment doors in the front panel of the amplifier and insert the coils firmly in place.

Note. Before inserting the plate coil, loosen the round-head locking screws located in the bushings on each end of the coupling coil shafts.

c. The PLATE POWER switch should not be turned on (up) until the transmitter and the grid circuit of the amplifier have been tuned to the operating frequency.

48. Transmitter and Amplifier, Final Adjustments

Before making any final adjustments to the amplifier, be sure that the transmitter is adjusted properly. Refer to paragraph 43*b*(1) through (4).

a. Operate the TEST key on the exciter unit to MARK.

b. Adjust the GRID TUNING control on the amplifier for a maximum indication of current on the GRID CURRENT meter. If necessary, rotate the EXCITATION INCREASE control slightly clockwise until a noticeable indication is obtained.

Warning: Do not exceed 100 ma on the transmitter P. A. PLATE meter at this point of adjustment.

c. Readjust the P. A. PLATE TUNING control on the transmitter for a minimum indication on the transmitter P. A. PLATE meter.

d. Rotate the EXCITATION INCREASE control in a clockwise direction until an indication of 200 ma is obtained on the amplifier GRID CURRENT meter, and not over 250 ma on the transmitter P. A. PLATE meter.

e. Readjust the GRID TUNING control of the amplifier and the P. A. PLATE TUNING control of the transmitter until the respective maximum and minimum meter readings are obtained.

f. Throw the PLATE POWER switch on the amplifier to the on position (NORMAL-TUNE UP switch in TUNE UP position). If necessary, momentarily push the OVERLOAD RESET button.

g. Adjust the PLATE TUNING control on the amplifier for a minimum reading on the PLATE CURRENT meter. This reading will be approximately 600 ma with the tank circuit off

resonance, and approximately 350 ma when tuned to resonance (*h* and *i* below), provided the coupling to the antenna is set correctly.

h. If the reading of the PLATE CURRENT meter is below 350 ma, set the PLATE POWER switch to OFF; disable the plate power to the transmitter by temporarily removing the plug from the DISABLING jack on Junction Box J–207/MRC–2. Open the plate compartment door and, using the neutralizing rod, readjust the movable coupling coil to increase coupling. Close the door to restore plate power to the transmitter and amplifier and again check the PLATE CURRENT meter reading. If it is still too low, repeat this procedure.

Warning: High voltage may be present when the plate compartment door is open. Use the insulated neutralizing rod provided for protection against severe shocks and burns.

i. If the reading of the PLATE CURRENT meter is above 350 ma, readjust the coupling coil to decrease coupling; observe the same precautions as given in *h* above. Again check the meter reading. Readjust if necessary.

j. Throw the NORMAL-TUNE UP switch to the NORMAL position and repeat the adjustment of the coupling coil, if necessary, to obtain a PLATE CURRENT meter reading of 900 to 1,000 ma (.9 to1.0 amperes). Readjust the P. A. PLATE TUNING and GRID TUNING controls to obtain a maximum power output (*c* and *h* above).

Caution: When this adjustment is completed, retighten the roundhead locking screws of the coupling coil; observe all previous precautions noted above.

k. Readjust the FILAMENT INCREASE control to 10 volts.

l. Set the TEST key on the exciter unit to NORM. The equipment now may be remotely controlled from the operating shelter.

m. Communicate with the operating shelter and have the operator at that point throw the TRANSMITTER switch on the control unit to the ON position. This should cause normal functioning of the exciter unit, transmitter, and amplifier. With the TRANSMITTER switch at the operating shelter set to ON, a continuous mark signal should be developed by the transmitting equipment. A space signal sent from the operating shelter should cause the transmitter carrier to shift 850 cycles lower in frequency.

Note. If the transmitter and the amplifier are being tuned up for the first time, check the neutralization. Refer to TM 11–826 for neutralizing Radio Transmitter BC–610–I and to paragraph 140 for neutralizing Amplifier AM–141/MRC.

Section IV. INITIAL ADJUSTMENT AT RECEIVING SHELTER

Note. Personnel who are to perform the procedures described in this section should be familiar with the use of controls and instruments and with the operating procedure described in this chapter.

49. Control Settings

Before starting the power unit, check to see that the controls of the components in the receiving shelter are in the positions indicated in the table below.

Component	Control	Position
Power circuit breaker		Set to OFF.
Light circuit breaker		Set to OFF.
Radio Receivers R–388/URR	OFF—STAND BY—ON	OFF.
	AVC switch	OFF.
	BAND CHANGE switch	Band containing frequency desired.
	Main tuning control	Set to desired frequency.
	CALIBRATE switch	OFF.
	BFO	OFF.
	RF GAIN	Set to 0.
	LIMITER	OFF.
	METER switch	INPUT (spring-loaded to stay at INPUT).
	CRYSTAL FILTER SELECTIVITY	0.
	CRYSTAL FILTER PHASING	Set to white line.

OPERATING INSTRUCTIONS

GENERAL OPERATION OF RADIO RECEIVER

(1) USE MANUAL VOLUME CONTROL, MVC, AT ALL TIMES.
(2) DO NOT USE IF CRYSTAL FILTER.
(3) TURN ON CW-OSC ONLY FOR INITAL SPOTTING OF SIGNALS BY EAR RECEPTION.
(4) AFTER LOCATING SIGNAL, USE EXTREME CARE IN TURNING BY VERNIER CONTROL ONLY.

GENERAL CONVERTER OPERATION

(1) FOR MAXIMUM SELECTIVITY AGAINST NOISE AND OTHER INTERFERENCE USE NARROW BAND WIDTH WITHOUT DRIFT COMPENSATOR AND CAREFULLY MAINTAIN PROPER TUNING.
(2) TO OBTAIN MAXIMUM ALLOWANCE FOR DRIFT OF TRANSMITTER AND RECEIVERS USE WIDE BAND WIDTH WITH DRIFT COMPENSATOR. DO NOT USE WIDE BAND WIDTH EXCEPT WHEN DRIFT COMPENSATOR IS IN USE.
(3) THE USE OF THE DRIFT COMPENSATOR WITH THE NARROW BAND WIDTH WILL GIVE AN INTERMEDIATE CONDITION OF DRIFT ALLOWANCE AND NOISE REJECTION.
(4) EXCEPT FOR ONE-WAY-REVERSIBLE OPERATION THE MARK HOLD LEVEL CONTROL SHOULD BE AT MAXIMUM CLOCKWISE POSITION. SEE INSTRUCTION BOOK FOR OTHER ADJUSTMENT.
(5) FOR 60 SPEED TELETYPE OPERATION KEEP L.P FILT IN THE IN POSITION.

AC SUPPLY ON

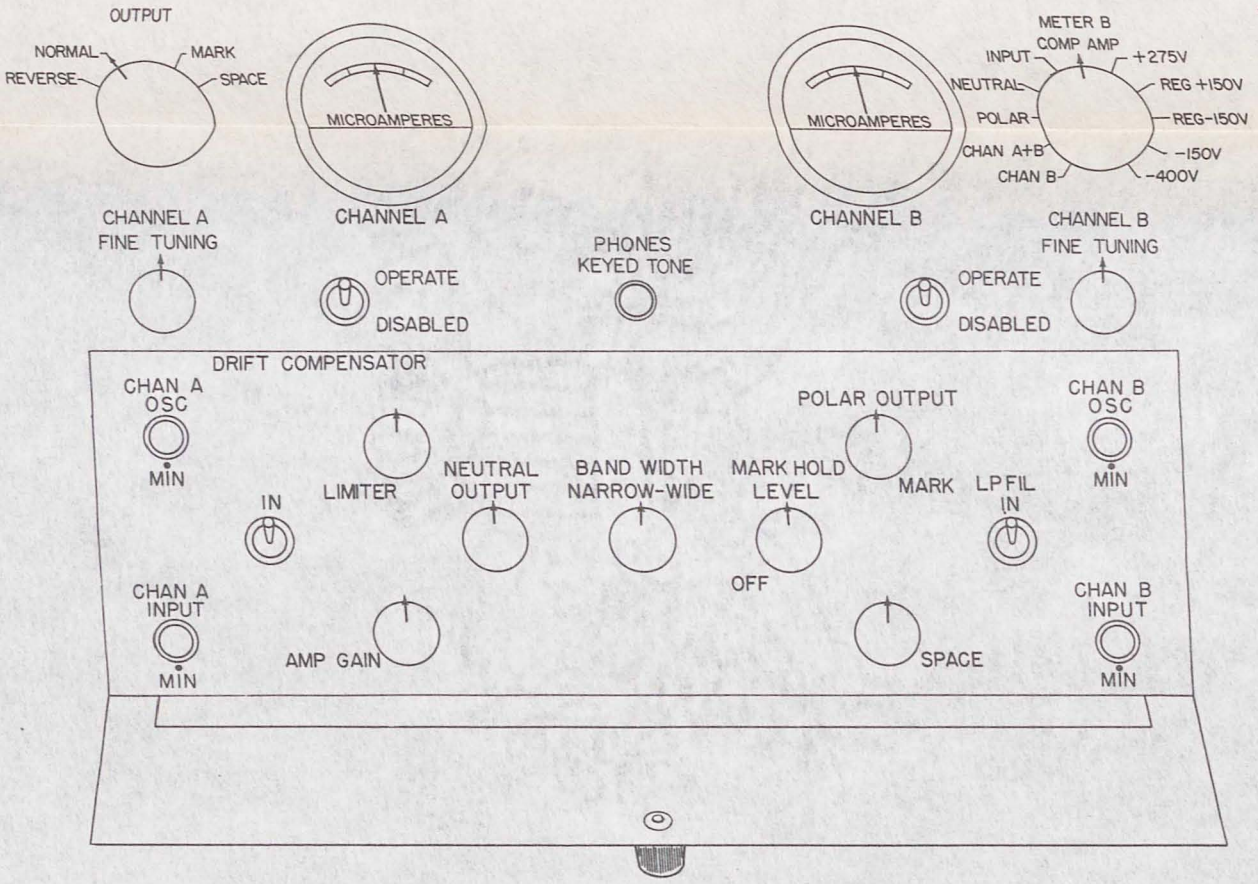
PLATE ON

	SET CONTROLS	ADJUST CONTROLS	NORMAL INDICATIONS
POWER SUPPLY CHECK	METER BAT. +275 V REG +150 V REG -150 V -150 V -400V	SEE INSTRUCTION BOOK FOR TROUBLE CONDITION	METER B +60 ± 6 +30 ± 5 -30 ± 5 -30 ± 5 (MARK) -80 ± 8
D.C. OUTPUT SETTING	OUTPUT-MARK METER B-POLAR	POLAR OUTPUT MARK	METER B +25
	OUTPUT-SPACE METER B-POLAR	POLAR OUTPUT SPACE	METER B -25
	OUTPUT-MARK METER B-NEUTRAL	NEUTRAL OUTPUT	METER B +60
TUNING ADJUSTMENTS	RCVR A VOL HIGH RCVR B VOL LOW	RCVR A VERNIER	MISC SIGNALS-METER A AVERAGE OF 0 STEADY MARK-METER A +50 FOR 1500 TO 8000 KC -50 FOR 8000 TO 18000 KC
	METER B-CHAN B RCVR B VOL HIGH RCVR A VOL LOW	RCVR B VERNIER	MISC SIGNALS-METER B AVERAGE OF 0 STEADY MARK-METER B +50 FOR 1500 TO 8000 KC -50 FOR 8000 TO 18000 KC
	METER B-INPUT RCVR A VOL LOW	RCVR B VOL	METER B PEAK READINGS OF +100 (IF NOT+100 KEEP VOL AT MAXIMUM)
	METER B-CHAN B	RCVR A VOL	EQUAL DIVISION OF DIVERSITY OUTPUT BETWEEN A AND B AS INDICATED BY METERS A AND B OVER SEVERAL SECONDS OF TIME
	METER B-COMP AMP (DRIFT COMP IN)	DRIFT COMP GAIN	WITH COMP LIMITER FULL CLOCKWISE OBTAIN MINIMUM KICKS ON METER B DURING MISCELLANEOUS SIGNALING.
	METER B-CHAN A & B (DRIFT COMP IN)	DRIFT COMP LIMITER	STEADY MARK OR RCVRS A & B VOL AT ZERO SET CONTROL TO BE ON VERGE OF DECREASING NORMAL INDICATION OF ± 70.
	METER B-CHAN A & B	OUTPUT NOR REV	METER B-RIGHT HAND INDICATION FOR MARK. DRIFT COMP OUT- 100 OR OFF SCALE DRIFT COMP IN- ± 70 ± 5 (SEE INSTRUCTION BOOK FOR ADJUSTMENT)

SEE INSTRUCTION BOOK FOR DETAILED INFORMATION.

OPERATION NOTES

(1) INSERTION OR REMOVAL OF DRIFT COMPENSATOR REQUIRES CHANGING OUTPUT FROM FROM NOR TO REV OR VICE VERSA.
(2) TO AID IN CHECKING THE TUNING OF AN INDIVIDUAL RECEIVER DURING OPERATION. MOMENTARILY UPSET THE DIVERSITY BALANCE BY DECREASING THE VOL SETTING OF THE OTHER RECEIVER SUFFICIENTLY TO ALLOW THE RECEIVER TO BE CHECKED TO CARRY THE TOTAL LOAD AND THUS GIVE AN INDICATION OF ITS TUNING ON METER A OR B.
(3) MONITORING OF THE KEYED TONE OUTPUT WILL GIVE AN INDICATION OF WHETHER OR NOT A CLEAN CUT OUTPUT IS BEING FURNISHED.
(4) FOR SMALL CORRECTIONS IN TUNING THE FINE TUNING A AND B CONTROLS MAY BE USED INSTEAD OF THE RECEIVER VERNIER CONTROLS.
(5) CAUTION: TAP METER RIM WHILE READING DEFLECTION.



TM S24A-701

Figure 48. Dual Diversity Converter CV-31D/TRA-7, front view, lower hinged panel open.

Component	Control	Position
Teletypewriter TT–4A/TG	MOTOR switch	OFF.
Dual Diversity Converter CV–31D/TRA–7.	AC SUPPLY switch	Off (down).
	PLATE switch	Off (down).
	OUTPUT switch	NORMAL.
	METER B switch	INPUT.
	DRIFT COMPENSATOR switch (under hinged panel).	Out (down).
	BAND WIDTH	NARROW.
	CHANNEL A disabling switch	OPERATE.
	CHANNEL B disabling switch	OPERATE.
	MARK HOLD LEVEL switch and control.	OFF.
	LP FIL	Out (down).

50. Receiving Shelter Starting Procedure

a. Power Unit PE–95–(*). Start the power unit according to instructions given in TM 11–904. Adjust the output voltages for 115 to 120 volts at the receiving shelter.

Note. Be sure the circuit breaker switch in the shelter is in the ON position.

b. Dual Diversity Converter CV–31D/TRA–7.

(1) Open the upper hinged cover on the dual diversity converter and check the input connections on transformers T201 and T302. For operation on 115 volts, connect the input to terminals 1 and 3 of both transformers. Close the upper hinged door securely.

(2) Throw the AC SUPPLY switch to the ON position. The white-jeweled AC SUPPLY pilot lamp should light.

(3) Throw the PLATE toggle switch to the ON position. The red-jeweled PLATE pilot lamp should light.

(4) Turn the METER B switch to the switch positions given in the chart below and observe the meter indications. The values given below are for an input voltage of 115 volts. The plus readings are to the right of 0 and the minus readings are to the left of 0.

Switch position	Meter reading (v)
+275V	+60±6
REG+150V	+30±5
REG−150V	−30±5
−150V	−30±5
−400V	−80±8

c. Radio Receiver R–388/URR. Turn the OFF-STAND BY-ON switch of the channel A and channel B receiver and the spare receiver to ON. Allow the receivers to warm up for 10 to 20 minutes, depending on the temperature of the shelter.

51. Converter Output Circuit Adjustments

(fig. 48)

a. Set the OUTPUT switch on the converter to the MARK position, and the METER B switch to the NEUTRAL position.

b. Adjust the NEUTRAL OUTPUT control knob to give an indication of +60 on meter B.

c. Set the MARK HOLD LEVEL control to the maximum counterclockwise position. This is the usual operating position except when one-way reversible operation is used.

d. Set the METER B switch to the POLAR position and adjust the POLAR OUTPUT MARK control to give an indication of +25 on meter B.

e. Set the OUTPUT switch to the SPACE position and adjust the POLAR OUTPUT SPACE control to give an indication of −25 on meter B.

f. Set the teletypewriter MOTOR switch to ON, and check to see that the teletypewriter runs open when the OUTPUT switch is set to SPACE, and holds when the OUTPUT switch is moved to MARK.

g. Leave the OUTPUT switch in the MARK position. The BAND WIDTH switch is set to NARROW unless the DRIFT COMPENSATOR switch is set to IN.

52. Adjustment of Radio Receiver R–388/URR

Check with the operrato in the operating shelter to see that the TRANSMITTER switch is in the off (down) position.

a. Channel A Receiver.

(1) Turn the BAND CHANGE switch until the assigned frequency falls within the range of frequencies appearing behind the window above MEGACYCLES.

(2) Turn the tuning control to the assigned frequency. This position is determined by the indicator in the window above MEGACYCLES and in the window below KILOCYCLES.

(3) Turn the RF GAIN control fully clockwise to 10.

(4) Check to see that the OFF-STAND BY-ON switch is in the ON position.

(5) Rotate the tuning control for a maximum deflection on the input meter. The METER switch is spring-loaded to stay in the INPUT position.

(6) If a very strong signal is being received which swings the meter needle beyond the right-hand end of the scale, reduce the RF GAIN until the meter indicates 75.

(7) Readjust the tuning control, if necessary, to give the same indication as noted in (5) above.

(8) The signal may be monitored with headphones or loudspeaker by turning the BFO switch to the ON position and adjusting the BFO PITCH and AUDIO GAIN controls for the desired pitch and volume. High volume produces an undesirable effect on the if output signal.

b. Channel B Receiver. Follow the procedure outlined in (1) through (8) above for the channel B receiver.

Note. Under weak signal conditions, the input signal may be improved by adjusting the ANT. TRIM control. Observe the meter indication while adjusting this control. Set this control to the position which gives the maximum indication on the meter. Adjust the ANT. TRIM control each time the BAND CHANGE switch is changed.

53. Channel A Receiver and Channel A Adjustment

a. On the converter, set the CHANNEL A disabling switch to OPERATE and the CHANNEL B disabling switch to DISABLED. Tune the channel A receiver to the assigned frequency.

b. Increase the RF GAIN control of the channel A receiver until meter B registers 50 or higher with METER B switch of the converter in the INPUT position.

c. Set the CHANNEL A FINE TUNING control on the converter to the straight-up position.

d. Retune the receiver by turning the tuning control carefully until meter A indicates zero after first going off scale. This indicates the center of the channel A discriminator output.

54. Channel B Receiver and Channel B Adjustment

a. On the converter, set the CHANNEL A disabling switch to DISABLED and the CHANNEL B disabling switch to OPERATE. Tune the channel B receiver to the assigned frequency.

b. Increase the RF GAIN control of the channel B receiver until meter B registers 50 or higher with METER B switch in the INPUT position.

c. Set the CHANNEL B FINE TUNING control to the straight-up position.

d. Adjust the tuning control of the channel B receiver until meter B indicates zero with the METER B switch of the converter in the CHAN B position. This indicates the center of the channel B discriminator output.

55. Adjustment and Check of Drift-Compensator Controls

The drift-compensator feature on the converter is used only when the if. output signals from the receivers are unstable because of drift of either the oscillators in the channel A receiver and channel B receiver or the signal being received. The drift-compensator feature should be used only if the frequency drift is serious. Do not use it if weak rf signals are received with prevailing high noise levels. Under these conditions, the output of the discriminators, as shown by meter A (or meter B with METER B switch set at CHAN B), seldom remain at values which can be read accurately on the meters. Maintain accurate tuning at these times by constantly monitoring the output of the converter as indicated by the meters. Adjust the receiver tuning control or the CHANNEL A and CHANNEL B FINE TUNING controls on the converter as necessary to keep the meters centered around zero.

a. Set the CHANNEL A disabling switch to OPERATE and the CHANNEL B disabling switch to DISABLED and then tune in a strong rf carrier signal.

b. Check to make sure that the CHANNEL A FINE TUNING control is set to the marker line in the straight-up position.

c. Adjust the channel A receiver tuning control very carefully until meter A indicates the exact center of the discriminator output (par. 53*a* through *d*).

d. Move the DRIFT COMPENSATOR switch to the IN position and turn the OUTPUT control to the REVERSE position.

e. Be sure that the BAND WIDTH switch is in the WIDE position, and that the LP FIL switch is set at the IN position.

f. Check to see that the meter deflects to the right when the CHANNEL A FINE TUNING control is turned to the right, and that it deflects to the left when the CHANNEL A FINE TUNING control is turned to the left.

g. Turn the METER B switch to the CHAN A+B position and turn both the AMP GAIN control and LIMITER control fully clockwise.

h. Check to see that the converter output can be changed from a steady mark signal (about +70 on meter B) to a steady space signal (about −70 on meter B), or vice versa, by a fast movement of the CHANNEL A FINE TUNING control from one side to the other. (The monitoring teletypewriter will provide an audible check.) If the meter B readings do not stay on the space side (left) after the FINE TUNING control is moved quickly to one side or the other, turn the AMP GAIN control about one-half turn counterclockwise and repeat this check.

i. Check to see that the mark and space readings on meter B are approximately +70 or −70 (within +5) when the CHANNEL A FINE TUNING control is given a quick turn from one side to the other.

j. Slowly turn the LIMITER control counterclockwise until the indication on meter B starts to drop below 70. Set the control at the point where the meter reading just barely starts to drop.

56. Preliminary Adjustment When Receiving Test Tape

With the initial adjustments completed, make the following preliminary adjustments while receiving a test tape signal from a distant station.

a. Adjustment Without Drift Compensator.

(1) Set the radio receivers to the correct band and frequency to receive the distant station.

(2) Set the METER B switch to the INPUT position, and set the OUTPUT switch to the MARK position. Turn on the monitoring teletypewriter and check to see that the teletypewriter holds.

(3) Set the OUTPUT switch to the SPACE position and check to see that the teletypewriter runs open. Return the OUTPUT switch to the MARK position.

(4) Advance the RF GAIN control on the channel A receiver to maximum gain and set the CHANNEL B disabling switch on the converter to DISABLED.

(5) Check both receivers to see that the AVC switch is set to the OFF position, the BFO is set to the OFF position, the LIMITER is set to OFF, and the CRYSTAL FILTER SELECTIVITY switch is set to 0. Adjust the ANT. TRIM control of the channel A receiver for the maximum indication on meter B.

(6) Tune in the distant station on the channel A receiver. Use the beat-frequency oscillator (bfo) to locate the signal and then turn the BFO switch to OFF.

(7) Adjust the tuning control of the channel A receiver until the random kicks on meter A center around zero and the indication on meter B is maximum with METER B switch in the INPUT position.

(8) Realign the ANT. TRIM control so that a maximum input is indicated on meter B.

(9) Place the DRIFT COMPENSATOR switch in the converter to the out (down) position.

(10) Set the OUTPUT control to NORMAL or REVERSE, depending on the frequency band of Radio Receiver R–388/URR used. The even-numbered bands have the oscillator frequency 500 kc above the incoming carrier and the odd-numbered bands have the oscillator frequency 500 kc below the incoming rf carrier frequency. It will be necessary to set the OUTPUT switch at NORMAL or REVERSE depending on the frequency band being used and the position of the DRIFT COMPENSATOR switch. The correct switch position may be obtained from the following table provided that the frequency of the mark signal transmitted by the distant station is higher than the frequency of the space signal. If the mark

frequency is lower than the frequency of the space signal, the transmitter keying lines at the distant station must be reversed.

BAND	OUTPUT switch position		Meter A deflection
	DRIFT COMPENSATOR switch OUT	DRIFT COMPENSATOR switch IN	
Even-numbered bands.	REVERSE	NORMAL	Right
Odd-numbered bands.	NORMAL	REVERSE	Left

(11) Check to see that teletypewriter signals are being received on the monitoring teletypewriter.

(12) Set the CHANNEL B disabling switch of the converter to OPERATE. Increase the RF GAIN of the channel B receiver to maximum. Set the CHANNEL A disabling switch on the converter to DISABLED.

(13) Adjust the ANT. TRIM control for a maximum reading on meter B with METER B switch in the INPUT position.

b. Adjustment with Drift Compensator. After the adjustments listed in *a* above have been completed, proceed as follows for the final adjustment of the drift-compensator circuits.

(1) Set the DRIFT COMPENSATOR switch to the IN position.

(2) Turn the OUTPUT control to the alternate (NORMAL or REVERSE) position from that given in *a* above.

(3) Set the CHANNEL A disabling switch to OPERATE and adjust the channel A receiver tuning control so that the meter A readings center at zero.

(4) Turn the METER B switch to the COMP AMP position.

(5) Turn the AMP GAIN knob fully counterclockwise and then turn it very slowly clockwise while observing meter B for irregular deflections or kicks. This adjustment is very critical. Set the knob at the point where the kicks are at a minimum and the meter indicator is essentially steady at zero.

Note. It will be practically impossible to make this adjustment unless a strong carrier is received which does not vary in frequency.

(6) Turn the METER B switch to the CHAN A+B position. See that meter B swings from approximately +70 to −70 and centers around zero on miscellaneous or tape keying signals.

(7) Obtain a steady rf carrier and reset the CHANNEL A FINE TUNING control to the straight-up position. Adjust the channel A receiver RF GAIN control so that meter A on the converter reads zero (the center of the discriminator output). Check to see that a quick adjustment of the CHANNEL A FINE TUNING control from one side to the other will establish readings on meter B of +70 (+5) and −70 (+5) (par. 55*h* and *i*).

Section V. INITIAL ADJUSTMENT OF OPERATING SHELTER

Note. Personnel who are to perform the procedures described in this section should be familiar with the use of controls and instruments and with the operating procedures described in this chapter.

57. Control Settings

Before starting the power unit, check to see that the controls of the components in the operating shelter are set in the positions indicated in the following chart:

Components	Control	Position
Power circuit breaker	Switch	OFF.
Light circuit breaker	Switch	OFF.
Teletypewriter TT–4A/TG (receive)	MOTOR switch	OFF.
Teletypewriter TT–4A/TG (send)	MOTOR switch	OFF.
Perforator Transmitter TT–56/MGC:		
Typing reperforator	MOTOR switch	OFF.
Transmitter-distributor	MOTOR ON-MOTOR OFF	MOTOR OFF.
	STOP-SEND	STOP.
Rectifier RA–87–A	Power switch	OFF.
Control Unit C–292B/TRA–7	AC SUPPLY switch	Off (down).

58. Operating Shelter Starting Procedure

a. Power Source. Set the circuit breaker switch to ON. After determining that the connections to the power unit are made properly and that the unit is in good running order, start the power unit according to the instructions given in TM 11–904. Adjust the output voltage for 115 to 120 volts at the operating shelter.

b. Initial Setting of Controls on Control Unit C–292 B/TRA–7.

(1) Turn the SERVICE switch on the control unit to the FULL DX position.

(2) Turn the OPERATION switch on the control unit to the NORMAL position.

(3) Turn the METER switch to the −150 VOLT SUPPLY position.

c. Voltage Check.

(1) Set the AC SUPPLY switch of the control unit to the ON position. The white AC SUPPLY indicator lamp should light.

(2) The meter should indicate 75±5 to the left of the center position. If the reading is not within these limits, raise the top cover on the control unit and adjust the slotted shaft control labeled −150V ADJ to obtain the correct meter reading. (Refer to TM 11–262.)

(3) Turn the METER switch to the +300 VOLT SUPPLY position. The meter should indicate 75±5 to the right of the center position. If the reading is not within these limits, raise the top cover on the control unit and adjust the slotted shaft control labeled +300V ADJ to obtain the correct meter reading. (Refer to TM 11–262.)

(4) Turn the METER switch to the −300 VOLT SUPPLY position. The meter should indicate 75±10 to the left of the center position. No adjustment of this supply is provided. If the reading is not within these limits, refer to the section on trouble shooting in TM 11–262.

59. Control Unit Initial Adjustment

a. Local Receiving Test.

(1) Turn the METER switch to the REC EXT CURRENT position. Momentarily depress the RECEIVING TEST SPACE key. The panel meter should indicate zero.

(2) Momentarily depress the RECEIVING TEST MARK key on the front panel of the control unit. Adjust the EXTENSION CURRENT knob until the meter indicates 75 to the right of zero.

(3) Turn the METER switch to the SEND EXT CURRENT position. The panel meter should indicate 75 to the right of zero. Momentarily depress the BREAK key on the send teletypewriter. The panel meter should read 0.

(4) Turn the METER switch to the BALANCE position. Alternately depress the RECEIVING TEST SPACE and the RECEIVING TEST MARK keys. The meter indicator should indicate equal deflections on either side of the zero position (between 75 and 80 in each case). If the readings are not equal, raise the lid on the control unit and adjust the BALANCE ADJ potentiometer (see TM 11–262) with a screw driver until the meter deflections are equal.

(5) Turn the METER switch to the SEND LINE CURRENT position.

(6) Adjust the SENDING LINE CURRENT MARK control until the panel meter indicates 60 to the right of zero.

(7) Set the send teletypewriter MOTOR switch to the ON position.

(8) Depress the BREAK key on the send teletypewriter.

(9) Adjust the SENDING LINE CURRENT SPACE control until the panel meter indicates 75 to the left of zero.

(10) Release the teletypewriter BREAK key.

b. Receiving Test Signals from Receiving Shelter.

(1) Communicate with the operator at the receiving shelter and have the operator turn the OUTPUT switch of the converter to the MARK position.

(2) Turn the METER switch on the control unit to REC LINE CURRENT position and check to see that the panel meter indicates between 50 and 85 to the right of the center position. If the meter reads to the left, reverse the LINE leads of the junction box marked TO RECEIVING SHELTER.

(3) Again communicate with the receiving shelter and have the operator turn the OUTPUT switch of the converter to the SPACE position.

(4) Check to see that the control unit meter indicates approximately the same to the left of the center point as described in (2) above.

(5) If the meter indication in (2) and (4) above are not approximately the same, have the operator at the receiving shelter readjust the POLAR OUTPUT MARK and POLAR OUTPUT SPACE controls of the dual diversity converter (fig. 48).

c. Local Sending Test.

(1) When the TRANSMITTER switch is set to ON, the green TRANSMITTER indicator lamp should light. Always notify the transmitting shelter operator before operating this switch.

(2) Turn the METER switch to the SEND LINE CURRENT position and adjust the SENDING LINE CURRENT MARK control until the meter indicates +60 to the right of the center position. If a reversal is noted at the transmitting shelter when comparing the mark signal sent from the operating shelter and the test mark signal from the transmitting shelter, reverse the LINE leads on the terminals of the junction box marked TO TRANSMITTING SHELTER in the operating shelter.

(3) Depress the BREAK key on the send teletypewriter.

(4) Adjust the SENDING LINE CURRENT SPACE control until the panel meter indicates 75 to the left of the center position. Release the teletypewriter BREAK key.

Section VI. FINAL ADJUSTMENTS

60. General

With the initial adjustment of equipment in the three shelters completed, the radio set will be ready for the final adjustment and coordination of the overall system. Paragraphs 61 through 67 outline the procedure to be followed when coordinating the operation of the transmitting, receiving, and operating shelters.

61. Final Adjustments of Transmitting Shelter and Operating Shelter

a. Communicate with the operator at the operating shelter and have him throw the TRANSMITTER switch to ON. With the TEST key of the frequency-shift exciter at NORM and the TEST OSC switch at OFF position, readjust the OSCILLATOR TUNING dial until zero beat is heard in the loudspeaker. (Do not retune the buffer at this time.)

b. Move the TEST OSC switch to the 850~ position and have the operator at the operating shelter send a space signal. Adjust the SHIFT dial until a zero beat is obtained between the two audio tones (850 cycles) and is indicated by the 850~TEST indicator tube.

c. Move the TEST OSC switch to the OFF position.

d. Communicate with the operator at the operating shelter and have him send a mark signal. If zero beat is not heard in the loudspeaker, readjust the OSCILLATOR TUNING dial slightly to obtain a zero beat.

e. Repeat the procedures in *b*, *c*, and *d* above until proper conditions are obtained and no readjustments are necessary.

62. Final Adjustments at Receiving Shelter and Operating Shelter

After all preliminary adjustments have been performed in the receiving shelter without connection to the system, and final adjustments with the transmitting shelter have been made, proceed with the following tests. These tests should also be made whenever a local system test is desirable.

a. Using Telephone EE–8–B, communicate with the operating shelter and check to make sure that the operator is ready to receive polar dc signals for operation of the control unit and teletypewriters in the operating shelter.

b. Request that the operating shelter send RY tape signals to the transmitting shelter.

c. Tune in the local transmitter (sending RY tape signals) with the channel A receiver and channel A of the converter, in accordance with the procedures in paragraph 52.

d. Check the copy on the monitoring teletypewriter. Adjust the range finder on the teletypewriter, if necessary.

e. Request the operating shelter to send a mark signal.

f. Check the neutral dc loops as follows:

(1) Restore the OUTPUT switch of the converter to the MARK position.

(2) Turn the METER B switch to NEUTRAL.

(3) Adjust the NEUTRAL OUTPUT knob until meter B indicates 60 to the right of zero.

g. Check the polar dc loop as follows:

(1) Turn the METER B switch to POLAR.

(2) Adjust the POLAR OUTPUT MARK control until meter B indicates 25 to the right of zero.

(3) Turn the OUTPUT switch to SPACE.

(4) Adjust the POLAR OUTPUT SPACE control until meter B indicates 25 to the left of zero.

(5) Restore the OUTPUT switch to either the NORMAL or REVERSE position.

h. Request the operating shelter to send tape signals and check the operating shelter teletypewriters for proper copy. Adjust the margin on the operating shelter teletypewriter, if necessary.

i. Set the CHANNEL A disabling switch to DISABLED and the CHANNEL B disabling switch to OPERATE. Turn the RF GAIN control of the channel B receiver to the maximum clockwise position. Using the channel B receiver and the channel B input to the converter, check to see that copy is received on the monitoring teletypewriter and also on the teletypewriter in the operating shelter.

j. The system lineup at the receiving shelter is now complete. Stand by for orders from the operating shelter.

63. Tuning to Distant Transmitter Frequency

a. Tune the receivers to the distant transmitter frequency.

b. Set the CHANNEL B disabling switch on the converter to DISABLED and the CHANNEL A disabling switch to OPERATE.

c. Turn the BFO switch of the channel A receiver to ON. Adjust the tuning control to locate the signal from the distant station and then turn the BFO switch to OFF.

d. Reduce the rf input by turning the RF GAIN control counterclockwise if the indication on meter B (METER B switch at INPUT) of the converter is more than 100.

e. Carefully tune the channel A receiver while observing meter A indications. Locate the signal in the center of the discriminator output (par. 53).

f. Check to see that meter A deflects to the right and to the left of zero for miscellaneous keying signals; these deflections should be of approximate equal plus and minus values when the receiver is tuned properly.

g. When the distant station is transmitting a steady mark signal, tune the channel A receiver until the meter deflection is approximately 50 (for a frequency shift of 850 cycles).

h. Set the CHANNEL A disabling switch to DISABLED and the CHANNEL B disabling switch to OPERATE. Increase the rf gain of the channel B receiver.

i. Turn the METER B switch to INPUT.

j. Adjust the ANT. TRIM control for a maximum indication on meter B.

k. Adjust the RF GAIN control for an indication of approximately 100 to the right of zero on meter B.

l. Turn the METER B switch to CHAN B and note the reading of meter B.

m. Set the CHANNEL A disabling switch to OPERATE. Carefully observe meters A and B since the meter deflections reveal the diversity effect on the two antennas if there is considerable fading. Check to see that the sum of the two readings of the meters is about ± 50 when a steady mark is transmitted, and that first one meter, and then the other, indicates a full-mark deflection. Most of the output may be received at times on one receiver when keyed signals are received, and quite often the mark signals are received over channel A and the space signals over channel B, or vice versa. If the distant transmitter is sending signals, adjust the rf gain of channel A receiver to make the maximum swings of meter A and meter B equal.

n. Adjust the rf gain of the channel A receiver until the output indicated by meter A is equal to the output from the channel B receiver as indicated on meter B (with METER B switch in the CHAN B position).

64. Tuning Check During Normal Transmission

a. During Period While Steady Mark is Transmitted.

(1) Observe when a steady marking condition is being transmitted.

(2) See that meters A and B on the dual diversity converter alternately deflect equally (approximately ± 50).

(3) If the meter A indications fail to equal the meter B indications, adjust the

tuning of the channel A receiver. First reduce the rf gain of the channel B receiver and then adjust the tuning of the channel A receiver for a reading on meter A of ±50. Increase the rf gain of the channel B receiver so that meter A and meter B deflect equally.

b. During Period When Miscellaneous Teletypewriter Signals are Transmitted.

(1) When receiving miscellaneous teletypewriter signals, the deflections of both meters A and B should average around zero.

(2) Detuning will be evident if both meters average either to the left or to the right.

(3) Adjustment of the tuning control of the channel A receiver in the proper direction will correct this condition.

65. Adjustment of Output Control Circuit

a. Drift Compensator Disconnected.

(1) The drift-compensator feature need not be used if the if outputs of channel A and channel B receivers remain stable. A sufficiently stable output is indicated if it is not necessary to retune the receivers more often than once an hour.

(2) Do not use the drift-compensator feature if weak rf signals are received with prevailing high noise levels. Under these conditions, the outputs of the discriminators as shown by meters A and B (METER B at CHAN B) seldom remain at values which can be read accurately on the meters. *Maintain accurate tuning at these times by constantly monitoring the output of the converter.*

(3) Check to see that the DRIFT COMPENSATOR is in the out (down) position and that the AMP GAIN knob is not set beyond its midposition.

(4) Turn the OUTPUT switch to the position that provides mark and space signals of proper polarities as indicated in the following table:

Deflection of meters A and B for a mark signal	Position of OUTPUT switch
Right	REVERSE
Left	NORMAL

(5) Set the METER B switch to the CHAN A+B position.

(6) Check to see that the meter needle swings approximately equal distances to the right and left for steady mark and space signals, and fluctuates about zero on miscellaneous keying signals.

Note. The meter deflection should be approximately full scale to the right for a steady mark, if the teletypewriter signals have an 850-cycle shift.

(7) Connect a headset to the PHONES KEYED TONE jack on the front panel of the converter, and verify that distinct tones are heard. Distinct tones indicate the absence of noise peaks or distortion arising from improper tuning.

b. Drift Compensator Used.

(1) Move the DRIFT COMPENSATOR switch to the IN position.

(2) Turn the OUTPUT switch to a position which is opposite to that which is used when the drift-compensator feature is disconnected, as follows:

Deflection of meters A and B for a mark signal	Position of OUTPUT switch
Right	NORMAL
Left	REVERSE

(3) Turn the METER B switch to the COMP AMP position.

(4) Turn the AMP GAIN knob fully counterclockwise and then, when miscellaneous signals are being received, slowly turn the knob clockwise while observing meter B for a minimum of irregular deflections or kicks. A tapered control is provided, and the normal setting usually will be 30° or 40° from the counterclockwise stop for an 850-cycle frequency shift. Set the AMP GAIN knob in a position that provides a keyed tone output from the converter and results in minimum kicks in meter B. A more definite setting of the AMP GAIN knob may be found if the LIMITER knob is first tuned fully clockwise.

(5) Turn the METER B switch to the CHAN A+B position.

(6) Verify that the deflection of meter B on a steady mark signal is 70 to the right of zero. During a steady mark signal, reset the LIMITER knob to a position which causes the indication to just start to decrease.

(7) Connect a headset to the PHONES KEYED TONE jack and verify that clear distinct tones are produced. Distinct tones indicate the absence of noise peaks or distortion arising from improper tuning.

66. Carrier-Control Mark-Hold Feature

The carrier-control mark-hold feature is provided in the converter to maintain a steady marking condition automatically if the transmitting station shuts down or the carrier frequency disappears for any reason. It must be used in case of one-way reversible operation. For other types of operation, full-duplex or half-duplex, the carrier-control mark-hold feature is not required for operating reasons. If the mark-hold feature is not required, turn the MARK HOLD LEVEL control counterclockwise to the OFF position. (This is indicated by a click.) When the mark-hold feature is used, make the following adjustments:

a. Turn the MARK HOLD LEVEL control knob fully clockwise.

b. With the power at the distant transmitter off or with both receivers detuned from the signal, verify that a steady marking signal is connected to one of the associated dc loops. (The teletypewriter does not run open.) Do not turn the receiver volume down for this test because total noise should be present.

Note. Occasional kicks may be transmitted if relatively high noise levels prevail. In this case, slowly turn the MARK HOLD LEVEL knob counterclockwise until a steady marking signal is produced.

c. When carrier current is received again, verify that the setting described in *b* above does not cause steady marking signals which interrupt normal keying.

d. Check the setting of the MARK HOLD LEVEL knob from time to time. It is important to provide a setting which is turned as far clockwise as possible so that it does not interfere when receiving weak or fading rf signals, and also is turned far enough counterclockwise to result in applying a steady marking signal when the carrier is disconnected. The setting of the control is subject to some change due to variable noise levels and different rf gain control adjustments of the associated receivers.

67. Monitoring Received Signal

a. Except when the noise level is high, frequently monitor the discriminator output of the converter on meter A and on meter B with the METER B switch in the CHAN B position. Adjust the receiver tuning controls or the CHANNEL A, CHANNEL B, and FINE TUNING controls to keep the output balanced near zero. When high noise levels prevail, monitor the keyed tones.

Note. If the above procedure is not required more than once an hour (after a warmup period of 2 hours), set the DRIFT COMPENSATOR switch to the out position (down). If these adjustments are necessary more often than once an hour, set the DRIFT COMPENSATOR switch to the IN position but do not use the drift-compensator feature when weak signals prevail.

b. Set the METER B switch to the INPUT position and continually monitor the input level on meter B.

(1) The input level indication should be more than 15, even under extreme fading conditions.

(2) Operate both receivers simultaneously for dual diversity reception.

(3) Keep the ANT. TRIM control on channel A and Channel B receivers at the position which gives the maximum indication on meter B, with METER B switch in the INPUT position.

(4) Keep the BFO switch at the OFF position on the channel A and channel B receivers except when using the loudspeaker to locate a distant station.

(5) Keep the CRYSTAL FILTER SELECTIVITY control at the lowest possible position necessary to keep out undesirable signals.

(6) Keep the CRYSTAL FILTER PHASING control at the position which most attenuates the unwanted heterodyne.

(7) Keep the LIMITER switch and the AVC switch at the OFF position.

Section VII. OPERATION UNDER USUAL CONDITIONS

68. Teletypewriter Operation

The sending teletypewriter, typing reperforator, or the transmitter-distributor, when operated, keys the Control Unit C–292B/TRA–7 through a neutral loop circuit. The control unit converts these neutral signals into a polar signal which, in turn, is carried over the wire line to the transmitting shelter. The polar signals control the frequency shift of the transmitter. Radioteletype signals are received by the radio receivers and are transferred to the converter. In the converter, neutral and polar signals are developed from the received signals. The neutral signals actuate the monitoring teletypewriter in the receiving shelter. The polar signals are supplied over wire lines to the control unit in the operating shelter. This control unit converts the polar signals to neutral signals and distributes them through Junction Box J–204/MRC–2 to the teletypewriter equipment. Page copy is either printed on the receive teletypewriter or tape copy is made on the typing reperforator. The teletypewriters and the typing-reperforator are provided with a set of transmitting contacts brought out on a *black* plug and an independent receiving mechanism, the connections of which are terminated in a *red* plug associated with the equipment. The transmitter-distributor has a set of transmitting contacts terminated in a *gray* plug. In general, the following requirements are necessary for satisfactory teletypewriter operation.

a. All mechanisms to be used in the circuit must be connected in series.

b. No more than three mechanisms should be connected in any one circuit.

c. Holding current of approximately 60 ma must be supplied to all receiving equipments to prevent them from running open. This holding current may be obtained from the send extension circuit or the receive extension circuit of the control unit or from the jack box associated with the typing reperforator.

d. All transmitting contacts which are to key the transmitter must be plugged into the black or gray jacks of the send extension circuit.

e. All receiving mechanisms which are to provide home copy of the transmitted messages must be plugged into the red jacks of the send extension circuit.

f. Junction Box J–204/MRC–2 provides a means for many patching arrangements. Five patching arrangement illustrations are described in paragraphs 69, 70, and 71. These illustrations (figs. 35, 49, 50, 51, and 52) are representative of the patching arrangements possible using Junction Box J–204/MRC–2. Other arrangements are left to the discretion of the operator.

69. Dual Diversity, Full-Duplex Operation

a. Receiving and Sending on Teletypewriters, Monitoring on One Teletypewriter.

(1) At the operating shelter, make the following connections on Junction Box J–204/MRC–2 (fig. 35):

(*a*) Patch Cord CC–66 between the SEND TTY BLACK jack and the SEND EXT. BLACK jack.

(*b*) Patch Cord CC–66 between the SEND TTY RED jack and the SEND EXT. RED jack.

(*c*) Patch Cord CC–66 between the REC. TTY RED jack and the REC. EXT. RED jack.

(2) At the operating shelter, set the telephone switch of the jack panel to COMBINED.

(*a*) Communicate with the transmitting shelter operator and have him check to see that the components are ready to transmit on a full-duplex basis.

(*b*) Communicate with the receiving shelter operator and have him check to see that the components are ready to receive messages on a full-duplex basis.

(3) Perform the following steps in the operating shelter:

(*a*) Set the OPERATION switch of the control unit to NORMAL.

(*b*) Set the SERVICE switch on the control unit to FULL DX.

(*c*) Set the METER switch on the control unit to REC. EXT. CURRENT, and adjust the EXTENSION CURRENT control for an indication of 75 to the right of zero on the meter.

(*d*) Set the MOTOR switch on the receive (right) teletypewriter to ON.

(*e*) Set the METER switch on the control unit to SEND LINE CURRENT. Adjust the SENDING LINE CURRENT MARK control for an indication of 60 to the right of 0 on the meter.

Depress the BREAK key and adjust the SENDING LINE CURRENT SPACE control for an indication of 75 to the left of 0 on the meter.

(*f*) Set the MOTOR switch on the send (left) teletypewriter to ON.

(*g*) Type out the message on the send teletypewriter. The message will be transmitted to the distant station and the message will be monitored as page copy on the send teletypewriter.

(*h*) Messages from the distant station will be received as page copy on the receive teletypewriter and may be monitored in the receiving shelter.

(4) To reverse the send and receive teletypewriter operation, make the following connections in place of those indicated in *a*(1)(*a*), (*b*), and (*c*) above. Refer to figure 49.

(*a*) Patch Cord CC–66 between the SEND TTY RED jack and REC. EXT. RED jack.

(*b*) Patch Cord CC–66 between the REC. TTY BLACK jack and the SEND EXT. BLACK jack.

(*c*) Patch Cord CC–66 between the REC. TTY RED jack and the SEND EXT. RED jack.

(5) To receive on both teletypewriters and send from the send teletypewriter, make the following connections in place of those indicated in *a*(1)(*a*), (*b*), and (*c*) above. Refer to figure 50.

(*a*) Patch Cord CC–66 between the SEND TTY BLACK jack and the SEND EXT. BLACK jack.

(*b*) Patch Cord CC–66 between the SEND TTY RED jack and the REC. EXT. RED jack.

(*c*) Patch Cord CC–66 between the REC. TTY RED jack and REC. EXT. RED jack.

b. Receiving on Typing Reperforator and Receive Teletypewriter and Monitoring and Sending on Send Teletypewriter.

(1) At the operating shelter, make the following connections to Junction Box J–204/MRC–2. Refer to figure 51.

(*a*) Patch Cord CC–66 between the SEND TTY RED jack and the SEND EXT. RED jack.

(*b*) Patch Cord CC–66 between the REC. TTY RED jack and the REC. EXT. RED jack.

(*c*) Insert the red shell plug of the typing reperforator into the REC. EXT. RED jack.

(*d*) Patch Cord CC–66 between SEND TTY BLACK jack and SEND EXT. BLACK jack.

(2) Proceed as directed in *a*(2)(*a*) and (*b*) above.

(3) Perform the following steps in the operating shelter:

(*a*) Proceed as directed in *a*(3)(*a*), (*b*), and (*c*) above.

(*b*) Set the power switch on the typing reperforator to ON and the MOTOR switch of the send and receive teletypewriters to ON.

(*c*) Type out the message on the send teletypewriter. The message will be transmitted to the distant station and the message will be monitored on the send teletypewriter.

(*d*) Messages from the distant station will be received on the typing reperforator as perforated and printed tape and on the receiver teletypewriter as page copy.

c. Preparing Perforated Tape and Sending on Typing Reperforator, Receiving on Receive Teletypewriter, and Monitoring with Send Teletypewriter.

(1) At the operating shelter, make the following connections to Junction Box J–204/MRC–2. Refer to figure 52.

(*a*) Patch Cord CC–66 between the REC. TTY RED jack and REC. EXT. RED jack.

(*b*) Patch Cord CC–66 between SEND TTY RED jack and SEND EXT. RED jack.

(*c*) Insert the red shell plug of the typing reperforator into the SEND EXT. RED jack and the black shell plug into the SEND. EXT. BLACK jack.

(2) Proceed as directed in *a*(2)(*a*) and (*b*) above.

(3) Perform the following steps in the operating shelter:

(*a*) Proceed as directed in *a*(3)(*a*), (*b*), (*c*), (*e*), and *b*(3)(*b*) above.

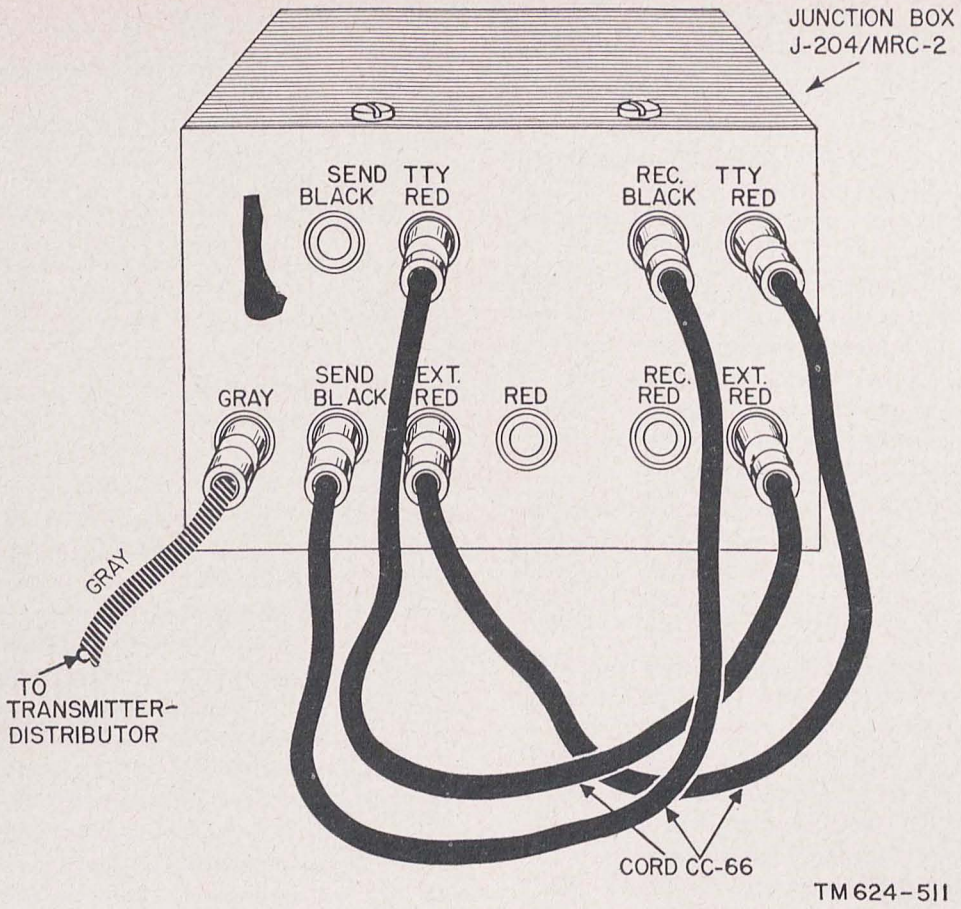


Figure 49. Reverse teletypewriter patching arrangement.

(*b*) Type out the message on the keyboard of the typing reperforator. The message will be transmitted to a distant station and will be monitored on the send teletypewriter. The message will appear as code perforated tape from the typing reperforator.

(*c*) Messages from the distant station will be printed as page copy by the receive teletypewriter.

d. Sending From Transmitter-Distributor, Monitoring With Receive Teletypewriter, and Receiving With Send Teletypewriter.

(1) At the operating shelter, make the following connections to Junction Box J–204/MRC–2. Refer to figure 49.

(*a*) Patch Cord CC–66 between the REC. TTY RED jack and the SEND EXT. RED jack.

(*b*) Patch Cord CC–66 between the SEND TTY RED jack and the REC. EXT. RED jack.

(*c*) Insert the gray shell plug of the transmitter-distributor into the SEND EXT. GRAY jack.

(2) Perform the following steps in the operating shelter:

(*a*) Proceed as directed in *a*(3)(*a*), (*b*), (*c*), and (*e*) above.

(*b*) Set the MOTOR switches of the receive teletypewriter and send teletypewriter to ON.

(*c*) Set the MOTOR ON-MOTOR OFF switch of the transmitter-distributor to MOTOR ON. Set the STOP-SEND switch to SEND.

(*d*) Feed the prepared tape through the tight tape switch and into the transmitter-distributor. The code perforated message will be sent to the distant station. This message will be monitored on the receive teletypewriter.

(*e*) The messages from a distant station will be received as page copy on the send teletypewriter.

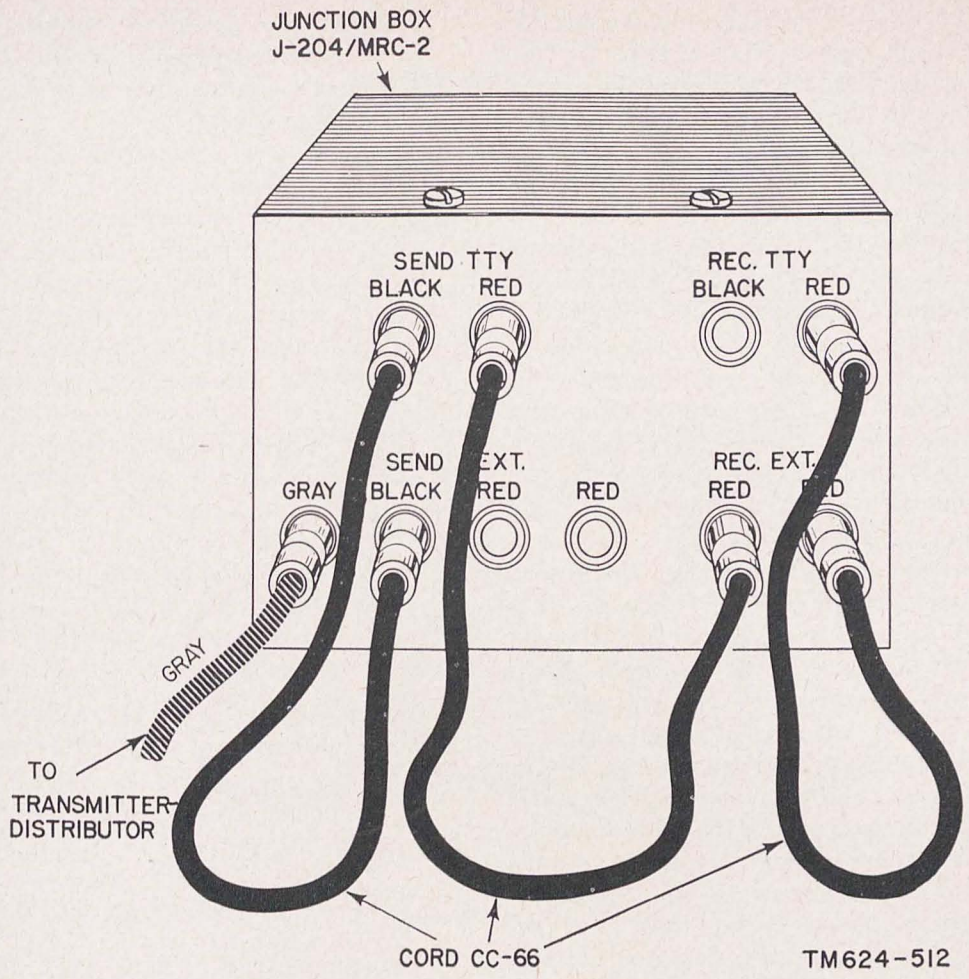


Figure 50. Receive on both teletypewriter, transmit on send teletypewriter, patching arrangement.

70. Dual Diversity, Half-Duplex Operation

a. Receiving and Sending on Send Teletypewriter, Monitoring on Receive Teletypewriter.

(1) Have the operator at the transmitter shelter communicate with the distant station. Advise the distant station operator to operate on half duplex at a certain time.

(2) From the operating shelter, communicate with the receiving shelter and have the operator adjust the receiving shelter components to the frequency of the distant station.

(3) At the operating shelter, make the following connections to Junction Box J–204/MRC–2:

(*a*) Patch Cord CC–66 between the SEND TTY RED jack and the REC. EXT. RED jack.

(*b*) Patch Cord CC–66 between the SEND TTY BLACK jack and SEND EXT. BLACK jack.

(*c*) Patch Cord CC–66 between the REC. TTY RED jack and the SEND EXT. RED jack.

(4) At the operating shelter, set the telephone switch to COMBINED.

(*a*) Communicate with the transmitting shelter operator and see that the components are ready to transmit on a half-duplex basis.

(*b*) Communicate with the receiving shelter operator and see that the components are ready to receive messages on a half-duplex basis.

(5) Perform the following steps in the operating shelter:

(*a*) Set the OPERATION switch of the control unit to NORMAL.

(*b*) Set the SERVICE switch on the control unit to HALF DX.

(*c*) Set the METER switch on the control unit to REC EXT CURRENT and adjust the EXTENSION CURRENT control for an indication of 75 to the right of O on the meter.

(*d*) Set the METER switch on the control unit to SEND LINE CURRENT. Adjust the SEND LINE CURRENT MARK control for an indication of 60 to the right of O. Depress the BREAK key of the send teletypewriter and adjust the SENDING LINE CURRENT SPACE control for an indication of 75 to the left of O on the meter.

(*e*) Set the MOTOR switches of the send and receive teletypewriters to ON.

(*f*) At the predetermined time, type out the message on the keyboard of the send teletypewriter. Signal the distant operator with a go-ahead signal at the end of the transmission. The receive teletypewriter will monitor the message sent to the distant station.

(g) The message from the distant station will be received on the send teletypewriter as page copy. At the end of the transmission, the operator of the distant station will give the local operator the go-ahead signal.

(*h*) Transmission can be interrupted by either the local or distant operator by depressing the BREAK key of the teletypewriter.

b. Receiving and Sending on Receive Teletypewriter, Monitoring on Send Teletypewriter.

(1) At the operating shelter, make the following connections to Junction Box J–204/MRC–2:

(*a*) Patch Cord CC–66 between SEND TTY RED jack and SEND EXT. RED jack.

(*b*) Patch Cord CC–66 between REC. TTY BLACK jack and SEND EXT. BLACK jack.

(*c*) Patch Cord CC–66 between REC. TTY RED jack and REC. EXT. RED jack.

(2) Proceed as directed in *a*(4)(*a*) and (*b*) above.

(3) At the operating shelter, perform the following steps:

(*a*) Proceed as directed in *a*(5)(*a*) through (*e*) above.

(*b*) At the predetermined time, type out the message on the keyboard of the receive teletypewriter. Signal the operator with a go-ahead signal at the end of the transmission. The send teletypewriter will monitor the message sent to the distant station.

(*c*) The message from the distant station will be received on the receive teletypewriter as page copy. At the end of the transmission, the operator at the distant station will give the local operator the go-ahead signal.

(*d*) Transmission can be interrupted by either the local or distant operator by depressing the BREAK key of the teletypewriter in use.

c. Receiving and Sending on Typing Reperforator and Monitoring on Send Teletypewriter.

(1) At the operating shelter, make the following connections on Junction Box J–204/MRC–2:

(*a*) Patch Cord CC–66 between the SEND TTY RED jack and the SEND EXT. RED jack.

(*b*) Insert the black plug of the typing reperforator into the SEND EXT. BLACK jack.

(*c*) Insert the red plug of the typing reperforator into the REC. EXT. RED jack.

(2) Proceed as directed in *a*(4)(*a*) and (*b*) above.

(3) Perform the following steps in the operating shelter:

(*a*) Proceed as directed in *a*(5)(*a*) through (*d*) above.

(*b*) Set the power switch of the typing reperforator to ON and the MOTOR switch of the send teletypewriter to ON.

(*c*) At the predetermined time, type out the message on the keyboard of the typing reperforator. Signal the distant operator with a go-ahead signal at the end of the transmission. The send teletypewriter will monitor the message sent to the distant station.

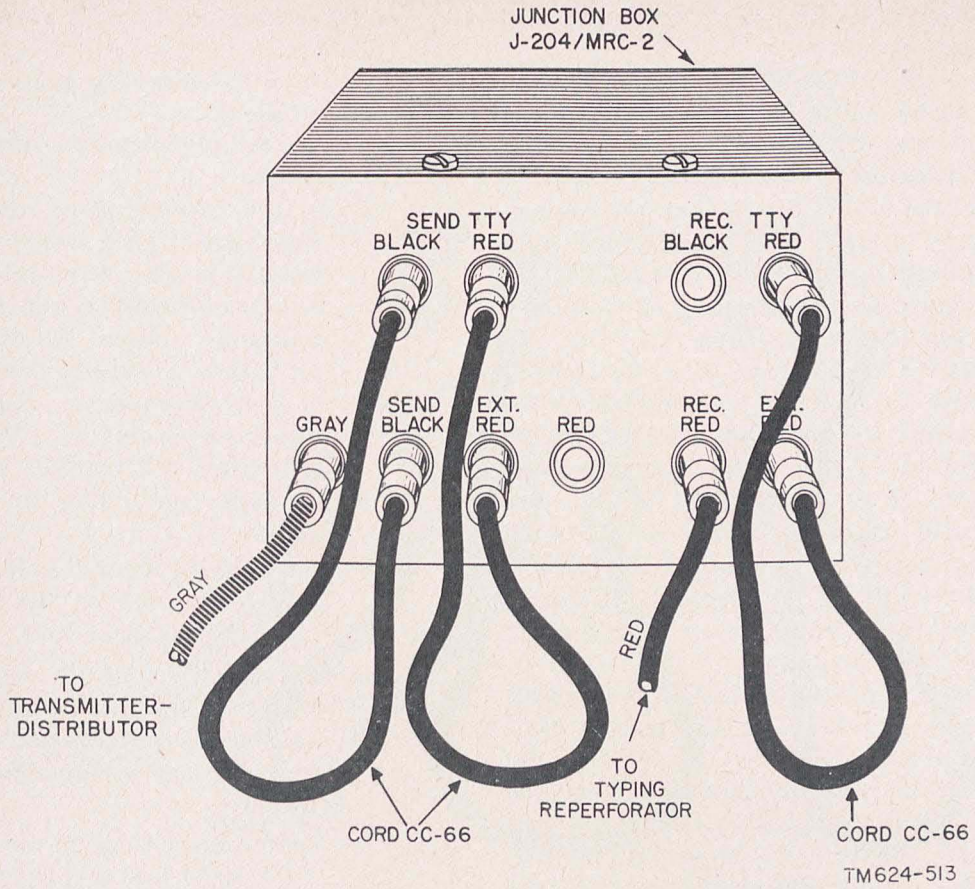


Figure 51. Normal operation and receiving on typing reperforator.

(*d*) The message from the distant station will be received on the reperforator transmitter as perforated and printed tape.

(*e*) Transmission can be interrupted by either the local or distant operator by depressing the BREAK key of the typing reperforator or the teletypewriter in use.

71. Dual Diversity, One-Way Reversible Operation

a. Receiving and Sending on Send Teletypewriter, Monitoring on Receive Teletypewriter.

(1) Have the operator at the transmitting shelter communicate with the distant station. Advise the distant station operator to operate on a one-way reversible basis at a certain time.

(2) From the operating shelter, communicate with the receiving shelter and have the operator adjust the receiving shelter components to the assigned frequency. Adjust the mark-hold level feature as indicated in paragraph 66.

(3) At the operating shelter, make the following connections to Junction Box J–204/MRC–2:

(*a*) Patch Cord CC–66 between the SEND TTY BLACK jack and the SEND EXT. BLACK jack.

(*b*) Patch Cord CC–66 between the SEND TTY RED jack and the REC. EXT. RED jack.

(*c*) Patch Cord CC–66 between the REC. TTY RED jack and the SEND EXT. RED jack.

(4) At the operating shelter, set the telephone switch to COMBINED.

(*a*) Communicate with the transmitting shelter operator and check to see that the components are ready to transmit on a one-way reversible basis.

(*b*) Communicate with the receiving shelter operator and check to see that the components are ready to receive messages on the one-way reversible basis.

(5) Perform the following steps in the operating shelter:

(*a*) Set the OPERATION switch on the control unit to NORMAL.

(*b*) Set the SERVICE switch on the control unit to ONE WAY.

(*c*) Set the METER switch on the control unit to REC EXT CURRENT and adjust the EXTENSION CURRENT control for an indication of 75 to the right of O on the meter.

(*d*) Set the METER switch on the control unit to SEND LINE CURRENT Adjust the SENDING LINE CURRENT MARK control for an indication of 60 to the right of O. Depress the BREAK key of the send teletypewriter and adjust the SENDING LINE CURRENT SPACE control for an indication of 75 to the left of O on the meter.

(*e*) Set the MOTOR switches of the send teletypewriter and the receive teletypewriter to ON.

(*f*) At the predetermined time, set the TRANSMITTER switch on the control unit to ON. Type out the message on the keyboard of the send teletypewriter. Signal the distant operator with a go-ahead signal at the end of the transmission. Set the TRANSMITTER switch to OFF. The receive teletypewriter will monitor the message sent to the distant station as page copy.

(*g*) The message from the distant station will be received on the send teletypewriter as page copy.

b. Receiving and Sending on Receive Teletypewriter, Monitoring on Send Teletypewriter.

(1) At the operating shelter, make the following connections to Junction Box J–204/MRC–2:

(*a*) Patch Cord CC–66 between REC. TTY BLACK jack and SEND EXT. BLACK jack.

(*b*) Patch Cord CC–66 between REC. TTY RED jack and REC. EXT. RED jack.

(*c*) Patch Cord CC–66 between SEND TTY RED jack and SEND EXT. RED jack.

(2) Proceed as directed in *a*(4)(*a*) and (*b*) above.

(3) Perform the following steps in the operating shelter:

(*a*) Proceed as directed in *a*(5)(*a*) through (*e*) above.

(*b*) At the predetermined time, set the TRANSMITTER switch on the control unit to ON. Type out the message on the keyboard of the receive teletypewriter. Signal the distant operator with a go-ahead signal at the end of the transmission. Set the transmitter switch to OFF. The send teletypewriter will monitor the message, as page copy, sent to the distant station.

(*c*) The message from the distant station will be received on the receive teletypewriter as page copy.

c. Receiving and Sending on Typing Reperforator, Monitoring with Send Teletypewriter.

(1) At the operating shelter, make the following connections to Junction Box J–204/MRC–2:

(*a*) Patch Cord CC–66 between the SEND TTY RED jack and the SEND EXT. RED jack.

(*b*) Insert the black shell plug of the typing reperforator into the SEND EXT. BLACK jack.

(*c*) Insert the red shell plug of the typing reperforator into the REC. EXT. RED jack.

(2) Proceed as directed in *a*(4)(*a*) and (*b*) above.

(3) Perform the following steps in the operating shelter:

(*a*) Proceed as directed in *a*(5)(*a*) through (*d*) above.

(*b*) Set the power switch of the typing reperforator to ON and the MOTOR switch of the send teletypewriter to ON.

(*c*) At the predetermined time, set the TRANSMITTER switch on the control unit to ON. Type out the message on the keyboard of the typing reperforator. Set the TRANSMITTER switch to OFF. Observe the end-of-line light to prevent the receive tele-

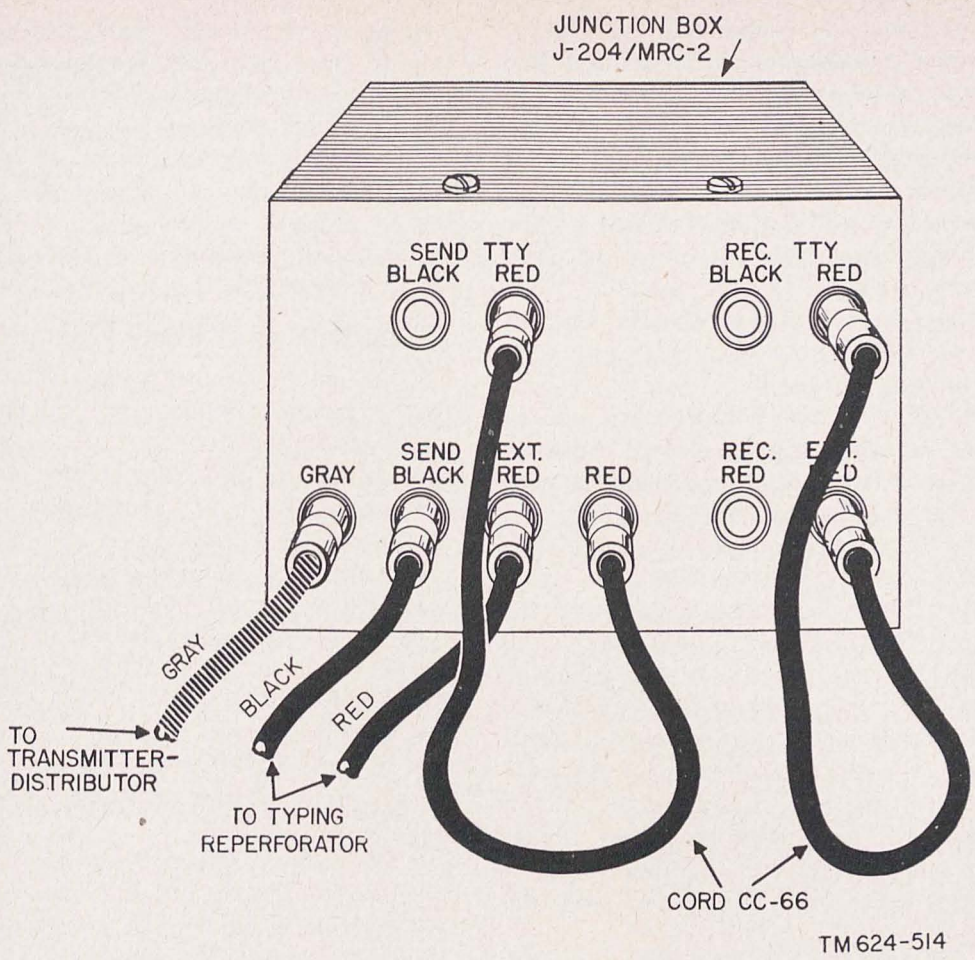


Figure 52. Transmit and cut tape on typing reperforator, normal operation.

typewriter from typing beyond the edge of the paper. The send teletypewriter will monitor the message as page copy.

(*d*) The typing reperforator will perforate and print the message from the distant station on tape.

72. Typing Reperforator Operation With Connection Box

(fig. 46)

The connection box dc power cord provides current for two test circuits. One of these has three jacks in series, and the other has two. These test jacks, in conjunction with the signal line jacks, permit various operating combinations for emergency land line operation.

a. To prepare a perforated and printed tape locally and to transmit simultaneously to the line from tape, make the following connections:

(1) Insert the red and black plugs of the typing reperforator into the jacks of local circuit 1.

(2) Insert the gray plug of the transmitter-distributor in the SEND jack of line 1 or line 2 as required.

b. To send from the typing reperforator keyboard to line and to receive from line (making perforated and printed tape on either operation) and to transmit simultaneously to another line from the tape (the station functioning as a repeater) use the following connections:

(1) Insert the red and black plugs of the typing reperforator in the REC. and SEND jacks of line 1 or 2 as required.

(2) Insert the gray plug of the transmitter-distributor in the send jack of the remaining line.

c. To send from the keyboard to line and to receive from line (making page copy on either

operation), to prepare a perforated tape locally, and to transmit simultaneously to another line from tape, use the following connections:

(1) Insert the red and black plugs of page teletypewriter in the REC. and SEND jacks of line 1 or 2 as required.

(2) Insert the red and black plugs of the typing reperforator in plugs of local circuit 1.

(3) Insert the gray plug of the transmitter-distributor in the SEND jack of the remaining line.

d. To send from the keyboard to line and to receive from line (making perforated tape on either operation), and to prepare simultaneous page copy from perforated tape previously obtained from any source, make the following connections:

(1) Insert the red and black plugs of the typing reperforator in the REC. and SEND jacks of line 1 or 2 as required.

(2) Insert the gray plug of the transmitter-distributor in the jack of local circuit 1.

(3) Insert the red plug of the page teletypewriter in the jack of local circuit 1.

e. To prepare a perforated tape plus a page copy locally and to transmit simultaneously to line from tape, make the following jack box connections:

(1) Insert the red plugs of the typing reperforator and the page teletypewriter in jacks of local circuit 1.

(2) Insert the black plug of the reperforator or page teletypewriter, depending on which keyboard is used, in the remaining jack of local circuit 1.

(3) Insert the gray plug of the transmitter-distributor in the SEND jack of line 1 or 2 as required.

f. To send from the keyboard of either the typing reperforator or the page teletypewriter to line, to receive from line (making perforated tape and page copy on either operation), and to transmit simultaneously to another line from tape, make the following connections:

(1) Insert the red and black plugs of the typing reperforator and the page teletypewriter in the REC. and SEND jacks of line 1 or 2 as required.

(2) Insert the gray plug of the transmitter-distributor in the SEND jack of the remaining line.

g. To prepare a perforated tape or page copy, or both, from previously prepared tape, make the following connections:

(1) Insert the gray plug of the transmitter-distributor in the jack of local circuit 1.

(2) Insert the red plug of the typing reperforator or the page teletypewriter, or both, depending on copy desired, in the remaining jacks of local circuit 1.

73. Radioteletype Relay Operation

a. Adjust the transmitting shelter components to the assigned frequency as indicated in paragraphs 40 through 47.

b. Adjust the receiving shelter components to the assigned frequency as indicated in paragraphs 50 through 55.

c. Adjust the operating shelter components as indicated in paragraphs 57 and 58.

d. In the operating shelter, set the OPERATION switch to the EMERG FS position and the SERVICE switch to the FULL DX position on the control unit.

e. Set the MOTOR switch of the monitoring teletypewriter in the receiving shelter to the ON position.

f. Messages received from one station will be retransmitted to the other station. The monitoring teletypewriter in the receiving shelter will print page copy of the message.

74. Normal Cw Transmission

a. From Transmitting Shelter.

(1) Insert the plug on the Key J–37 cord into the KEY jack of Junction Box J–207/MRC–2 or either KEY jack of Junction Box JB–70–(*).

Note: If the KEY jack of Junction Box JB–70–(*) is used, Cord CD–1019 must be removed from the DISABLING jack of Junction Box J–207/MRC–2. If this is not done, a continuous unbroken carrier at the mark frequency will be transmitted. This cord *must not* be removed when keying from Junction Box J–207/MRC–2.

(2) Set the TEST key on the frequency shift exciter unit to the MARK position.

(3) Set the transmitter switch on Junction Box JB–70–(*) to the TRANS. ON position.

(4) Depress Key J–37. The buffer indicator lamp becomes bright, and normal current meter readings are observed on the transmitter and amplifier.

(5) Release the key and the buffer indicator lamp will become dim.

(6) The cw intelligence can be monitored at Junction Box JB–70–(*) by plugging the headset into either HEADSETS jack and setting the C. W. SIDETONE switch to the correct position. In the TO BC–342 position, the sidetone will be heard in the right-hand jacks and in the TO BC–312 position, in the left-hand jacks.

b. From Receiving Shelter.

(1) At the operating shelter, set the OPERATION switch of the control unit to the EMERG CW position and the EE–8 switch on the jack panel to the COMBINED position.

(2) Communicate with the receiving shelter. Instruct the operator to set the OUTPUT switch of the converter to the SPACE position.

(3) Communicate with the transmitting shelter. Instruct the operator as follows:

(*a*) Remove the plug at the end of Key J–37 from the KEY jack of Junction Box J–207/MRC–2.

(*b*) Set the TEST key on the exciter unit to the NORM position.

(*c*) Operate the transmitter switch of Junction Box JB–70–(*) to the TRANS. ON position.

(4) At the receiving shelter, depress the telegraph key. Communicate with the operator at the transmitting shelter. Have the operator check to be sure that the conditions described in *a*(4) above are observed.

(5) Release the key and have the operator check to be sure that the conditions described in *a*(5) above are observed.

(6) The cw transmission may be monitored at the junction box as in *a*(6) above or at the receiving shelter by Radio Receiver R–388/URR.

75. Radiotelephone Transmission

Radio Set AN/MRC–2(*) is primarily used for transmission of teletypewriter signals. However, in certain emergencies or in mobile operation (Radio Set AN/MRC–2C only) or at other times when desired, radio telephone operation may be used. Amplifier AM–141(*)/MRC must always be disconnected during radio telephone operation.

a. Normal Transmission.

(1) Disconnect Cord CG–65A/MRC–1 from the transmitter output terminals.

(2) Disconnect the antenna lead-in Cord CG–145A/MRC–1 from the output terminals of the amplifier and connect them to the output terminals of the transmitter.

(3) Tune the transmitter in the normal manner. Remove high voltage from the set. (Have the TRANSMITTER switch at the control unit in the off position (down); the PLATE POWER switch on the transmitter off (down); and the transmitter switch on the junction box at the TRANS. OFF position.

(4) Set the CW-PHONE switch to the PHONE position.

(5) Set the MODULATOR BIAS control fully counterclockwise.

(6) Set the TEST switch on the exciter unit to the MARK position.

(7) Remove the plug at the end of disabling Cord CD–1019 from the CARBON MIC. 1 jack of the speech amplifier and insert the plug from Microphone T–17–D.

(8) Press the button on the carbon microphone and adjust the MODULATOR BIAS control until the MODULATOR PLATE meter on the speech amplifier indicates 40 milliamperes (ma). Speak into the microphone and adjust the CARBON MIC. 1 control on the speech amplifier for an indication of approximately 200 ma on voice peaks.

(9) Microphone T–45 may be used in place of the carbon microphone by inserting the plug attached to the cord into the CARBON MIC. 1 jack.

(10) Microphone T–50, a dynamic microphone, may be used to modulate the transmitter carrier by inserting the plug attached to this microphone into the DYNAMIC MIC. 2 socket on the speech amplifier. (Remove Cord CD–1019 from the CARBON MIC. 1 jack regardless of the type of microphone used.)

b. Mobile Operation. The only antenna available while the transmitting shelter is in motion is the whip antenna. This must be used with Antenna Tuning Unit BC–939–B which is available only with Radio Set AN/MRC–2C.

(1) Remove Cord CG–65A/MRC–1 (to the amplifier) from the transmitter output terminals and connect the coaxial cable from the antenna tuning unit.

(2) Check to see that the antenna tuning unit output terminal is connected to Mast Base MP–47–A in the roof of the shelter.

(3) Set the antenna tuning unit band switch to the correct position for the frequency to be used. Set the COUPLING control to the minimum coupling position.

(4) Tune the transmitter in the normal manner as outlined in paragraph 43, omitting any adjustments on the amplifier.

(5) Set the antenna tuning unit COUPLING control at approximately half coupling (20 to 30 on the indicating window above the crank).

(6) Rotate the FREQUENCY crank which covers the frequency of transmission to the point where the reading on the P. A. PLATE current meter is approximately 100 ma.

(7) Set the HIGH VOLTAGE PROTECT switch to the down position.

(8) Add coupling by use of the COUPLING control until a maximum of 300 ma of pa plate current is obtained.

(9) Adjust the P. A. PLATE TUNING control for minimum plate current.

(10) Readjust the FREQUENCY crank for maximum rf current on the ANTENNA CURRENT meter.

(11) Turn off the PLATE POWER switch and move the C. W.-PHONE switch to the PHONE position. Follow the procedures of *a*(5) through (10) above.

76. Emergency Operation

a. Frequency Shift Transmission From Receiving Shelter Teletypewriter. If teletypewriter signals cannot be passed from the operating shelter to the transmitting shelter, frequency shift transmission may be maintained in the following manner:

(1) At the receiving shelter, communicate with the operator at the operating shelter. Instruct the operator to set the OPERATION switch to the EMERG FS position and the METER switch to the SEND LINE CURRENT position on the control unit.

(2) At the receiving shelter, set the OUTPUT switch on the converter to the SPACE position. Insert the plug from the telegraph key into the KEY jack of the operating table jack panel.

(3) Instruct the operator at the operating shelter to set the TRANSMITTER switch to the ON position. Depress the telegraph key (mark signal).

(4) Set the METER B switch on the converter to the NEUTRAL position and check meter B to see that it indicates 60 to the right of zero.

(5) Release the key to transmit a space signal. Check meter B to see that it indicates O.

b. Transmission in Event of Amplifier Failure. All types of transmission may be maintained in the event of amplifier failure. This is done at reduced power by connecting the output of Transmitter BC–610–I directly to the antenna. Proceed as follows:

(1) Disconnect Cord CG–65A/MRC–1 from the transmitter output terminals.

(2) Disconnect antenna lead-in Cord CG–145A/MRC–1 from the output terminals of the amplifier.

(3) Connect antenna lead-in Cord CG–145A/MRC–1 to the transmitter output terminals.

(4) Proceed to operate as normal.

c. Transmission in Event of Frequency-shift Exciter Unit Failure. Radioteletype transmission is not possible in the event of exciter unit failure. In this event, transmission on cw or phone may be continued in the following manner:

(1) Set the M. O.-XTAL switch of the transmitter tuning unit to the M. O. position.

(2) Tune the transmitter for master-oscillator operation as described in TM 11–826.

(3) For cw operation, follow the procedures in paragraph 74*a*.

(4) For radiotelephone operation, follow the procedures in paragraph 75*a* or 75*b*.

d. Emergency Cw Operation. In the event of failure of the 12-volt system or of relay RY 200 in Junction Box JB–70–(*), cw operation can be maintained in the following manner:

(1) Set the M. O.-XTAL switch of the transmitter tuning unit to the M. O. position.

(2) Tune the transmitter for master-oscillator operation as described in TM 11–826.

(3) Turn on high voltage in the transmitter by moving the transmitter switch on the junction box to the TRANS. ON position.

(4) Insert the plug from Key J–37 into the KEY jack on Speech Amplifier BC–614–I and transmit.

Caution: When using this emergency cw operation, the disabling circuits are not operative. Set the monitoring receiver away from the transmitter frequency. Do this whether the monitoring receiver is on or not.

(5) The cw transmission may be monitored at the junction box as outlined in paragraph 74*a*(6).

77. Antijamming Instructions

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

a. Jammed Am Signals by Cw, Pulse, Fm, Am, or Bagpipes.

(1) Detune the receiver several degrees on either side of the desired signal by using the MEGACYCLES-KILOCYCLES tuning knob. This may cause some separation of the desired signal from the jamming signal.

(2) Operate the LIMITER switch to the ON position. Strong pulse signals may be reduced greatly. If not, operate the switch to the OFF position.

(3) Operate the CRYSTAL FILTER SELECTIVITY control to position 1. Adjust the CRYSTAL FILTER PHASING control for the best reception of the desired signals. Repeat the procedures given in (1) above. If the results are unfavorable, operate the SELECTIVITY control to each of the three other positions and adjust the PHASING control each time the SELECTIVITY control is operated. Again repeat the procedures given in (1) above. When the SELECTIVITY control is in position 4, the radio receiver is most selective. Selectivity may result in a greater separation of signals.

(4) Vary the RF GAIN control in both directions. This may reduce the jamming signal sufficiently to permit the comparatively weak wanted signal to be copied. When the radio frequency gain of the receiver is increased, it is possible to saturate the jamming signal.

(5) Operate the AVC control to the OFF position. Position the CRYSTAL FILTER SELECTIVITY control at position 1, 2, 3, or 4 for the best reception. The sensitivity of the radio receiver will be increased somewhat, and better separation of the wanted signals and the jamming signals may be obtained.

(6) Vary the AUDIO GAIN control in both directions. The level of the desired signal may be raised sufficiently to saturate the jamming signals and provide perfect copy of the desired signals.

(7) If the above instructions fail to provide satisfactory separation of the desired signals from the jamming signals, try the following methods:

(*a*) Request a change in frequency and call letters.

(*b*) Request the use of cw signals if teletypewriter or am methods fail.

(8) When the jamming action is so thorough that reception is impossible, make a report to the immediate superior but continue to operate the equipment.

b. Jammed Cw Signals by Cw and Pulse Signals or Bagpipes, Either Separately or in Combination.

(1) Repeat the procedures in *a*(1) and (3) above.

(2) Vary the BFO PITCH control to separate the tone characteristics of the desired signal from that of the jamming signal.

(3) Operate the LIMITER control to the ON position to eliminate strong noise pulses.

(4) Repeat the procedures given in *a*(4), (5), (6), (7), and (8) above.

78. Stopping Procedure

The following procedure is used to shut down all equipment after communications have ceased:

a. Operating Shelter. The operator will notify the operators in the other shelters to cease operations, and then will proceed to shut down the operating shelter as follows:

(1) Turn the TRANSMITTER switch, on the control unit, to the off (down) position.

(2) Turn off all ac supply switches on the components in the shelter.

(3) Press the STOP switch on the power unit.

b. Transmitting Shelter.

(1) Turn off all ac supply switches on the components in the shelter.

(2) Press the STOP switch on Junction Box JB–70–(*).

c. Receiving Shelter.

(1) Turn off all ac supply switches on the components in the shelter.

(2) Press the STOP switch on the power unit.

Section VIII. OPERATION UNDER UNUSUAL CONDITIONS

Note. The operation of Radio Set AN/MRC–2(*) may be difficult in regions where extreme cold, heat, humidity and moisture, sand conditions, etc., prevail. In this section, instructions are given on procedures for minimizing the effect of these unusual operating conditions.

79. Operation in Arctic Climates

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

a. Handle the equipment carefully.

b. Keep the equipment warm and dry. Keep shelter heaters turned on at all times and regulate ventilation as necessary. An additional electric heater may be requisitioned for auxiliary heating if the shelter heater is not adequate.

c. Do not attempt to operate teletypewriters when they are cold, because the typing mechanism is inoperable at low temperatures. Allow adequate warmup time before using them.

d. When equipment has been exposed to the cold, moisture will condense on it. When the equipment reaches room temperature, dry it thoroughly.

80. Operation in Tropical Climates

a. When operating the equipment in tropical climates, high relative humidity will cause condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than the temperature of the surrounding air. To minimize this condition, provide adequate ventilation. Dry the equipment thoroughly before operating it.

b. Tape all cable connectors with rubber tape to prevent shorts and leakage caused by moisture.

81. Operation in Desert Climates

a. The main problem which arises with equipment operation in desert areas is the large amount of sand or dust and dirt which enters the moving parts of equipment such as motors and power units. Try to make the shelters as dustproof as possible with available materials. Hang wet sacking over windows and doors. Check and clean air filters in Power Units PE–95–(*) daily.

b. Keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (par. 87). Pay particular attention to the lubrication of the equipment. Excessive amounts of dust, sand, or dirt that come into contact with oil and grease result in grit, which will damage the equipment.

c. Make periodic checks of the doublet and/or rhombic antennas, to prevent damage during sudden wind squalls which occur in desert areas.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE

Section I. ORGANIZATIONAL TOOLS AND EQUIPMENT

82. Tools and Equipment Supplied with Radio Set AN/MRC–2(*)

The table of components in the appendix contains the listing of the tools and equipment supplied for each of the shelters.

83. Special Tools for Radio Set AN/MRC–2(*)

The tools that are furnished with Radio Set AN/MRC–2(*) should be adequate for organizational maintenance of the equipment. A neutralizing indicator and a neutralizing tool are included to aid in neutralizing the Amplifier AM–141(*)/MRC. This tool consists of a loop of insulated wire and an incandescent lamp. If the loop is placed near a circuit containing rf currents, the loop will pick up sufficient energy to light the lamp. The neutralizing tool is included to adjust the neutralizing capacitors while the set is on. This consists of a polystyrene rod about 12 inches long with a rubber ball on one end to turn the plates of the neutralizing capacitors. A special, long-handled T-wrench is provided to aid in removing the radio transmitter from the shelter deck. Additional tools, if required, can often be improvised. For example, a safety shorting stick and several jumper wires may be constructed. For construction of a suitable shorting stick see TM 11–826. Jumper wires made from heavy flexible wire, about 18 inches long, with heavy clips attached to each end are also supplied for use as shorting links across high-voltage capacitors in components that are being repaired or cleaned.

Section II. PREVENTIVE MAINTENANCE SERVICES

84. Definition of Preventive Maintenance

Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles from occurring.

85. General Preventive Maintenance Techniques

a. Use No. 000 sandpaper to remove corrosion.

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

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

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

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

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

d. For further information on preventive maintenance techniques, refer to TB SIG 178, Preventive Maintenance Guide for Radio Communication Equipment.

86. Use of Preventive Maintenance Forms (figs. 53 and 54)

a. The decision as to which items on DA Forms 11–238 and 11–239 are applicable to this equipment is a tactical decision to be made in the case of first echelon maintenance by the communication officer/chief or his designated representative,

and in the case of second and third echelon maintenance, by the individual making the inspection. Instructions for the use of each form appear on the reverse side of the form.

b. Records of the maintenance and inspection of the major radio components (except Amplifier AM–141(*)/MRC) which make up the radio set are maintained on individual Forms DA 11–238 and DA 11–239. Specific instructions on the preventive maintenance of each of these are contained in their respective manuals (par. 1). Instructions for the specialized maintenance of the teletypewriter equipment are given in detail in TM 11–2234.

c. Circled items on figures 53 and 54 are applicable to the *remaining* equipments of Radio Set AN/MRC–2(*). These include the shelter itself, the various antennas, antenna accessories and lead-ins, Amplifier AM–141(*)/MRC, and the several junction boxes. Items not applicable to the equipment have been crossed out.

87. Performing Preventive Maintenance

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

a. Exterior Items (fig. 53).

(1) Check the completeness and satisfactory condition of the equipment listed in paragraph 86*c*.

(2) Check the suitability of location and installation for normal operation (par. 15) (figs. 20 and 21).

(3) Clean dirt and moisture from the antenna mast bases, microphones, headsets, keys, jacks, plugs, equipment cases and panels, and antenna and transmission line insulators (par. 85).

(4) Inspect all pilot lamps, fuses, connectors and plug-in coils for satisfactory seating and good electrical contact (figs. 81 through 84).

(5) Inspect controls on the amplifier and the junction boxes for binding, scraping, excessive looseness, and misalinement. Make certain that each control has positive action (figs. 44 and 45).

(6) Check the amplifier and overall system for normal operation (pars. 68 through 75).

(7) Clean and tighten all panel screws, shock mounts, whip antenna connections, coaxial transmission lines, and cable connections (par. 85).

(8) Inspect for rust, corrosion, and moisture in all cases, mountings, antennas, mast bases, mast sections, and all exposed metal surfaces (par. 91).

(9) Inspect for cuts, breaks, kinks, and fraying in all cords, cable assemblies, shelter wiring, shelter interconnecting lines, and antenna guys (par. 93).

(10) Inspect all antennas for eccentricities, corrosion, damaged insulators; check all mast sections for tightness of fit (pars. 19 through 24).

(11) Inspect canvas items, leather, and cabling for mildew, tears, and fraying (par. 93).

(12) Inspect switches, knobs, jacks, connectors, transformers, equipment mounts, relays, blower motor, capacitors, and pilot lamp assemblies (figs. 80 and 82 through 86).

(13) Inspect storage batteries in transmitting shelter (AN/MRC–2C only), power units, and vehicles for dirt, loose terminals, electrolyte level, specific gravity, and damaged or corroded cables (par. 93).

(14) Clean blower air filters, name plates, dial and meter windows, and pilot lamp jewels (par. 85*b*).

(15) Inspect amplifier meters for damaged glass and cases (fig. 8).

(16) Inspect Shelters HO–17–(*) and shelters and covers of the power units for adequacy of weatherproofing (par. 90).

(17) Check the guy wires of the doublet antennas and rhombic antenna masts for looseness and proper tension (fig. 42 and 43).

(18) Check terminal box covers for cracks, dirt, and grease.

(19) Where deficiencies are noted and not immediately corrected, indicate on the form the action taken.

b. Interior Items (fig. 54).

Caution: Disconnect all power before performing the following operations. Upon completion, reconnect the power and check for satisfactory operation.

(1) Inspect fixed capacitors for leaks, bulges, and discoloration (par. 93).

OPERATOR FIRST ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT

RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE: RADIO SET AN/MRC-2(*)

EQUIPMENT SERIAL NO.

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

NOTE: Strike out items not applicable.

DAILY

NO.	ITEM	CONDITION S	M	T	W	T	F	S
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT *(receiver, transmitter, [redacted] wire and cable, microphones, tubes, spare parts, technical manuals and accessories).* PAR. 87 a (1)							
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 87 a (2)							
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, [redacted] KEYS, JACKS, PLUGS, TELEPHONES, [redacted] COMPONENT PANELS. PAR. 87 a (3)							
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: [redacted] LAMPS, [redacted] FUSES, CONNECTORS, [redacted] PLUG-IN COILS AND RESISTORS. PAR. 87 a (4)							
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR. 87 a (5)							
6	CHECK FOR NORMAL OPERATION. PAR. 87 a (6)							

WEEKLY

NO.	ITEM	CONDITION	NO.	ITEM	CONDITION
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, [redacted] SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, [redacted] AND CABLE CONNECTIONS. PAR. 87 a (7)		13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES. PAR. 87 a (13)	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR. 87 a (8)		14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES. PAR. 87 a (14)	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR. 87 a (9)		15	INSPECT METERS FOR DAMAGED GLASS AND CASES. PAR. 87 a (15)	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS. PAR. 87 a (10)		16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING. PAR. 87 a (16)	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING. PAR. 87 a (11)		17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION. PAR. 87 a (17)	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, [redacted] RELAYS, [redacted] MOTORS, BLOWERS, CAPACITORS, [redacted] AND PILOT LIGHT ASSEMBLIES. PAR. 87 a (12)		18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE. PAR. 87 a (18)	
19	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 87 a (19)				

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

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Figure 53. DA Form 11-238.

SECOND AND THIRD ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT

RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE: RADIO SET AN/MRC-2 (*)

EQUIPMENT SERIAL NO.

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

NO.	ITEM	CONDITION
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT (*receiver, transmitter, [redacted], wire and cable, microphones, tubes, spare parts, technical manuals and accessories*). PAR. 87 a (1)	
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 87 a (2)	
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, [redacted] KEYS, JACKS, PLUGS, TELEPHONES, [redacted], COMPONENT PANELS. PAR. 87 a (3)	
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: [redacted], LAMPS, [redacted] FUSES, CONNECTORS, [redacted] PLUG-IN COILS AND RESISTORS. PAR. 87 a (4)	
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR. 87 a (5)	
6	CHECK FOR NORMAL OPERATION. PAR. 87 a (6)	
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, [redacted], SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, [redacted], AND CABLE CONNECTIONS. PAR. 87 a (7)	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR. 87 a (8)	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR. 87 a (9)	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS. PAR. 87 a (10)	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING. PAR. 87 a (11)	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, [redacted], RELAYS, [redacted], MOTORS, BLOWERS, CAPACITORS, [redacted], AND PILOT LIGHT ASSEMBLIES. PAR. 87 a (12)	
13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES. PAR. 87 a (13)	
14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES. PAR. 87 a (14)	
15	INSPECT METERS FOR DAMAGED GLASS AND CASES. PAR. 87 a (15)	
16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING. PAR. 87 a (16)	
17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION. PAR. 87 a (17)	
18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE. PAR. 87 a (18)	
19	~~ELECTRON TUBES - INSPECT FOR LOOSE ENVELOPES, CAP CONNECTORS, CRACKED SOCKETS; INSUFFICIENT SOCKET SPRING TENSION; CLEAN DUST AND DIRT CAREFULLY; CHECK EMISSION OF RECEIVER TYPE TUBES.~~	
20	~~INSPECT FILM CUT-OUTS FOR LOOSE PARTS, DIRT, MISALIGNMENT AND CORROSION.~~	
21	INSPECT FIXED CAPACITORS FOR LEAKS, BULGES, AND DISCOLORATION. PAR. 87 b (1)	
22	INSPECT RELAY AND CIRCUIT BREAKER ASSEMBLIES FOR LOOSE MOUNTINGS; BURNED, PITTED, CORRODED CONTACTS; MISALIGNMENT OF CONTACTS AND SPRINGS; INSUFFICIENT SPRING TENSION; BINDING OF PLUNGERS AND HINGE PARTS. PAR. 87 b (2)	
23	INSPECT VARIABLE CAPACITORS FOR DIRT, MOISTURE, MISALIGNMENT OF PLATES, AND LOOSE MOUNTINGS. PAR. 87 b (3)	
24	INSPECT RESISTORS, BUSHINGS, AND INSULATORS, FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE. PAR. 87 b (4)	
25	INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR CORROSION, DIRT AND LOOSE CONTACTS. PAR. 87 b (5)	
26	CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES, AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE. PAR. 87 b (6)	
27	INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS. PAR. 87 b (7)	
28	CHECK SETTINGS OF ADJUSTABLE RELAYS. PAR. 87 b (8)	
29	LUBRICATE EQUIPMENT IN ACCORDANCE WITH APPLICABLE DEPARTMENT OF THE ARMY LUBRICATION ORDER. PAR. 87 b (9)	
30	INSPECT BLOWER MOTOR BRUSHES, FOR BRUSH WEAR, SPRING TENSION, ARCING, AND FITTING OF COMMUTATOR. PAR. 87 b (10)	
31	CLEAN AND TIGHTEN CONNECTIONS AND MOUNTINGS FOR TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS. PAR. 87 b (11)	
32	INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS FOR OVERHEATING AND OIL-LEAKAGE. PAR. 87 b (12)	
33	BEFORE SHIPPING OR STORING - REMOVE BATTERIES. PAR. 87 b (13)	
34	~~INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS.~~	
35	INSPECT BATTERIES FOR SHORTS AND DEAD CELLS. PAR. 87 b (14)	
36	INSPECT FOR LEAKING WATERPROOF GASKETS, WORN OR LOOSE PARTS. PAR. 87 b (15)	
37	MOISTURE AND FUNGIPROOF. PAR. 87 b (16)	
38	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 87 a (19)	

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Figure 54. DA Form 11–239.

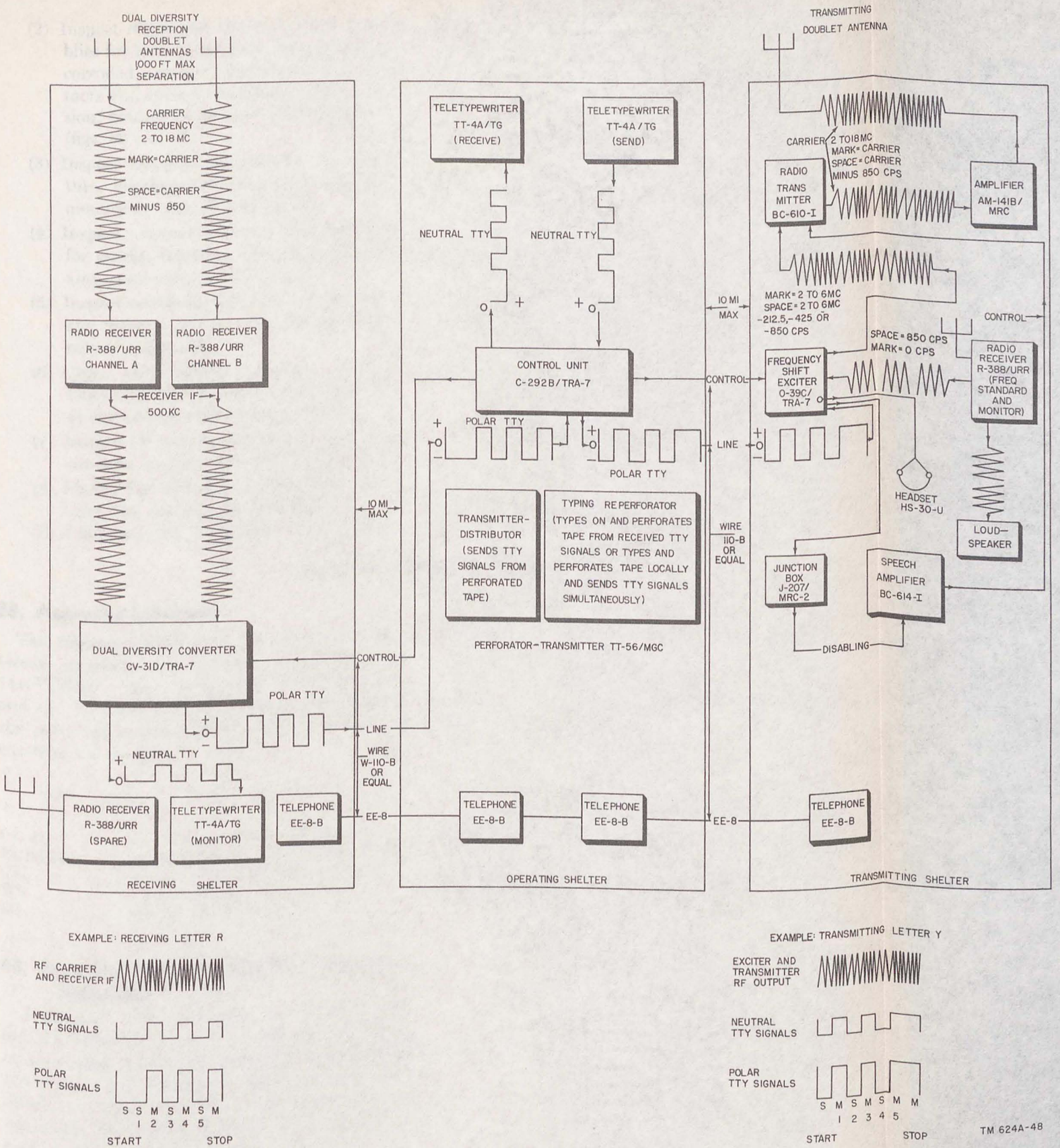

Figure 55. Radio Set AN/MRC-2D, system block diagram.

(2) Inspect relays and circuit breaker assemblies for loose mountings; burned, pitted, corroded contacts; misalinement of contacts and springs; insufficient spring tension; binding of plungers and hinge parts (figs. 86 and 87).

(3) Inspect variable capacitors for dirt, moisture, misalinement of plates, and loose mountings (par. 93 and fig. 82).

(4) Inspect resistors, bushings, and insulators for cracks, chipping, blistering, discoloration, and moisture (par. 93).

(5) Inspect terminals of large fixed capacitors and resistors for corrosion, dirt, and loose contacts (par. 93).

(6) Clean and tighten switches, terminal blocks, blowers, relay cases, and interiors of chassis and cabinets (par. 85).

(7) Inspect all terminal blocks for loose connections, cracks, and breaks (par. 93).

(8) Check the settings of adjustable relays (par. 141 and figs. 86 and 87).

(9) Lubricate the equipment in accordance with the applicable Department of the Army lubrication order (par. 89).

(10) Inspect the blower motor brushes for brush wear, spring tension, smoothness of surface, and signs of arcing (par. 137).

(11) Clean and tighten connections and mountings for transformers, chokes, potentiometers, and rheostats. (Refer to the applicable technical manual.)

(12) Inspect transformers, chokes, potentiometers, and rheostats for overheating andoil leakage. (Refer to the applicable technical manuals.)

(13) Before shipping or storing, remove batteries from all telephones, transmitting shelter, and power units.

(14) Inspect wet-cell batteries for shorts or dead cells.

(15) Inspect shelter openings, windows, doors, cable entrance holes etc. for leaking waterproof gaskets, and worn or loose parts.

(16) Inspect moistureproofed and fungiproofed components (par. 90*b*).

Section III. LUBRICATION

88. Approved Lubricants

The following table lists the lubricating materials necessary in servicing Amplifier AM–141(*)/MRC. Information on the lubricants and the lubrication of all other components of the radio set is found in the individual manual covering the equipment (par. 1).

Symbols	Standard nomenclature
OE–10	Oil, Engine, Heavy Duty SAE 10.
PL Special	Oil, Lubricating, Preservative, Special.
GL	Grease, Aircraft and Instruments.
WB	Grease, General Purpose, No. 2.
SD	Solvent, Dry Cleaning.

89. Amplifier AM–141(*)/MRC, Lubrication Instructions

a. General. The intervals at which Radio Set AN/MRC–2(*) is to be lubricated are based on an average 8-hour day operation under normal conditions. For operation under climatic conditions in which extreme temperatures are encountered, the lubricants listed below should be used in place of those specified (par. 88).

Lubricant specified	For temperatures		
	Above +32° F.	+32° F. to 0° F.	Below 0° F.
OE–10	OE–10	PL Special	PL Special.
GL	GL	GL	PL Special.
WB	WB	GL	GL.

Note. Before applying lubricant, be sure that the parts are clean and free from dust or dirt. Lubricate sparingly. Wipe off excess lubricant.

b. Lubrication. Clean and lubricate the following parts every 3 months:

(1) *Plate tuning capacitors.*

(*a*) Apply 1 drop of oil (PL Special) to each of the bearings located at the ends of the rotor shafts.

(*b*) Clean the contact surfaces of the contact wipers with a cloth or stiff brush and solvent (SD). After cleaning, wipe with a clean cloth. *Do not lubricate contact wipers.*

(*c*) Apply 1 drop of oil (PL Special) to each tuning dial shaft bearing.

(2) *Grid tuning capacitors.*

(*a*) Apply 1 drop of oil (PL Special) to each of the bearings located at the ends of the rotor shafts.

(*b*) Clean contact surfaces of contact wipers with a cloth or stiff brush and solvent (SD). After cleaning, wipe with a clean cloth. *Do not lubricate contact wipers.*

(*c*) Apply 1 drop of oil (PL Special) to each tuning dial shaft bearing.

(*d*) Lightly coat the teeth of each of the bevel drive gears with grease (GL). Wipe off excess grease.

(3) *Band switch.*

(*a*) Apply 1 drop of oil (PL Special) to each shaft bearing.

(*b*) Lightly coat the teeth of the gear and rack with grease (GL). Wipe off excess grease.

(*c*) Clean the slide contactor plate by wiping it with a cloth moistened with oil (PL Special).

(4) *Blower motors B1 and B2.* Apply 4 to 6 drops of oil (OE–10) to the blower motor through oil tubes attached to each motor.

(5) *Disassembly of high pressure blower motor B3 for lubrication.*

(*a*) Remove the high-pressure blower air filter and blower housing by unscrewing the ¼-inch machine screw and turning the Air-loc studs counterclockwise.

(*b*) Open the terminal box by removing the two screws that hold the lid in place. Unsplice and disconnect the four motor leads. Push the motor leads inside the housing.

(*c*) Remove the Allen head screws on the housing that hold the motor support bracket. Unscrew the four thumb nuts that hold the air filter in place and remove the filter. The fan and motor assembly now may be removed.

(*d*) Before removing the two end bells from the motor housing, mark the relative positions of the end bells and the motor housing. This can be done with a sharp instrument drawn across the junction of the end bell and the housing. When reassembling, the bells will be in the same position as they were before being removed.

(*e*) If it is necessary to remove the bearings from the shaft, apply pressure only against the inner race.

(*f*) Clean the bearing with solvent (SD). Dry the bearing thoroughly before applying grease. Knead grease (WB) into the space between the inner and outer races. Wipe off excess grease and replace the bearings on the shaft. Do not allow dirt or other foreign matter to contaminate the grease in the bearing.

Note. Some motors are equipped with sealed bearings which are prelubricated for the life of the bearing. Do not disassemble or lubricate this type of motor.

(*g*) To reassemble the blower, reverse the procedure described above. After the motor and blower have been reassembled, be sure that the fan clears the inside of the housing. It may be necessary to readjust the motor mounting brackets to achieve proper fan clearance.

Section IV. WEATHERPROOFING

90. Weatherproofing

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

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

c. Arctic Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66 and TB SIG 219.

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

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

91. Rustproofing and Painting

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

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

b. When a touchup job is necessary, apply paint with a small brush. Remove rust from the case by cleaning corroded metal with solvent (SD). In severe cases it may be necessary to use solvent (SD) to soften the rust and to use sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations. For further information on painting, refer to TM 9–2851.

Section V. TROUBLESHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

92. General

a. The troubleshooting and repair work that can be performed at the organizational maintenance level (operators and repairmen) is necessarily limited in scope by the tools, test equipment, and replaceable parts issued, and by the existing tactical situation. Accordingly, troubleshooting is based on the performance of the equipment and the use of the senses and substitution techniques in determining such trouble as burned-out tubes, fuses, etc. The amplifier tubes can only be checked by substitution. For all other tubes refer to the individual equipment manuals.

b. Paragraphs 92 through 96 will help to determine which component is at fault. After localizing the fault to a component, the defective stage or item can be determined.

93. Visual Inspection

a. Many of the faults appearing in Radio Set AN/MRC–2(*) may be detected by a visual inspection of the system components.

b. Pilot lamps are used to indicate when the power source is connected to a component. If the indicating lamp fails to light, check to see that the power cords are connected to the proper receptacle and that the plugs are inserted properly. Check to see that cords and plugs are not broken or worn.

c. One type of fault is the improper setting of switches and controls. Check the switch and control settings for the mode of operation to be used.

d. Check to see that the type of operation and service is one that is permitted by the tactical situation.

94. System Sectionalization of Trouble to a Component

a. System sectionalization consists of determining in which shelter the defective component is located and then determining which component is defective.

b. Operate the entire system and observe its performance. Refer to the equipment performance check list (par. 96) for normal operating indications.

c. If the components of any particular shelter do not function, the trouble is in the power source.

d. If only one component is inoperative, the trouble is in that component and may be only a fuse. Do not continue to burn out fuses before looking elsewhere to determine the source of the trouble.

e. If the signal is present in one component (as indicated by proper meter reading such as polar on converter), but there is no indication of a signal in the component which follows it, the trouble may be a defective connector or disconnected cord.

Note. The order in which one component follows the other is shown on the complete block diagram (fig. 55).

f. If the teletypewriter equipment does not operate properly, the trouble is probably in the TTY equipment cords, plugs, or jacks, or in the setting of switches in Control Unit C–292B/TRA–7.

g. To find the source of excessive noise, remove the antenna lead-in from the operating receiver. If noise becomes less pronounced or stops, the trouble is either in the antenna, or from a source external to the shelter. If noise persists, try one receiver at a time. If the noise continues with either receiver, the trouble is within the receiver.

Refer to the troubleshooting sections of the receiver manual.

h. Use the procedures outlined above to isolate the trouble to a particular unit.

i. If these checks are not productive, use the equipment performance check list.

95. Troubleshooting by Using Equipment Performance Checklist

a. General. The equipment performance checklist (par. 96) will help the operator to locate trouble in the equipment of a particular shelter. The chart gives the item to be checked, the conditions under which the item is checked, the normal indications and tolerances of correct operation, and the corrective measures the operator can take. *To use this list, follow the items in sequence.*

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

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

d. Corrective Measures. The corrective measures listed are those the operator can make without turning in the equipment for repairs. A reference in the checklists to a paragraph or technical manual indicates that the trouble probably cannot be corrected during operation and that troubleshooting by an experienced repairman is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must attempt to maintain the set in operation as long as it is possible to do so.

96. Equipment Performance Checklist

a. Transmitting Shelter.

	Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Power Unit PE–95–(*)	CIRCUIT BREAKER switch.	Check to see that it is in the ON position.	In ON position when remote start-stop operation from Junction Box JB–70–(*) is required.	Place in ON position.
	2		MANUAL START-REMOTE START switch.	Check to see that it is in the REMOTE START position.	In REMOTE START position.	Place in correct position for starting method used.
	3	Junction Box JB–70–(*)	Transmitter switch	Set to TRANS. OFF.		
	4		BATTERY SOURCE switch.	Set at AUX.		
	5		REMOTE CONTROL EE–8 switch.	Set at NORMAL position.		
	6		RECEIVER DISABLING switches.	Set BC–312 and BC–342 switches at ON.		
	7		C. W. SIDETONE switch	Set at OFF position.		
	8		RECEIVER OUTPUT switch.	Set at NORMAL.		
	9	Frequency Shift Exciter 0–39(*)/TRA–7.	AC SUPPLY switch	Set at off (down).		
	10		OVEN switch	Set at off (down).		
	11		TEST OSC 850 ~ switch	Set at OFF.		
	12		TEST key	Set at NORM.		
	13		OSCILLATOR RANGE switch.	Set in accordance with calibration chart.		
	14		OSCILLATOR TUNING control.	Set in accordance with calibration chart.		
	15		SHIFT control	Set in accordance with calibration chart.		
	16		BUFFER TUNING control.	Set in accordance with calibration chart.		
	17	Radio Receiver R–388/URR (AN/MRC–2D only).	OFF-STAND BY-ON switch.	Set at OFF position.		
	18		CRYSTAL FILTER SELECTIVITY control.	Set at O position.		
	19		LIMITER switch	Rotate to OFF position.		
	20		AVC switch	Set at OFF position.		
	21		RF GAIN control	Set at O position.		
	22		BFO switch	Turn to OFF position.		
	23		AUDIO GAIN control	Set at O position.		
	24		CALIBRATE switch	Turn to OFF position.		
	25		BFO PITCH control	Set to white line.		

a. Transmitting Shelter—Continued

	Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
START	66	Frequency Shift Exciter O–39(*)/TRA–7.	AC SUPPLY and OVEN switches.	Throw to ON position at least 2 hours before initial adjustment.	AC SUPPLY and OVEN indicator lamps light.	Check to see that cord is connected to AC SUPPLY socket. Replace fuse F101 or F102, or both. Replace defective indicator lamp.
	67	Radio Transmitter BC–610–I.	FILAMENT POWER switch.	Set to ON position. Wait 1 minute for filaments to reach operating temperature.	Green pilot lamp lights	Check fuses FS1, FS2, and FS4 and Cord CD–763. Replace fuses if necessary.
	68	Radio Transmitter BC–610–I.	FILAMENT VOLTAGE control.	Turn partially clockwise	FILAMENT VOLTAGE meter reads 5 to 5.3 volts.	Adjust FILAMENT VOLTAGE control.
	69	Amplifier AM–141(*)/MRC	CIRCUIT BREAKER switch.	Set to ON position	Indicator lamp at left of CIRCUIT BREAKER glows.	Replace lamp. Check Cord CX–135/MRC–1.
	70		INCREASE FILAMENT control.	Turn partially clockwise	FILAMENT VOLTAGE meter indicates 10 volts.	Adjust INCREASE FILAMENT control. Check CIRCUIT BREAKER K5 contacts. Replace fuse F1 or F2 if necessary.
	71	Radio Receiver R–388/URR (AN/MRC–2D only).	OFF-STAND BY-ON switch.	Turn to ON position	Dial lamp lights	Check fuse F101 at rear of set. If blown, try to determine cause by visual inspection before inserting new fuse. Check line cord and power source.
	72		RF GAIN control	Set at 10	Rushing noise is heard at output.	Refer to TM 11–854.
	73		AUDIO GAIN control	AUDIO GAIN control set at 5.		
	74		BFO switch	Set to ON.		
	75		CALIBRATE switch	Set to ON.		

76	Frequency Shift Exciter O–39(*)/TRA–7.	TEST key	All dials and controls set in accordance with charts. TEST key set at MARK. BUFFER TUNING dial rotated in either direction.	BUFFER INDICATOR lamp glows with maximum brilliance when BUFFER TUNING dial is tuned to resonance.	Check settings of all controls in accordance with instructions (par. 42). Check for faulty connections in either end of Cord CX–961/TRA–7 (red). Disconnect key cord plug from jack on Junction Box J–207/MRC–2. Refer to TM 11–257.
77	Radio Transmitter BC–610–I.	DOUB. knob	TEST key on exciter unit set to MARK. DOUB. knob adjusted for maximum INT. AMP. GRID X1 current. EXCITATION METER SWITCH set to: DOUBLER PLATE X10. INT. AMP. GRID X1.	EXCITATION METER reads: 25 to 45 ma. 1 to 8 ma.	If the meter does not indicate in any position (except for a low reading in the DOUBLER PLATE X10 position), check the installation and tuning of the tuning unit, the setting of the BAND SWITCH, and the position of the M.O.-XTAL switch on the tuning unit. If the meter readings are improper, retune the transmitter. Refer to TM 11–826.
78		INT. AMP. knob	TEST key on exciter unit set to MARK. INT. AMP. knob adjusted for maximum P.A. GRID X10 current. EXCITATION METER SWITCH set to: INT. AMP. PLATE X20. P.A. GRID X10.	EXCITATION METER reads: 125 to 175 ma. 60 to 100 ma.	Retune the DOUB. knob. Refer to TM 11–826.
79	Radio Transmitter BC–610–I.	P.A. PLATE TUNING dial.	TEST key on exciter unit set to MARK. HIGH VOLTAGE PROTECT switch set to HIGH VOLTAGE PROTECT. INCREASE EXCITATION knob (on Amplifier AM–141(*)/MRC) rotated about one-half turn in clockwise direction.		

a. Transmitting Shelter—Continued

EQUIPMENT PERFORMANCE

Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
			P.A. PLATE TUNING dial adjusted for minimum indication.	P.A. PLATE meter reads 100 ma.	Remove rf coil unit and move the coupling coil to about 15° from horizontal and replace coil unit. If reading is still below 100 ma, add more coupling in the same manner. Check fuse FS3. Check all interlock switches. Refer to TM 11–826.
80		P.A. PLATE meter	TEST key on exciter set to MARK. HIGH VOLTAGE PROTECT switch set to NORMAL.	P.A. PLATE meter reads 200 to 300 ma.	Check tuning of P.A. TUNING control. Check adjustment of GRID TUNING control on the power amplifier. Check EXCITATION INCREASE control on power amplifier. Operate the overload reset switch.
81	Radio Receiver R–388/URR (AN/MRC–2D only).	KILOCYCLES dial knob	Tune across entire band by rotating KILOCYCLES dial knob. Rotate ANT. TRIM control in a small arc.	Receiver tracking on signals. Meter in input position fluctuates with varying signals strength. As optimum match is met, signal increases.	If normal signals are heard but meter shows no reaction, trouble shooting is necessary. Refer to TM 11–854. If no signals or weak signals are heard, check antenna for firm connections. Check shield for fraying that might ground antenna. Check soldered connections for corrosion or high resistance. Check ground along antenna.
			Tune to the nearest frequency which is an exact multiple of 100 kc in the range it is desired to calibrate.	Zero-beat signal is heard at output.	Retune KILOCYCLES knob for zero beat. Check to see if CALIBRATE switch is in the ON position.

82	----------	ZERO ADJ. control------	Turn ZERO ADJ. control to set tuning control division marker to coincide with index line. Turn CALIBRATE switch to off. Plug one end of Cord CG–390/U into PHONES jack of receiver and plug other end into FREQUENCY METER IN jack of frequency shift exciter. Set KILOCYCLES dial knob to the assigned frequency.	Receiver is ready to be used as a frequency standard.	Refer to TM 11–854.
83	Frequency Shift Exciter 0–39 (*)/TRA–7.	OSCILLATOR TUNING control (AN/MRC–2D).	TEST OSC. switch in OFF position. Tune OSCILLATOR TUNING control for zero beat of strongest signal. Retune BUFFER dial------	Zero beat obtained in loudspeaker of Radio Receiver R–388/URR. Stationary shadow on 850~TEST indicator.	Refer to paragraph 46*a*.
84	----------	OSCILLATOR TUNING control (AN/MRC–2C only).	TEST OSC switch in OFF position. TEST key in MARK position. Frequency meter set to assigned frequency. Transmitter alined to exciter frequency. Rotate OSCILLATOR TUNING dial in either direction.	Zero beat obtained in headphones when exciter oscillator is turned to operating frequency.	Refer to paragraph 46 or TM 11–257. Check settings and readjust controls.
85	Frequency Shift Exciter 0–39(*)/TRA–7.	Headset----------	With plug inserted into PHONES 850 ~ TEST jack VOLUME 850 ~ TEST control to midposition, and TEST OSC switch set to 850 ~ position.	850-cycle tone heard in headset.	Refer to paragraph 42 or TM 11–257.
86	----------	VOLUME control---------	Rotate in either direction----	Level of 850-cycle tone will vary.	Refer to paragraph 46*d*.

a. Transmitting Shelter—Continued

EQUIPMENT PERFORMANCE

Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
87		SHIFT control	TEST OSC switch to 850~ position. TEST key in SPACE position. Rotate SHIFT control slightly in either direction. Transmitter alined to exciter frequency.	A zero beat, the combination of an audio tone of 850 cycles (the difference between transmitter and radio receiver signals) beating with the 850-cycle signal from the tone oscillator is obtained in headset when shift dial is adjusted properly. This point also is indicated on the 850~ TEST indicator tube by minimum flutter.	Refer to paragraph 46*d* and *e*. Refer to TM 11–257.
88	Frequency Shift Exciter O–39(*)/TRA–7.	TEST key	With transmitter alined to exciter frequency and TRANSMITTER switch on control unit in ON position: Set on MARK. Set on SPACE. Set on NORM.	BUFFER INDICATOR lamp glows and normal meter readings are observed on the transmitter in all three positions.	Refer to TM 11–257.
89	Amplifier AM–141(*)/MRC	GRID TUNING control	TEST key on exciter to MARK position. Transmitter is adjusted properly. Adjust GRID TUNING control for maximum indication of current. Rotate INCREASE EXCITATION control in clockwise direction.	Transmitter P. A. PLATE meter does not read over 250 ma. Amplifier GRID CURRENT meter reads 200 ma.	Readjust GRID TUNING control of power amplifier and P. A. PLATE TUNING dial of transmitter until correct meter readings are obtained.
90		PLATE TUNING control	Set power amplifier PLATE POWER switch to on position. Set NORMAL-TUNE UP switch in TUNE UP position.	PLATE POWER indicator lamp lights.	Check lamp; push OVERLOAD RESET switch button. Check that all access doors are closed. Push OVERLOAD RESET switch button.

				Adjust PLATE TUNING control for minimum reading on PLATE CURRENT meter.	PLATE CURRENT meter reads 350 ma.	Readjust power amplifier coupling coil to increase or decrease coupling.
				Set NORMAL-TUNE UP switch to NORMAL position.	PLATE CURRENT meter reads 900 to 1,000 ma.	Readjust power amplifier coupling coil if necessary. Readjust PLATE TUNING and GRID TUNING controls to obtain maximum power output. Check antenna installation and length. Check neutralization (par. 140).
STOP	91	Frequency Shift Exciter O–39(*)/TRA–7.	TEST key	Set to NORM. TRANSMITTER switch on control unit in operating shelter set at off (down) position.		
	92	----------	AC SUPPLY and OVEN switches.	Set at off (down) positions	BUFFER INDICATOR lamp goes out. OVEN and dial lamps go out.	
	93	Amplifier AM–141(*)/MRC	PLATE POWER switch	Set at OFF position	PLATE POWER indicator lamp goes out.	
	94	----------	NORMAL - TUNE UP switch.	Set to TUNE UP position (down).		
	95	----------	CIRCUIT BREAKER switch.	Set at OFF position	Bias and filament supply shut off. Blowers stop operating. Transmitter PLATE POWER indicator lamp goes out.	
	96	Radio Transmitter BC–610–I.	FILAMENT POWER switch.	Set to off position	White light goes out and filament power shuts off.	
	97	Radio Receiver R–388/URR (AN/MRC–2D only).	OFF - STAND BY - ON switch.	Turn to OFF position	Dial lamp goes out.	
	98	Frequency Meter BC–221 (*) (AN/MRC–2C only).	Rectifier switch	Set to OFF position	Pilot lamp goes out.	
	99	----------	Operation switch	Set to OFF position.		
	100	Radio Receiver BC–312–(*) (AN/MRC–2C only).	OFF-M. V. C.-A. V. C. switch.	Turn to OFF position	Pilot lamps go out.	
	101	Junction Box JB–70–(*)	STOP button	Press STOP button	All power goes off.	

b. Receiving Shelter.

	Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Shelter HO–17–(*)	Power circuit breaker	Set to OFF position.		
	2		Light circuit breaker	Set to OFF position.		
	3	Radio Receiver R–388/URR, channel A and channel B receivers.	OFF-STAND BY-ON	Turn to OFF position.		
	4		AVC switch	Set to OFF position.		
	5		BAND CHANGE switch	Set to band desired.		
	6		Tuning control	Set to frequency desired.		
	7		CALIBRATE switch	Set to OFF position.		
	8		LIMITER switch	Set to OFF position.		
	9		CRYSTAL FILTER SELECTIVITY switch.	Set to 0 position.		
			CRYSTAL FILTER PHASING control.	Set to white line.		
	10		BFO switch	Set to OFF.		
	11		BFO PITCH control	Set to white line.		
	12	Teletypewriter TT–4A/TG	MOTOR switch	Set to OFF position.		
	13	Dual Diversity Converter CV–31D/TRA–7.	AC SUPPLY switch	Set in off (down) position.		
	14		PLATE ON power switch	Set in off (down) position.		
	15		OUTPUT switch	Set in NORMAL position.		
	16		METER B switch	Turn to COMP AMP.		
	17		DRIFT COMPENSATOR switch.	Place in out (down) position.		
	18		BAND WIDTH switch	Set to the NARROW position.		
	19		CHANNEL A disabling switch.	Set to the OPERATE position.		
	20		CHANNEL B disabling switch.	Set to the OPERATE position.		
	21		MARK HOLD LEVEL switch and control.	Set to OFF.		
	22		LP FIL switch	Set to out (down) position.		
START	23	Power Unit PE–95–(*)	CIRCUIT BREAKER switch.	Set to OFF position.		
	24		START-STOP button	Push START button	Power unit starts	Check for discharged battery in power unit. Set MANUAL–REMOTE switch to MANUAL START position. Refer to TM 11–904.

25	----------	CIRCUIT BREAKER switch (main power switch if commercial source is used).	Set to ON position ----------	Normal line voltage (117 volts) indicated on A.C. VOLTS meter on power unit panel.	Check circuit breaker. Refer to TM 11–904.
26	Shelter HO–17–(*)----------	Power circuit breaker----	Set to ON position.		
27	----------	Light circuit breaker-----	Set to ON position--- ------	Shelter power lamps go on--	Check Cord CX–1165/U from power unit.
28	Radio Receiver R–388/URR channel A and channel B receivers.	OFF - STAND BY - ON switch.	Turn to ON position--------	Dial lamps light----------	Check fuse at rear of chassis. Check power cord and plugs.
29	----------	RF GAIN and AUDIO GAIN controls.	Turn clockwise----------	Increased signal or noise is heard.	Check antenna connection and RF Cable Assembly CG–557/U.
30	Dual Diversity Converter CV–31D/TRA–7.	AC SUPPLY switch-------	Throw to ON position-------	White-capped pilot lamp should light.	Check power Cord CX–954/TRA–7, fuses, and lamp.
31	----------	PLATE ON power switch--	Throw to ON position-------	Red - capped pilot lamp should light.	Refer to TM 11–261.
32	Teletypewriter TT–4A/TG--	MOTOR switch----------	Set to ON position----------	Motor starts----------	Check power cord.
33	Radio Receiver R–388/URR channel A and channel B receivers.	ANT. TRIM control------	Rotate----------	Maximum noise peaks of signal can be obtained.	Check antenna.
34	----------	Tuning control----------	Adjust----------	Use for receiver tuning.	
35	----------	BFO set to ON----------	Rotate BFO PITCH control in either direction.	Beat note can be heard to pass through zero beat.	Retune signal using tuning control.
36	Dual Diversity Converter CV–31D/TRA–7.	—400-volt supply----------	METER B switch in —400V position.	Meter B indicates between 72 and 88 to the left.	Refer to TM 11–261.
37	----------	—150-volt supply----------	METER B switch in —150V position.	Meter B indicates between 25 and 35 to the left.	
38	----------	Regulated —150-volt supply.	METER B switch in REG —150V position.	Meter B indicates between 25 and 35 to the left.	Refer to TM 11–261.
39	----------	Regulated +150-volt supply.	METER B switch in REG +150V position.	Meter B indicates between 25 and 35 to the right.	Refer to TM 11–261.
40	----------	+275-volt supply----------	METER B switch in +275V position.	Meter B indicates between 54 and 66 to the right.	Refer to TM 11–261.
41	----------	Input signal----------	METER B switch in INPUT position.	Peak indication of 100 to the right on meter B.	Increase receiver volume if required.
42	----------	Neutral loop current------	METER B switch in NEUTRAL position.	Meter B indicates +60 (.060 amp) for mark signals and 0 for space signals.	Adjust NEUTRAL OUTPUT control.
43	----------	Polar loop current---------	METER B switch in POLAR position.	Meter B indicates +25 (.025 amp) for mark signals and —25 for space signals.	Adjust POLAR OUTPUT MARK and SPACE controls.

EQUIPMENT PERFORMANCE

b. Receiving Shelter—Continued

	Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	44		Channel A + B signal	METER B switch in CHAN A+B position.	DRIFT COMPENSATOR out (down); meter B indicates +100 (mark) and −100 (space). DRIFT COMPENSATOR IN; meter B indicates +70 (mark) and −70 (space).	Adjust DRIFT COMPENSATOR LIMITER control.
	45		Output of channel B discriminator.	METER B switch in CHAN B position, receiver A volume reduced.	Meter B indicates ±50 for steady mark signal and averages 0 for miscellaneous signals.	Check tuning of CHANNEL B FINE TUNING control and tuning of receiver B. Refer to TM 11–261.
	46		Output of channel A discriminator.	Receiver B volume reduced	Meter A indicates ±50 for a steady mark signal, averages 0 for miscellaneous TTY signals.	Check tuning of CHANNEL A FINE TUNING control and tuning of receiver A. Refer to TM 11–261.
	47		Diversity output of channels A and B discrimina-	METER B switch in CHAN B position.	Reading on meter A will exceed reading of meter B about 50 per cent of the time when steady mark signal is received; sum of meters A and B readings will be approximately 50.	
	48		Drift compensator circuit	METER B switch in COMP AMP position and LIMITER control in full clockwise position.	Minimum kicks on meter B while receiving signals.	Adjust AMP GAIN control for minimum motor kicks.
	49		Mark condition	Converter OUTPUT switch at MARK position.	Teletypewriter holds	Refer to TM 11–2234.
	50		Space condition	Converter OUTPUT switch at SPACE position.	Teletypewriter runs open	Refer to TM 11–2234.

STOP	51	Dual Diversity Converter CV–31D/TRA–7.	PLATE ON power switch	Throw to off (down) position	Red-capped pilot lamp goes out.	
	52	----------	AC SUPPLY switch	Throw to off (down) position	White-capped pilot lamp goes out.	
	53	Radio Receiver R–388/URR	OFF-STAND BY-ON switch.	Turn to OFF position	Dial lamp goes out.	
	54	Teletypewriter TT–4A/TG	MOTOR switch	Set to OFF position	Motor stops.	
	55	Shelter HO–17–(*)	Power and light circuit breakers.	Set to off position	Power and lights go off.	
	56	Power Unit PE–95–(*)	START-STOP button	Press STOP button firmly until engine stops.	Engine stops. AC VOLTS meter indicates 0.	
	57	----------	CIRCUIT BREAKER switch.	Set to OFF position.		

c. Operating Shelter.

	Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Shelter HO–17–(*)	Power circuit breaker	Set to off position.		
	2	----------	Light circuit breaker	Set to off position.		
	3	Teletypewriter TT–4A/TG (receive).	MOTOR switch	Set to OFF position.		
	4	Teletypewriter TT–4A/TG (send).	MOTOR switch	Set to OFF position.		
	5	Typing reperforator (part of Perforator-Transmitter TT–56/MGC).	MOTOR switch	Set to OFF position.		
	6	Transmitter-distributor (part of Perforator-Transmitter TT–56/MGC).	MOTOR switch	Set to OFF position.		
	7	----------	STOP-SEND switch	Set to STOP position.		
	8	Rectifier RA–87–A	ON-OFF switch	Set to OFF position.		
	9	Control Unit C–292B/TRA–7.	AC SUPPLY switch	Set to off (down) position.		
	10	----------	TRANSMITTER switch	Set to off (down) position.		
	11	Power Unit PE–95–(*)	CIRCUIT BREAKER switch.	Set to OFF position.		
	12	Power Unit PE–95–(*)	START-STOP button	Push START button	Power unit starts	Check for discharged battery in power unit. Set MANUAL START-REMOTE START switch to REMOTE START. Refer to TM 11–904.

c. Operating Shelter—Continued

	Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
START	13	Power Unit PE–95–(*)	CIRCUIT BREAKER switch (main power switch if commercial source is used).	Set at ON position	Normal line voltage (117 volts) indicated on A. C. VOLTS meter on power unit panel.	Check circuit breaker. Refer to TM 11–904.
	14	Shelter HO–17–(*)	Power circuit breaker switch.	Set to on position		Check Cord 1165/U from Power Unit PE–95–(*).
	15		Light circuit breaker switch	Set to on position	Lamps go on	Check circuit breakers.
	16	Control Unit C–292/TRA–7	AC SUPPLY switch	Set to ON position	AC SUPPLY indicator lamp should light.	Check lamp in control unit. Check ac outlet to bench. Check bench connector and outlet. Check Cord CX–959/TRA–7. Refer to TM 11–262.
	17		SERVICE switch	Set to the FULL DX position.		
	18		OPERATION switch	Set to the NORMAL position.		
EQUIPMENT PERFORMANCE	19	Control Unit C–292B/TRA–7.	−150-volt supply	METER switch in −150 VOLT SUPPLY position.	Meter indicates 75±5 to the left of 0.	Refer to TM 11–262.
	20		+300-volt supply	METER switch in +300 VOLT SUPPLY position.	Meter indicates 75±5 to the right of 0.	Refer to TM 11–262.
	21		−300-volt supply	METER switch in −300 VOLT SUPPLY position.	Meter indicates 75±10 to the left of 0.	Refer to TM 11–262.
	22		Send extension current	METER switch in SEND EXT CURRENT position. BREAK key on send teletypewriter.		Check Cord CX–956/TRA–7 Check SEND EXT jumper Check SEND EXT jacks.
				Depress (space)	Meter indicates 0	Check patch cords.
				Release (mark)	Meter indicates 75 (60 ma) to the right of 0.	Check plugs on send teletypewriter. Refer to figure 35.
	23		Receive extension current	METER switch in REC EXT CURRENT position.		
				Press RECEIVING TEST SPACE button on control unit.	Meter indicates 0	
				Press RECEIVING TEST MARK button on control unit.	Meter indicates 75 (60 ma) to the right of 0 for full-duplex operation; 0 for	Adjust EXTENSION CURRENT control. Check Cord CX–956/TRA–7.

				half-duplex or one-way reversible.	Check REC EXT jumper. Refer to figure 35. Check patch cords. Check plugs on receiving teletypewriter.
24		Balance circuit	METER switch in BALANCE position, alternately depress RECEIVING TEST, MARK SPACE buttons on control unit.	Equal indications (approximately 75) each side of 0 (MARK to the right; SPACE to the left).	Adjust BALANCE ADJ control on top of chassis for equal deflections. Refer to TM 11–262.
25		Receiving line current	METER switch in REC LINE CURRENT position; have alternate mark and space signals sent from the receiving shelter.	Meter reading of 72 (25 ma) ±10 to the right of 0 for mark signals, and 75 (25 ma) ±10 to the left of 0 for space signals when length of connecting line between control unit and converter is short. Meter reading of 60 (20 ma) ±10 when converter and control unit are separated by 10 miles.	Refer to TM 11–262. Check LINE connections to receiving shelter at E2. Check Cord CX–957/TRA–7. Reverse LINE wires to receiving shelter.
26		TRANSMITTER switch	Set to off (down) position (notify operator at transmitter shelter before changing switch).	Green TRANSMITTER indicator lamp should go out; transmitter and exciter plate power should go off at transmitter shelter.	Check switch. Check lamp. Check Cord CX–958/TRA–7. Check control line going to transmitter shelter. Have operator at transmitting shelter check position of TEST key on exciter (should be in NORM position) and transmitter switch on JB–70–(*) (should be in TRANS. OFF position). Refer to TM 11–262.

c. Operating Shelter—Continued

Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
27		Send line current	METER switch in SEND LINE CURRENT position. Depress BREAK key (space) on send teletypewriter. Release BREAK key on send teletypewriter (mark). Have operator at transmitting shelter:		Check LINE connections to transmitting shelter at El.
				Meter reads 75 (25 ma) to the left of 0.	Check Cord CX–958/TRA–7
				Meter reads 60 (20 ma) to right of 0.	Adjust SENDING LINE CURRENT, SPACE, and MARK controls.
			Set TEST key of exciter to NORM position.		
			Check frequency shift	Shift should be 850 cycles	Adjust SENDING LINE CURRENT, SPACE, and MARK controls.
					Have transmitter shelter operator adjust shift.
			Compare mark signals from operating shelter with test mark signal at transmitting shelter.	The same note should be heard in the headset.	Reverse LINE connections to the transmitting shelter.
28	Teletypewriter TT–4A/TG (sending).	MOTOR switch	Set to ON position	Motor runs	Check MOTOR FUSE.
				Machine runs closed	Check power source for correct power.
					Check power cord and plug.
					Check LINE FUSE and D. C. MILLIAMPERES meter.
					Check black and red shell plugs and line signal cords.
					Check to see that the line signal cords are plugged into the proper jacks of jack panel.
29		BREAK switch	Depress button momentarily	Control unit meter indicates 75 to the left of 0. Machine runs open.	Refer to TM 11–2234.

30	----------	Space bar----------	Hold space bar down momentarily.	Carriage travels to right; stops when released.	Refer to TM 11–2234.
31	----------	Manual carriage return lock bar.	Press carriage return bar----	Carriage returns to the left side of machine.	Refer to TM 11–2234.
32	----------	Test message----------	Type out message on keyboard.	Machine prints message----	Refer to TM 11–2234.
33	Teletypewriter (TT–4A/TG (receiving).	MOTOR switch----------	Set to ON position----------	Motor runs----------	Check MOTOR FUSE. Check power source for correct power. Check power cord and plug.
				Machine runs closed------	Check LINE FUSE and the D. C. MILLIAMPERES meter. Check black and red shell plugs and line signal cords. Check to see that the line signal cords are plugged into the proper jacks of jack panel.
34	----------	TT TRANSPOSE switch set to LEFT REC-RIGHT SEND position.	Set SPACE-MARK switch to MARK position.	Left teletypewriter runs closed.	Check to see that the signal line plugs are in the proper jacks of the jack panels. Check signal line cords and plugs.
35	----------	TT TRANSPOSE switch set to LEFT REC-RIGHT SEND position.	Set SPACE-MARK switch to SPACE position.	Left teletypewriter runs open.	Refer to TM 11–2234.
36	----------	Manual carriage return lock bar.	Press carriage return lock bar.	Carriage returns to left side of machine.	Refer to TM 11–2234.
37	Rectifier RA–87–A----------	ON-OFF switch----------	Set to ON position----------	----------	Check power selector switch (50–60 cycles) position.
38	Typing reperforator (part of Perforator-Transmitter TT–56/MGC).	MOTOR switch----------	Set to ON (down)----------	Motor runs. Machine runs closed.	Check motor connection box ac cord. Refer to TM 11–2223. Check Rectifier RA–87–A. Check send and receive cords of reperforator.
39	----------	Line BREAK key----------	Press----------	Machine runs open----------	Refer to TM 11–2233.
			Release----------	Machine runs closed.	

c. Operating Shelter—Continued

Item No.	Unit	Item	Action or condition	Normal indications	Corrective measures
40		Space bar	Hold down for 10 seconds	Signal lamp lights indicating end of line.	Press LINE FEED and CAR. RET. keys.
41		CAR. RET. key	Press	Lamp goes out	Check lamp. Refer to TM 11–2223.
42		Test message	Type test message on keyboard.	Tape should be printed and perforated correctly.	Refer to TM 11–2223 and TM 11–2201.
43	Typing reperforator (part of Perforator-Transmitter TT–56/MGC).	Transmitter-distributor tight-tape stop lever.	Place tight-tape stop lever in down position.	Tape moves through the transmitter-distributor.	
			Raise tight-tape stop lever	Tape stops	
44	Transmitter-distributor (part of Perforator-Transmitter TT–56/MGC).	MOTOR ON-MOTOR OFF switch.	Set to ON	Motor runs	Refer to TM 11–2222.
		STOP-SEND switch	Set to SEND	Machine runs closed	Refer to TM 11–2222.
45		Transmitter-distributor test tape.	Place test tape in transmitter-distributor and send.	Same message appears on the TTY in the line circuit.	Refer to TM 11–2201 and TM 11–2223.
46	Shelter HO–17–(*)	Test message	Have operator at transmitting shelter place all controls in position for transmitting frequency shift signals. Send test message by prearrangement with a distant station.	Test message sent from the operating shelter should be printed on the send TTY in the operating shelter and on the receiving TTY at the distant station.	
			Have operator at receiving shelter tune receivers to distant station. Have distant station send test message.	Test message from distant station should be printed on monitor teletypewriter in receiving shelter and on receiving TTY in operating shelter as well as on sending TTY at distant station. The distant message should be same as message sent	

STOP	47	Teletypewriter TT–4A/TG	MOTOR switch	Set to OFF	Motor stops	Refer to TM 11–2234.
	48	----------	BREAK switch	Depress button	Transmission stops	Refer to TM 11–2234.
	49	Perforator - Transmitter TT–56/MGC.	Typing reperforator MOTOR switch.	Set to OFF position	Motor stops	Refer to TM 11–2223.
	50	----------	Transmitter - distributor STOP–SEND switch.	Set at STOP position	Stops feeding tape through transmitter-distributor.	Refer to TM 11–2222.
	51	----------	Transmitter - distributor MOTOR switch.	Set to OFF position.		
	52	Rectifier RA–87–A	Power ON-OFF switch	Set to OFF position	----------	Refer to TM 11–957.
	53	Control Unit C–292B/TRA–7.	TRANSMITTER switch	Set to down (off) position	Green TRANSMITTER indicator lamp should go out. Transmitter and exciter unit plate power in transmitting shelter goes off.	
	54	----------	AC SUPPLY switch	Set to down (off) position	AC SUPPLY indicator lamp should go out.	
	55	Shelter HO–17–(*)	Power circuit breaker and light circuit breaker.	Throw to OFF position	Power and lights in shelter should go off.	
	56	Power Unit PE–95–(*)	CIRCUIT BREAKERS	Set at OFF position.		
	57	----------	START–STOP button	Press STOP button firmly until engine stops.	Engine stops.	

CHAPTER 5

THEORY

Section I. GENERAL

97. Introduction

This chapter consists of four sections which deal with the system theory of Radio Set AN/MRC–2(*). This information aids in keeping the equipment in operation.

a. The first section explains the course of the signals, both originating and received, through the components of this radio set.

b. The second section consists of information on teletypewriter theory and interunit circuits. The power distribution and the main interunit control circuits for various operations are detailed by theory and functional diagrams. These circuits may be between components in one shelter or between components in more than one shelter.

c. The third section consists of the theory of Amplifier AM–141(*)/MRC. The amplifier is sectionalized, and the function of each section is discussed in detail.

d. The fourth section contains general information in regard to antennas and antenna systems with some specific reference to its application to this system.

e. Detailed theory is not given on components already covered by individual technical manuals. See paragraph 1 for a listing of the appropriate manuals.

98. Sending Radioteletype Signals

(fig. 55)

a. Operating the keys on the keyboard of a teletypewriter or typing reperforator produces mechanical movements which open and close the sending contacts. A closed contact (neutral mark signal) produces a current flow in the signal loop, and an open contact (neutral space signal) produces no current flow in the signal loop.

b. These current or no-current electrical impulses are applied to the grid of the first tube in the sending circuit in the control unit. The sending circuit converts these neutral mark and space signals into polar mark (current flow in one direction) and polar space (current flow in the opposite direction) signals.

c. The output of the sending circuit in the control unit is polar mark or space signals, depending on the signals developed by the teletypewriter equipment. These polar mark and space signals are applied to the frequency-shift exciter unit.

d. Polar mark signals applied to the rf oscillator in the frequency-shift exciter unit have no effect on the frequency developed by this rf oscillator. Polar space signals applied to the rf oscillator in the frequency-shift exciter unit (transmitting shelter) cause the frequency developed by the rf oscillator to be shifted to a lower frequency. The frequencies developed by the rf oscillator in the frequency-shift exciter unit are applied to the grid of the first rf stage in the radio transmitter.

e. The frequency of the radio transmitter is controlled by the frequency output of the frequency-shift exciter unit. These frequencies, either the carrier frequency or the carrier frequency minus 212.5 or 425 or 850 cycles (mark or space, respectively), are amplified (in certain ranges multiplied) and are applied to the power amplifier.

f. The power amplifier further amplifies the carrier or carrier minus 850-cycle frequencies. These amplified frequencies are applied to the transmitting antenna.

99. Receiving Radioteletype Signals

(fig. 55)

a. Frequency-shift keyed teletypewriter signals are received by channel A and channel B receivers from separate antennas. The rf carrier frequency is a mark signal, and the rf carrier frequency decreased by 850 cycles is a space signal. The carrier frequency from one antenna, modulated by mark and space signals, is converted in the channel A receiver to an intermediate frequency. This intermediate frequency is applied to the

channel A input of the dual diversity converter. The carrier frequency from the other antenna, modulated by mark and space signals, is converted in the channel B receiver to an intermediate frequency. This intermediate frequency is applied to the channel B input of the dual diversity converter.

b. The intermediate frequency, modulated by mark and space signals applied to the channel A input of the dual diversity converter, is converted to a 50–kc frequency. This 50–kc frequency is amplified, limited, and demodulated by the discriminator. The intermediate frequency, modulated by mark and space signals, applied to the channel B input of the dual diversity converter, is converted to a 29.3–kc frequency. This 29.3–kc frequency is amplified, limited, and demodulated by a separate discriminator. The output from each discriminator is combined. The converter develops polar and neutral mark and space signals.

c. The neutral mark and space signals developed by the converter are applied to the monitoring teletypewriter in the receiving shelter. The electrical impulses from the converter are applied to the receiving solenoid of the teletypewriter. The electrical impulses are translated to mechanical movements that operate the keys on the keyboard and which print copy of the received message.

d. The polar mark and space signals developed by the converter are applied to the input of the receiving circuit of the control unit located in the operating shelter. The polar mark and space signals are converted to neutral mark and space signals in the receiving circuit of the control unit. These neutral signals are applied to the receiving solenoid in the teletypewriter equipment. The electrical impulses applied to the receiving solenoid are translated into mechanical movements which operate the type bars on the teletypewriter. The message is printed or code-perforated and printed on tape, depending on the teletypewriter equipment connected into the signal circuit.

100. Sending Cw Signals

a. Cw signals may originate in the frequency-shift exciter unit or in the radio transmitter. Keying the relay in the frequency-shift exciter unit keys the rf oscillator and the buffer in the frequency-shift exciter unit. This keys the transmitter. The output of the transmitter is applied to the power amplifier, and the output of the amplifier is applied to the transmitting antenna.

b. Cw signals originated in the transmitter are developed by directly keying the rf oscillator in the transmitter (par. 74*a*). The output of the transmitter is applied to the power amplifer and the output of the amplifier is applied to the transmitting antenna.

101. Sending Voice Signals

a. Am signals originate from a microphone or telephone. The audio frequencies from a microphone or telephone are applied to the input of the speech amplifier. The speech amplifier amplifies these audio signals.

b. The output of the speech amplifier is applied to the radio transmitter. The audio signals modulate the rf carrier. The am carrier is applied to the transmitting antenna. Amplifier AM–141-(*)/MRC is disconnected during voice operation (par. 75).

102. Receiving Voice Signals

a. The carrier frequency, amplitude-modulated by audio frequencies, is received by the channel A receiver from one antenna and by the channel B receiver from the other antenna. The am carrier is converted to an intermediate frequency in each receiver independently. The audio frequencies are separated from the intermediate frequency in each receiver and, after amplification, are applied to the loudspeaker.

b. The output from the channel A receiver is applied to the channel A loudspeaker. The output from the channel B receiver is applied to the channel B loudspeaker. Operation is possible with one receiver when receiving am signals.

103. Receiving Cw Signals

a. The interrupted carrier frequency is received by the channel A receiver from one antenna and by the channel B receiver from the other antenna. The carrier frequency is converted to an intermediate frequency and amplified. The bfo output is mixed with the intermediate frequency and the result is an audible tone.

b. The audible tone is applied to the channel A loudspeaker from the channel A receiver. The audible tone is applied to the channel B loudspeaker from the channel B receiver. Operation is possible with one receiver when receiving cw signals.

104. Types of Radioteletype System Operation

a. Half-duplex Radioteletype System.

(1) In the half-duplex circuit, traffic moves in but one direction at a time, and the receiving station has control over the circuit in such a manner that the transmitted traffic can be interrupted. In Radio Set AN/MRC–2(*), half-duplex operation requires the following conditions:

(*a*) The frequency of the radio transmission must be separated from the frequency of the radio reception by at least 400 kc.

(*b*) One teletypewriter can be used for both transmission and reception at any one terminal.

(*c*) The control unit SERVICE switch must be set for HALF DX operation.

(2) Essentially, the radio circuit is a full-duplex setup because different frequencies are used for transmitting and receiving. The patching arrangement of the teletypewriters and the circuit control, however, is such that it is possible for the receiving station to use one machine for both page copy reception and transmission and, by pressing the BREAK key of the teletypewriter, the operator can interrupt the flow of traffic from the transmitting station. When the SERVICE switch on the control unit at both ends of the circuit is set to HALF DX, the plate of the receive extension driving tube is removed from the receive extension circuit and connected to the receiving selector magnet of the sending teletypewriter through the send extension circuits. In this case, current through the sending teletypewriter selector magnet is not mixed (as for full duplex); it is controlled by adjustment of the EXTENSION CURRENT control of the control unit. When the extension is arranged for half-duplex service, the operator at the receiving terminal can interrupt the sender if he opens the extension circuit at his end by operating the BREAK key of the teletypewriter, transmitting a space signal to the distant terminal. Reception of the space signal operates to interrupt current through the sending teletypewriter selector magnet, and prevents the sending teletypewriter from printing transmitted copy. Figure 56 shows a simplified diagram of the teletypewriter equipments patched for half-duplex operation. For circuit details within the control unit, refer to TM 11–262.

b. Full-Duplex Radioteletype System.

(1) Full-duplex radioteletype circuits permit the simultaneous transmission and the reception of traffic. For full-duplex operation of Radio Set AN/MRC–2(*), the following conditions must be met:

(*a*) The frequency of the radio transmission must be separated from the frequency of the radio reception by at least 400 kc.

(*b*) The SERVICE switch on the control unit is set to FULL DX.

(2) A full-duplex system is set up when the circuits are patched so that the selector magnet of one teletypewriter receives signal impulses from the receiving channel of the control unit, and the keyboard contacts of the other teletypewriter initiate signals for the transmitting channel of the control unit. The traffic-handling capability of a full-duplex circuit greatly exceeds that of a half-duplex circuit. Figure 57 illustrates a functional diagram of the teletypewriter equipments connected for full-duplex operation.

c. One-way Reversible Radioteletype System. One-way reversible operation is essentially the same as half-duplex operation (fig. 56) except that the same frequency is used for both transmission and reception. Any convenient local patching arrangement can be used for the teletypewriters. In Radio Set AN/MRC–2(*), the following conditions establish one-way reversible operation:

(1) Both terminals use the same frequency for transmission and reception.

(2) The SERVICE switch of the control unit is set to the ONE WAY position. With these conditions, and the TRANSMITTER switch of the control unit in the ON position, keying circuits are closed. These circuits operate a relay

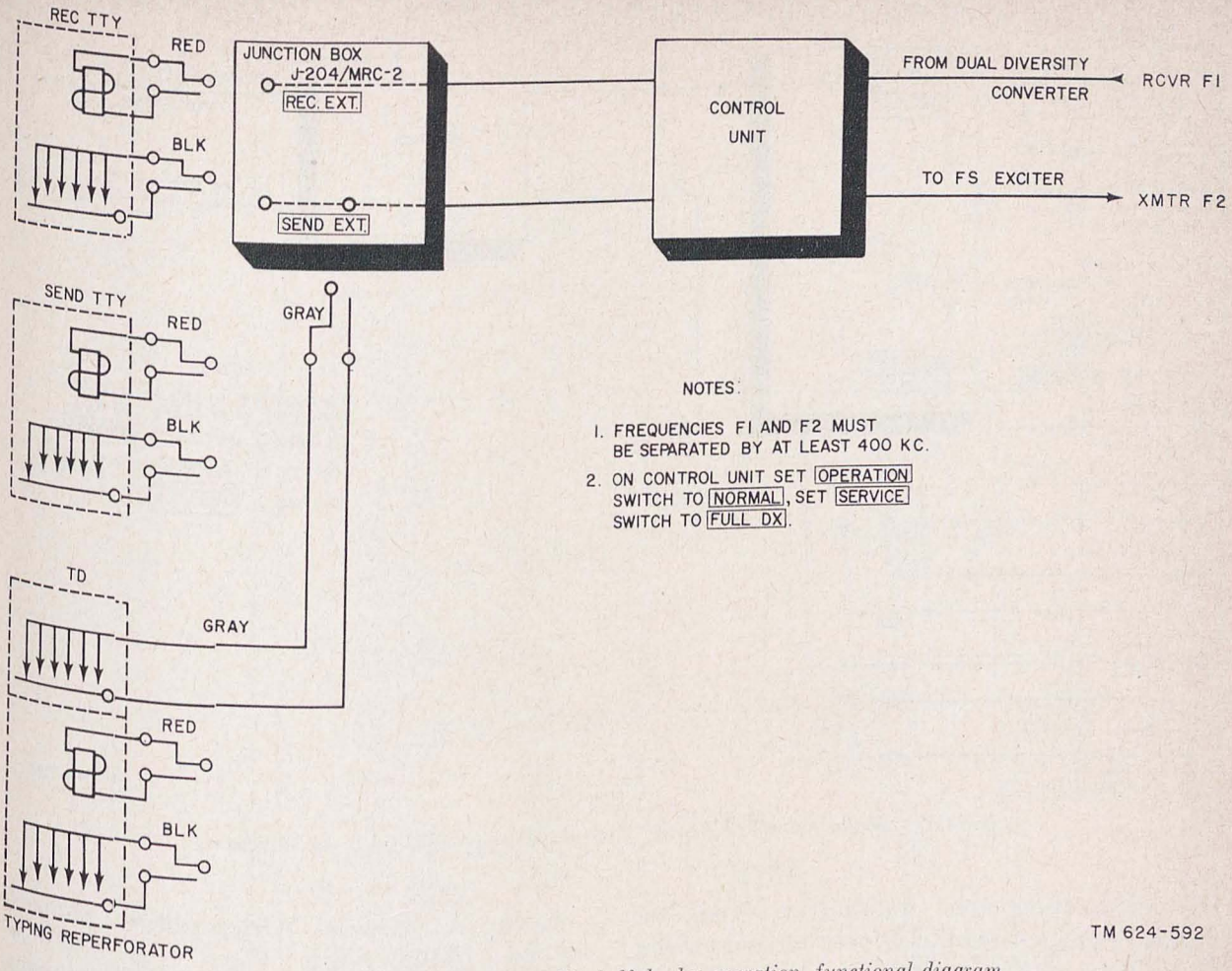

Figure 56. Radio Set AN/MRC–2(*), half-duplex operation, functional diagram.

in the tone oscillator of the receiving dual diversity converter. When this relay is energized, it applies a potential which controls the receiver disabling relays which in turn short the antenna inputs of the radio receivers. At the same time, the keying relay in the frequency-shift exciter unit is operated, power is applied to the exciter unit tubes, and those circuits are connected for sending. Transmission from an operating terminal can occur only when the TRANSMITTER switch of the control unit is in the ON position. When the TRANSMITTER switch is in the *off* position, the keying relay in the frequency-shift exciter unit is de-energized and no rf transmission occurs. At the same time, the relay in the dual diversity converter is released, and the radio receivers are again in a receiving condition. Break-in operation is not possible when the SERVICE switch is in the ONE WAY position.

105. Teletypewriter Circuits Patching Arrangements

By use of Junction Box J–204/MRC–2, the connection box on Perforator Transmitter TT–56/MGC, the operating table jack connectors, and the patch cords supplied, several combinations of teletypewriter equipments are possible to provide the different types of operation of the radio set, and to provide a means of continuing normal operation while one teletypewriter is being repaired. Figures 58 through 62 are functional schematic diagrams of the usual patching arrangements of the equipments in the operating shelter.

a. Normal Patching Arrangements. This circuit arrangement provides a means of transmitting from perforated tape, which is passed through the

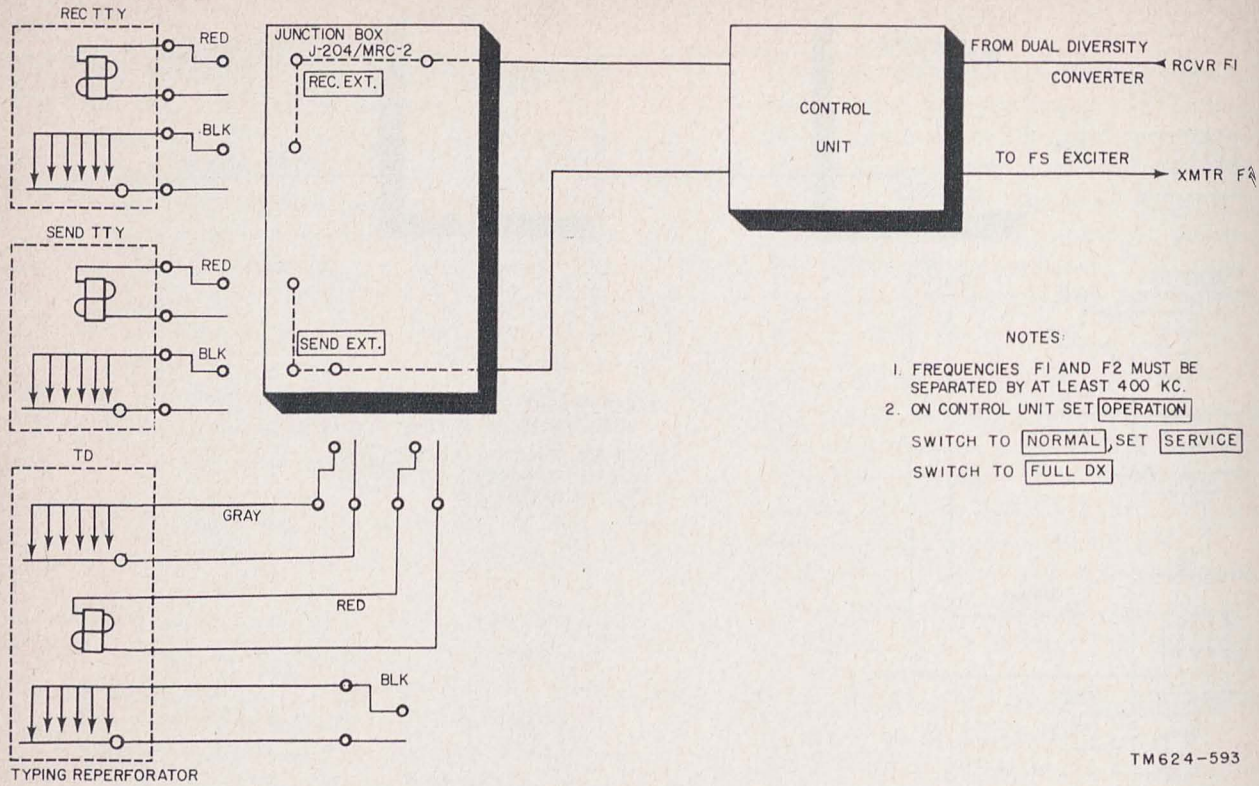

Figure 57. Radio Set AN/MRC–2(*), full-duplex operation, functional diagram.

transmitter-distributor, transmitting from the normally assigned send teletyperwriter and making a page copy on that machine from either the tape or the keyboard, whichever is used, and receiving on the normally assigned receive teletypewriter. Figure 58 illustrates the circuit paths through the junction box, via the bench wiring and cables to the send and receive circuits in the control unit, which receive the neutral impulses from the teletypewriters. Figure 35 is a pictorial drawing of the normal teletypewriter patching.

b. Reverse Teletypewriter Patching. This circuit provides a means of interchanging the normally assigned send teletypewriter with the normally assigned receive teletypewriter. This reversal of machines is useful when the keyboard of the send teletypewriter becomes inoperative, or when the selector magnet or typing-unit functions of the receive teletypewriter develop faults. Rapid reversal of the teletypewriters will permit an uninterrupted flow of traffic. Figure 59 illustrates the circuit paths through the junction box, bench wiring, and cables to the control unit send and receive channels. Figure 49 is a pictorial drawing of this patching arrangement.

c. Receive on Both Teletypewriters; Transmit on Send Teletypewriter. When it is desired to make two separate page copies of an incoming message, or when a check of one page copy against another on a different teletypewriter localizes a fault in either the teletypewriter equipment or other parts of the system, the patching arrangement as shown in the simplified schematic of figure 60 should be used. Figure 50 is a pictorial drawing of this patching arrangement.

d. Normal Operation and Receive on Typing-Reperforator. This circuit permits the typing-reperforator to make a punched-tape copy of incoming traffic. The receive selector magnet of the typing-reperforator is patched into the receive channel of the control unit, and the keyboard of the send teletypewriter is patched to the send channel of the control unit. The receive teletypewriter selector magnet is patched to the receive channel of the control unit and is in series with the selector magnet of the typing-reperforator. Figure 61 is a simplified functional schematic diagram of this circuit, and figure 51 is a pictorial drawing.

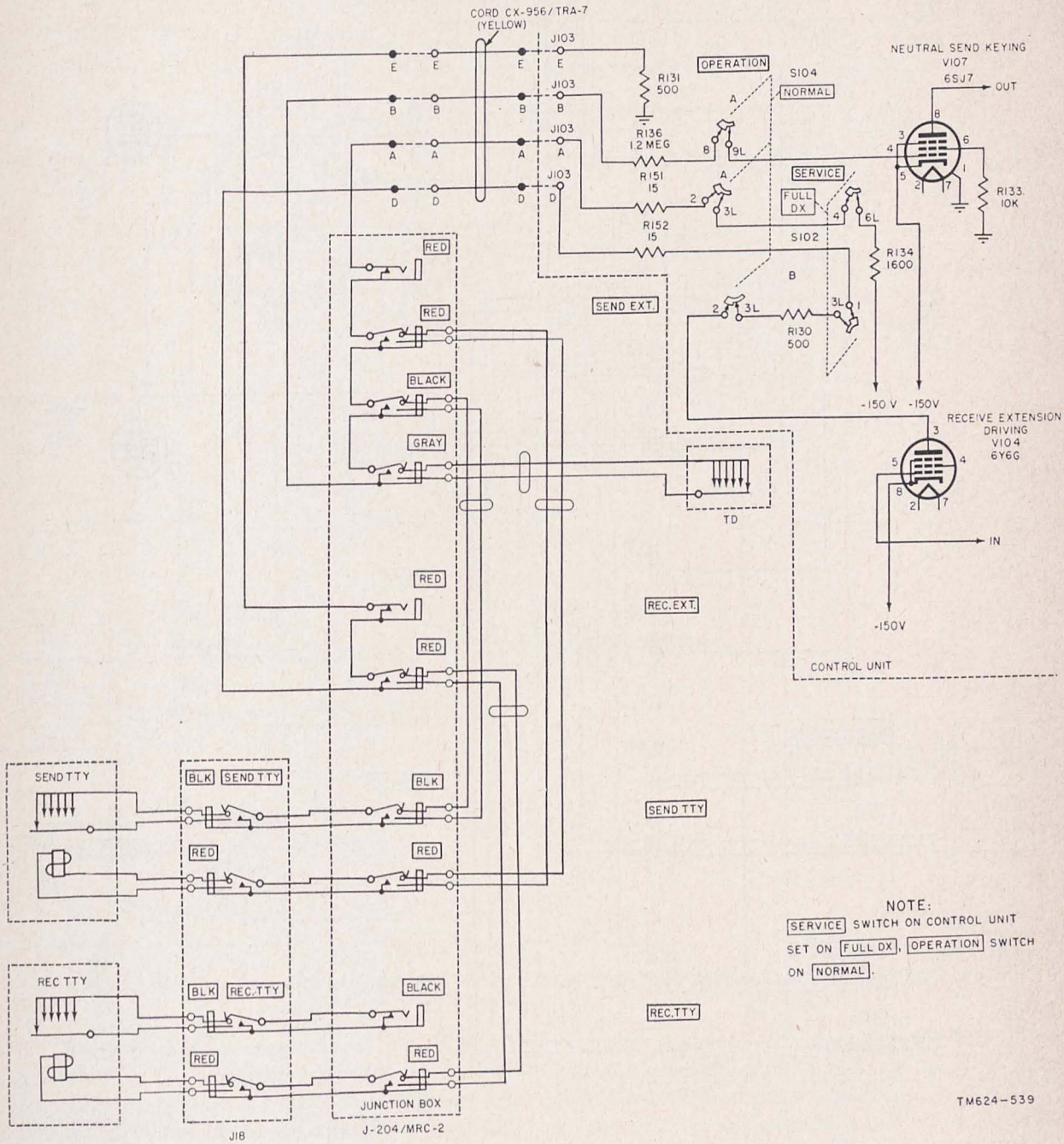

Figure 58. Normal teletypewriter patching, functional schematic diagram.

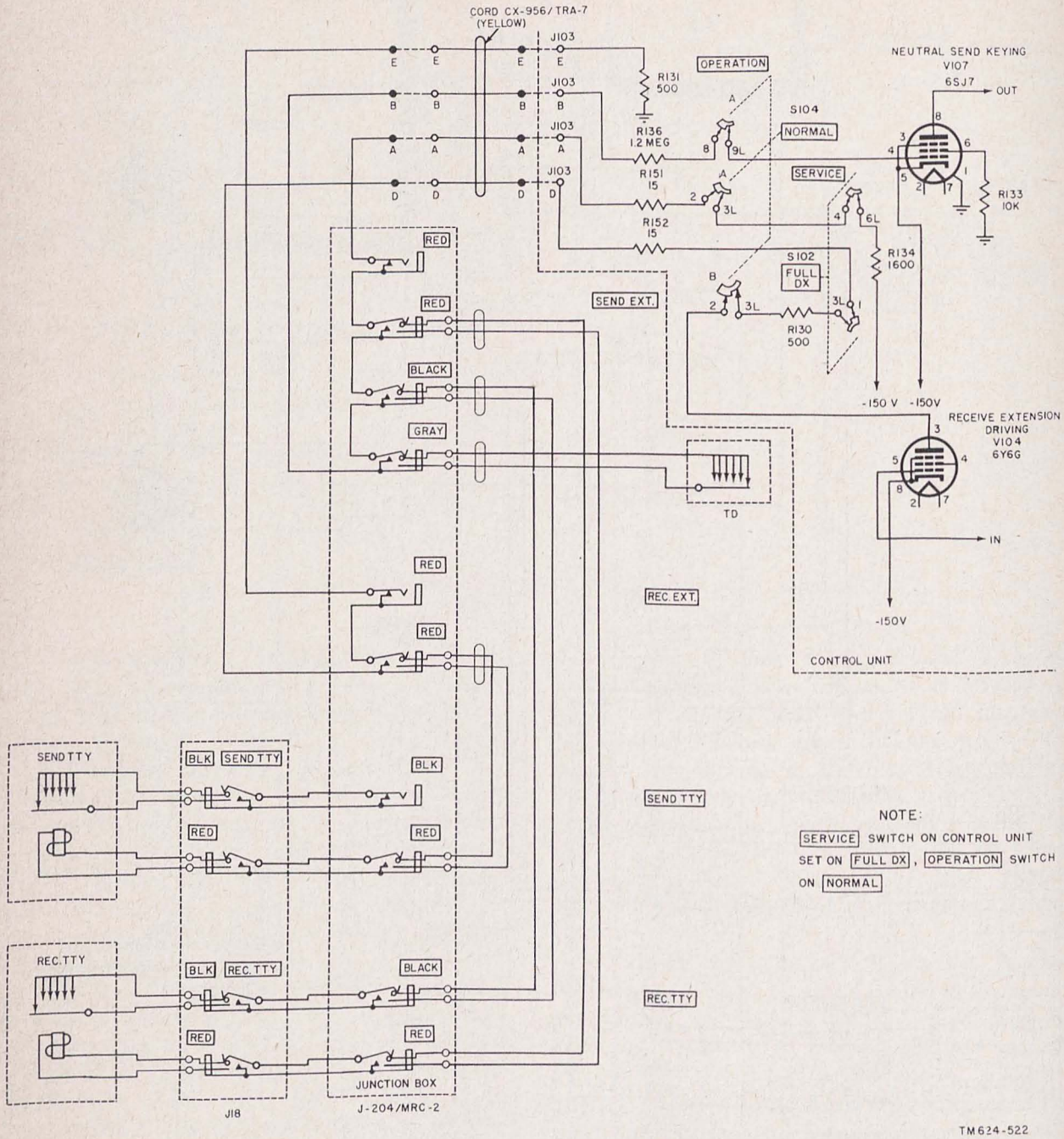

Figure 59. Reverse teletypewriter patching, functional schematic diagram.

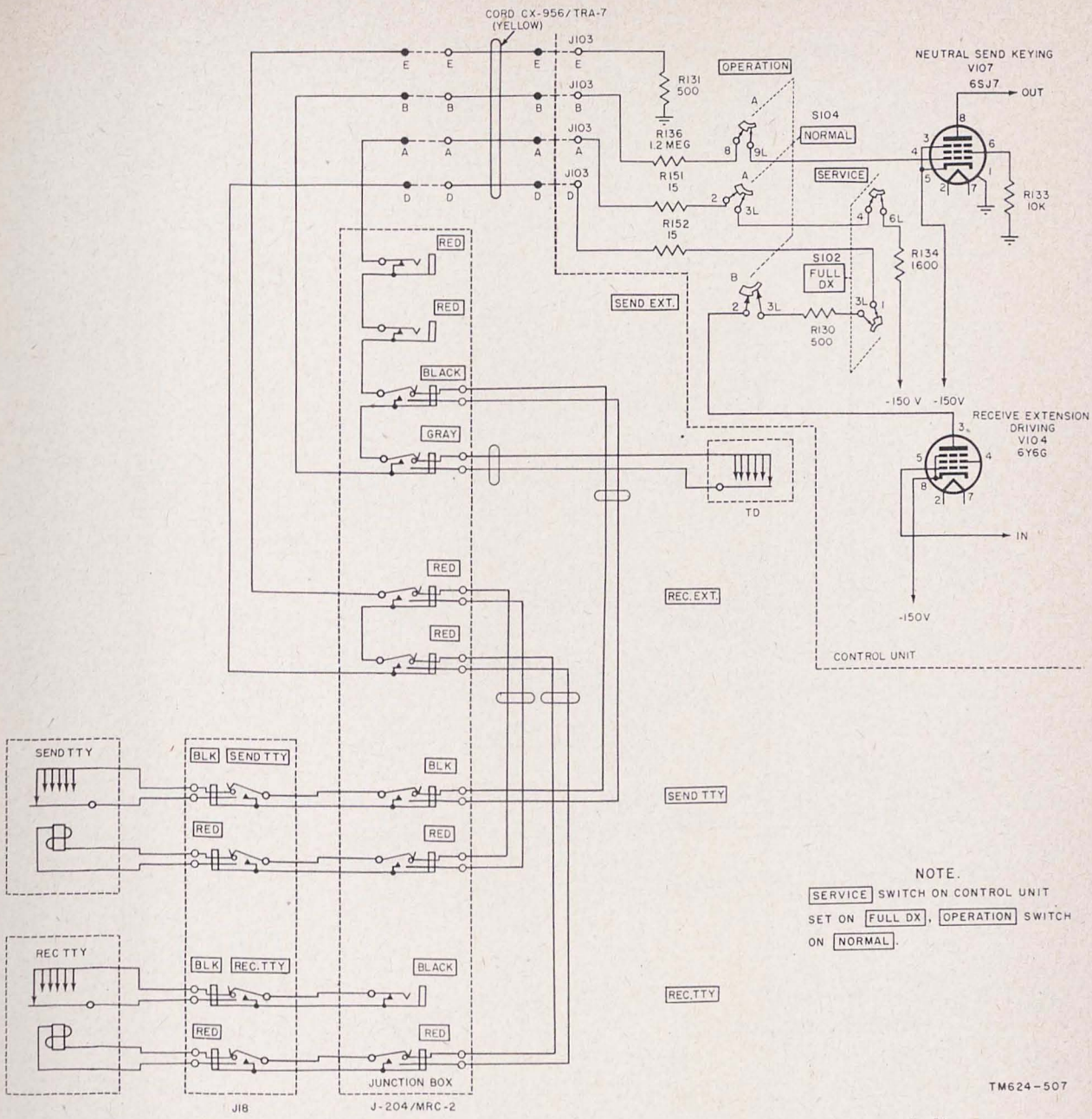

Figure 60. Receive on both teletypewriters, transmit on send teletypewriter, functional schematic diagram.

e. Transmit and Punch Tape on Typing-Reperforator. This circuit permits the local perforation of a tape for later transmission by means of the transmitter-distributor, as well as simultaneous keyboard transmission by means of the typing-reperforator. Reception of incoming traffic is accomplished by the normally assigned receive teletypewriter. Referring to figure 62, the typing-reperforator selector magnet is patched in series with the keyboard of the typing-reperforator, and both are in the send extension channel of the control unit. The transmitter-distributor is patched in series with the above. The receive teletypewriter is patched in the receive extension channel of the control unit, as in normal operation. Figure 52 is a pictorial drawing of this patching arrangement.

106. Power Distribution in Transmitting Shelter

(figs. 27 and 28)

a. Power for the operation of the lights and transmitting shelter units, except the amplifier,

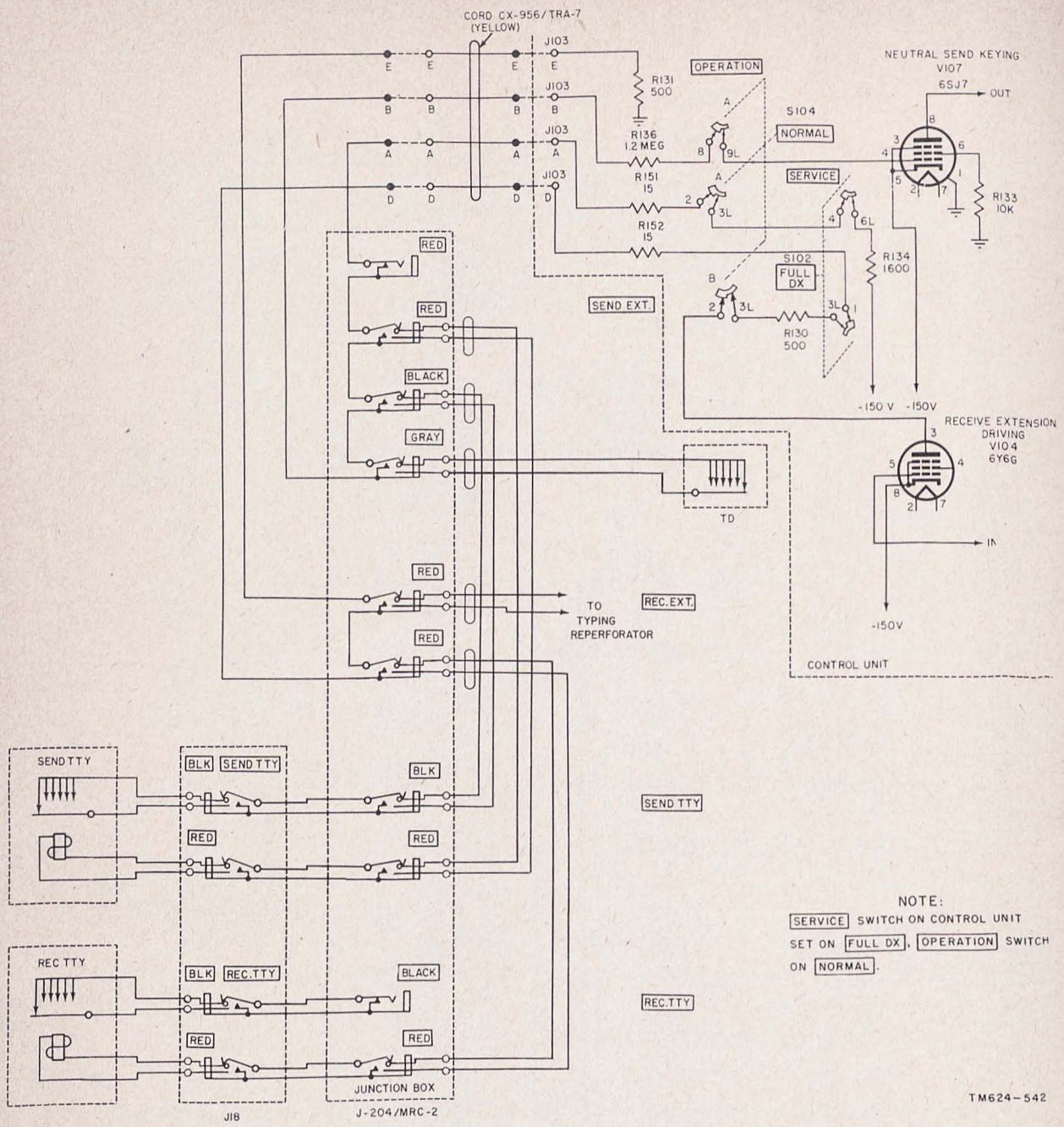

Figure 61. Normal operation and receive on typing-reperforator, functional schematic diagram.

is applied to Junction Box JB–70–(*) from Power Unit PE–95–(*). The power panel of the power unit is connected to socket SO 200 on Junction Box JB–70–(*) by means of Cord CO–316, Cord CD–652, and Cord CO–335. These are shielded six-conductor cords. Two conductors supply the primary ac power for the shelter, two conductors supply the 12-volt dc power for operating relay RY200 in the junction box, one conductor is connected to ground through the STOP switch, and one conductor is connected to ground through the START switch on Junction Box JB–70–(*) (fig. 65).

b. Power for the operation of the amplifier is supplied directly from Power Unit PE–95–(*). The ac terminals on the power panel are connected to the 115V AC input of the amplifier by means of Cord CX–135/MRC–1, Power Cable Assembly CX–1166/U, and Power Cable Assembly CX–1165/U (fig. 27).

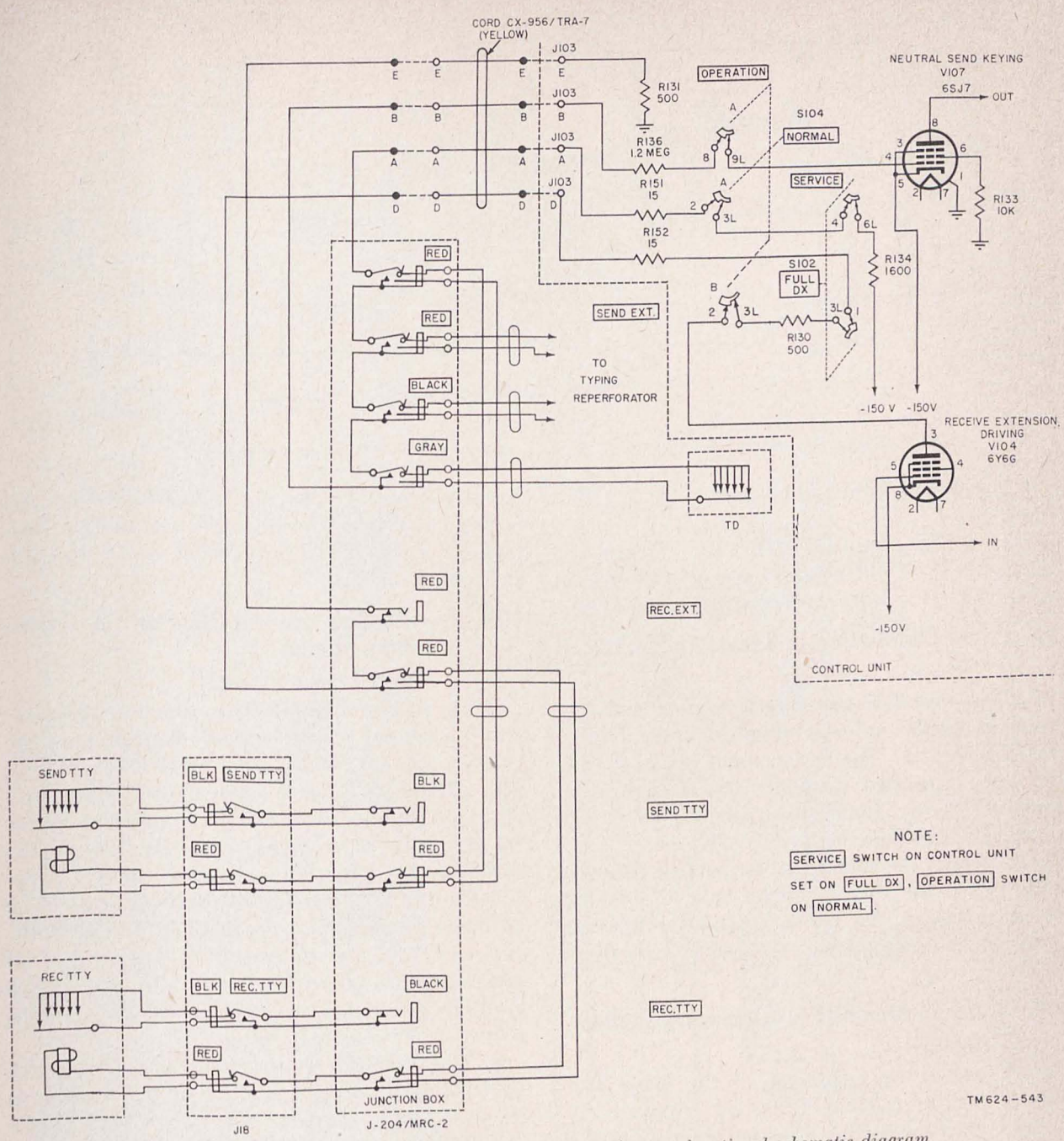

Figure 62. Transmit and punch tape on typing-reperforator, functional schematic diagram.

c. Power for the radio transmitter is supplied from socket SO 201 of Junction Box JB–70–(*) to socket SO 6 of the transmitter by means of Cord CD–763. Junction Box JB–70–(*) supplies power for the lights, heater, shelter blower, radio receiver (in the AN/MRC–2D only), and frequency-shift exciter unit, either directly or by means of power outlets (figs. 27 and 28).

d. The transmitter supplies power for the speech amplifier through Cord CD–764. Power to the speech amplifier is controlled by the FILAMENT POWER switch on the transmitter. It is protected by fuses FS5, FS4, and FS2, on one leg and by fuse FS1 on the other lef of the ac line.

e. In Radio Set AN/MRC–2C, Radio Receiver BC–312(*) obtains its 12-volt dc operating voltage from socket SO 204 of Junction Box JB–70–A. This 12 volts is obtained either from the PE–95–(*) (*a* above) or from Rectifier RA–63–E. During periods when the PE–95–(*) is off, the 12

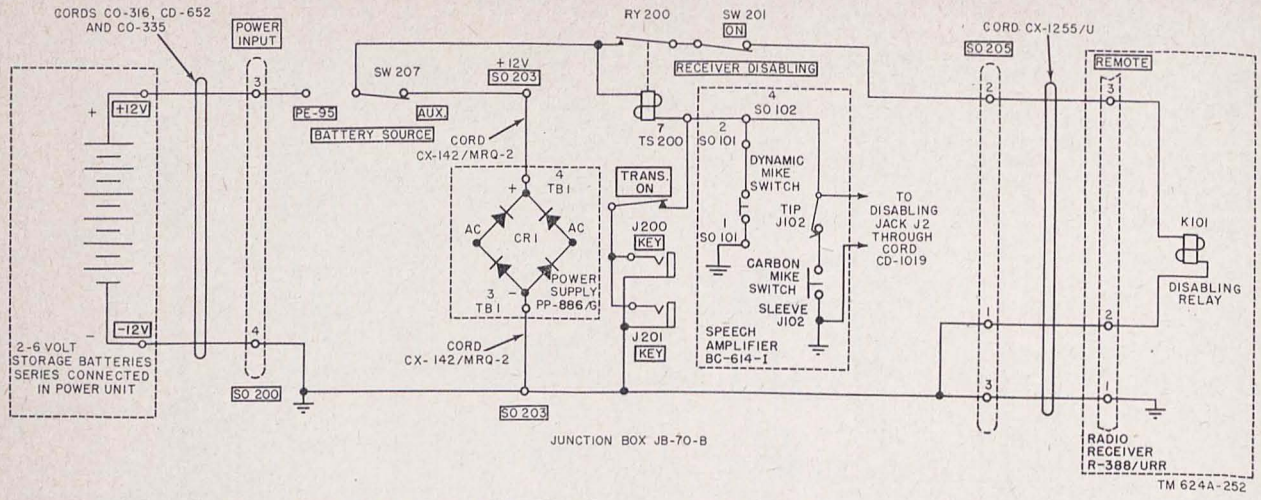

Figure 64. Radio Set AN/MRC–2D, transmitting shelter, 12-volt dc distribution.

volts is obtained from the battery in Chest CH–109–A.

f. In Radio Set AN/MRC–2C, Frequency Meter BC–221(*) is plugged into a wall outlet to receive the 115 volts necessary for its operation.

107. Power Distribution in Receiving Shelter

(fig. 29)

a. The power for operating the lights and the receiving shelter units is supplied from Power Unit PE–95–(*). The ac terminals of the power unit are connected through the feedthrough receptacle to the double-pole circuit breaker by means of Power Cable Assembly CX–1165/U.

b. Ac power is connected to outlets through conduit from the circuit breaker box. Power for the operation of the lights, ventilating blower, heater, and the components is supplied from these outlets.

108. Power Distribution in Operating Shelter

(fig. 32)

a. Power for the operation of the lights and operating shelter components is supplied by Power Unit PE–95–(*). The ac terminals of the power unit are connected through the feedthrough receptacle to the double-pole circuit breaker by means of Power Cable Assembly CX–1165/U.

b. The power outlets are connected by conduit to the circuit breaker box. Power for the operation of the lights, ventilating blower, heater, and the components is supplied from the power outlets.

c. Dc power for the connection box local 60–ma dc circuits is supplied from the Rectifier RA–87–A outlet. Ac power for operating the typing reperforator and the transmitter distributor is supplied from a table outlet through the connection box.

109. Twelve-Volt dc Distribution in Transmitting Shelter

(figs. 63, 64, and 65)

a. Dc power is supplied to Junction Box JB–70–(*) from one of two sources, depending on the position of the BATTERY SOURCE switch. The 12-volt dc source from Power Unit PE–95–(*) is supplied to terminals 3 and 4 of socket SO 200 from the battery terminals through the +12V and −12V terminals of the power panel and Cords CO–316, CD–652, and CO–335. The common terminal of the BATTERY SOURCE, switch SW207, is connected to terminal 3 of socket SO 200 when this switch is in the PE–95 position. Terminal 4 of socket SO 200 is connected to the chassis (ground).

b. The 12-volt dc source from Chest CH–109–A (AN/MRC–2C only, fig. 63) and the rectifier is supplied to the common terminal of BATTERY SOURCE switch SW207 in the AUX. position and to the chassis (ground) through terminals of socket SO 600, Cord CD–659, and socket SO 206. The dc output from rectifier RA–63–E (AN/MRC–2C, fig. 63) or Power Supply PP–886/G (AN/MRC–2D, fig. 64) is connected to socket SO 206 through Cord CX–142/MRQ–2 and socket SO 203.

c. In Radio Set AN/MRC–2C, the +12-volt dc source is connected to terminal T of socket SO 1 in Radio Receiver BC–312–(*) through terminal 4 of socket SO 204 and Cord CD–565.

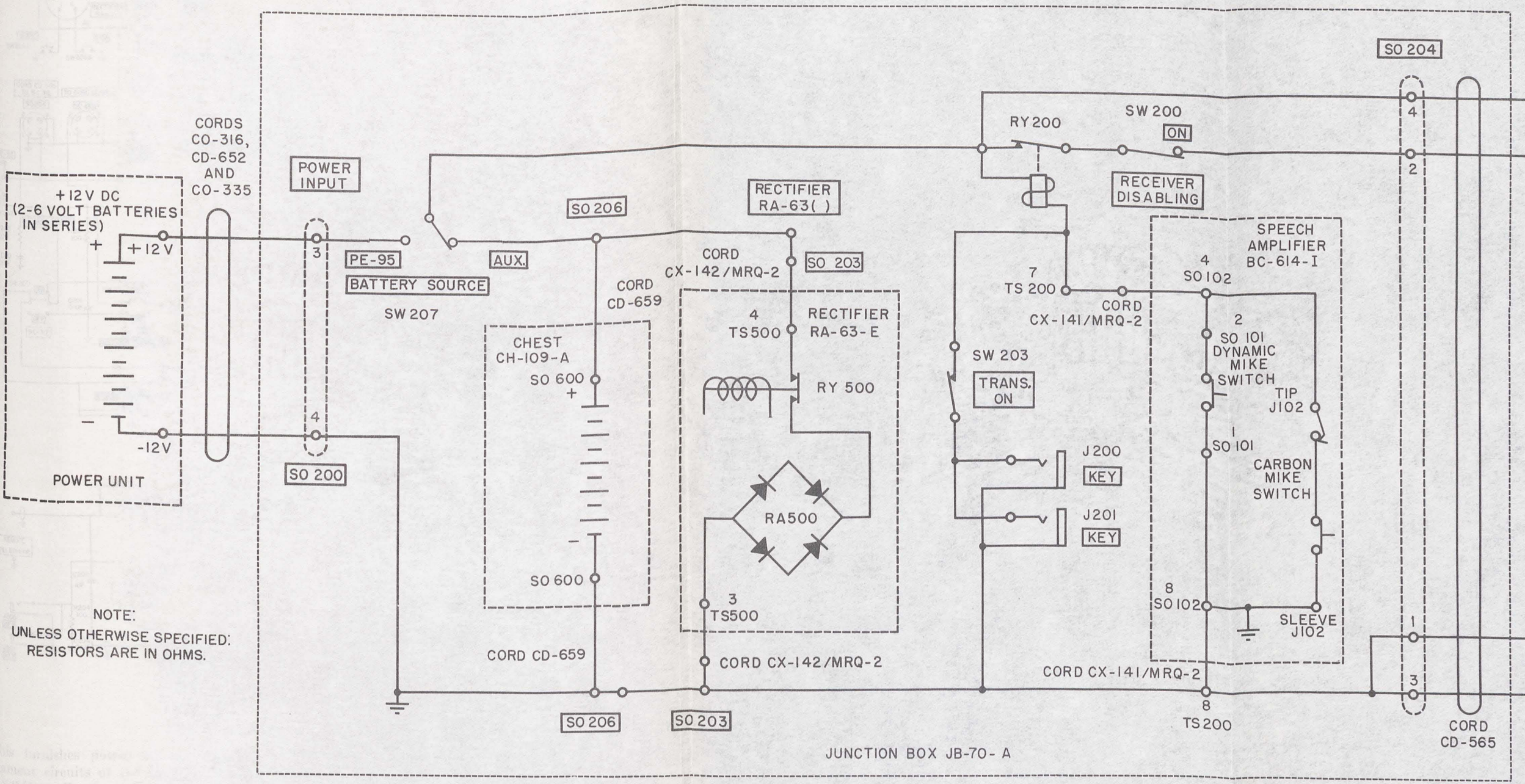

Figure 63. Radio Set AN/MRC–2C, transmitting shelter, 12-volt dc distribution.

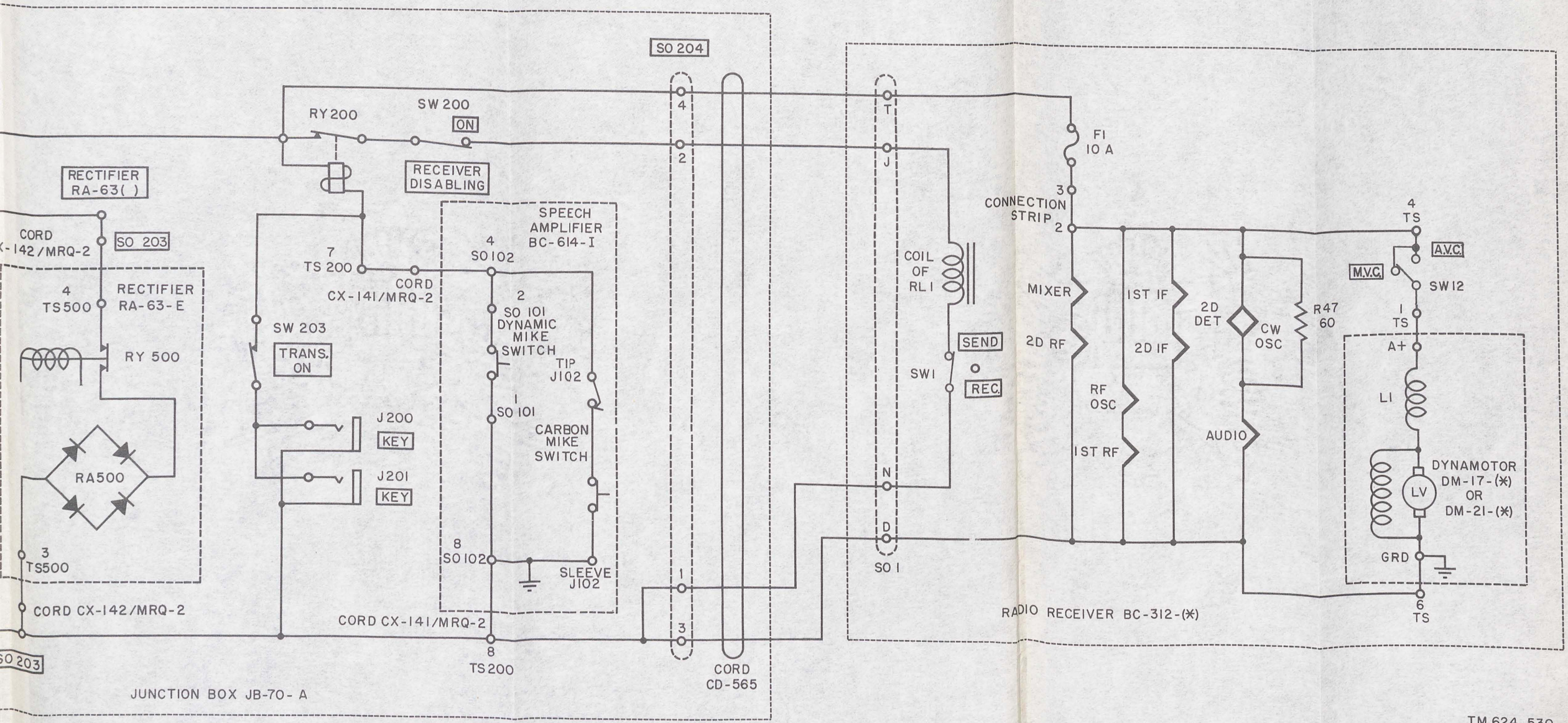

Figure 63. Radio Set AN/MRC-2C, transmitting shelter, 12-volt dc distribution.

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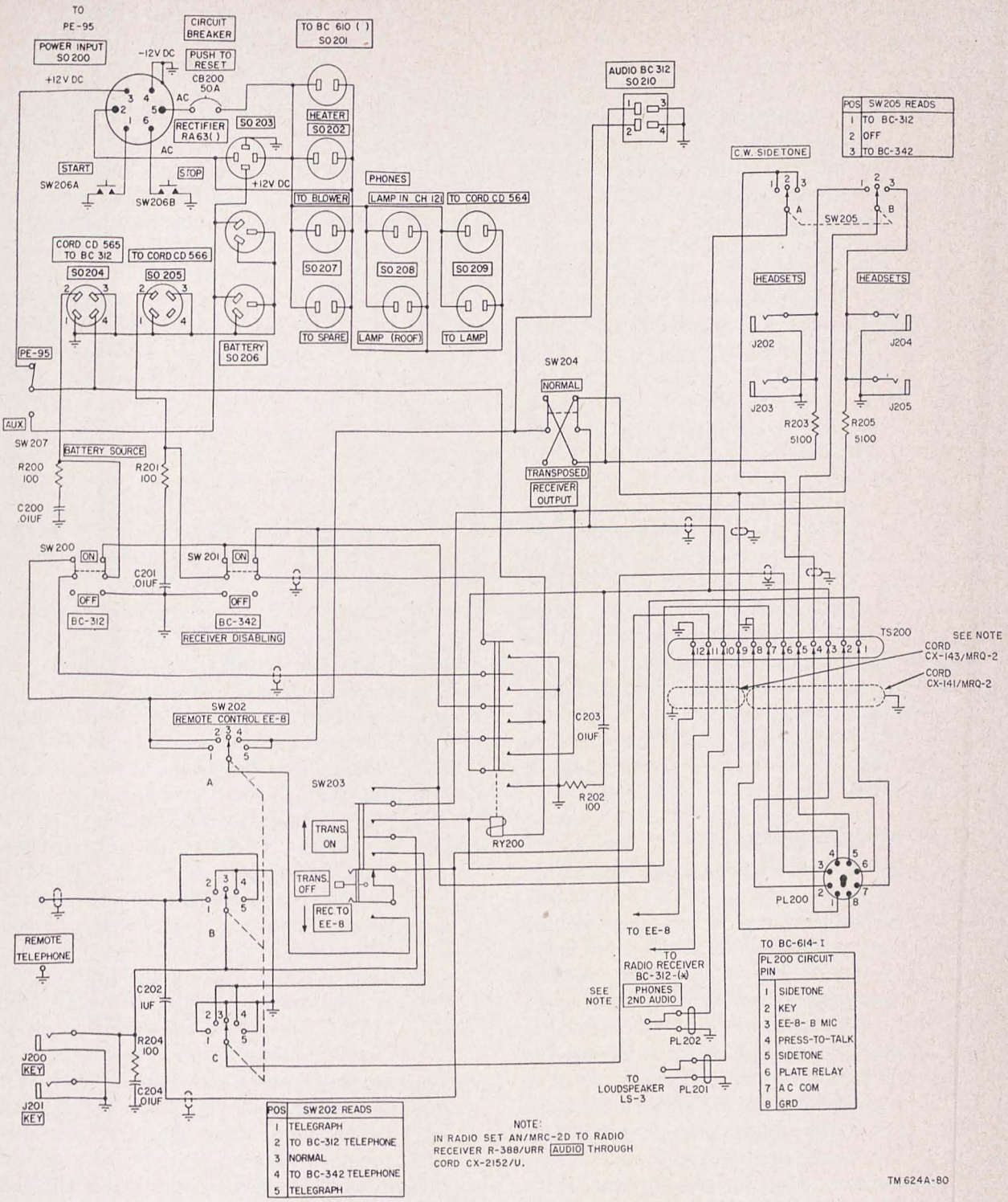


POS	SW205 READS
1	TO BC-312
2	OFF
3	TO BC-342

POS	SW202 READS
1	TELEGRAPH
2	TO BC-312 TELEPHONE
3	NORMAL
4	TO BC-342 TELEPHONE
5	TELEGRAPH

PL 200 CIRCUIT PIN	
1	SIDETONE
2	KEY
3	EE-8- B MIC
4	PRESS-TO-TALK
5	SIDETONE
6	PLATE RELAY
7	A C COM
8	GRD

Figure 65. Junction Box JB-70-(*), schematic diagram.

This furnishes power for the dynamotor and filament circuits of the receiver. In Radio Set AN/MRC–2D, the radio receiver uses 115 volts ac for operating voltage.

d. The +12-volt dc supply also is connected to one contact and one side of the coil of relay RY200. When relay RY200 is energized, this dc voltage serves to disable the transmitting shelter receiver during transmission (par. 110*a*).

e. The 12-volt dc circuit connected to one side

of the coil of relay RY200 in Junction Box JB–70–(*) is completed to ground either by pressing one of the microphone switches connected to jack J102 or socket SO 101 in the Speech Amplifier BC–614–I or by depressing a telegraph key inserted in either KEY jacks J200 or J201. Terminals 8 of terminal strip TS200 and socket SO 102, TO JB–70, are connected together by Cord CX–141/MRQ–2. The sleeve of jack J102 and terminal 1 of socket SO 101 are connected to terminal 8 (ground) of socket SO 102. The coil of relay RY200 is grounded through terminal 7 of terminal strip TS200, terminal 4 of socket SO 102, tip of jack J102 (CARBON MIC. 1 jack), mike switch and sleeve of jack J102. It may also be grounded through terminal 7 of terminal strip TS200, terminal 4 of socket SO 102, terminal 2 of socket SO 101 (DYNAMIC MIC. 2), mike switch and terminal 1 of socket SO 101.

f. Ground may be connected to this side of the coil of relay RY200 by means of a closed key inserted in either of the normally open KEY jacks J200 or J201. The sleeves of both jacks are connected to ground. Ground is connected to the coil by means of a telegraph key and switch SW203 in the TRANS. ON position.

g. Ground can be connected to the coil of relay RY200 by means of jack J102 in the speech amplifier and the disabling cord to Junction Box J–207/MRC–2. This circuit is discussed in paragraph 110*a*.

110. Receiver Disabling Circuits

a. Receiver in Transmitting Shelter (figs. 63 and 66).

(1) The monitoring receiver is disabled during transmission (fig. 66) by grounding its antenna circuit internally. This is accomplished by operating disabling relays within the receiver. One side of the coil of relay RY200 in Junction Box JB–70–(*) is supplied from a 12-volt dc source through the BATTERY SOURCE switch (par. 109*d*). The other side of the coil may be grounded in several ways as outlined in paragraph 109*e* through *g*. Figure 66 shows the circuit for relay RY200 operation during normal operation. The primary control is plate voltage relay K101 in the frequency-shift exciter unit. Operation of this relay completes the relay RY200 circuit to ground at the CARBON MIC. 1 jack on the speech amplifier, through disabling Cord CD–1019, the DISABLING jack of Junction Box J–207/MRC–2, Cord CX–961/TRA–7 (RED), the LOCAL CW CONTROL jack of the frequency shift exciter unit, and the points of relay K101.

(2) In Radio Set AN/MRC–2C, closing relay RY200 completes the 12-volt circuit from the relay contacts to the disabling relay in Radio Receiver BC–312–(*). This circuit is completed through RECEIVER DISABLING BC–312 switch SW200, terminal 2 of socket SO 204, Cord CD–565, terminal J of socket SO 1, and the SEND–REC. switch (SEND position) on the receiver (fig. 63).

(3) In Radio Set AN/MRC–2D, closing relay RY200 completes the 12-volt circuit from the relay contacts to antenna shorting relay K101 in Radio Receiver R–388/URR. This circuit is completed through RECEIVER DISABLING BC–342 switch SW201, terminal 2 of socket SO 205, Cord CX–2155/U, and the REMOTE terminal strip (fig. 66).

b. Receivers in Receiving Shelter (fig. 67).

(1) Operation on a one-way reversible basis requires that the receivers be disabled during transmission. Setting the TRANSMITTER switch to the ON position and the SERVICE switch to the ONE WAY position on Control Unit C–292B/TRA–7, in the operating shelter, establishes the circuits for disabling the two receivers in the receiving shelter.

(2) Relay K401 in the tone oscillator section of the dual diversity converter (TM 11–261) completes the circuit from rectifier CR401 (12-volt source in the converter) to the disabling relays in each of the receivers. Energizing these relays shorts the ANTENNA input terminals to ground.

(3) Relay K401 is energized in the following manner: One hundred and fifty volts from the power supply of the converter is applied to the coil through resistor R409. From the other side of the coil, the circuit is completed through D of jack 404, Cord CX–952/TRA–7 to the RED terminal on the jack panel set in

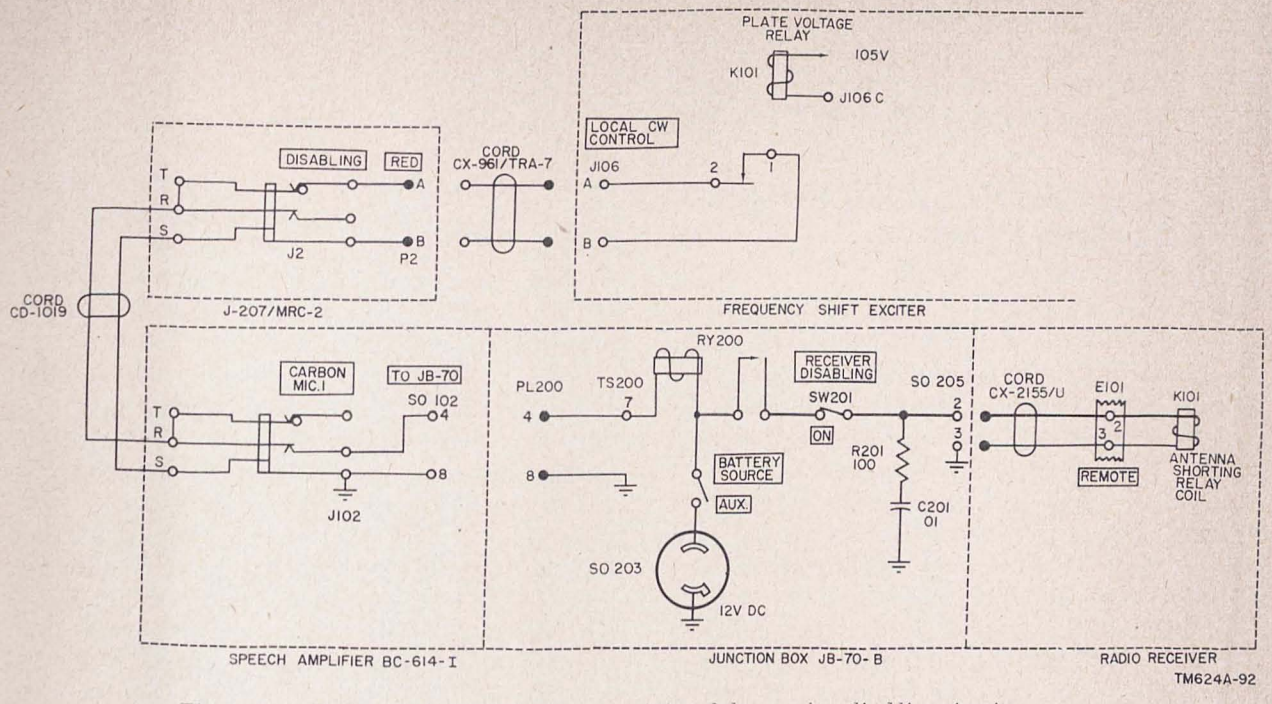


Figure 66. Radio Set AN/MRC–2D, transmitting shelter receiver disabling circuit.

Operating Table FN–23/MRC–2, junction box E1 (CONTROL terminals), field wire to junction box E2 in the operating shelter (CONTROL terminals), and to jack panel J17 in the table to the control unit. Within the control unit, the circuit is completed through the SERVICE switch in the ONE WAY position and the TRANSMITTER switch in the ON position to terminal C of jack J101. From this terminal, the circuit is completed back to grounded pin C of jack J404 of the dual diversity converter in the receiving shelter.

111. Interunit Circuits Controlled By Exciter Relay K101

(figs. 68, 27, and 32)

a. Transmission is normally controlled by relay K101 in the frequency-shift exciter unit. Operation of this relay is controlled by the OPERATION switch S104B and the TRANSMITTER ON switch S110 in the control unit of the operating shelter. Because a positive dc voltage is continuously supplied to one side of the coil of this relay, operating the relay depends on grounding the other side of the coil.

b. Terminal C of socket J107 is connected to ground in the frequency-shift exciter. Terminal C of socket J107 is connected to terminal C of socket J102 in the control unit through Cord CX–961/TRA–7, terminal C of the BLUE plug P1, CONTROL binding posts of Junction Box J–199/MRC–2 in the transmitting shelter and of E1 in the operating shelter, Wire WD–1/TT, and terminal C of the GREEN jack J14 in operating table FN–22/MRC. Terminals C and D of socket J102 are connected together through terminal 12L and terminal 10 or 11 of OPERATION switch S104B, TRANSMITTER ON switch S110, terminals 7 or 8 and 9L of switch S104B and resistor R150. Terminal D of jack J102 is connected to terminal D of the GREEN jack J14, CONTROL binding posts in both shelters, BLUE plug P1, socket J107, socket J106 and RED plug P2, by means of Cord CX–958/TRA–7, Wire WD–1/TT, and Cord CX–961/TRA–7. Terminal D of RED plug P2 is connected to the ground side of the coil through normally closed KEY jack J4, terminal C of RED plug P2, Cord CX–961/TRA–7, and terminal C of socket J106. Relay K101 remains continuously keyed for radio-teletype operation. For *cw* keying of relay K101 from Junction Box J–207/MRC–2 refer to paragraph 114.

c. Operating relay K101 completes the circuits for the plate of tube V101 and the cathode of tube V102 in the frequency-shift exciter unit which excites the rf oscillator stage of the transmitter. Another set of contacts of this relay is

in series with the circuit which grounds one side of the coil of relay RY200 in Junction Box JB–70–(*). Paragraph 110*c* describes the circuit for the operation of relay RY200 by the action of relay K101.

112. Interunit Circuits Controlled by Junction Box Relay RY200.

(figs. 68, 65, 27, and 28).

a. One set of contacts of relay RY200 grounds the cathodes of the rf oscillator (tube V8) in the transmitter and the sidetone oscillator (tube V106) in the speech amplifier. Because of the simultaneous action, the sidetone heard by the operator will be identical with the transmitted cw. The circuit from the rf oscillator cathode to ground is through choke CH2, choke CH9 in parallel with resistor R35, terminal 2 of socket SO 5, Cord CD–764, terminal 2 of socket SO 103 on the speech amplifier, terminal 2 of socket SO 102, Cord CX–141/MRQ–2 to terminal 3 of TS200 in the junction box. At this point, a junction is made with the circuit from the cathode of the sidetone oscillator. The common circuit from this point is connected to a contact on relay RY200 which connects to ground whenever the relay is energized. Because the sidetone is not desired in any type of operation other than cw, the cathode circuit of the sidetone oscillator to the relay contacts can be broken by setting the C. W. SIDETONE switch to the OFF position. KEY jack J101 in the speech amplifier is used for emergency cw operation (par. 76*d* and 117). A key inserted in this jack can operate the transmitter oscillator in the event of relay RY200 failure.

b. One set of contacts is in parallel with a pair of contacts on the transmitter switch (fig. 65). Ac power from the transmitter comes to terminal 2 of TS200 via Cord CD–764, terminal 4 of socket SO 103, terminal 6 of socket SO 102 and Cord CX–141/MRQ–2. From terminal 2 of TS200, contact is made to the relay point and also to transmitter switch SW203 (not shown in figure 68; see figure 65). From the other contact of the relay, and also from the switch, contact is made to terminal 1 of TS200. The circuit is completed to plate power and antenna shorting relays RY1 and RY4 in the transmitter through Cord CX–141/MRQ–2, terminal 7 of SO 102, terminal 3 of socket SO 103, Cord CD–764, and terminal 3 of socket SO 5. The contacts of the transmitter switch operate the transmitter relays during cw operation; the contacts of relay RY200 complete the circuit during radioteletype and radiotelephone operation.

c. Another set of contacts of relay RY200 connects the 12-volt dc source to the disabling relay circuits of Radio Receiver BC–312–(*) in Radio Set AN/MRC–2C and to Radio Receiver R–388/URR in Radio Set AN/MRC–2D. (Refer to paragraph 110*a* and figures 63 and 66.) Figure 68 shows the circuit from this contact to the Radio Receiver BC–312–(*) disabling relay through switch SW200.

d. When the receiver in the transmitting shelter is disabled, the audio output is also grounded. This is accomplished by another set of contacts on relay RY200. From the PHONES jack of the BC–312–(*), the audio circuit is completed to terminal 10 of TS200 through Cord CX–143/MRQ–2 (fig. 27 and 68). In Radio Set AN/MRC–2D, the audio circuit from Radio Receiver R–388/URR is completed to the same terminal through Cord CX–2152 (fig. 28). Within the junction box, the circuit is completed to ground through the RECEIVER DISABLING, BC–342 switch SW201, and the contact on the relay. When the receiver is *not* disabled, the audio output of the receiver can be heard in a headset connected to HEADSETS jacks J204 and J205 through RECEIVER OUTPUT switch SW204 (in the NORMAL position) and resistor R205. When the RECEIVER OUTPUT switch is set to the TRANSPOSED position, the audio output of the receiver will be heard only in the HEADSETS jacks J202 and J203.

113. Sidetone Control Circuit

(fig. 68)

The sidetone oscillator and the sidetone amplifier are located in the speech amplifier but are controlled by circuits and switches in Junction Box JB–70–(*). The sidetone oscillator is set into operation by grounding its cathode at relay RY200 (par. 112*a*). The output of the sidetone amplifier stage (a cathode follower circuit) is developed across cathode resistor R122 and is applied to the HEADSETS jacks through isolating resistor R141, terminal 5 of socket SO 102, Cord CX–141/MRQ–2, terminal 5 of TS200, and switch SW205. When the C. W. SIDETONE switch is in the TO BC–342 position, the sidetone is heard in jacks J204 and J205. In the TO BC–312 position, the sidetone is heard in jacks J202 and J203. Isolating resistors R205 and R203 prevent shorting of these jacks during

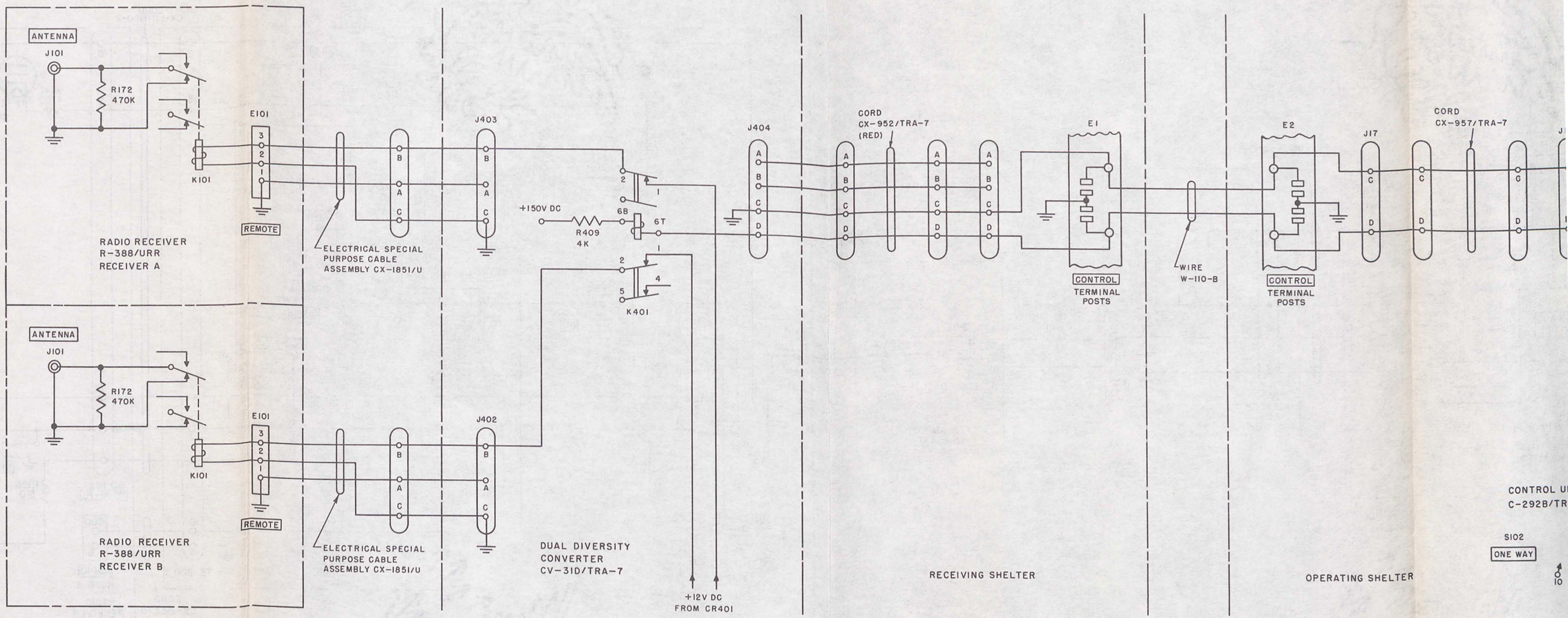


Figure 67. Receiver disabling circuit in receiving shelter.

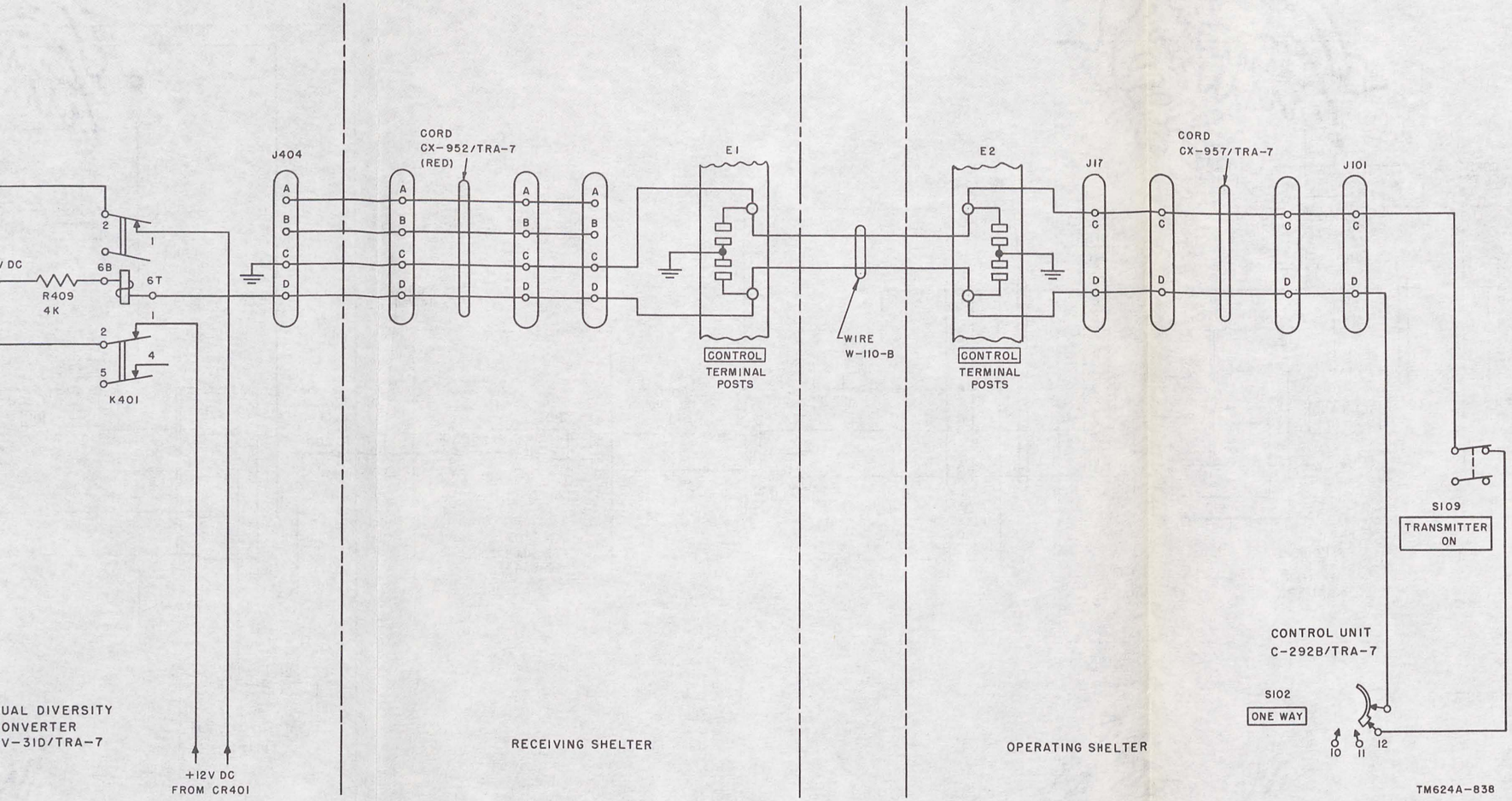
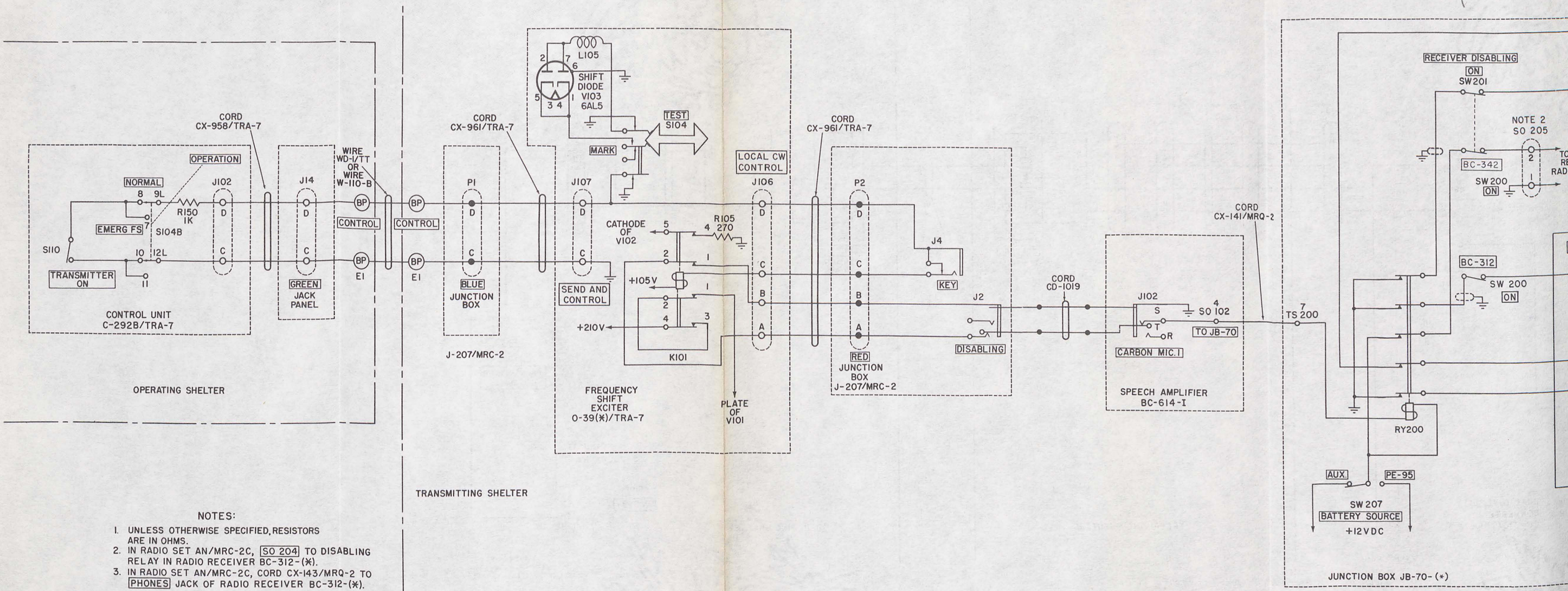


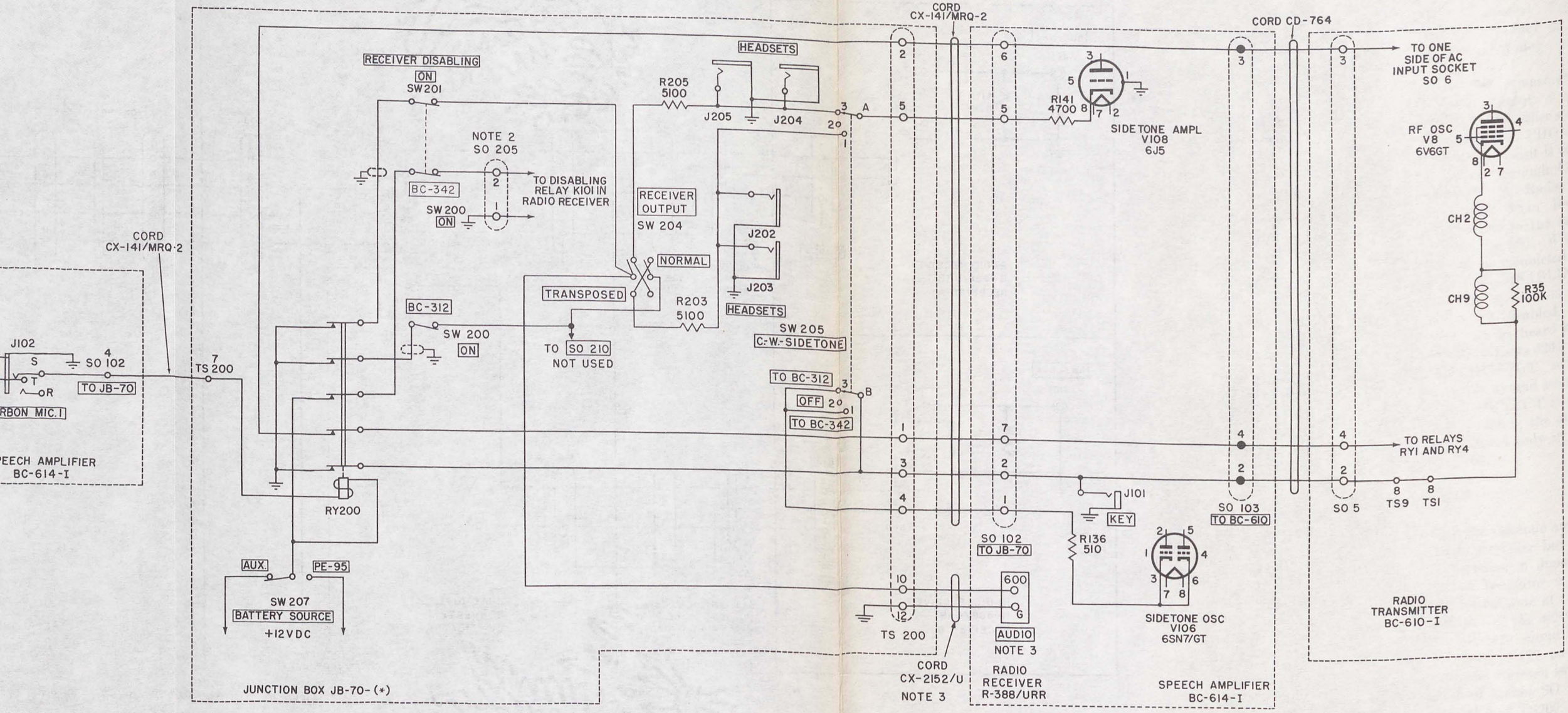
Figure 67. Receiver disabling circuit in receiving shelter.



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE IN OHMS.
2. IN RADIO SET AN/MRC-2C, SO 204 TO DISABLING RELAY IN RADIO RECEIVER BC-312-(*).
3. IN RADIO SET AN/MRC-2C, CORD CX-143/MRQ-2 TO PHONES JACK OF RADIO RECEIVER BC-312-(*).

Figure 68. Circuits controlled by relay K101 and relay KY200.



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rcuits controlled by relay K101 and relay KY200.

transmission when the receiver audio line is grounded at relay RY200 contacts (par. 112*d*).

114. Interunit Circuits for Cw Keying From Junction Box J–207/MRC–2

(fig. 68)

a. The normally closed KEY jack J4 on Junction Box J–207/MRC–2 is in series with the circuit from one side of the coil of relay K101 to ground at TEST switch S104 in the MARK position on the frequency-shift exciter unit. With switch S104 in the MARK position, the control of relay K101 is removed from the control unit in the operating shelter. The plates of the shift-diode tube V103 are grounded and the cathode circuit is open. This disables the shift diode, and the transmitter output is the mark frequency only.

b. A telegraph key inserted in the KEY jack opens the circuit to ground from one side of the coil of relay K101. This deenergizes the coil, and the circuits controlled by the relay are open. Depressing the key energizes the coil and operates the relay. Cw signals are produced by depressing and releasing the telegraph key.

115. Interunit Circuits for Cw Keying From Receiving Shelter

(fig. 69)

a. Cw keying from the receiving shelter is controlled by the OPERATION switch on the control unit in the operating shelter set to EMERG, CW position. This keying depends on the operation of relay K101 in the frequency-shift exciter unit of the transmitting shelter. With the OUTPUT switch of the dual diversity converter in the SPACE position and a telegraph key inserted in the KEY jack on the operating table of the receiving shelter, cw keying is accomplished by depressing and releasing the key.

b. Depressing the key grounds the plate of driver amplifier tube V113 in the dual diversity converter. The plate of tube V113 is connected to ground at terminal B of socket J404 through OUTPUT switch S102B in the SPACE position (terminals 5 and 4) by closing Key J–45 at the KEY jack on the operating table. Grounding the plate of tube V113 decreases the voltage at the grid of the polar-space amplifier tube V116. The grid of this tube becomes negative and this tube becomes nonconducting.

c. The plate of tube V116 is connected to the grid of the polar-mark amplifier tube V115. When tube V116 is nonconducting, tube V115 becomes conducting and a polar-mark current flows in the loop circuit which includes the primary of transformer T101. This loop circuit includes resistor R190, impedances Z111 and Z113, socket J103, Cord CX–953/TRA–7, the BLUE plug on the operating table of the receiving shelter, the LINE binding posts in the receiving and operating shelters, Wire W–110–B or WD–1/TT, the BLACK jack on the operating table of the operating shelter, Cord CX–957/TRA–7, socket J101 of the control unit and resistor R101.

d. The direction of the polar-mark current through transformer T101 in the loop circuit produces a negative voltage at the grid of mark-space switching tube V101 of the control unit and tube V101 becomes nonconducting. The plate of this tube is connected to the grid of the mark-space locking tube V103 and the receive extension driving tube V104. Tube V103 holds tube V101 in a nonconducting condition until a polar-space current is supplied to transformer T101. When tube V101 is nonconducting, tube V104 becomes conducting and relay K101 in the frequency-shift exciter unit operates.

e. One side of the coil of relay K101 is supplied from a +105 volt source. The circuit to complete the coil circuit includes socket J106 (RED), Cord CX–961/TRA–7, terminal C of the RED plug of Junction Box J–207/MRC–2, KEY jack J4, terminal D of the RED plug, Cord CX–961/TRA–7, terminal D of socket J106, terminal D of socket J107, Cord CX–961/TRA–7, the BLUE plug of the junction box, CONTROL binding posts in the transmitting and operating shelters, Wire W–110–B or WD–1/TT, the GREEN jack on the operating shelter table, Cord CX–958/TRA–7, socket J102, resistor R150, switch S104B (terminals 9L and 9), resistor R149, tube V104 (conducting) and the –150-volt power supply of the control unit.

f. Depressing Key J–45 at the operating table in the receiving shelter energizes the coil of relay K101 in the exciter unit. Energizing this coil closes the contacts of the relay which keys certain tubes within the exciter unit and also completes the circuit to the coil of relay RY200 in Junction Box JB–70–(*) (par. 110*a*). Energizing the coil of relay RY200 closes the contacts of this relay and, through one set of contacts, ac power is connected to the coils of relay RY1 and RY4 in the transmitter (par. 112*b*). Energizing relay K101 causes the transmitter to transmit a mark signal.

g. Releasing Key J–45 causes a polar-space current to flow in the polar-loop circuit which includes transformer T101 in the control unit. The direction of flow is such that receive extension driving tube V104 in the control unit becomes nonconducting and the coil of relay K101 is deenergized. Deenergizing the coil of relay K101 opens the contacts of this relay and no transmission occurs. In this manner cw keying from the receiving shelter is accomplished.

116. Interunit Circuits for Manual Frequency-Shift Keying From Receiving Shelter

(figs. 70, 69)

a. Frequency-shift keying from the receiving shelter is controlled by the OPERATION switch on the control unit in the operating shelter set to EMERG FS position. With the OUTPUT switch on the dual diversity converter in the SPACE position and Key J–45 inserted into the KEY jack on the operating table (fig. 69), frequency-shift keying is accomplished by depressing and releasing the key.

b. Depressing the key causes tube V113 in the dual diversity converter to produce a polar-mark current in the telegraph loop circuit which includes primary transformer T101 in the control unit. Releasing the key causes tube V113 to produce a polar-space current in the telegraph loop which includes the primary of transformer T101 in the control unit. This circuit is explained in paragraph 115*b* and *c*.

c. A polar-mark current in the primary of transformer T101 results in tube V101 in the control unit not conducting (par. 115*d*). A polar-space current in the primary of transformer T101 results in tube V101 conducting. The plate of tube V101 is connected to the grid of the neutral send keying tube V107 through resistor R129 and terminals 7 and 9L of OPERATION switch S104A. When tube V101 is nonconducting, tube V107 becomes conducting. The plate of tube V107 is connected to the grid of the polar-space driving tube V106 through resistor R139. When tube V107 is conducting, tube V106 is nonconducting. The plate of tube V106 is connected to the grid of the polar-mark driving tube V105. When tube V106 is nonconducting, tube V105 is conducting. A current flows in the external cathode to plate circuit which includes resistor R153, jack J102, Cord CX–958/TRA–7, the GREEN jack on the operating table, the LINE binding posts in the operating and transmitting shelter, Wire W–110–B or WD–1/TT, the BLUE plug on Junction Box J–207/MRC–2, Cord CX–961/TRA–7, socket J107 of the frequency-shift exciter unit, chokes L109 and L110, resistor R108, resistor R111 and tube V103.

d. The direction of the flow of this polar-mark current is such that the end of resistor R108 connected to the cathodes of tube V103 is positive with respect to the end connected to the plates of tube V103. This cuts off tube V103 and a mark signal is transmitted.

e. A polar-space current flowing through the primary of transformer T101 is in such a direction as to cause tube V101 in the control unit to conduct. When tube V101 conducts, tube V107 is nonconducting and tube V106 is conducting.

f. When tube V106 is conducting, it produces a polar-space current which flows in the telegraph loop circuit in such a direction that the polarity of the voltage across resistor R108 is reversed. With the plates of tube V103 positive with respect to the cathodes, tube V103 conducts and a space signal is transmitted.

g. Radio Set AN/MRC–2 (*) can be used as a relay station. The circuit is the same as the circuit for frequency-shift keying except that Key J–45 is removed and the OUTPUT switch is set in the NORMAL or REVERSE position, depending on the setting of the bandswitch in the receiver. Polar mark and space signals which result from normally received radioteletype signals actuate tube V113 and these signals are retransmitted without actuating the teletypewriter equipment in the operating shelter.

117. Interunit Circuits for Emergency Cw Keying from the Speech Amplifier

(fig. 71)

a. Emergency cw keying from the speech amplifier is accomplished by operating Key J–37 inserted in the KEY jack J101. This method is used when control by relay RY200 in Junction Box JB–70–(*) is impossible due to failure of the 12-volt circuit or the relay itself. Operating the PLATE POWER switch of the transmitter to on (up) operates plate power relay RY1 and antenna shorting relay RY4. Operating RY4 removes the short across the antenna-output terminals (TM 11–826).

b. Depressing Key J–37 closes the circuit from the cathode of the rf oscillator tube V8 to ground

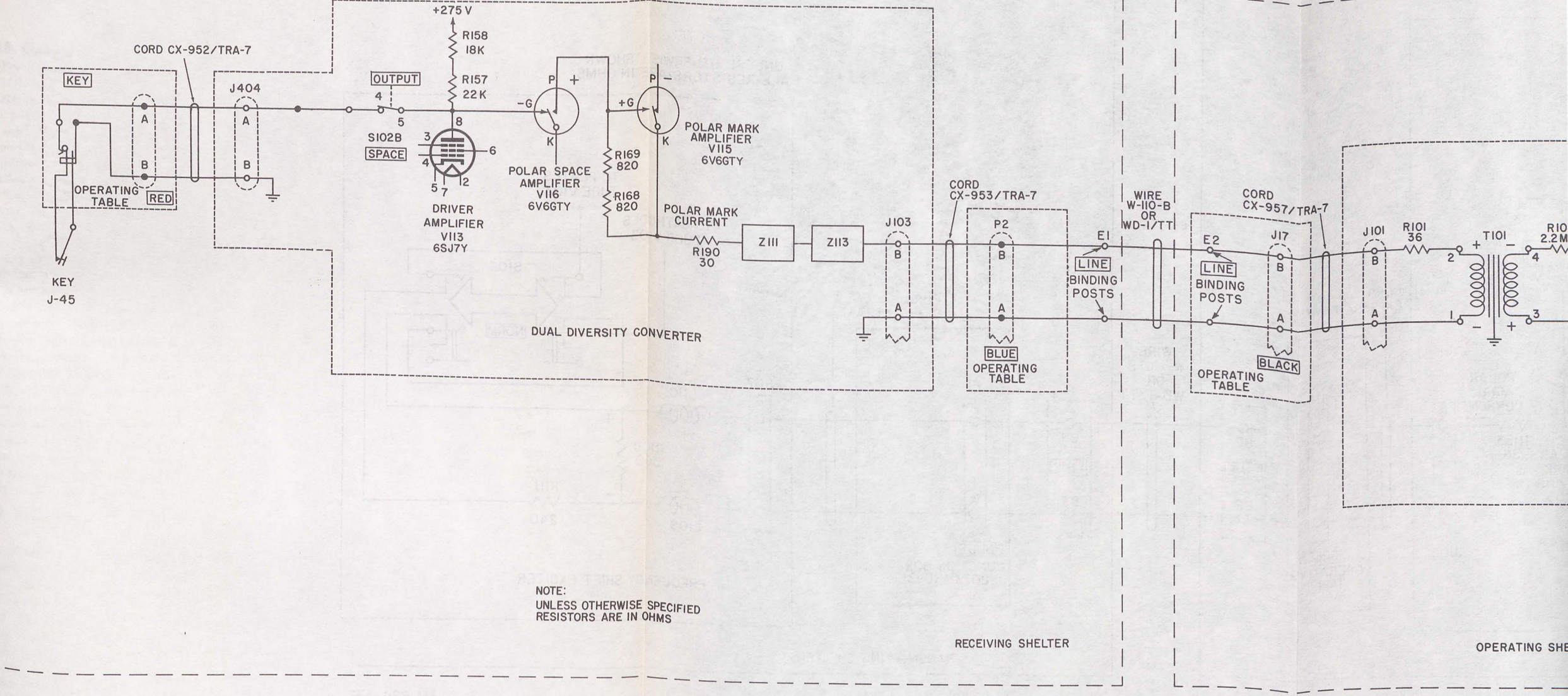


Figure 69. Interunit circuits for cw keying from

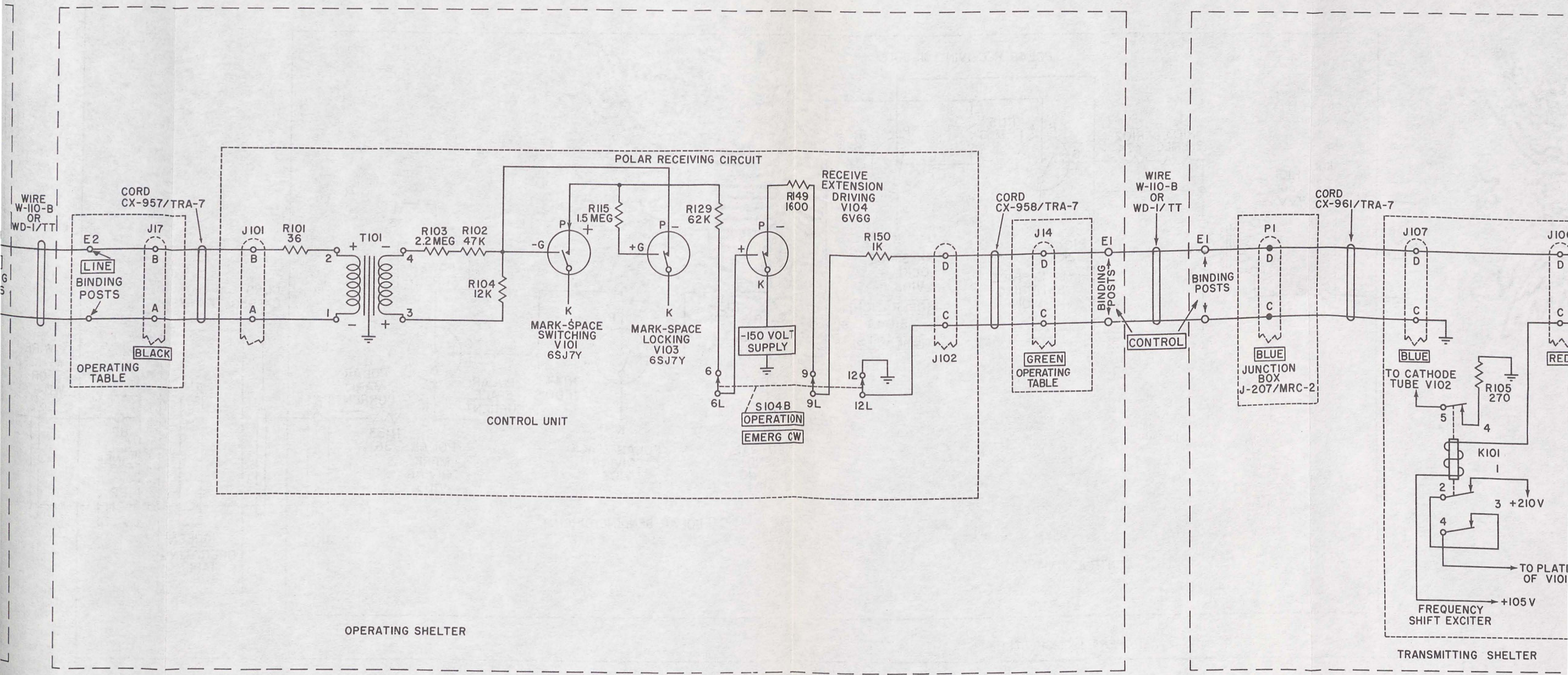


Figure 69. Interunit circuits for cw keying from the receiving shelter.

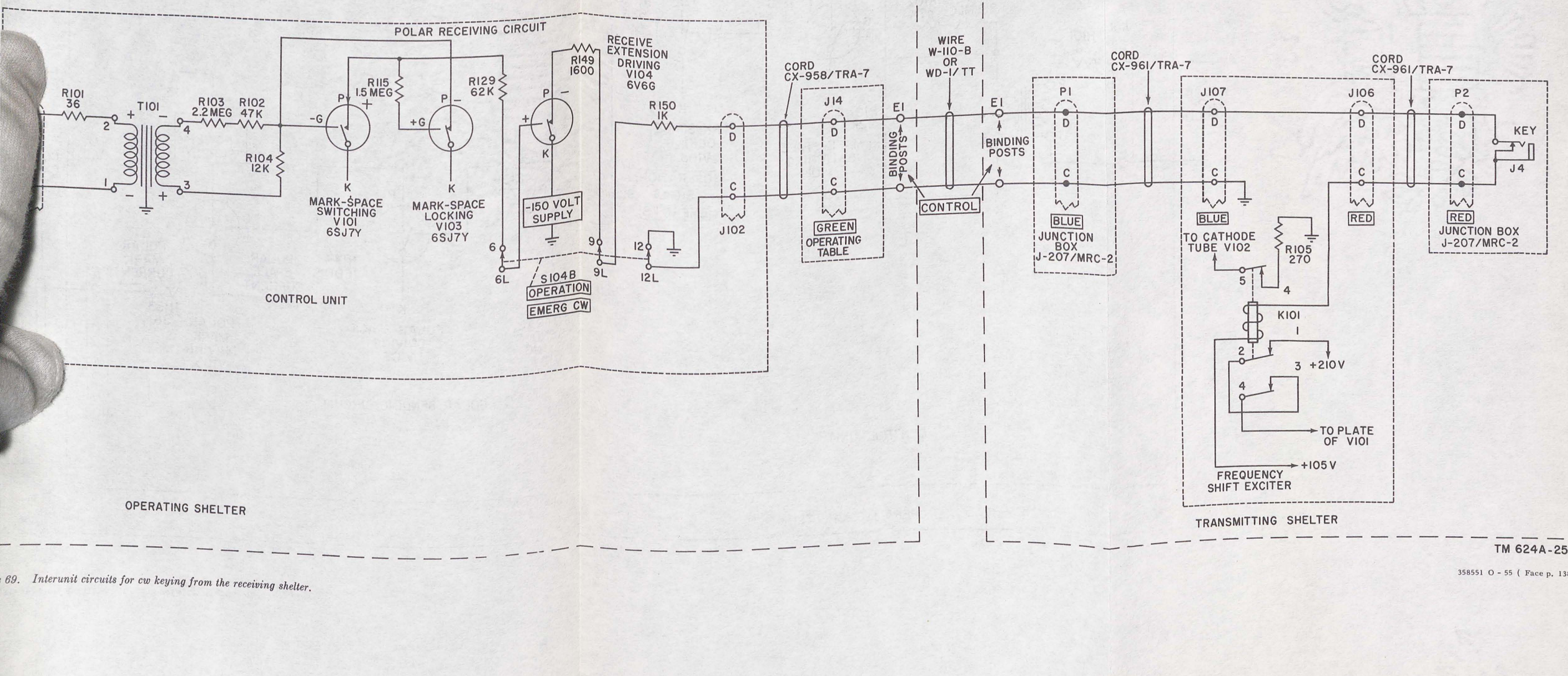


Figure 69. Interunit circuits for cw keying from the receiving shelter.

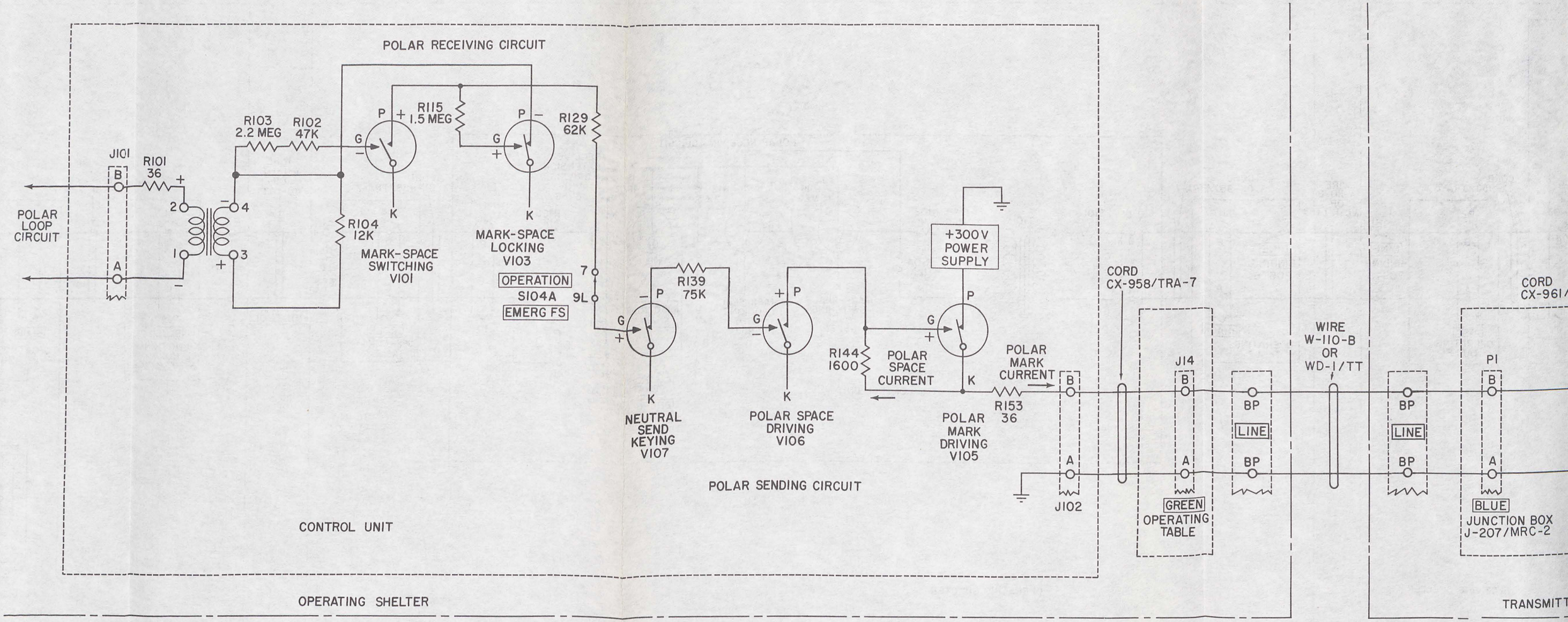
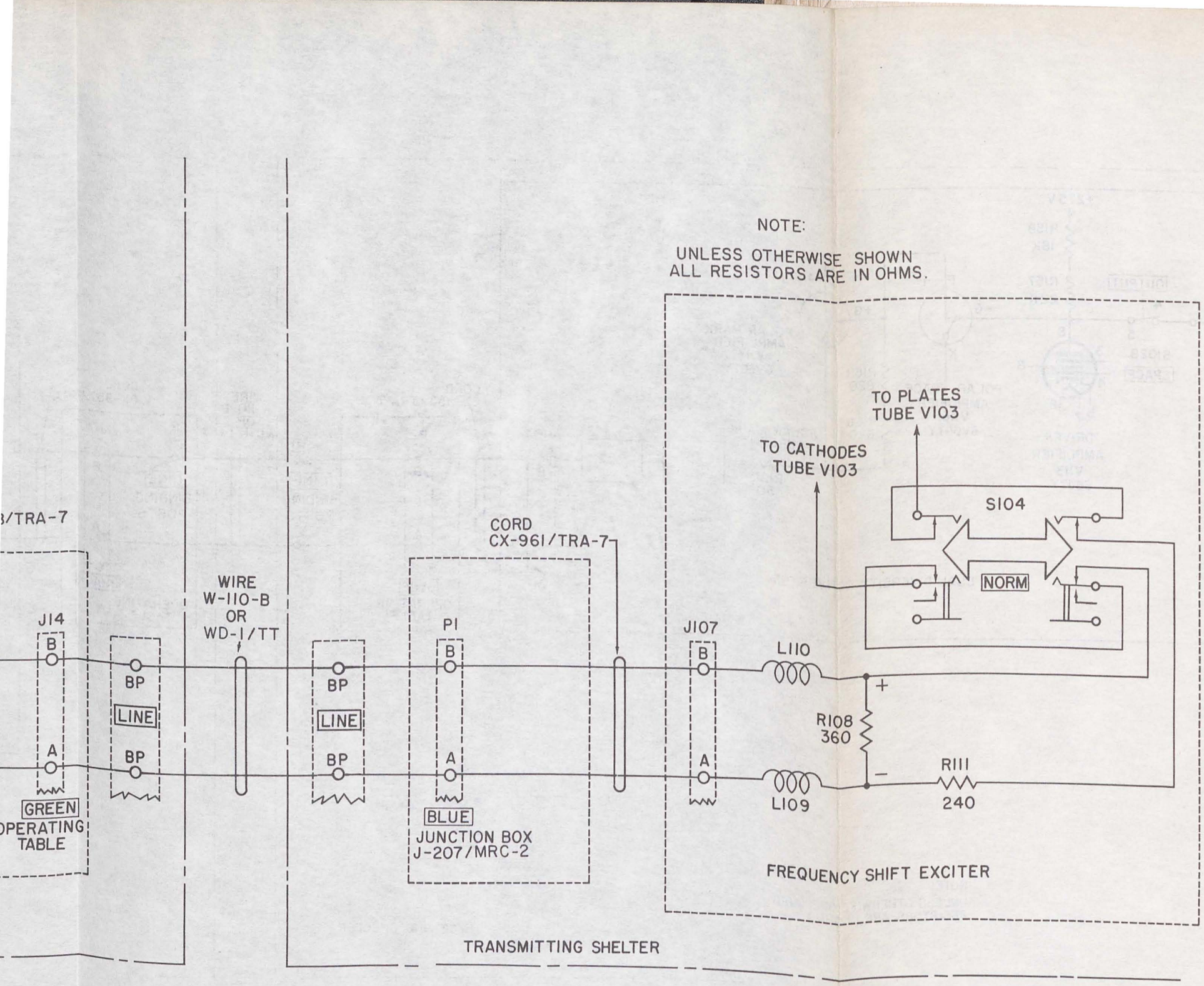


Figure 70. Interunit circuits for manual FS keying from the receiving shelter.

NOTE:

UNLESS OTHERWISE SHOWN
ALL RESISTORS ARE IN OHMS.



ceiving shelter.

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at KEY jack J101 in the speech amplifier. Ground from the speech amplifier is connected to ground in the radio transmitter by Cord CD–764 which also connects terminal 2 of socket SO 103 (TO BC–610) to terminal 2 of socket SO 5. Grounding the cathode of tube V8 keys tube V8 and transmission occurs. Releasing the key opens the circuit from cathode to ground and no transmission occurs.

c. The radio receiver disabling circuit controlled by relay RY200 is inoperative. To avoid damage to the receiver, the receiver must be tuned to a frequency at least 400 kc from the transmitter frequency.

Section III. THEORY OF AMPLIFIER AM–141(*)/MRC

118. General

For discussion in this section, Amplifier AM–141(*)/MRC is divided electrically into three parts: the rf section, the power supply section, and the power distribution and control circuits. The rf section is a class C rf amplifier that uses two type 833A triodes connected in push-pull. The amplifier delivers a power output of approximately 2 kilowatts when operated with an ac power input of 5,000 volt-amperes at 115 volts, 60 cycles per second (cps). Rf excitation to the grids of the 833A tubes is accomplished by connecting the tuned grid circuit by a link coupling to the rf output terminals of Radio Transmitter BC–610–I. The balanced rf output of the amplifier is coupled by a variable link on the plate tank coil to the antenna bowl feedthrough insulators at the top of the cabinet. A bias power supply provides the proper negative voltage for operating the amplifier as a class C stage. A protective relay in this circuit prevents damage to the amplifier tubes when excitation from the radio transmitter fails or drops below a safe value. A system of interlock switches provides protection to operating and maintenance personnel by disabling the high-voltage supply when any of the coil-access panels are opened. The schematic diagram for Amplifier AM–141(*)/MRC is shown in figure 93.

119. Rf Section

(fig. 72)

a. Excitation. Excitation is obtained by connecting the rf output terminals of Radio Transmitter BC–610–I to coaxial connector J4 (EXCITATION INPUT) on the amplifier by means of Cord CG–65A/MRC–1. The efficiency of rf power transfer to the amplifier is controlled by by the position of the variable link-coupling coil mounted inside the final plate tank coil of Radio Transmitter BC–610–I.

b. Grid Circuit. The rf power from the transmitter is coupled inductively to the grid circuit of the amplifier by a fixed link-coupling coil inside grid coil L1. Coil L1 is a plug-in type. The correct coil must be selected for the frequency range in use. Tuning of the grid circuit to the transmitter frequency is accomplsihed by means of the two-section variable grid-tuning capacitor C2. Plug-in vacuum Capacitor CA–423 (shown as C3 on the schematics) is used in parallel with capacitor C2 to increase the capacitance of the grid tank circuit when operation from 2.0 to 2.24 mc is desired. Both fixed bias and self bias are applied to the grids of tubes V1 and V2 through the center tap of the secondary winding of grid coil L1. The voltage developed across resistor R4 by grid current during excitation increases the fixed negative bias from the bias power supply, and thereby increases the plate circuit efficiency of tubes V1 and V2. Rf choke L3 and resistor R1 in conjunction with capacitor C1, form an rf filter that prevents the flow of rf current through grid current meter M1 and the bias power supply. Capacitors C20 and C21 serve as additional rf bypass elements to prevent rf current from flowing through the grid current meter M1 and the bias supply.

c. Plate Circuit. The plate tank circuit of the amplifier consists of plug-in coil L2 and the variable-capacitor unit formed by the ganging of the individual dual-section capacitors, C11 and C16. The three-position band switch S17 controls the circuit arrangement of this tank. Position 1 (midfrequency range) connects capacitors C11A and C11D across each half of plate tank coil L2. Position 2 (high-frequency range, shown in figure 72) connects capacitors C11A and C11B in series across one-half of coil L2, and capacitors C11C and C11D in series across the other half of coil L2. Position 3 (low-frequency range) connects capacitors C11A and C11B and capacitors C11C and C11D in parallel across each coil half. Power is applied to the plate circuit of tubes V1 and V2 from the plate power supply through rf choke L4 to the center tap of plate tank coil L2. L4 aids in equalizing the loading of the plates of tubes V1 and V2 and, in conjunction with capacitor

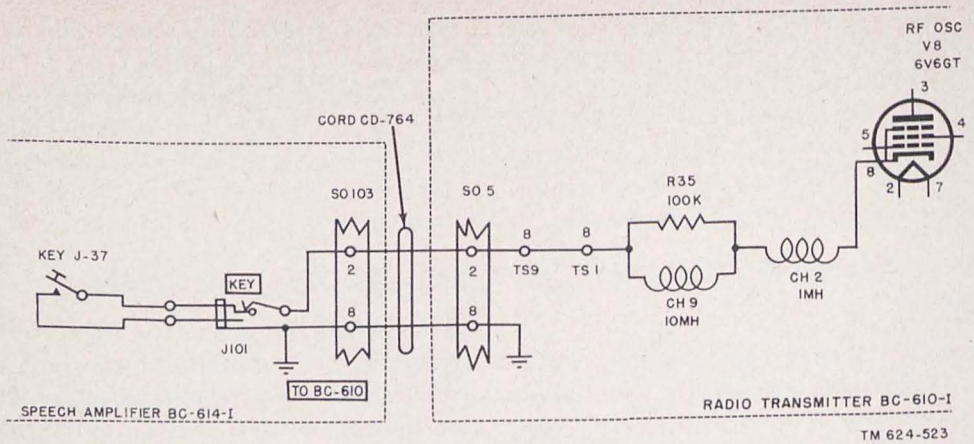


Figure 71. Emergency cw keying circuits from the speech amplifier.

C12, prevents rf from entering the high-voltage supply. The rf energy in the plate tank circuit is coupled inductively to the antenna through the secondary winding (an adjustable link) of coil L2. The secondary coil can be rotated through 360°; it provides the variable output coupling to the antenna necessary for correct power loading of the amplifier tubes. To prevent parasitic oscillations, a single-turn, heavy bus-bar wire choke coil, L9, is placed around, and connected in parallel to noninductive resistor R2 in series with the plate circuit of V1. Choke L10 is connected in parallel with R3 in the plate circuit of V2 for the same purpose.

d. Neutralization. Neutralization of the power amplifier is accomplished by feeding a portion of the output of each tube to the grid of the other tube through variable neutralizing capacitors C8 and C9. This method of neutralizing a push-pull stage is called cross neutralization. Neutralizing capacitor C8 is adjusted so that the magnitude of the voltage fed back to the grid of V1 is equal and opposite in phase to the voltage fed back through the interelectrode (plate to grid) capacity of tube V1. The voltages being equal and 180° out of phase cancel each other. This also applies to capacitor C9 and tube V2. With this type of neutralization, self-oscillation of tubes V1 and V2 is prevented, and the amplifier can operate over the entire band of frequencies.

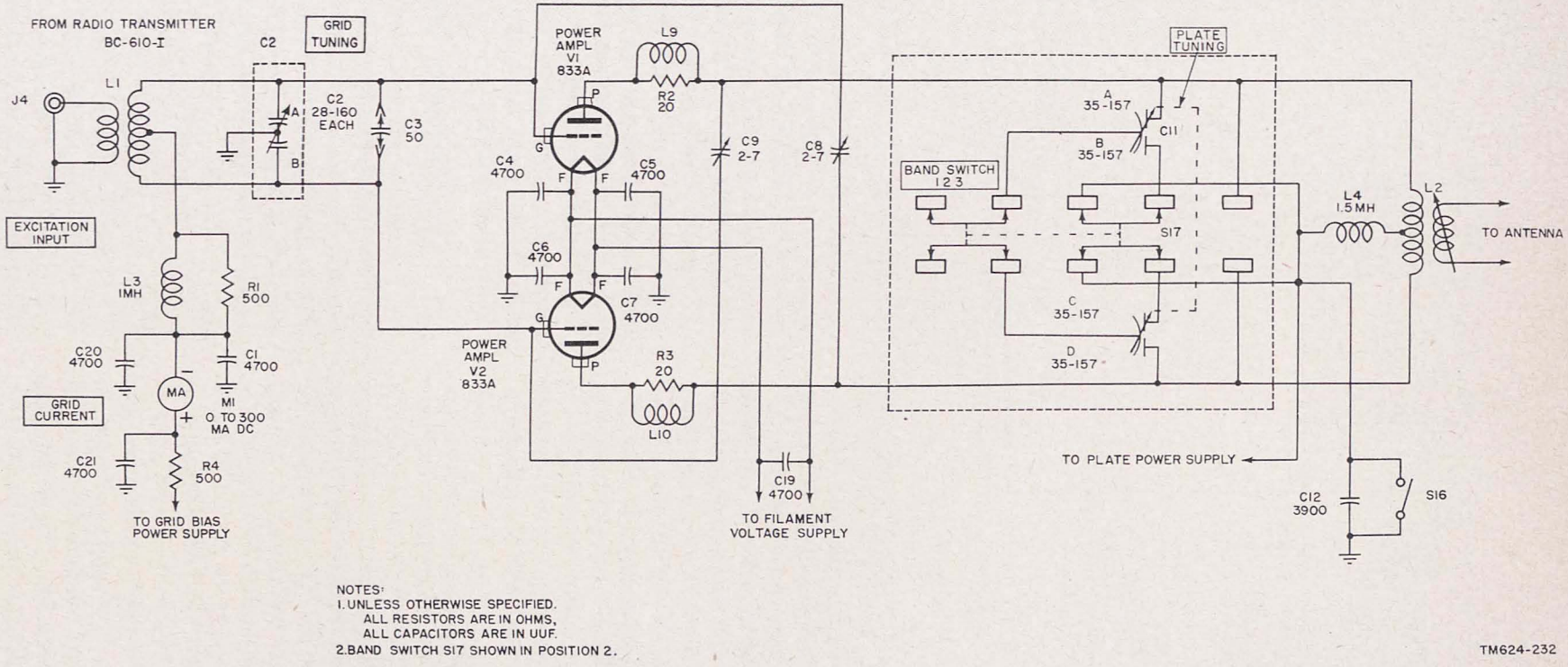
e. Switch S16 is a protective device to ground the high-voltage plate line and discharge the power supply filter capacitors if the normal interlock circuit fails.

f. Filament Circuit (fig. 93). The filaments of tubes V1 and V2 are connected in parallel across the secondaries of transformers T3 and T4, which are connected in series. Capacitors C4, C5, C6, and C7 bypass radio frequencies to ground. Capacitor C19, connected across meter M2, is an additional rf bypass.

120. Power Supply Section

Two separate power supplies are included in the power amplifier: a bias supply and a plate supply. The ac input power applied to the bias and plate supplies is controlled by an interlock circuit. Opening of the interlock circuit always will disable the plate supply and sometimes the bias supply, depending on the point of opening.

a. Bias Power Supply (fig. 73). Negative grid bias voltage for tubes V1 and V2 is supplied by a bias power supply that consists of two gas-filled 3B28-type tubes, V3 and V4, in a full-wave rectifier circuit. The filament voltage of 2.5 volts ac is supplied to the two rectifier tubes by transformer T2, the center tap of which is connected to ground. Transformer T1 supplies plate voltage to the rectifier tubes through rf chokes L5 and L6. These chokes serve to suppress the rf interference or hash generated by the rectifier tubes. The negative dc output of the rectifier at the center tap of transformer T1 is filtered by a two-section choke, L7, and capacitors C15 and C14 which form a dual-section choke-input filter. Resistor R5, in series with the coil of relay K2, forms a high-current bleeder across the bias power supply, and thus provides good regulation and a discharge path for the filter capacitors when the set is turned off. The contacts of relay K2 open if the bleeder current falls below 115 to 135 ma and close when the current increases to a value between 190 to 210 ma. When insufficient grid bias voltage is present, the open contacts of K2 prevent applica-



NOTES:
1. UNLESS OTHERWISE SPECIFIED.
   ALL RESISTORS ARE IN OHMS,
   ALL CAPACITORS ARE IN UUF.
2. BAND SWITCH S17 SHOWN IN POSITION 2.

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Figure 72. Amplifier AM–141(*)/MRC, rf section, schematic diagram.

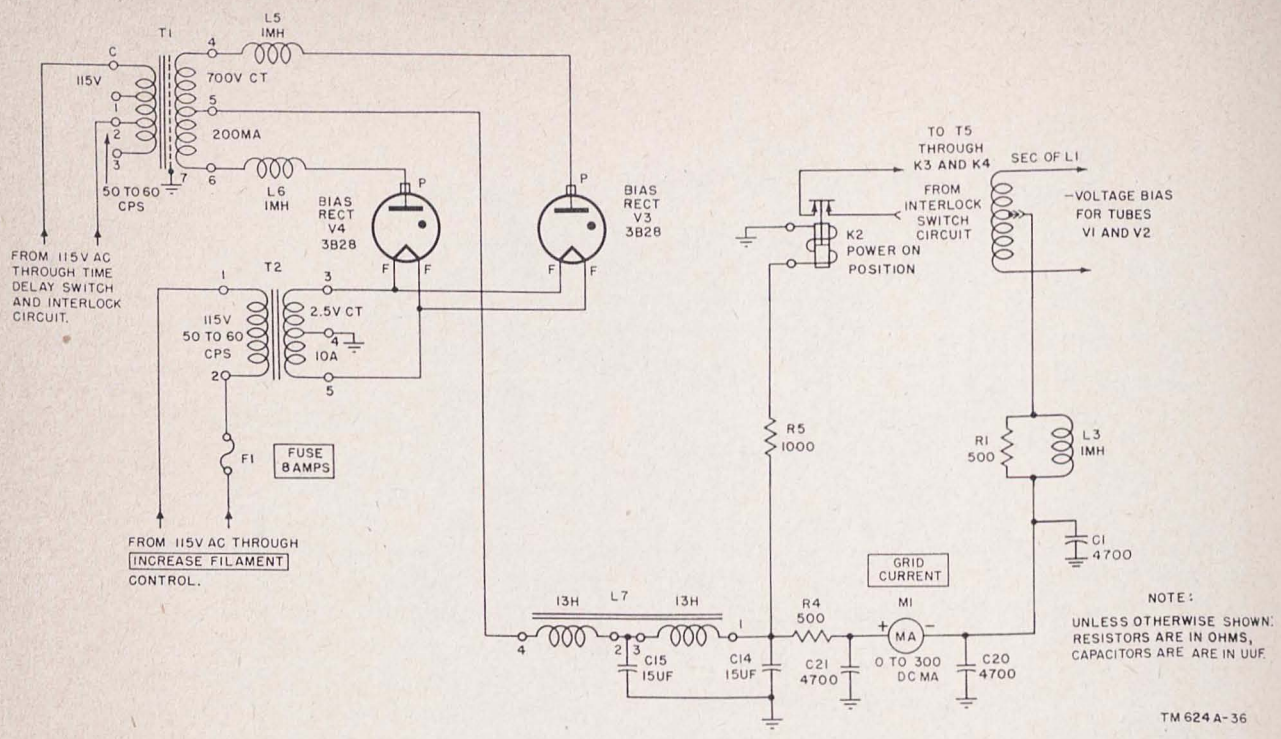


Figure 73. Amplifier AM–141(*)/MRC, bias power supply, schematic diagram.

tion of plate power to tubes V1 and V2; this protects the tubes against damage. If the bias supply circuit fails during operation, the grid-leak current flow through resistor R4 and the coil of K2 will bias the tube adequately, and will hold the contacts of relay K2 closed; thus the amplifier will continue to operate. If the excitation to the amplifier is interrupted momentarily, relay K2 contacts will open, break the interlock circuit, and disable the high-voltage power supplies of the amplifier and the transmitter. It will not be possible to reapply excitation until the bias supply trouble is corrected.

b. Plate Power Supply (fig. 74). The high-voltage plate power supply for the power amplifier consists of two gas-filled type 4B32 tubes, V5 and V6, in a full-wave rectifier circuit. The 5-volt ac filament voltage for the two rectifier tubes is supplied by transformer T6. The output of the rectifier (voltage positive with respect to ground) at the center tap of transformer T6 is filtered by a choke-input filter that consists of choke L8 and capacitor C13. Resistors R6 and R7 make up the bleeder circuit between B+ and ground. Transformer T7 supplies plate voltage to the rectifier tubes, and its center tap is connected to ground through the coil of overload relay K3 and PLATE CURRENT meter M3. The total plate current of tubes V1 and V2 and the bleeder current of resistors R6 and R7 flows through this circuit to ground and is indicated by PLATE CURRENT meter M3. PLATE POWER switch S1 should never be set to the ON position without first setting the NORMAL-TUNE UP switch to the TUNE UP (switch open) position. In the NORMAL position, full power is applied immediately to the high-voltage power supply components and may cause high current and voltage surges in them. This may cause damage to components or the release of overload relay K3. PLATE POWER lamp E6 will light when the high-voltage power supply is operating.

121. Power Distribution Circuits

(fig. 75)

The application and control of ac power in the various circuits and components of Amplifier AM–141(*)/MRC is illustrated in figure 75 and discussed in *a* through *e* below. The amplifier is connected to Radio Transmitter BC–610–I and the 115-volt, 60-cycle power source is connected to socket J2 on the amplifier by Cord CX–135/MRC–1. The circuit diagram shows the positions of relay contacts and switches in the normal position with all panels closed.

a. CIRCUIT BREAKER switch K5, when thrown to the ON position, supplies ac power to

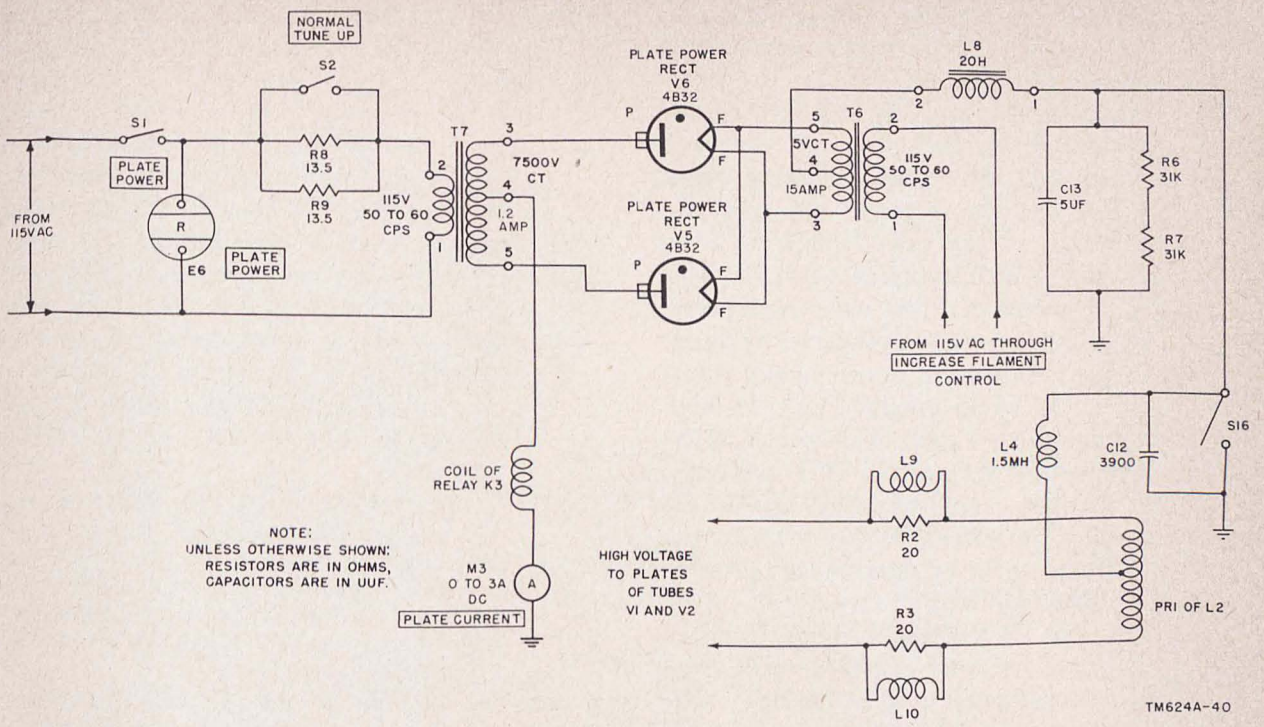


Figure 74. Amplifier AM–141(*)/MRC, plate power supply, schematic diagram.

the following components:

(1) Panel indicator lamp E5.

(2) Filament variac T5.

b. Adjustment of variac T5 to a reading of 10 volts on the FILAMENT VOLTAGE METER (maximum tolerance ±.5 volts) will apply 115 volts (±5 volts) to the following components:

(1) Filament transformers T4, T3, T2, and T6.

(2) Blower motors B1 and B2.

(3) Time-delay switch K1.

c. The application of power to time-delay switch K1 starts the rotation of the timer motor. This motion turns a cam which, after a preset interval of from 45 to 60 seconds, actuates a microswitch. At this point the motor stops and the cam holds the switch contacts closed. This completes the path through terminals 1 and 3 of the time-delay switch for application of power to the following (if all interlocks are closed):

(1) Blower motor B3.

(2) Bias power supply plate transformer T1.

(3) Coil of relay K4.

d. When relay K4 is energized, its contacts close and one pair of contacts completes the 115-volt ac circuit to one side of the primary winding of the high-voltage plate supply transformer T7. PLATE POWER switch S1 connects the other side of the primary winding to the main power source. When this switch is closed, plate power is applied to tubes V1 and V2 (fig. 72) and plate power indicator lamp E6 will glow.

e. A second set of contacts on relay K4 completes the ac primary circuit of the high-voltage transformer in Radio Transmitter BC–610–I (S14 set to the OFF position). When the contacts are closed, INCREASE EXCITATION variac T8 varies the voltage supplied to the primary winding of the plate power transformer in the transmitter through Cord CX–911/U. This cord is connected between receptacle J3 of the power amplifier and terminal strip TS15 of the transmitter. The power applied to the variac is obtained from Radio Transmitter BC–610–I. A 115-volt ac supply voltage is fed from Radio Transmitter BC–610–I to variac T8 through terminals 2 and 3 of jack J3. Terminal 1 connects the variable output of T8 to the plate power transformer of the transmitter. The rf output of the transmitter can be controlled by varying the INCREASE EXCITATION control.

122. Overload and Protection Circuits

(fig. 75)

a. Plate Overload Relay K3.

(1) Plate overload relay K3, part of the high-voltage power supply dc circuit (fig. 74), protects the amplifier tubes and the power supply against any overload

conditions that may occur. The contacts of relay K3 normally are held in the closed position by a latch. When plate current in excess of 1.325 amperes flows through the load coil, the latch trips and the relay contacts open. When the relay contacts are open, the ac power to the coil of relay K4 from variac T5 is interrupted, and the relay is de-energized. The open contacts of relay K4 prevent application of power to the high-voltage power supply transformer T7 of the amplifier and the high-voltage power supply transformer of the transmitter (S14 set to OFF position). When the condition that causes the overload is corrected, the contacts can be closed again by momentarily pressing OVERLOAD RESET switch S15. Pressing the OVERLOAD RESET switch energizes the reset coil of relay K3 and causes the contacts to be latched. The latch now will hold the contacts of relay K3 closed until another overload condition releases the latch.

(2) The overload coil is provided with a delay mechanism to prevent premature tripping of the relay by momentary load current surges caused by cw keying and switching of the plate power supply. The movable iron core within the load coil normally is held out of the coil by an adjustable expansion spring. Adjustment also is provided for initially placing the core in any degree of engagement with the overload coil. The distance the iron core moves into the overload coil is determined by the relative amount of plate current flowing through the overload coil. Because of the inertia of the iron core and the spring tension against it, the iron core will not move far enough into the coil to increase the magnetic pull on the latch mechanism to a point where it will trip unless current settings are exceeded or the current surge is exceedingly high or abnormally prolonged when the plate power is first switched on.

b. Bias Underload Relay K2. Failure of the bias power supply to furnish sufficient grid bias voltage (with no excitation) to the amplifier would allow excessive plate current to flow and damage the amplifier tubes. Relay K2, part of the bias supply bleeder circuit (fig. 73), protects the amplifier tubes in the following manner:

(1) When the bias supply bleeder current drops to 115–135 ma (low bias voltage condition) because of failure of the bias power supply components or its power source (with no excitation), the relay contacts open and deenergize relay K4. The contacts on relay K4 open and remove the ac power source from the high-voltage plate supply transformers of both the amplifier and Radio Transmitter BC–610–I (S14 set to OFF position).

Note. If NEUT. SWITCH S14 is in the ON position, the high-voltage circuit of the transmitter is unaffected by relay K4. For emergency operation when the amplifier fails and use of the transmitter is desired (par. 75, 76*b*), see that the NEUT. SWITCH is in the ON position.

(2) The contacts of relay K2 will close when a bleeder current of 190–210 ma is flowing through the relay coil.

c. NORMAL-TUNE UP Switch S2. NORMAL-TUNE UP switch S2, when set to the TUNE UP position, places voltage-dropping resistors R8 and R9 in series with the primary winding of power transformer T7. This reduces the output voltage of the plate power supply by approximately 60 per cent. When NORMAL-TUNE UP switch S2 is placed at the NORMAL position, resistors R8 and R9 are bypassed and the full voltage is applied to the primary of transformer T7.

d. Interlock Switches. Switches S5 through S13 form the interlock circuit of Amplifier AM–141(*)/MRC. Opening any of the interlock switches (switch S14 set to OFF position) removes the ac power supplied to blower B3, bias supply transformer T1, and relay K4. The contacts of relay K4 open and remove the ac power supplied to high-voltage transformer T7 and INCREASE EXCITATION variac T8. This prevents operating personnel from accidentally contacting dangerously high voltages within the amplifier if the doors or panels are opened. The locations of the interlock switches are as follows:

(1) S5, back panel interlock, access door to tubes V5 and V6.

(2) S6, back panel interlock, access door to tubes V3 and V4.

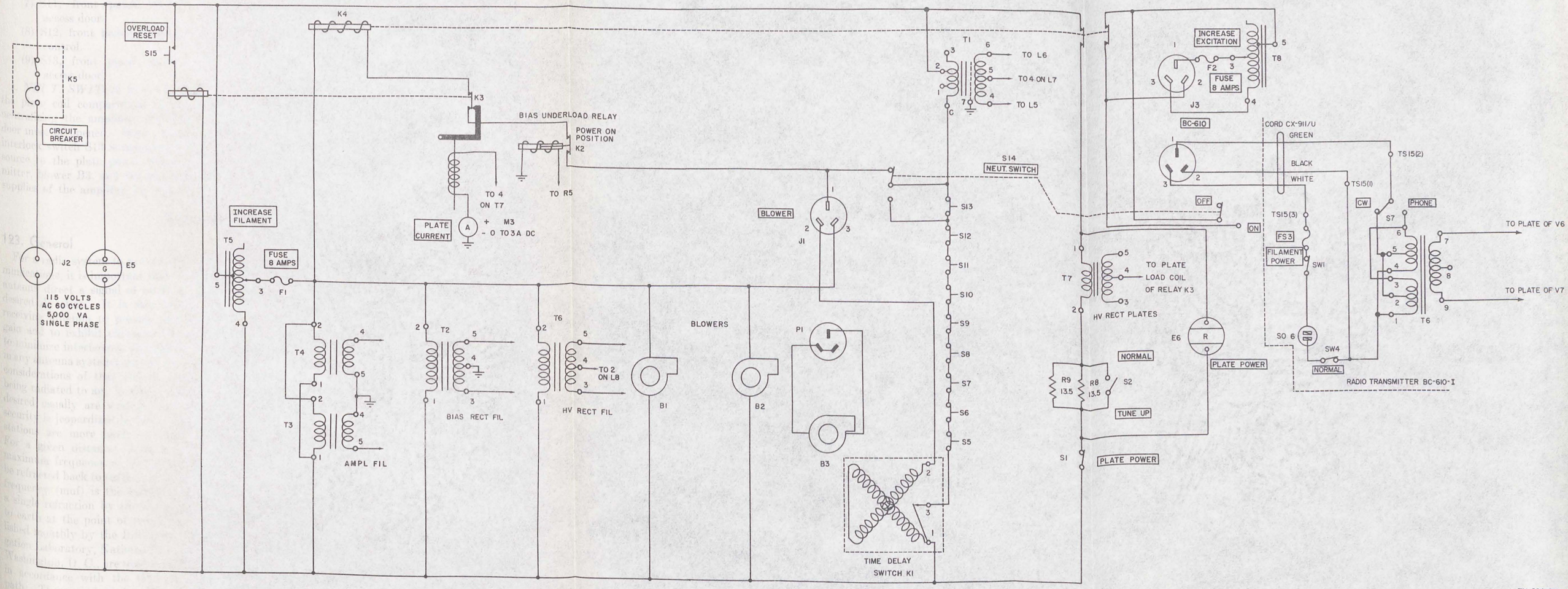


Figure 75. Amplifier AM-141(*)/MRC, power distribution circuits.

g. Releasing Key J–45 causes a polar-space current to flow in the polar-loop circuit which includes transformer T101 in the control unit. The direction of flow is such that receive extension driving tube V104 in the control unit becomes nonconducting and the coil of relay K101 is deenergized. Deenergizing the coil of relay K101 opens the contacts of this relay and no transmission occurs. In this manner cw keying from the receiving shelter is accomplished.

116. Interunit Circuits for Manual Frequency-Shift Keying From Receiving Shelter

(figs. 70, 69)

a. Frequency-shift keying from the receiving shelter is controlled by the OPERATION switch on the control unit in the operating shelter set to EMERG FS position. With the OUTPUT switch on the dual diversity converter in the SPACE position and Key J–45 inserted into the KEY jack on the operating table (fig. 69), frequency-shift keying is accomplished by depressing and releasing the key.

b. Depressing the key causes tube V113 in the dual diversity converter to produce a polar-mark current in the telegraph loop circuit which includes primary transformer T101 in the control unit. Releasing the key causes tube V113 to produce a polar-space current in the telegraph loop which includes the primary of transformer T101 in the control unit. This circuit is explained in paragraph 115*b* and *c*.

c. A polar-mark current in the primary of transformer T101 results in tube V101 in the control unit not conducting (par. 115*d*). A polar-space current in the primary of transformer T101 results in tube V101 conducting. The plate of tube V101 is connected to the grid of the neutral send keying tube V107 through resistor R129 and terminals 7 and 9L of OPERATION switch S104A. When tube V101 is nonconducting, tube V107 becomes conducting. The plate of tube V107 is connected to the grid of the polar-space driving tube V106 through resistor R139. When tube V107 is conducting, tube V106 is nonconducting. The plate of tube V106 is connected to the grid of the polar-mark driving tube V105. When tube V106 is nonconducting, tube V105 is conducting. A current flows in the external cathode to plate circuit which includes resistor R153, jack J102, Cord CX–958/TRA–7, the GREEN jack on the operating table, the LINE binding posts in the operating and transmitting shelter, Wire W–110–B or WD–1/TT, the BLUE plug on Junction Box J–207/MRC–2, Cord CX–961/TRA–7, socket J107 of the frequency-shift exciter unit, chokes L109 and L110, resistor R108, resistor R111 and tube V103.

d. The direction of the flow of this polar-mark current is such that the end of resistor R108 connected to the cathodes of tube V103 is positive with respect to the end connected to the plates of tube V103. This cuts off tube V103 and a mark signal is transmitted.

e. A polar-space current flowing through the primary of transformer T101 is in such a direction as to cause tube V101 in the control unit to conduct. When tube V101 conducts, tube V107 is nonconducting and tube V106 is conducting.

f. When tube V106 is conducting, it produces a polar-space current which flows in the telegraph loop circuit in such a direction that the polarity of the voltage across resistor R108 is reversed. With the plates of tube V103 positive with respect to the cathodes, tube V103 conducts and a space signal is transmitted.

g. Radio Set AN/MRC–2 (*) can be used as a relay station. The circuit is the same as the circuit for frequency-shift keying except that Key J–45 is removed and the OUTPUT switch is set in the NORMAL or REVERSE position, depending on the setting of the bandswitch in the receiver. Polar mark and space signals which result from normally received radioteletype signals actuate tube V113 and these signals are retransmitted without actuating the teletypewriter equipment in the operating shelter.

117. Interunit Circuits for Emergency Cw Keying from the Speech Amplifier

(fig. 71)

a. Emergency cw keying from the speech amplifier is accomplished by operating Key J–37 inserted in the KEY jack J101. This method is used when control by relay RY200 in Junction Box JB–70–(*) is impossible due to failure of the 12-volt circuit or the relay itself. Operating the PLATE POWER switch of the transmitter to on (up) operates plate power relay RY1 and antenna shorting relay RY4. Operating RY4 removes the short across the antenna-output terminals (TM 11–826).

b. Depressing Key J–37 closes the circuit from the cathode of the rf oscillator tube V8 to ground

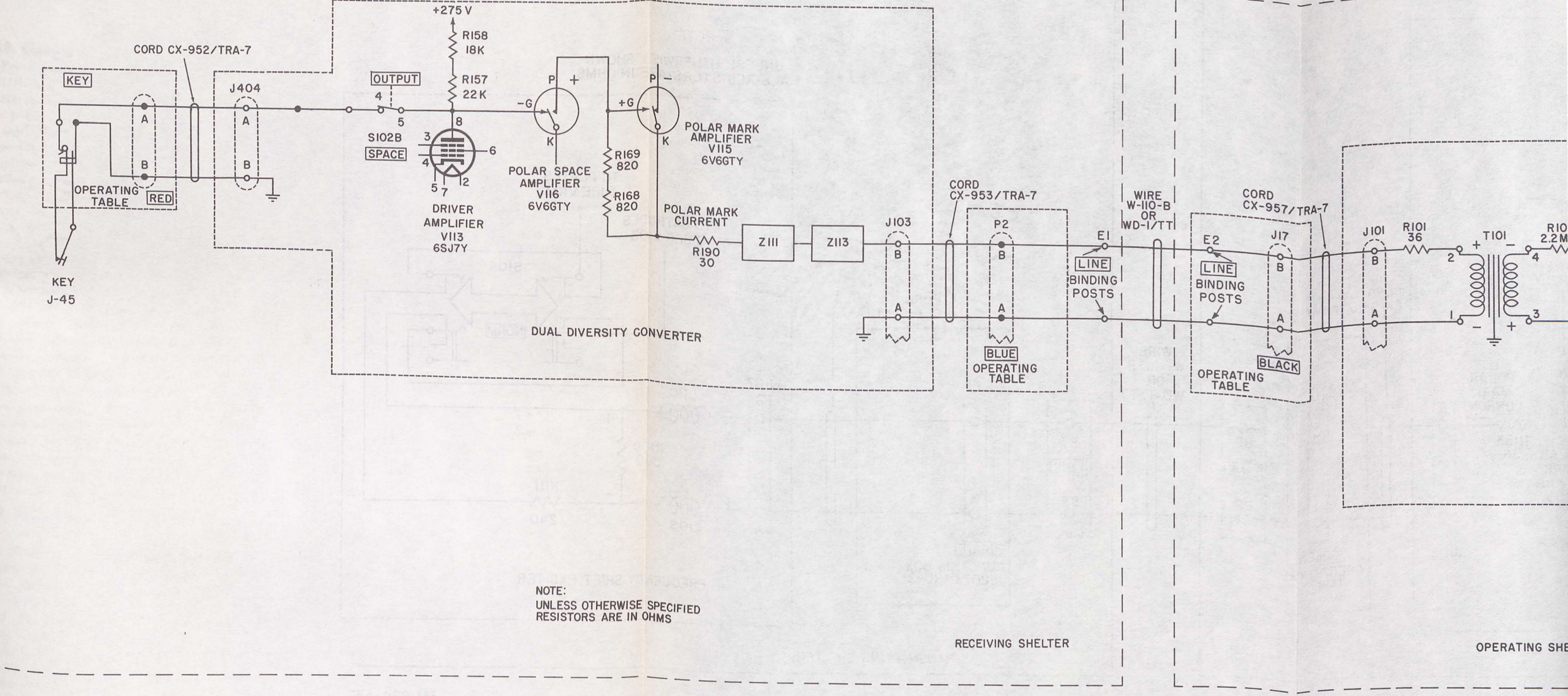


Figure 69. Interunit circuits for cw keying from

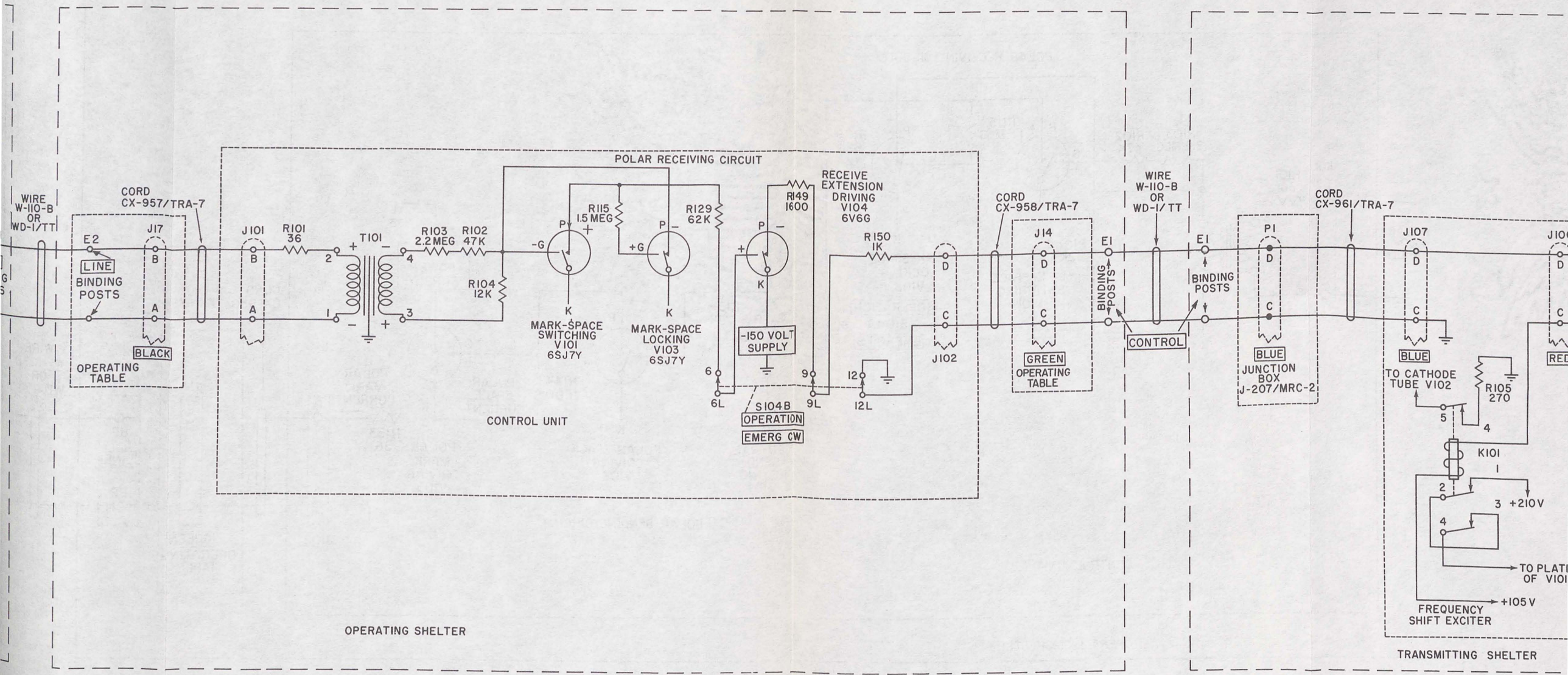


Figure 69. Interunit circuits for cw keying from the receiving shelter.

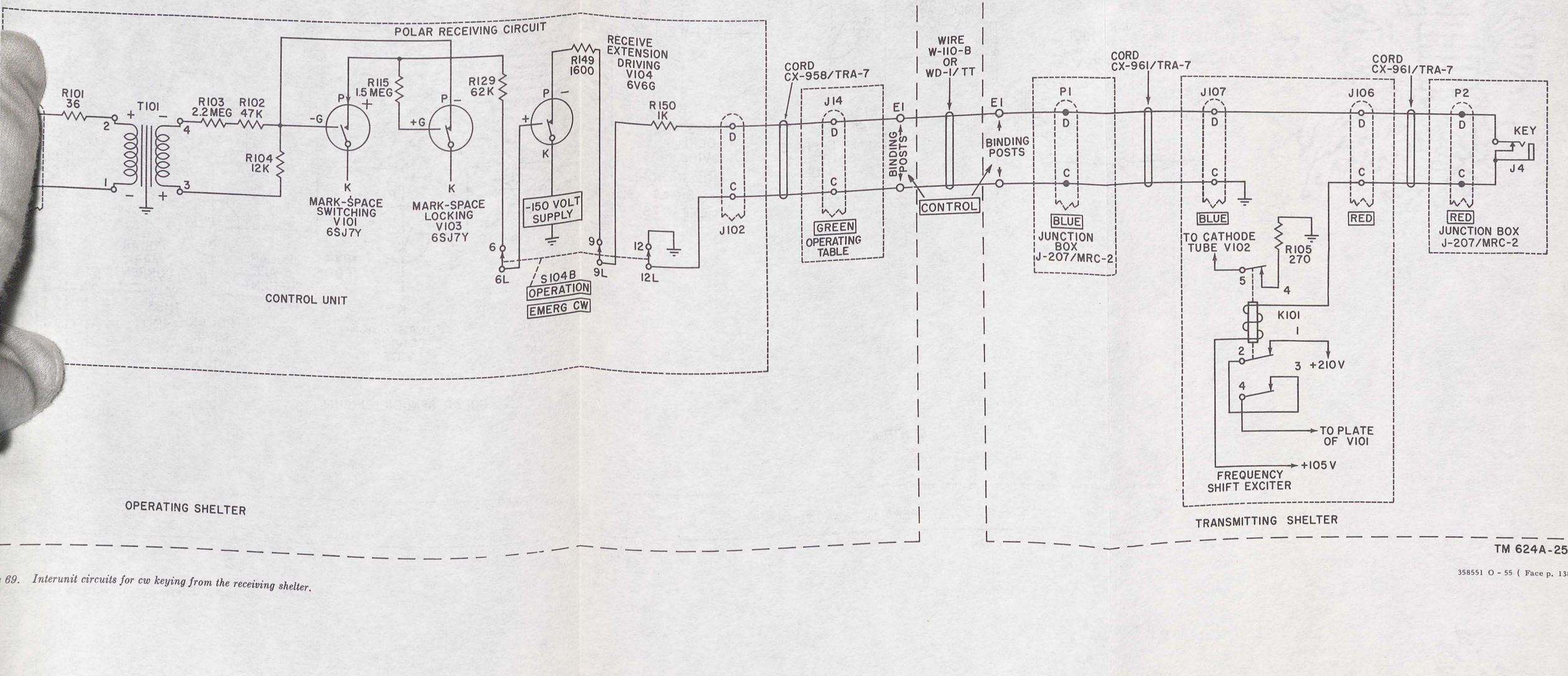


Figure 69. Interunit circuits for cw keying from the receiving shelter.

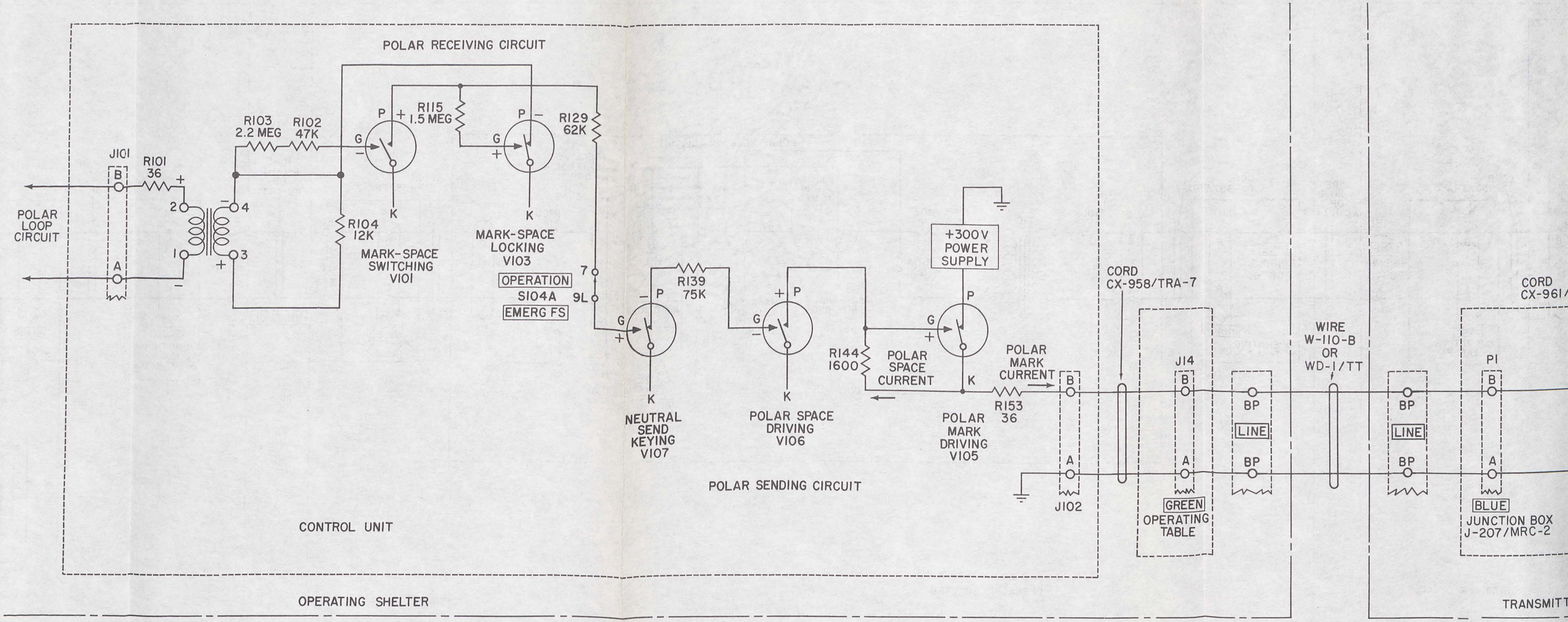
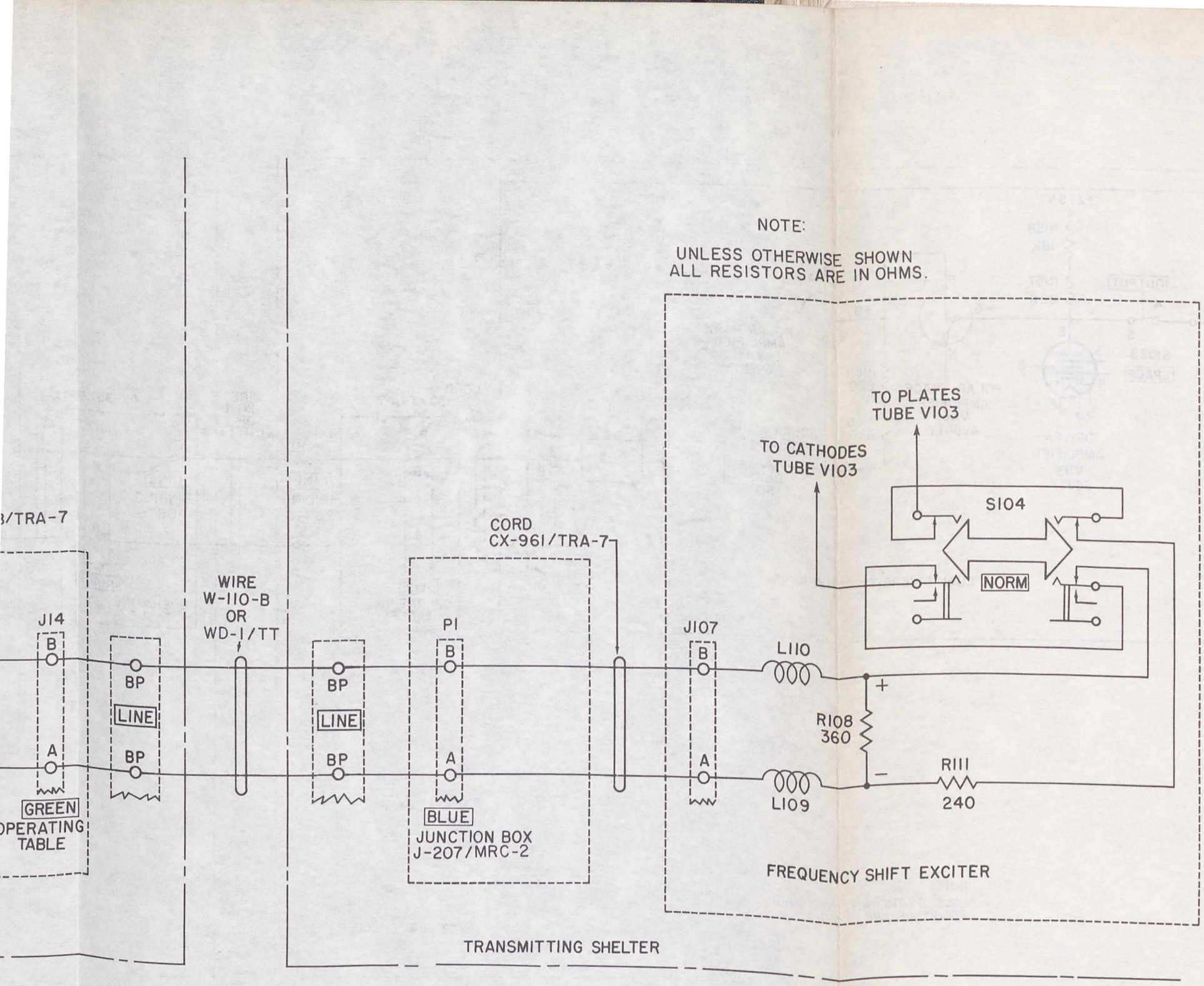


Figure 70. Interunit circuits for manual FS keying from the receiving shelter.

NOTE:

UNLESS OTHERWISE SHOWN
ALL RESISTORS ARE IN OHMS.



ceiving shelter.

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at KEY jack J101 in the speech amplifier. Ground from the speech amplifier is connected to ground in the radio transmitter by Cord CD–764 which also connects terminal 2 of socket SO 103 (TO BC–610) to terminal 2 of socket SO 5. Grounding the cathode of tube V8 keys tube V8 and transmission occurs. Releasing the key opens the circuit from cathode to ground and no transmission occurs.

c. The radio receiver disabling circuit controlled by relay RY200 is inoperative. To avoid damage to the receiver, the receiver must be tuned to a frequency at least 400 kc from the transmitter frequency.

Section III. THEORY OF AMPLIFIER AM–141(*)/MRC

118. General

For discussion in this section, Amplifier AM–141(*)/MRC is divided electrically into three parts: the rf section, the power supply section, and the power distribution and control circuits. The rf section is a class C rf amplifier that uses two type 833A triodes connected in push-pull. The amplifier delivers a power output of approximately 2 kilowatts when operated with an ac power input of 5,000 volt-amperes at 115 volts, 60 cycles per second (cps). Rf excitation to the grids of the 833A tubes is accomplished by connecting the tuned grid circuit by a link coupling to the rf output terminals of Radio Transmitter BC–610–I. The balanced rf output of the amplifier is coupled by a variable link on the plate tank coil to the antenna bowl feedthrough insulators at the top of the cabinet. A bias power supply provides the proper negative voltage for operating the amplifier as a class C stage. A protective relay in this circuit prevents damage to the amplifier tubes when excitation from the radio transmitter fails or drops below a safe value. A system of interlock switches provides protection to operating and maintenance personnel by disabling the high-voltage supply when any of the coil-access panels are opened. The schematic diagram for Amplifier AM–141(*)/MRC is shown in figure 93.

119. Rf Section

(fig. 72)

a. Excitation. Excitation is obtained by connecting the rf output terminals of Radio Transmitter BC–610–I to coaxial connector J4 (EXCITATION INPUT) on the amplifier by means of Cord CG–65A/MRC–1. The efficiency of rf power transfer to the amplifier is controlled by by the position of the variable link-coupling coil mounted inside the final plate tank coil of Radio Transmitter BC–610–I.

b. Grid Circuit. The rf power from the transmitter is coupled inductively to the grid circuit of the amplifier by a fixed link-coupling coil inside grid coil L1. Coil L1 is a plug-in type. The correct coil must be selected for the frequency range in use. Tuning of the grid circuit to the transmitter frequency is accomplsihed by means of the two-section variable grid-tuning capacitor C2. Plug-in vacuum Capacitor CA–423 (shown as C3 on the schematics) is used in parallel with capacitor C2 to increase the capacitance of the grid tank circuit when operation from 2.0 to 2.24 mc is desired. Both fixed bias and self bias are applied to the grids of tubes V1 and V2 through the center tap of the secondary winding of grid coil L1. The voltage developed across resistor R4 by grid current during excitation increases the fixed negative bias from the bias power supply, and thereby increases the plate circuit efficiency of tubes V1 and V2. Rf choke L3 and resistor R1 in conjunction with capacitor C1, form an rf filter that prevents the flow of rf current through grid current meter M1 and the bias power supply. Capacitors C20 and C21 serve as additional rf bypass elements to prevent rf current from flowing through the grid current meter M1 and the bias supply.

c. Plate Circuit. The plate tank circuit of the amplifier consists of plug-in coil L2 and the variable-capacitor unit formed by the ganging of the individual dual-section capacitors, C11 and C16. The three-position band switch S17 controls the circuit arrangement of this tank. Position 1 (midfrequency range) connects capacitors C11A and C11D across each half of plate tank coil L2. Position 2 (high-frequency range, shown in figure 72) connects capacitors C11A and C11B in series across one-half of coil L2, and capacitors C11C and C11D in series across the other half of coil L2. Position 3 (low-frequency range) connects capacitors C11A and C11B and capacitors C11C and C11D in parallel across each coil half. Power is applied to the plate circuit of tubes V1 and V2 from the plate power supply through rf choke L4 to the center tap of plate tank coil L2. L4 aids in equalizing the loading of the plates of tubes V1 and V2 and, in conjunction with capacitor

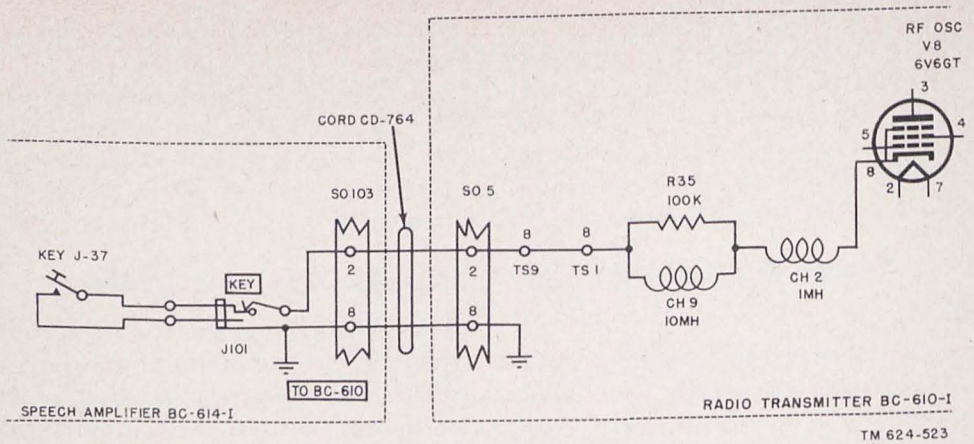


Figure 71. Emergency cw keying circuits from the speech amplifier.

C12, prevents rf from entering the high-voltage supply. The rf energy in the plate tank circuit is coupled inductively to the antenna through the secondary winding (an adjustable link) of coil L2. The secondary coil can be rotated through 360°; it provides the variable output coupling to the antenna necessary for correct power loading of the amplifier tubes. To prevent parasitic oscillations, a single-turn, heavy bus-bar wire choke coil, L9, is placed around, and connected in parallel to noninductive resistor R2 in series with the plate circuit of V1. Choke L10 is connected in parallel with R3 in the plate circuit of V2 for the same purpose.

d. Neutralization. Neutralization of the power amplifier is accomplished by feeding a portion of the output of each tube to the grid of the other tube through variable neutralizing capacitors C8 and C9. This method of neutralizing a push-pull stage is called cross neutralization. Neutralizing capacitor C8 is adjusted so that the magnitude of the voltage fed back to the grid of V1 is equal and opposite in phase to the voltage fed back through the interelectrode (plate to grid) capacity of tube V1. The voltages being equal and 180° out of phase cancel each other. This also applies to capacitor C9 and tube V2. With this type of neutralization, self-oscillation of tubes V1 and V2 is prevented, and the amplifier can operate over the entire band of frequencies.

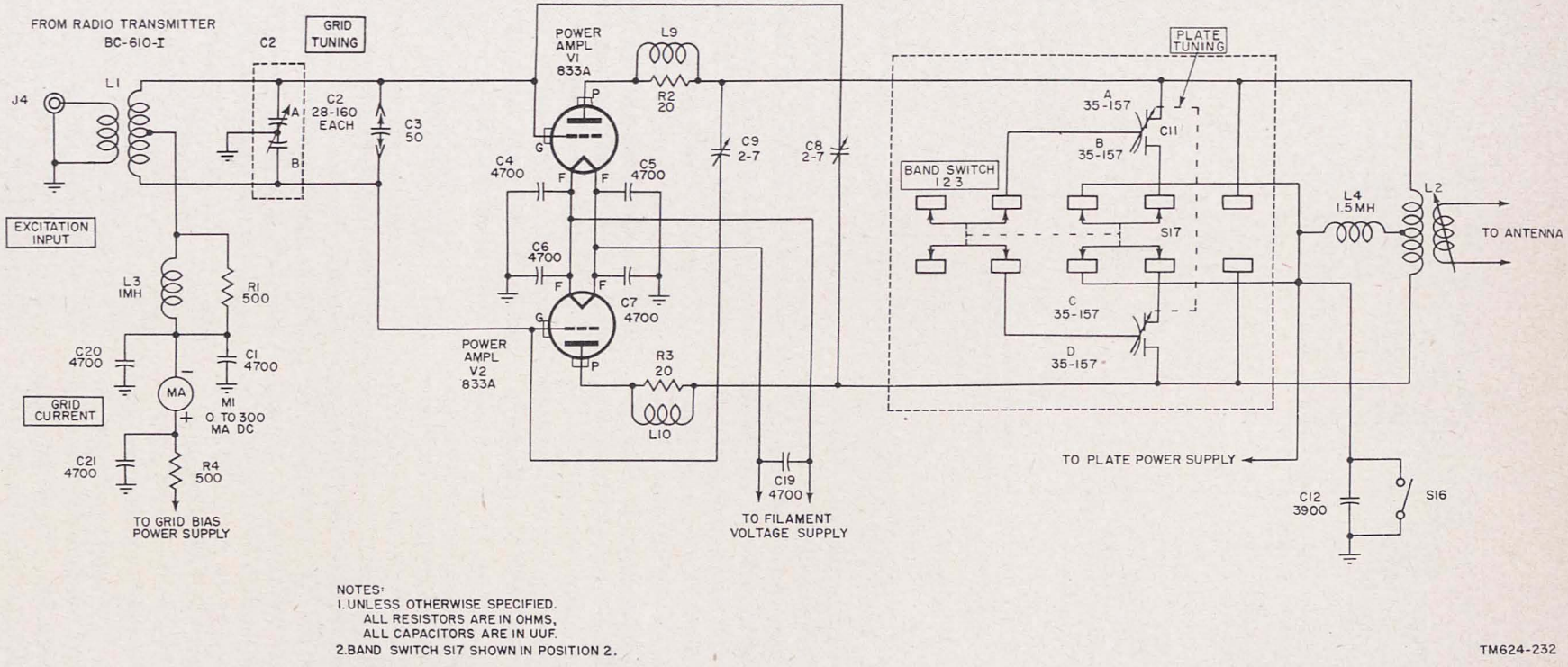
e. Switch S16 is a protective device to ground the high-voltage plate line and discharge the power supply filter capacitors if the normal interlock circuit fails.

f. Filament Circuit (fig. 93). The filaments of tubes V1 and V2 are connected in parallel across the secondaries of transformers T3 and T4, which are connected in series. Capacitors C4, C5, C6, and C7 bypass radio frequencies to ground. Capacitor C19, connected across meter M2, is an additional rf bypass.

120. Power Supply Section

Two separate power supplies are included in the power amplifier: a bias supply and a plate supply. The ac input power applied to the bias and plate supplies is controlled by an interlock circuit. Opening of the interlock circuit always will disable the plate supply and sometimes the bias supply, depending on the point of opening.

a. Bias Power Supply (fig. 73). Negative grid bias voltage for tubes V1 and V2 is supplied by a bias power supply that consists of two gas-filled 3B28-type tubes, V3 and V4, in a full-wave rectifier circuit. The filament voltage of 2.5 volts ac is supplied to the two rectifier tubes by transformer T2, the center tap of which is connected to ground. Transformer T1 supplies plate voltage to the rectifier tubes through rf chokes L5 and L6. These chokes serve to suppress the rf interference or hash generated by the rectifier tubes. The negative dc output of the rectifier at the center tap of transformer T1 is filtered by a two-section choke, L7, and capacitors C15 and C14 which form a dual-section choke-input filter. Resistor R5, in series with the coil of relay K2, forms a high-current bleeder across the bias power supply, and thus provides good regulation and a discharge path for the filter capacitors when the set is turned off. The contacts of relay K2 open if the bleeder current falls below 115 to 135 ma and close when the current increases to a value between 190 to 210 ma. When insufficient grid bias voltage is present, the open contacts of K2 prevent applica-



NOTES:
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2. BAND SWITCH S17 SHOWN IN POSITION 2.

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Figure 72. Amplifier AM–141(*)/MRC, rf section, schematic diagram.

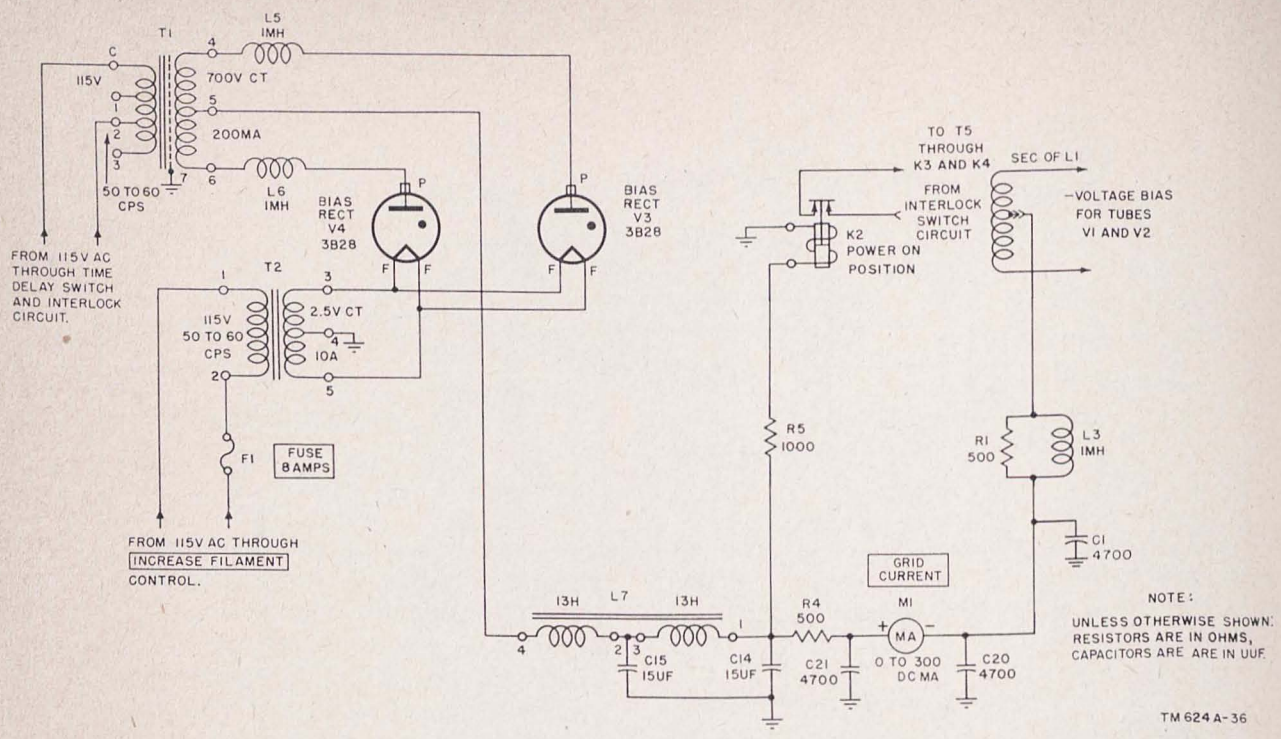


Figure 73. Amplifier AM–141(*)/MRC, bias power supply, schematic diagram.

tion of plate power to tubes V1 and V2; this protects the tubes against damage. If the bias supply circuit fails during operation, the grid-leak current flow through resistor R4 and the coil of K2 will bias the tube adequately, and will hold the contacts of relay K2 closed; thus the amplifier will continue to operate. If the excitation to the amplifier is interrupted momentarily, relay K2 contacts will open, break the interlock circuit, and disable the high-voltage power supplies of the amplifier and the transmitter. It will not be possible to reapply excitation until the bias supply trouble is corrected.

b. Plate Power Supply (fig. 74). The high-voltage plate power supply for the power amplifier consists of two gas-filled type 4B32 tubes, V5 and V6, in a full-wave rectifier circuit. The 5-volt ac filament voltage for the two rectifier tubes is supplied by transformer T6. The output of the rectifier (voltage positive with respect to ground) at the center tap of transformer T6 is filtered by a choke-input filter that consists of choke L8 and capacitor C13. Resistors R6 and R7 make up the bleeder circuit between B+ and ground. Transformer T7 supplies plate voltage to the rectifier tubes, and its center tap is connected to ground through the coil of overload relay K3 and PLATE CURRENT meter M3. The total plate current of tubes V1 and V2 and the bleeder current of resistors R6 and R7 flows through this circuit to ground and is indicated by PLATE CURRENT meter M3. PLATE POWER switch S1 should never be set to the ON position without first setting the NORMAL-TUNE UP switch to the TUNE UP (switch open) position. In the NORMAL position, full power is applied immediately to the high-voltage power supply components and may cause high current and voltage surges in them. This may cause damage to components or the release of overload relay K3. PLATE POWER lamp E6 will light when the high-voltage power supply is operating.

121. Power Distribution Circuits

(fig. 75)

The application and control of ac power in the various circuits and components of Amplifier AM–141(*)/MRC is illustrated in figure 75 and discussed in *a* through *e* below. The amplifier is connected to Radio Transmitter BC–610–I and the 115-volt, 60-cycle power source is connected to socket J2 on the amplifier by Cord CX–135/MRC–1. The circuit diagram shows the positions of relay contacts and switches in the normal position with all panels closed.

a. CIRCUIT BREAKER switch K5, when thrown to the ON position, supplies ac power to

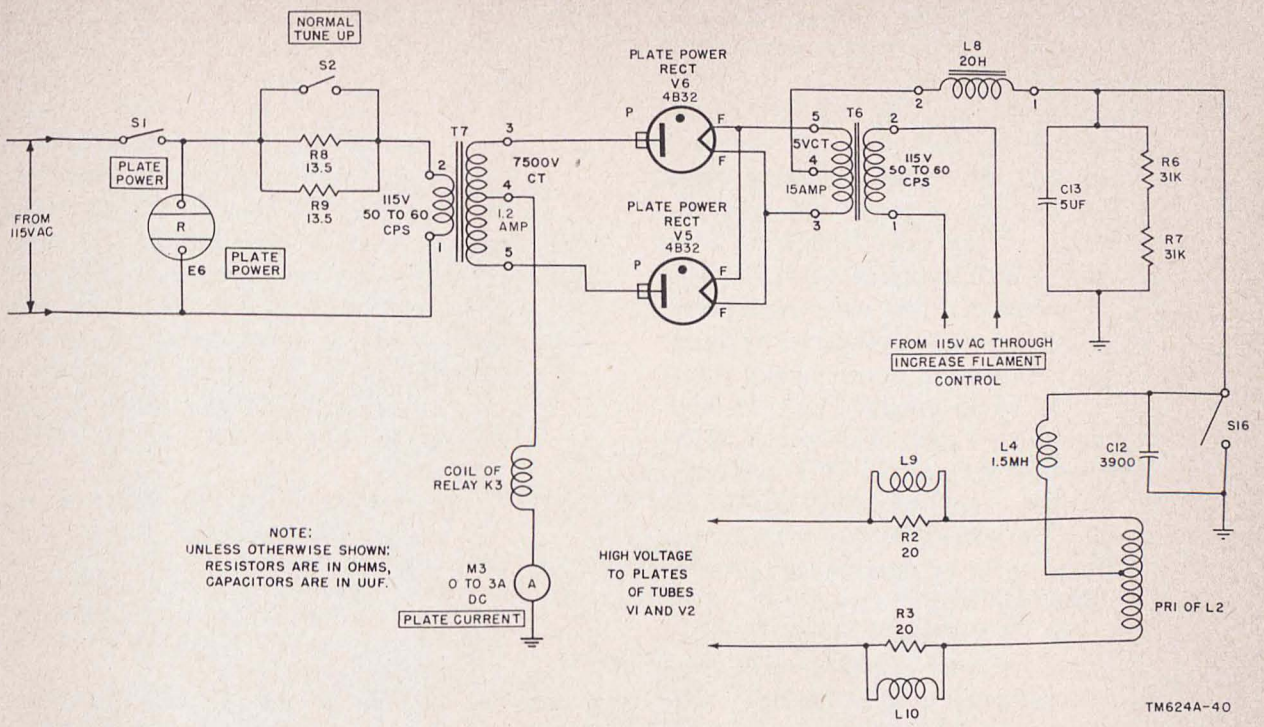


Figure 74. Amplifier AM–141(*)/MRC, plate power supply, schematic diagram.

the following components:

(1) Panel indicator lamp E5.

(2) Filament variac T5.

b. Adjustment of variac T5 to a reading of 10 volts on the FILAMENT VOLTAGE METER (maximum tolerance ±.5 volts) will apply 115 volts (±5 volts) to the following components:

(1) Filament transformers T4, T3, T2, and T6.

(2) Blower motors B1 and B2.

(3) Time-delay switch K1.

c. The application of power to time-delay switch K1 starts the rotation of the timer motor. This motion turns a cam which, after a preset interval of from 45 to 60 seconds, actuates a microswitch. At this point the motor stops and the cam holds the switch contacts closed. This completes the path through terminals 1 and 3 of the time-delay switch for application of power to the following (if all interlocks are closed):

(1) Blower motor B3.

(2) Bias power supply plate transformer T1.

(3) Coil of relay K4.

d. When relay K4 is energized, its contacts close and one pair of contacts completes the 115-volt ac circuit to one side of the primary winding of the high-voltage plate supply transformer T7. PLATE POWER switch S1 connects the other side of the primary winding to the main power source. When this switch is closed, plate power is applied to tubes V1 and V2 (fig. 72) and plate power indicator lamp E6 will glow.

e. A second set of contacts on relay K4 completes the ac primary circuit of the high-voltage transformer in Radio Transmitter BC–610–I (S14 set to the OFF position). When the contacts are closed, INCREASE EXCITATION variac T8 varies the voltage supplied to the primary winding of the plate power transformer in the transmitter through Cord CX–911/U. This cord is connected between receptacle J3 of the power amplifier and terminal strip TS15 of the transmitter. The power applied to the variac is obtained from Radio Transmitter BC–610–I. A 115-volt ac supply voltage is fed from Radio Transmitter BC–610–I to variac T8 through terminals 2 and 3 of jack J3. Terminal 1 connects the variable output of T8 to the plate power transformer of the transmitter. The rf output of the transmitter can be controlled by varying the INCREASE EXCITATION control.

122. Overload and Protection Circuits

(fig. 75)

a. Plate Overload Relay K3.

(1) Plate overload relay K3, part of the high-voltage power supply dc circuit (fig. 74), protects the amplifier tubes and the power supply against any overload

conditions that may occur. The contacts of relay K3 normally are held in the closed position by a latch. When plate current in excess of 1.325 amperes flows through the load coil, the latch trips and the relay contacts open. When the relay contacts are open, the ac power to the coil of relay K4 from variac T5 is interrupted, and the relay is de-energized. The open contacts of relay K4 prevent application of power to the high-voltage power supply transformer T7 of the amplifier and the high-voltage power supply transformer of the transmitter (S14 set to OFF position). When the condition that causes the overload is corrected, the contacts can be closed again by momentarily pressing OVERLOAD RESET switch S15. Pressing the OVERLOAD RESET switch energizes the reset coil of relay K3 and causes the contacts to be latched. The latch now will hold the contacts of relay K3 closed until another overload condition releases the latch.

(2) The overload coil is provided with a delay mechanism to prevent premature tripping of the relay by momentary load current surges caused by cw keying and switching of the plate power supply. The movable iron core within the load coil normally is held out of the coil by an adjustable expansion spring. Adjustment also is provided for initially placing the core in any degree of engagement with the overload coil. The distance the iron core moves into the overload coil is determined by the relative amount of plate current flowing through the overload coil. Because of the inertia of the iron core and the spring tension against it, the iron core will not move far enough into the coil to increase the magnetic pull on the latch mechanism to a point where it will trip unless current settings are exceeded or the current surge is exceedingly high or abnormally prolonged when the plate power is first switched on.

b. Bias Underload Relay K2. Failure of the bias power supply to furnish sufficient grid bias voltage (with no excitation) to the amplifier would allow excessive plate current to flow and damage the amplifier tubes. Relay K2, part of the bias supply bleeder circuit (fig. 73), protects the amplifier tubes in the following manner:

(1) When the bias supply bleeder current drops to 115–135 ma (low bias voltage condition) because of failure of the bias power supply components or its power source (with no excitation), the relay contacts open and deenergize relay K4. The contacts on relay K4 open and remove the ac power source from the high-voltage plate supply transformers of both the amplifier and Radio Transmitter BC–610–I (S14 set to OFF position).

Note. If NEUT. SWITCH S14 is in the ON position, the high-voltage circuit of the transmitter is unaffected by relay K4. For emergency operation when the amplifier fails and use of the transmitter is desired (par. 75, 76*b*), see that the NEUT. SWITCH is in the ON position.

(2) The contacts of relay K2 will close when a bleeder current of 190–210 ma is flowing through the relay coil.

c. NORMAL-TUNE UP Switch S2. NORMAL-TUNE UP switch S2, when set to the TUNE UP position, places voltage-dropping resistors R8 and R9 in series with the primary winding of power transformer T7. This reduces the output voltage of the plate power supply by approximately 60 per cent. When NORMAL-TUNE UP switch S2 is placed at the NORMAL position, resistors R8 and R9 are bypassed and the full voltage is applied to the primary of transformer T7.

d. Interlock Switches. Switches S5 through S13 form the interlock circuit of Amplifier AM–141(*)/MRC. Opening any of the interlock switches (switch S14 set to OFF position) removes the ac power supplied to blower B3, bias supply transformer T1, and relay K4. The contacts of relay K4 open and remove the ac power supplied to high-voltage transformer T7 and INCREASE EXCITATION variac T8. This prevents operating personnel from accidentally contacting dangerously high voltages within the amplifier if the doors or panels are opened. The locations of the interlock switches are as follows:

(1) S5, back panel interlock, access door to tubes V5 and V6.

(2) S6, back panel interlock, access door to tubes V3 and V4.

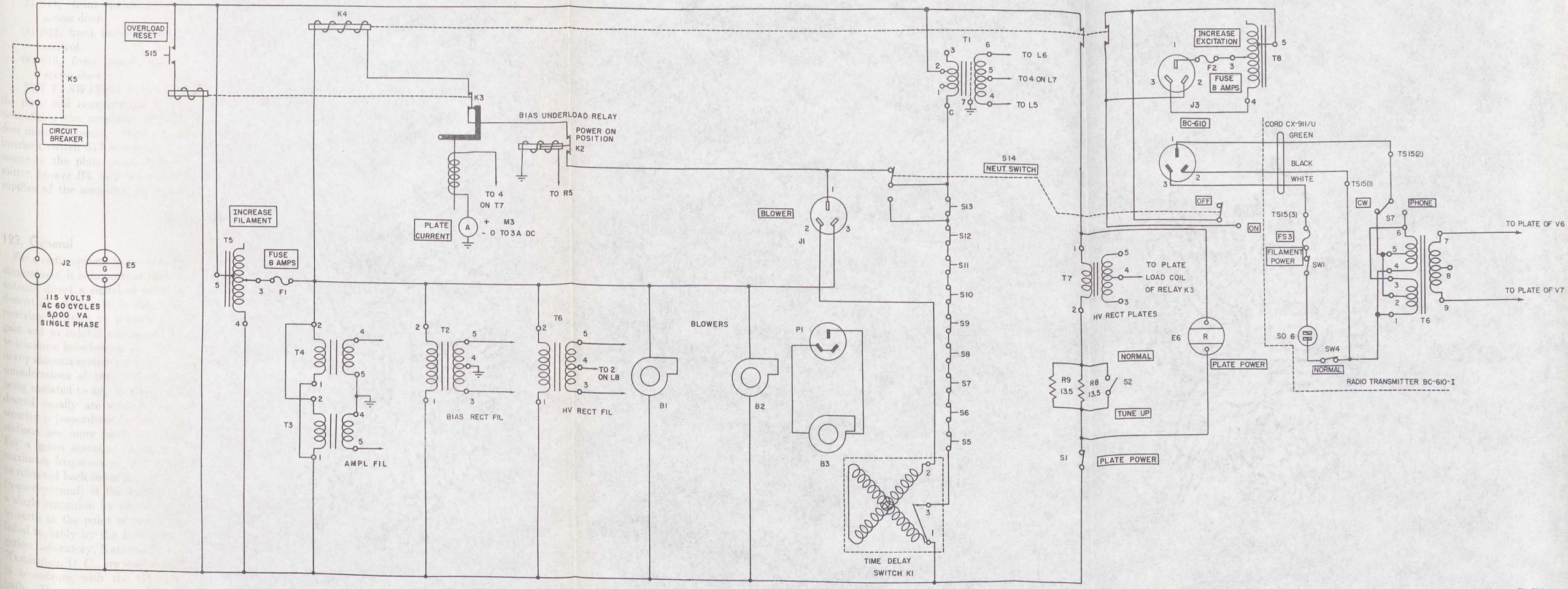


Figure 75. Amplifier AM-141(*)/MRC, power distribution circuits.

(3) S7, left side panel interlock.
(4) S8, top panel interlock.
(5) S9, right side panel interlock.
(6) S10, front panel interlock, relay access door.
(7) S11, front panel interlock, grid coil access door.
(8) S12, front panel interlock, band switch control.
(9) S13, front panel interlock, plate coil access door.

e. NEUT. SWITCH S14. To gain access to the plate coil compartment for the purpose of neutralizing the amplifier, the plate coil access door must be opened. When the door is opened, interlock switch S13 is opened and the ac power source to the plate power supply of the transmitter, blower B3, and the bias and plate power supplies of the amplifier are removed, and these circuits are disabled. When the NEUT. SWITCH is set to the ON position, power is restored to the bias power supply transformer T1 and to the plate power supply of the transmitter through variac T8, but not to the amplifier high-voltage plate power supply and blower B3. One pole of the double-pole, double-throw neutralizing switch S14 opens the portion of the interlock circuit that furnishes power to blower B3 and to the contacts of relay K2; it also reconnects bias supply transformer T1 to the power source through interlock switch S12 by short-circuiting open interlock switch S13. The second pole of switch S14 short-circuits the open contacts on relay K4 in the circuit of variac T8, and thereby restores the connection to jack J3 (fig. 75). During normal operation of the amplifier, the NEUT. SWITCH is set at the OFF position.

Section IV. ANTENNA SYSTEMS

123. General

For a radio system to provide dependable communications, it is important that the transmitting antenna direct a signal of useful strength in the desired direction. It is also important for the receiving antenna to provide maximum receiver gain and to exhibit characteristics of directivity to minimize interference and fading. Directivity in any antenna system is one of the most important considerations of that antenna system. Signals being radiated to any location other than the one desired usually are wasted, and communication security is jeopardized because enemy monitoring stations are more likely to locate the signals. For a given distance, there is an approximate maximum frequency at which the sky wave will be refracted back to earth. The maximum usable frequency (muf) is the highest frequency which a single refraction by the ionosphere will return to earth at the point of reception. Charts published monthly by the Interservice Radio Propagation Laboratory, National Bureau of Standards, Washington, D. C., are used to determine the muf in accordance with the time and transmission path. These are issued as TB 11–499–( ) Basic Radio Propagation Predictions. The following paragraphs of this section discuss antenna theory as related to Radio Set AN/MRC–2(*) and its applications. For a more detailed discussion of radio wave propagation and antenna theory, refer to TM 11–666, Antennas and Radio Propagation.

124. Diversity Reception

Diversity reception is a method widely used in communication systems to overcome the effects of fading of radio signals. Short period variations (fading), usually 1 second or less in duration, in the signal delivered by the receiving antenna will not have a great effect upon low-speed telegraph or radiotelephone communication, but in the case of high-speed telegraphy and radioteletype traffic, even short variations will have a marked effect upon the legibility of a message.

a. Types of Fading. Fading may be divided into two types; single-path and multipath. Single-path fading is considered from the viewpoint of variations on only one wave of radiation of the many waves making up the received signal. In multipath fading, the canceling effect of two or more waves that are components of the received signal traveling over different path lengths and arriving out of phase are considered. Both types of fading may, and usually do, exist simultaneously.

b. Reducing Effects of Fading. The most practical methods developed to date to reduce the effects of fading are automatic volume control (avc), frequency diversity, space diversity, and polarization diversity. Of these, only the space-diversity method is utilized for radioteletype operation by Radio Set AN/MRC–2(*).

(1) *Automatic volume control.* Avc circuits are used in Radio Receivers R–388/URR.

They cannot, however, be used for radioteletype reception to reduce fading because rapid action of the avc circuits will remove the lower modulation frequencies of the received signal and thereby produce considerable signal distortion. Therefore, the avc must be switched off when the radio receivers are used for radioteletype service.

(2) *Space diversity.* A space-diversity system makes use of the diversity of fading which exists at receiving antennas spaced a number of wave lengths apart (par. 23*a* and fig. 21). It is based on the fact that instantaneous fading does not occur everywhere at any one time. The several positions chosen will fade alternately so that a relatively strong signal always will be received at some position. This system has been widely adopted and is the one used by Radio Set AN/MRC–2(*). This space-diversity receiving system consists of three major components:

(*a*) Two independent antennas with identical polarization characteristics.

(*b*) Two radio receivers (one for each antenna).

(*c*) A dual diversity converter to combine the outputs of the radio receivers. In addition, there are special control circuits, depending on the type of operation (radiotelegraphy, radioteletype, or radiotelephone operation).

125. Doublet Transmitting Antenna

The doublet transmitting antenna of Radio Set AN/MRC–2(*) is, fundamentally, a half-wave antenna designed for harmonic operation on the third and fifth harmonics and the fundamental frequency. It is a doublet-type antenna consisting of two ¼ wave lengths which are terminated at the center by a special coaxial cable connector. Current is fed to that point by coaxial RF Cable Assembly CG–145A/MRC–1. The antenna wire is broken up into sections which are connected by insulators. The antenna wire can be made to have several fundamental resonant frequencies by placing jumper wires around the insulators (par. 19 and fig. 36). At the fundamental operating frequencies, the field pattern of the transmitter signal is sufficiently broad to enable operation of the transmitter in nets. At odd harmonic operating frequencies, a more directive signal is produced. The transmission line for the antenna is an impedance-matched untuned line that uses a 70-ohm concentric cable. The coaxial rf cable assembly consists of a stranded conductor, insulated from the surrounding braided copper concentric sheath by polyethylene. The entire cable is protected from moisture by a heavy rubber covering. The efficiency of this coaxial cable is high, and if the half-wave doublet has been cut accurately to the desired frequency of operation, maximum possible radiation should occur.

126. Receiving Antennas

Two doublet antennas, spaced a minimum of 3 wave lengths apart (or a maximum of 1,000 feet), are used to supply the signal voltages to the two receivers in Radio Set AN/MRC–2(*) for diversity reception (fig. 21). The antenna construction is similar to that used in the transmitting antenna. RF Cable Assembly CG–557/U (500 feet in length) is used for the signal feed line between the antenna and the shelter. If possible, a frequency mode of operation that will not have a radiation lobe across the local transmitting antenna should be selected. Doublet receiving antennas and doublet transmitting antennas have the same directional patterns.

127. Whip Antennas

Whip antennas used in Radio Set AN/MRC–2(*) receive (or transmit) equally well in all directions; that is, they have a 360° field pattern. The distance over which satisfactory communications can be carried with whip antennas is not as great as with the doublet antennas. Whip antennas are also comparatively noisier, since most local noise is polarized vertically. Extreme noise pickup may be due to an unshielded vehicle or power unit in the immediate vicinity.

128. Rhombic Transmitting Antenna

A rhombic antenna kit is supplied with Radio Set AN/MRC–2(*) so that superior transmitting facilities may be had when the doublet transmitting antenna is not sufficient for satisfactory circuit operation. A rhombic antenna consists of two tilted-wire antennas placed side by side in a horizontal plane, and terminated at the end opposite the feeder connections with a noninduc-

tive resistance which equals the characteristic resistance of the transmission line (par. 20*g* and fig. 39). The antenna gives excellent results over a frequency range of 2 to 18 mc. The antenna has sharp directional characteristics and, when properly terminated, a high front-to-back signal ratio which minimizes reception from unwanted directions. A rhombic antenna must be fed with a balanced high-impedance transmission line to preserve the phase relationship of the currents flowing in the rhombic antenna legs. Symmetry of the antenna is important where accurate orientation must be maintained. The rhombic antenna supplied with the radio set is illustrated in figures 38 and 39, and design data is given in paragraph 20.

CHAPTER 6

FIELD MAINTENANCE

Note. Field maintenance and detailed troubleshooting of all the major components except Amplifier AM–141(*)/MRC and Junction Box JB–70–(*) of Radio Set AN/MRC–2(*) is contained in the individual manuals referenced in paragraph 1. This chapter contains field maintenance instructions for the amplifier and the junction box. The extent of repairs that can be accomplished is limited only by the skill of the repairman and the tools and equipment available.

Section I. TROUBLESHOOTING AT FIELD MAINTENANCE LEVEL

Warning: When servicing any component in this radio set, be extremely careful of exposure to high voltages. With high voltages off, potentials of several thousand volts may be present across capacitor terminals. When measuring high voltages, keep one hand in the pocket and keep clear of all terminals carrying potentials above ground. After the power has been turned off, short the high voltage terminals to ground. If the radio transmitter or Amplifier AM–141(*)/MRC is involved, use the safety shorting stick for this purpose. Read the caution notices in the individual equipment technical manuals before attempting repairs.

129. Troubleshooting Data

Take advantage of the material supplied in this manual. The organizational maintenance troubleshooting section (par. 92 through 96) gives the techniques for sectionalizing operational troubles to a particular component and for use of the equipment performance check list. Parts of the theory section (pars. 106 through 117 and figs. 63 through 71) outline the signal and control paths for various types of operation. Use the text and figures to help sectionalize the troubles in the control circuits. The lines between the shelters can be tested as outlined in the installation section in paragraph 26. Consult the troubleshooting data in the individual manuals furnished and the following material in this manual:

Par. or fig. No.	Description
Fig. 55	Radio Set AN/MRC–2D, system block diagram.
Fig. 63	Radio Set AN/MRC–2C, transmitting shelter, 12–volt dc distribution.
Fig. 64	Radio Set AN/MRC–2D, transmitting shelter, 12-volt dc distribution.
Fig. 65	Junction Box JB–70–(*), schematic diagram.
Fig. 66	Radio Set AN/MRC–2D, transmitting shelter receiver disabling circuit.
Fig. 67	Receiver disabling circuit in receiving shelter.
Fig. 68	Circuits controlled by relay K101 and relay RY200.
Fig. 69	Interunit circuits for cw keying from the receiving shelter.
Fig. 70	Interunit circuits for manual FS keying from the receiving shelter.
Fig. 75	Amplifier AM–141(*)/MRC, power distribution circuits.
Fig. 76	Amplifier AM–141(*)/MRC, tube socket voltage and resistance diagram.
Fig. 77	Operating Table FN–22/MRC–2 in operating shelter, schematic diagram.
Fig. 78	Operating Table FN–23/MRC–2 in receiving shelter, schematic diagram.
Fig. 79	Junction Boxes J–207/MRC–2 and J–199/MRC–2, schematic diagram.
Fig. 80	Junction Box JB–70–(*), top interior view of chassis.
Fig. 81	Amplifier AM–141(*)/MRC, rectifier tube access doors open.
Fig. 82	Amplifier AM–141(*)/MRC, left side panel removed.
Fig. 83	Amplifier AM–141(*)/MRC, right side panel removed.
Fig. 84	Amplifier AM–141(*)/MRC, grid and plate coil access doors.
Fig. 85	Amplifier AM–141(*)/MRC, relay panel.
Fig. 91	Resistor color codes.
Fig. 92	Capacitor color codes.
Fig. 93	Amplifier AM–141(*)/MRC, schematic diagram.
Par. 131	Troubleshooting procedures.
Par. 132	Localizing trouble in Amplifier AM–141(*)/MRC.
Par. 133	Voltage and resistance measurements in Amplifier AM–141(*)/MRC.

Par. or fig. No.	Description
Par. 134	Continuity checks in Junction Box JB–70–(*), Operating Tables FN–22/MRC–2 and FN–23/MRC–2, and Junction Boxes J–207/MRC–2 and J–199/MRC–2.

130. Test Equipment Required

Multimeter TS–352/U (TM 11–5527) is suitable for making all voltage and resistance measurements on Amplifier AM–141(*)/MRC. Additional test equipments used for final testing of individual components is listed in the individual manuals for those components.

131. Troubleshooting Procedures

a. General. The tests listed below will aid in isolating the source of the trouble in the amplifier. Follow the procedure in the order given. Remember that servicing procedure should cause no further damage to the equipment.

b. Service Procedure. The first step in servicing a defective amplifier is to sectionalize the fault. This means tracing the fault to the *stage or circuit* responsible for the abnormal operation. The second step is to localize the fault to the defective *part* in that circuit. Some faults such as burned-out resistors, rf arcing, and shorted transformers often can be located by sight and smell. Most faults, however, must be localized by checking the voltages and resistances. The service procedure is summarized as follows:

(1) *Visual inspection.* Visual inspection frequently reveals the stage in which the trouble exists. This inspection is valuable in preventing future failures and in avoiding additional damage which might occur through improper servicing methods. When failure is encountered and the cause is not immediately apparent, check as many of the items listed below as possible before starting a detailed examination of the amplifier. If possible, obtain information from the operator of the equipment regarding performance at the time the trouble occurred. A visual examination usually will reveal the following defects:

(*a*) Defective power cables.
(*b*) Worn, broken, or disconnected cords or plugs.
(*c*) Wires broken because of excessive vibration.
(*d*) Burned-out fuses.
(*e*) Loose or defective tubes.
(*f*) Relay contacts burned because of excessive overload.
(*g*) Resistors blistered or discolored by overheating.

(2) *Checking B+ circuits for shorts.* These measurements prevent further damage to the amplifier from possible short circuits. Since these measurements give an indication of the condition of the filter circuits, their function is more than preventive.

(3) *Operational test.* The equipment performance check list (par. 96) is important because it frequently indicates the general location of trouble and often determines the exact nature of the fault. All symptoms must be interpreted in relation to one another.

(4) *Intermittents.* In all these tests, the possibility of intermittents should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the circuit elements. It is possible that the trouble is not in the amplifier itself, but in the installation. Test the installation as thoroughly as possible.

132. Localizing Trouble in Amplifier AM–141(*)/MRC

After the trouble has been localized to Amplifier AM–141(*)/MRC by applying the equipment performance check list (par. 96), and it has been determined that the amplifier is the cause of the trouble, the fault existing in the amplifier may be determined by the use of the chart below. Throughout the operation, be sure to listen for crackling or buzzing noises which indicate arcing high voltage. Check the amplifier for smoke and the odor of burned or overheated parts.

Symptom	Probable trouble	Correction
1. CIRCUIT BREAKER does not remain in on position (up).	1. Overload or short circuit	1. Wait 30 seconds and try again. If breaker does not stay up, disconnect power Cable CX–135/MRC–1 and repeat. If breaker remains up with power off, check primary wiring and transformers for short circuits or grounds.
	Defective CIRCUIT BREAKER	Test as above. If breaker does not remain up with power off, replace CIRCUIT BREAKER K5.
2. Green light out, CIRCUIT BREAKER up, tubes do not light.	2. No power to amplifier	2. See that Cables CX–135/MRC–1, CX–1165/U, and CX–1166/U and their fittings are making good connections.
	Defective CIRCUIT BREAKER	Replace CIRCUIT BREAKER K5.
3. Green light out, tubes light	3. Burned-out lamp	3. Replace lamp E5.
	Defective socket	Replace socket.
	Broken wire to socket	Resolder or replace wire.
4. Filament voltage low, FILAMENT control fully clockwise.	4. Low supply voltage	4. Check and adjust voltage at Power Unit PE–95–(*). Refer to TM 11–904.
	Defective INCREASE FILAMENT control variac T5.	Clean all contacts and contact surfaces. Replace carbon brush in rotor if required. Replace control if necessary.
	Defective meter	Replace FILAMENT VOLTAGE meter M2.
5. GRID CURRENT low, FILAMENT VOLTAGE normal.	5. Off resonance	5. Check coils, capacitors, and dial settings according to the tuning charts.
		See tune-up procedure (par. 43). Readjust P. A. PLATE TUNING of BC–610–I and GRID TUNING of amplifier.
	Low excitation	Turn INCREASE EXCITATION control clockwise; increase coupling of output coil in BC–610–I.
	Shorted or loose connections in rf Cord CG–65A/MRC–1.	Tighten all connections. Check cord and replace if required.
	Loose coils	Check to see that all coils are fully and firmly seated. Examine for loose, bent, or broken banana plugs or connections.
	Weak or defective tube in amplifier.	Replace tubes V1 and/or V2 (833A) if required.
	Defective GRID CURRENT meter.	Replace meter M1.
6. GRID CURRENT high	6. Excessive excitation	6. Reduce INCREASE EXCITATION control. Reduce coupling in output of BC–610–I.
	Defective tubes V1 and V2	Check tubes, replace if required.
7. GRID CURRENT varies with PLATE TUNING, PLATE POWER switch OFF.	7. Improper neutralization	7. Readjust neutralizing capacitors C8 and C9. See paragraph 140.
8. GRID TUNING does not resonate (peak to maximum).	8. Wrong coil	8. Check to see that grid coil L1 agrees with tuning chart and that BC–610–I is tuned properly.
	Capacitor C3 installed	Check with tuning chart to see whether capacitor C3 is required.
	Capacitor C3 omitted	Check with tuning chart to see whether capacitor C3 is required.
	Poor coil connections	Check contacts on coil L1. Tighten if necessary and reinstall coil firmly.

Symptom	Probable trouble	Correction
9. Red light out, PLATE POWER switch ON, NORMAL - TUNE UP switch set to TUNE UP.	9. Open interlock switch	9. See that all cabinet panels and doors are tight, that NEUT. SWITCH is OFF, and that BAND CHANGE switch is positioned properly. (K1, K2, and K4 must be closed but cannot be inspected because of interlock on access door.)
	Defective interlock switch	Replace as required.
	Overload relay tripped	Press OVERLOAD RESET button.
	Burned-out lamp	Replace lamp E6.
	Broken wire to lamp	Replace wire.
	Open resistors R8 and R9	Replace resistors.
10. PLATE CURRENT zero, red light on, NORMAL-TUNE UP switch set to TUNE UP.	10. Plate power supply defective.	10. Replace transformer.
	Transformer T6 or T7 defective	Replace tubes.
	Rectifier tubes V5 and V6 defective.	
	Open circuit to plate circuit of tubes V1 and V2.	Check chokes L8 and L4. Check plug in coil L2.
11. PLATE CURRENT, low, NORMAL - TUNE UP switch set to NORMAL.	11. Insufficient excitation	11. Check GRID CURRENT. Readjust all excitation controls.
	Low plate voltage	Check for weak rectifier tubes V5 and V6 or defective switch S2.
		Readjust rotor of plate coil L2 (par. 48).
	Loose antenna coupling	Check antenna for proper adjustment.
	Antenna does not load at proper frequency.	Check for grounded antenna and transmission line, for loose or broken connections, or short circuits.
	Defective tube V1 or V2	Replace tube V1 or V2 if required.
12. PLATE CURRENT, high, trips overload relay.	12. Antenna overcoupled	12. Readjust rotor of plate coil L2. Press OVERLOAD RESET button. Set NORMAL-TUNE UP switch to TUNE UP position before applying PLATE POWER.
	Shorted transmission line	Remove plate coil L2; check across antenna terminals for shorted line or antenna; check from antenna; check from terminals to ground for ground or leakage.
	Wrong harmonic	Recheck all coils, capacitors, and dial settings according to tuning chart. See tune-up procedure (par. 43); retune as indicated.
13. PLATE TUNING does not resonate. (Dip to minimum.)	13. Wrong coil or wrong position of BAND SWITCH.	13. Correct according to tuning chart.
14. Meters do not indicate correctly.	14. Meter defective	14. Check against meter of known accuracy. If error exceeds 5 per cent, meter should be replaced.
15. Relay K2, K3, or K4 inoperative.	15. Improper adjustment	15. Readjust relay.
	Defective coil	Check resistance; see point-to-point resistance chart.
	Improper adjustment	Readjust (par. 141).
	Overload relay K3 tripped	Push OVERLOAD RESET button.
16. Time-delay switch slow or inoperative.	16. Defective unit	16. Replace complete unit assembly.
		Adjust FILAMENT VOLTS to 10V.
17. Blower B1 or B2 inoperative.	17. Rotor stuck or binding	17. Check for bent rotor, solidified lubricant, or gummed bearings. If necessary, clean bearings and lubricate as specified in pargraph 89. Bent rotors which have been repaired should be checked carefully for balance before returning to service.

Symptom	Probable trouble	Correction
18. Blower B3 inoperative	18. No power to motor	18. Check to see that plug P1 is inserted and that cord and connections are not broken.
	Rotor stuck or binding	Check for bent rotor or gummed bearings. If necessary, clean and lubricate bearings as specified in paragraph 89.
	Defective motor starting capacitor.	Replace capacitor.
19. Tubes V1 and V2 hot as evidenced by discolored plate and grid terminals.	19. Blowers not delivering enough air.	19. Check to see that air duct is clean and able to exhaust heated air. (A strong head wind outside of the shelter will prevent proper exhaust.) Open duct into shelter. Check air filter and clean if required.
		Check B1 and B2 for air flow on tubes. Check cord on blower B3 and plug P1. Check all blowers for gummed or binding rotors. Clean and lubricate if required.

133. Voltage and Resistance Measurements in Amplifier AM–141(*)/MRC

To assist maintenance personnel in the servicing of defective amplifiers, a tube socket voltage and resistance diagram (fig. 76), supplementary voltage measurement chart (subpar. *b* below), and a supplementary resistance measurement chart (subpar. *c* below) are included in this manual.

a. Tube Socket Voltage and Resistance Diagram (fig. 76).

(1) When making voltage measurements on the amplifier, apply excitation in accordance with the measurement chart. Measure the plate voltage with the NORMAL-TUNE UP switch in NORMAL position. All voltages are measured with respect to ground (chassis). All voltages are taken with a 20,000 ohm-per-volt meter.

(2) All resistance measurements are made with respect to ground (chassis), with all external cables disconnected.

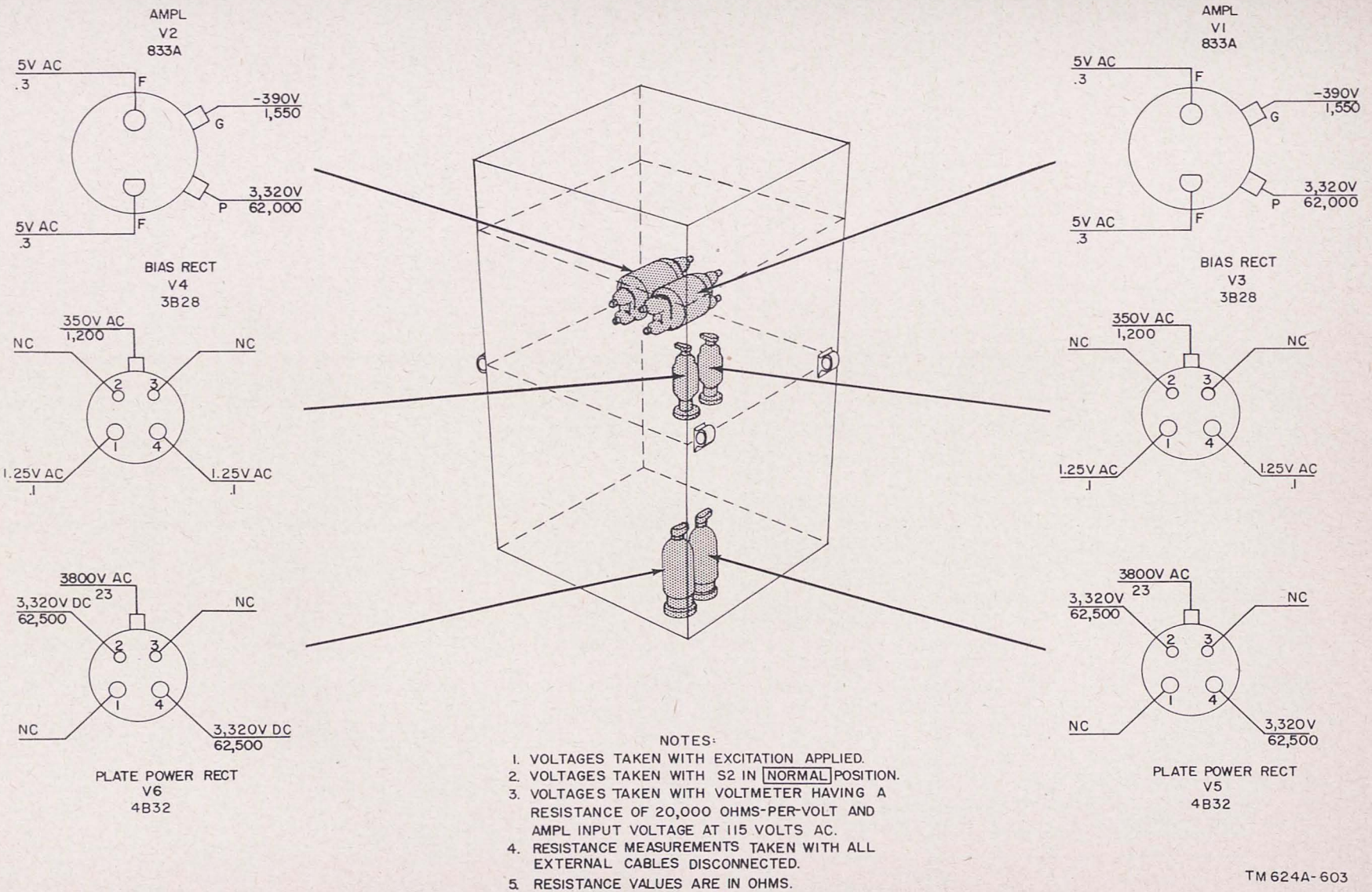


Figure 76. Amplifier AM–141(*)/MRC, tube socket voltage and resistance diagram.

b. Supplementary Voltage Measurement Chart.

Voltage	Measured from—	Ref symbol	Term.	Action or condition (all measurements taken with 115v ac input)	Measured to—	Volts
Grid bias	GRID CURRENT meter	M1	Either	Without excitation (NEUT. SWITCH at ON, 0 grid current).	Ground	−280 v dc
Grid bias	GRID CURRENT meter	M1	Either	With excitation (NEUT. SWITCH at ON, 200-ma grid current).	Ground	−390 v dc
Plate voltage	Plate bypass capacitor	C12	Top	350-ma PLATE CURRENT switch S2 in TUNE UP position.	Ground	+1,370 v dc
Plate voltage	Plate bypass capacitor	C12	Top	900-ma PLATE CURRENT switch S2 in NORMAL position.	Ground	+3,320 v dc
Filament voltage	Filament, tube	V1 and V2.	Filament terminal.	FILAMENT VOLTS set to 10v ac, PLATE POWER off.	Other filament terminal.	10 v ac
Filament voltage	Filament, tube	V3 and V4.	Filament terminal.	FILAMENT VOLTS set to 10v ac, PLATE POWER off.	Other filament terminal.	2.5 v ac
Filament voltage	Filament, tube	V5 and V6.	Filament terminal.	FILAMENT VOLTS set at 10v ac, PLATE POWER off.	Other filament terminal.	5.0 v ac
Hv bias transformer ac output.	Bias rectifier tubes	V3	Plate	PLATE POWER off	V4 plate	700 v ac
Hv plate transformer ac output.	Hv plate transformer	T7	CT	S2 in TUNE UP position, 350-ma PLATE CURRENT.	Either hv terminal.	1,400 v ac
Hv plate transformer ac output.	Hv plate transformer	T7	CT	S2 in NORMAL position, 900-ma PLATE CURRENT.	Either hv terminal.	3,800 v ac
Hv plate transformer ac output.	Hv plate transformer	T7	CT	S2 in TUNE UP position, plate leads removed from V5 and V6.	Either hv terminal.	3,360 v ac
Hv plate transformer ac output.	Hv plate transformer	T7	CT	S2 in NORMAL position, plate leads removed from V5 and V6.	Either hv terminal.	3,980 v ac

c. Supplementary Resistance Measurement Chart.

From	To	Resistance in ohms	Action or condition
Filament of hv rectifier tubes V5 and V6	Plates of V1 and V2	58.	
Plate of bias rectifier tube V3	Plate of V4	160.	
Bias rectifier choke L7, terminal 1	Terminal 3	65.	
Bias rectifier choke L7, terminal 2	Terminal 4	65.	
Ac input, measured across J2		1.5–2	CIRCUIT BREAKER K5 closed.
Ac input, measured across J2		Infinity	CIRCUIT BREAKER K5 open.
Excitation input, jack J4, center	Ground	0.	
Excitation input, jack J4, shell	Ground	0.	
Excitation input, jack J4, shell	Center	Over 10 megohms.	Coil L1 removed.
Blowers B1 and B2 terminals	Other terminals	80	Terminals disconnected.
Blower B3, P1	P1	30.	
Relay K1 coil, terminal 1	Terminal 2	500.	
Relay K1 heater, terminal 1	Terminal 3	560	Armature depressed.
Relay K2 coil, term. 2 (ungrounded side)	Chassis	25.	
Relay K3 overload coil, terminal 1	Term. 2	1.	
Relay K3 reset coil, terminal 3	Term. 4	1,500.	
Relay K4 coil, across coil		10	K3 overload tripped.
Dropping resistors R8 and R9, in parallel, top of switch S2.	Bottom of S2	6.7	Switches S1 and S2 open. (PLATE POWER down, S2 in TUNE UP position.)
Time delay switch, terminal 1, lead #77	Terminal 2, lead #80	550	Disconnected.

134. Continuity Checks

To facilitate the location of trouble on a system basis, continuity checks are given for Junction Box JB–70–(*), Operating Table FN–22/MRC–2, Operating Table FN–23/MRC–2, Junction Box J–207/MRC–2, and Junction Box J–199/MRC–2. The continuity checks were made with all interconnecting cables and wires removed.

a. Junction Box JB–70–(*). (fig. 65).

Measurements made from—	Term. No.	Conditions	Measurements made to—	Resistance in ohms
Terminal Strip TS200	1	Transmitter switch SW203 at TRANS. ON.	Term. 2 of TS200	0
	3	C. W. SIDETONE switch SW205 at position 1 or 3.	Term. 4 of TS200	0
	3	Manually operate relay RY200.	Chassis (ground)	0
	5	Switch SW205 in position 3	Term. 9 of TS200	5, 100
	5	Switch SW205 in position 1 and switch SW204 at TRANSPOSED.	Term. 10 of TS200	5, 100
	6	REMOTE CONTROL EE–8 switch SW202 at position 1, 3, or 5.	Chassis (ground)	0
	6	Switch SW202 at position 2 or 4 and switch SW203 at TRANS. ON.	Term. 11 of TS200	0
	8		Term. 12 of TS200	0
	11		Upper REMOTE TELEPHONE terminal.	(1)

[1] Infinity.

a. Junction Box JB–70–(*). (fig. 65)—Continued

Measurements made from	Term. No.	Conditions	Measurements made to—	Resistance in ohms
Terminal Strip TS200	11	Capacitor C202 jumpered	Upper remote telephone terminal.	0
	12		Sleeve of jacks J200 to J205	0
	12		Chassis (ground)	0
Plug PL200	1		Term. 4 of TS200	0
	2		Term. 3 of TS200	0
	3		Term. 6 of TS200	0
	4		Term. 7 of TS200	0
	5		Term. 5 of TS200	0
	6		Term. 2 of TS200	0
	7		Term. 1 of TS200	0
	8		Term. 8 of TS200	0
Plug PL201	Tip		Term. 9 of TS200	0
	Sleeve		Term. 12 of TS200	0
Plug PL202	Tip		Term. 10 of TS200	0
	Sleeve		Term. 12 of TS200	0
Socket SO 200	1	Press START button	Chassis (ground)	0
	2		Ac term of socket SO 203	0
	2		One side of ac sockets SO 201, SO 202, SO 207, SO 208 and SO 209.	0
	3	BATTERY SOURCE switch SW207 at PE–95.	Term. 4 of socket SO 204	0
	3	Switch SW207 at PE–95	Term. 7 of TS200	200
	3	Switch SW207 at PE–95 and switch SW200 (BC–312) at ON. Manually operate relay RY200.	Term. 2 of SO 204	0
	3	Switch SW207 at PE–95 and switch SW201 (BC–342) at ON. Manually operate relay RY200.	Term. 2 of socket SO 205	0
	3	Switch SW207 at PE–95 and switch SW203 at TRANS. ON. Switch SW 202 at NORMAL.	Tip of jacks J200 and J201	100
	3	Switch SW207 at PE–95 and switch SW203 at TRANS. ON. Switch SW202 at positions 1 or 5.	Ungrounded REMOTE TELEPHONE binding post.	100
	3	Switch SW207 at PE–95, switch SW203 at TRANS. ON, and switch SW202 at positions 2 or 4.	Chassis (ground)	100
	4		Chassis (ground)	0
	5		Other side of SO 201, SO 202, SO 207, SO 208, and SO 209.	
	6	Press STOP button	Chassis (ground)	0
Socket SO 204	1		Chassis (ground)	0
	3		Chassis (ground)	0
	4	Switch SW207 at AUX	+12v DC term. of socket SO 203 and ungrounded term. of socket SO 206.	0
Socket SO 205	1		Chassis (ground)	0
	3		Chassis (ground)	0
Socket SO 206	Ground terminals.		Chassis (ground)	0

a. Junction Box JB–70–(*). (fig. 65)—Continued

Measurements made from	Term. No.	Conditions	Measurements made to—	Resistance in ohms
Socket SO 210	1		Tip of jacks J202 and J203	5, 100
	1	Switch SW205 at position 1	Term. 5 of TS200	5, 100
	1	Switch SW204 at NORMAL	Term. 2 of socket SO 210	0
	1	Switch SW204 at TRANSPOSED.	Term. 10 of TS200	0
	2	Switch SW204 at TRANSPOSED.	Term. 9 of TS200	0
	2	Switch SW204 at TRANSPOSED.	Tip of jacks J204 and J205	5, 100
	2	Switch SW205 at position 3 and switch SW204 at TRANSPOSED.	Term. 5 of TS200	5, 100

b. Operating Table FN–22/MRC–2. (fig. 77.)

Measurements made from	Term. No.	Conditions	Measurements made to	Resistance in ohms
TO TRANSMITTING SHELTER binding posts.	EE–8		Tip of EE–8 jack J13	0
	EE–8		Sleeve of EE–8 jack J13	0
	EE–8	Switch S1 in COMBINED position.	Tip of EE–8 jack J16	0
	EE–8	Switch S1 in COMBINED position.	Sleeve of EE–8 jack J16	0
	CONTROL		Term. D of GREEN jack J14.	0
	CONTROL		Term. C of GREEN jack J14.	0
	LINE		Term. A of GREEN jack J14.	0
	LINE		Term. B of GREEN jack J14.	0
Junction Box J–204/MRC–2 SEND TTY BLK jack J2.	Tip		Tip of SEND TTY BLK jack J19.	0
	Sleeve		Sleeve of SEND TTY BLACK jack J19.	0
SEND TTY RED jack 3	Tip		Tip of SEND TTY RED jack J20.	0
	Sleeve		Sleeve of SEND TTY RED jack J20.	0
REC. TTY BLACK jack J4.	Tip		Tip of REC. TTY BLK jack J21.	0
	Sleeve		Sleeve of REC. TTY BLK jack J21.	0
REC. TTY RED jack J5	Tip		Tip of REC. TTY RED jack J22.	0
	Sleeve		Sleeve of REC. TTY RED jack J22.	0
SEND EXT. GRAY jack J6.	Tip		Term. B of YELLOW plug P1.	0
	Sleeve	SEND EXT. binding post 2 and 1 strapped.	Term. C of YELLOW plug P1.	0
SEND EXT. BLACK jack J7.	Tip		Term. B of YELLOW plug P1.	0
	Sleeve	SEND EXT. binding post 2 and 1 strapped.	Term. C of YELLOW plug P1.	0

b. Operating Table FN–22/MRC–2. (fig. 77)—Continued

Measurements made from	Term. No.	Conditians	Measurements made to	Resistance in ohms
SEND EXT. RED jack J8 or jack J9.	Tip		Term. A of YELLOW plug P1.	0
	Sleeve		Term. B of YELLOW plug P1.	0
REC. EXT. RED jack J10 or jack J11.	Tip	REC. EXT. binding post 3 and 4 strapped.	Term. E of YELLOW plug P1.	0
	Sleeve		Term. D of YELLOW plug P1.	0
TO RECEIVING SHELTER binding posts.	EE–8		Tip of EE–8 jack J16	0
	EE–8		Sleeve of EE–8 jack J16	0
	CONTROL		Term. C of BLACK jack J17.	0
	CONTROL		Term. D of BLACK jack J17.	0
	LINE		Term. A of BLACK jack J17.	0
	LINE		Term. B of BLACK jack J17.	0

c. Operating Table FN–23/MRC–2 (fig. 78).

Measurements made from	Term. No.	Conditions	Measurements made to—	Resistance in ohms
TO OPERATING SHELTER binding posts.	EE–8		Tip of EE–8 jack J2	0.
	EE–8		Sleeve of EE–8 jack J2	0.
	CONTROL		Term. C of RED plug P1	0.
	CONTROL		Term. D of RED plug P1	0.
	LINE		Term. A of BLUE plug P2	0.
	LINE		Term. B of BLUE plug P2	0.
BLUE plug P2	D		Tip of RED jack J6	0.
	E		Sleeve of BLK jack J5	0.
BLK jack J5	Tip		Sleeve of RED jack J6	Less than .1.
RED plug P1	A		Tip of KEY jack J4	Less than .1.
	B		Sleeve of KEY jack J4	Less than .1.

d. Junction Boxes J–207/MRC–2 and J–199/MRC–2 (fig. 79).

Measurements made from	Term. No.	Conditions	Measurements made to—	Resistance in ohms
TO OPERATING SHELTER binding posts.	EE–8		Tip of EE–8 jack J3	0.
	EE–8		Sleeve of EE–8 jack J3	0.
	CONTROL		Term. D of BLUE plug P1	0.
	CONTROL		Term. C of BLUE plug P1	0.
	LINE		Term. A of BLUE plug P1	0.
	LINE		Term. B of BLUE plug P1	0.
RED plug P2	A		Tip of DISABLING jack J2.	0.
	B		Sleeve of DISABLING jack J2.	0.
	C		Tip of KEY jack J4	0.
	D		Sleeve of KEY jack J4	0.

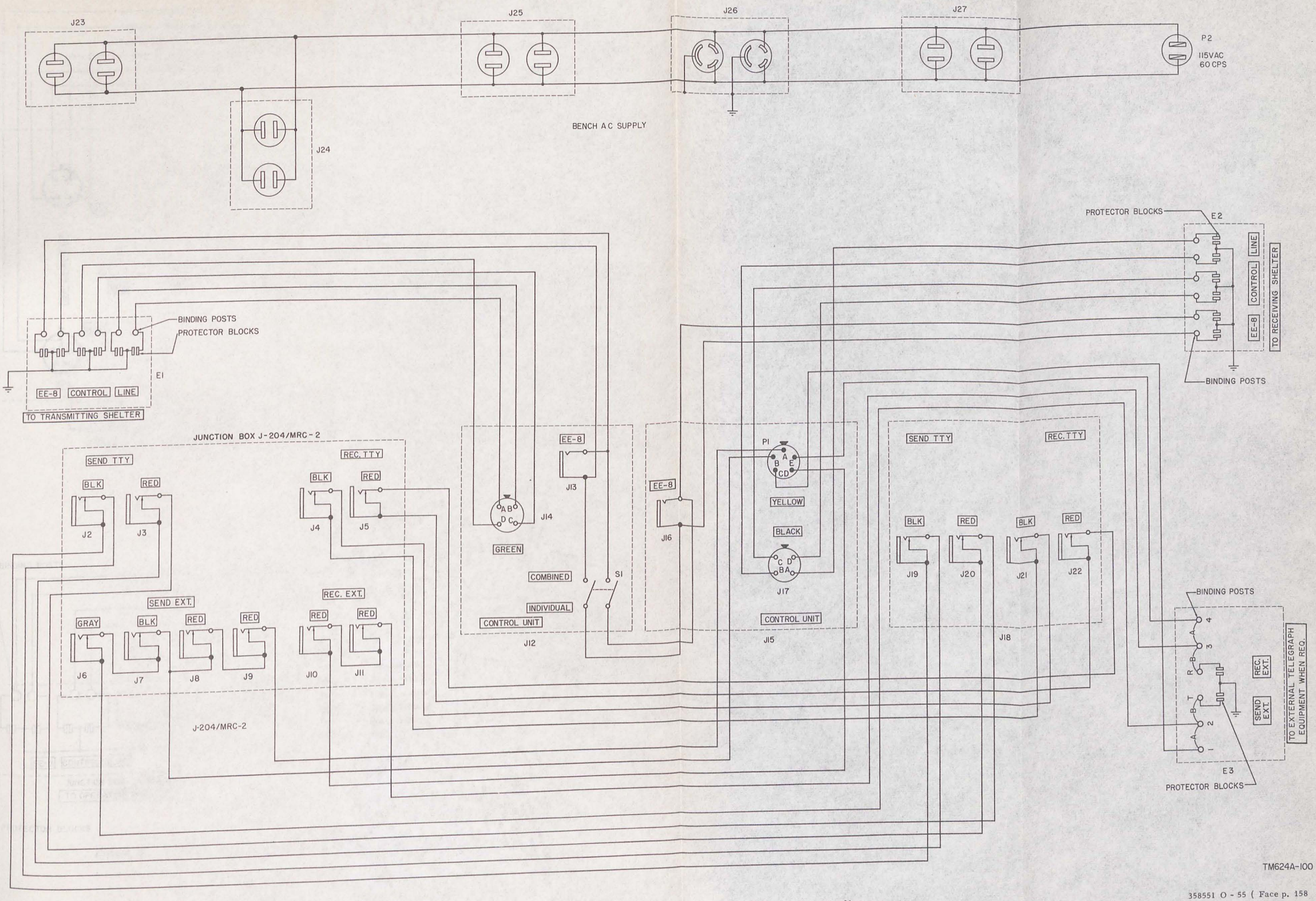


Figure 77. Operating Table FN–22/MRC–2 in operating shelter, schematic diagram.

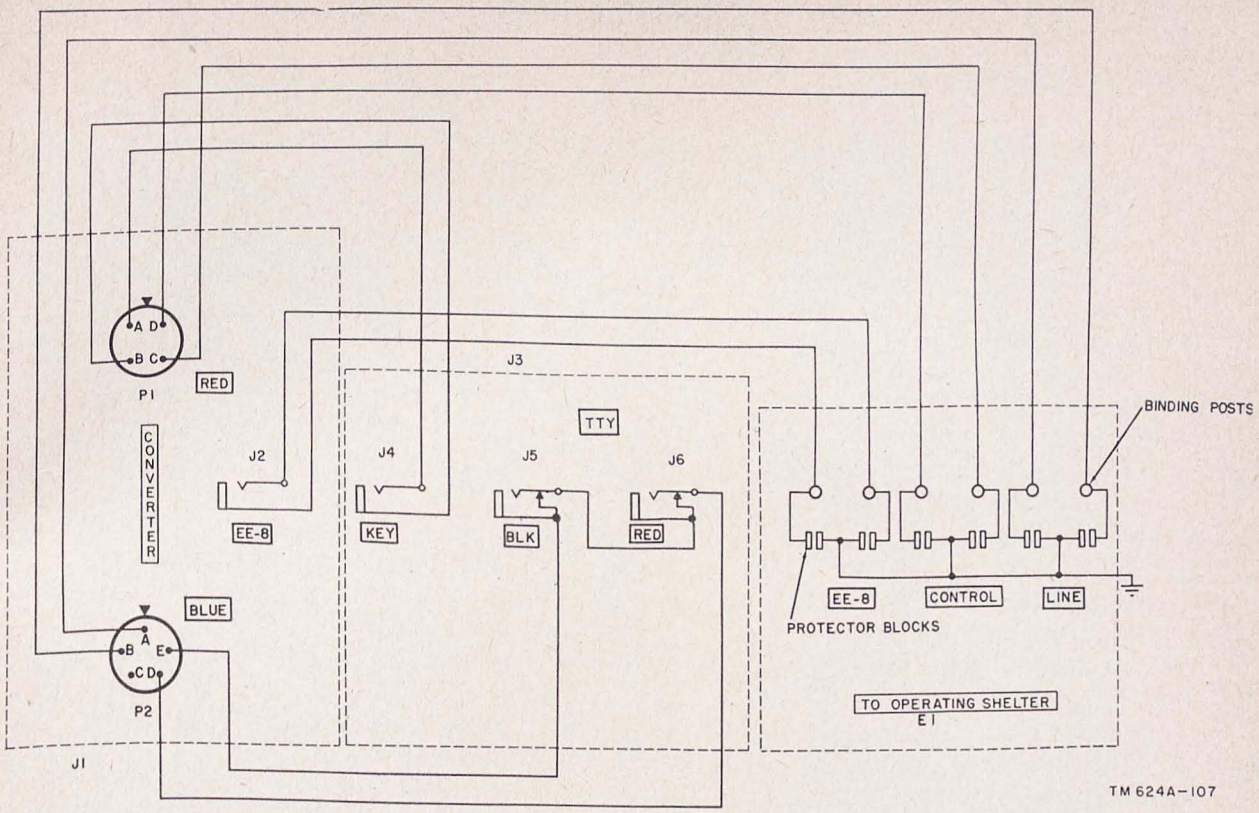


Figure 78. Operating Table FN–23/MRC–2 in receiving shelter, schematic diagram.

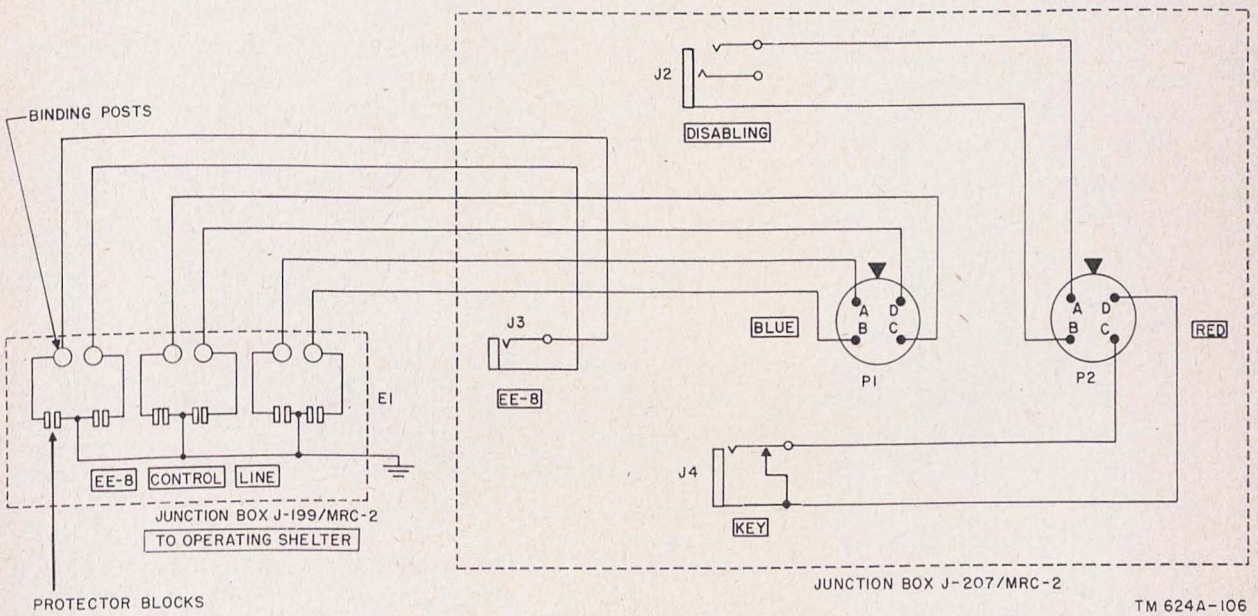


Figure 79. Junction Boxes J–207/MRC–2 and J–199/MRC–2, schematic diagram.

Section II. REPAIRS

135. Replacement of Parts

a. General

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

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

(3) Do not allow drops of solder to fall into the equipment because they may cause short circuits.

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

(5) The new part should be placed in exactly the same position as the original one, especially in high-frequency circuits.

(6) Give particular attention to proper grounding when replacing a part. Use the same ground as in the original wiring. Failure to observe this precaution may result in decreased output or possible oscillation in certain circuits.

b. Junction Box JB–70–(*) (fig. 80). All of the parts of the junction box are readily accessible and easily replaced when the chassis is removed from its case. To remove the junction box from the case in the chest in Radio Set AN/MRC–2C or from the table in Radio Set AN/MRC–2D use the following procedures:

(1) Disconnect all cords connected underneath and on the right side of the box.

(2) Disconnect the cord from the junction box to the speech amplifier at the speech amplifier TO JB–70 terminal.

(3) Disconnect the grounding braid from the bottom of the chassis with a screw driver.

(4) Disconnect the cords from the REMOTE TELEPHONE TERMINALS.

(5) Release the four panel locks and pull the chassis directly forward. With a screw driver, disconnect the leads from terminals 9, 10, 11, and 12 of terminal strip TS200 (fig. 80). Pull the cord (Cord CX–143/MRQ–2 in Radio Set AN/MRC–2C, Cord CX–2152/U in Radio Set AN/MRC–2D) through the rubber grommet in the right side of the junction box. Pull the chassis all the way out of the cabinet.

c. Amplifier AM–141(*)/MRC (fig. 81 through 85). The replacement of parts in Amplifier AM–141(*)/MRC is conventional in most cases; however, some parts may be more difficult to remove than others because of their physical size, weight, and location.

(1) The amplifier should not be moved out of the shelter for repairs unless it is absolutely necessary or when a new amplifier is being substituted.

(2) A number of the smaller parts are fastened to the front panel or to the subchassis behind the front panel. Some of these parts are accessible through the small front panel doors; for others, it is necessary to remove the front panel, the side panels, or both. The side panels are held by Dzus fasteners. Most repairs can be made by working through the doors on the front panel or by removing the left side panel. The left side is partially accessible with Radio Transmitter BC–610–I in place; however, it is necessary to temporarily relocate the transmitter if full access to the left side is needed.

(3) A door at the rear of the shelter permits access to the working space behind the amplifier and transmitter. Two doors on the rear panel provide access to the rectifier tubes and rf amplifier tubes (fig. 81).

Caution: Always short B+ circuits to the chassis or frame after removing a panel for access.

(4) When the knobs are removed, make a note of the knob position in relation to the control position so that they may be reinstalled in the same relative positions. Refer to figures 81 through 85 for locations of the amplifier parts.

136. Replacement of Amplifier AM–141(*)/MRC Tubes

Be careful when removing or installing the power amplifier (pa) tubes in the amplifier. These tubes are ruggedly constructed, but careless handling can easily damage them.

a. Removing Tubes. Do not attempt to force

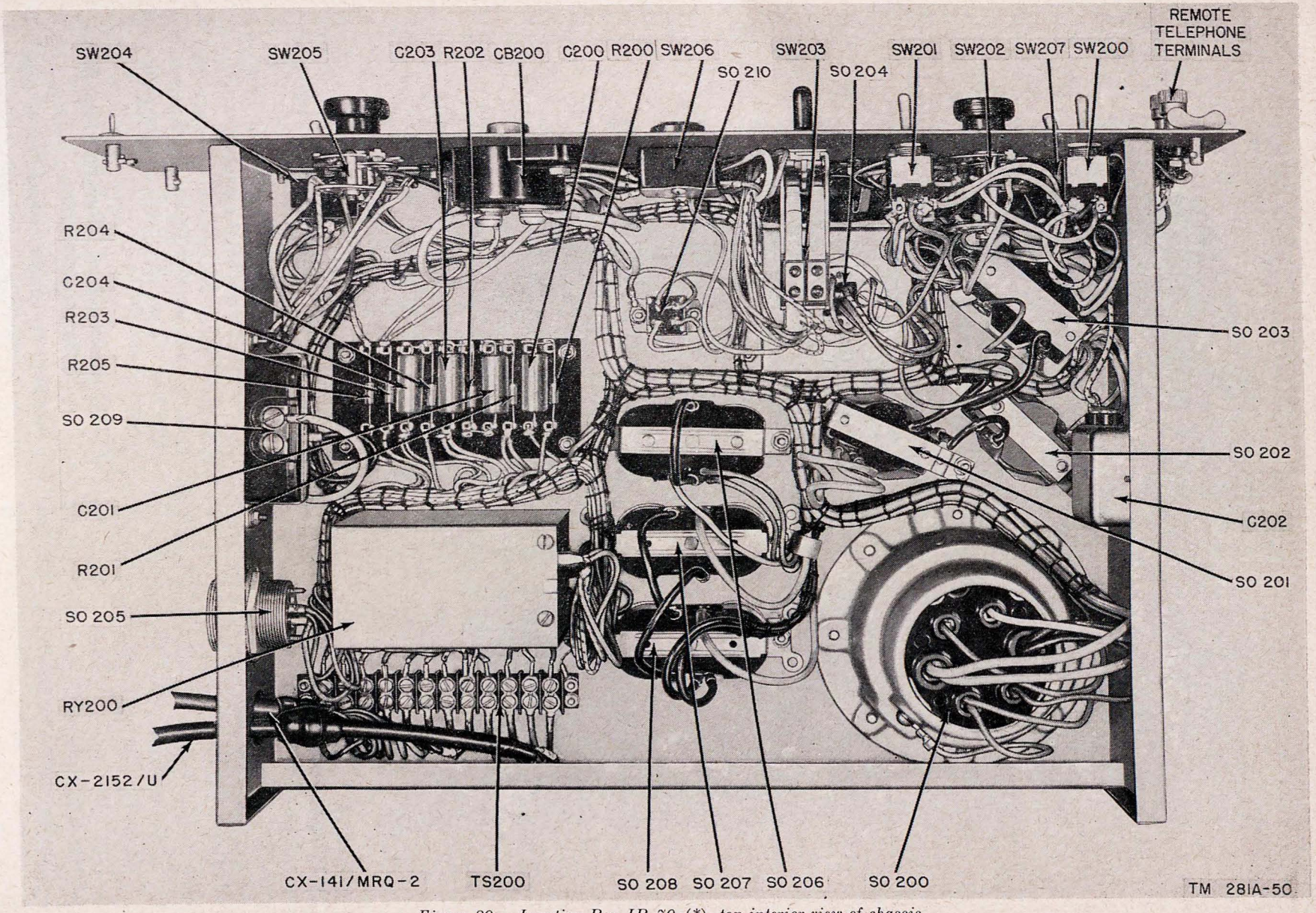


Figure 80. Junction Box JB-70-(*), top interior view of chassis.

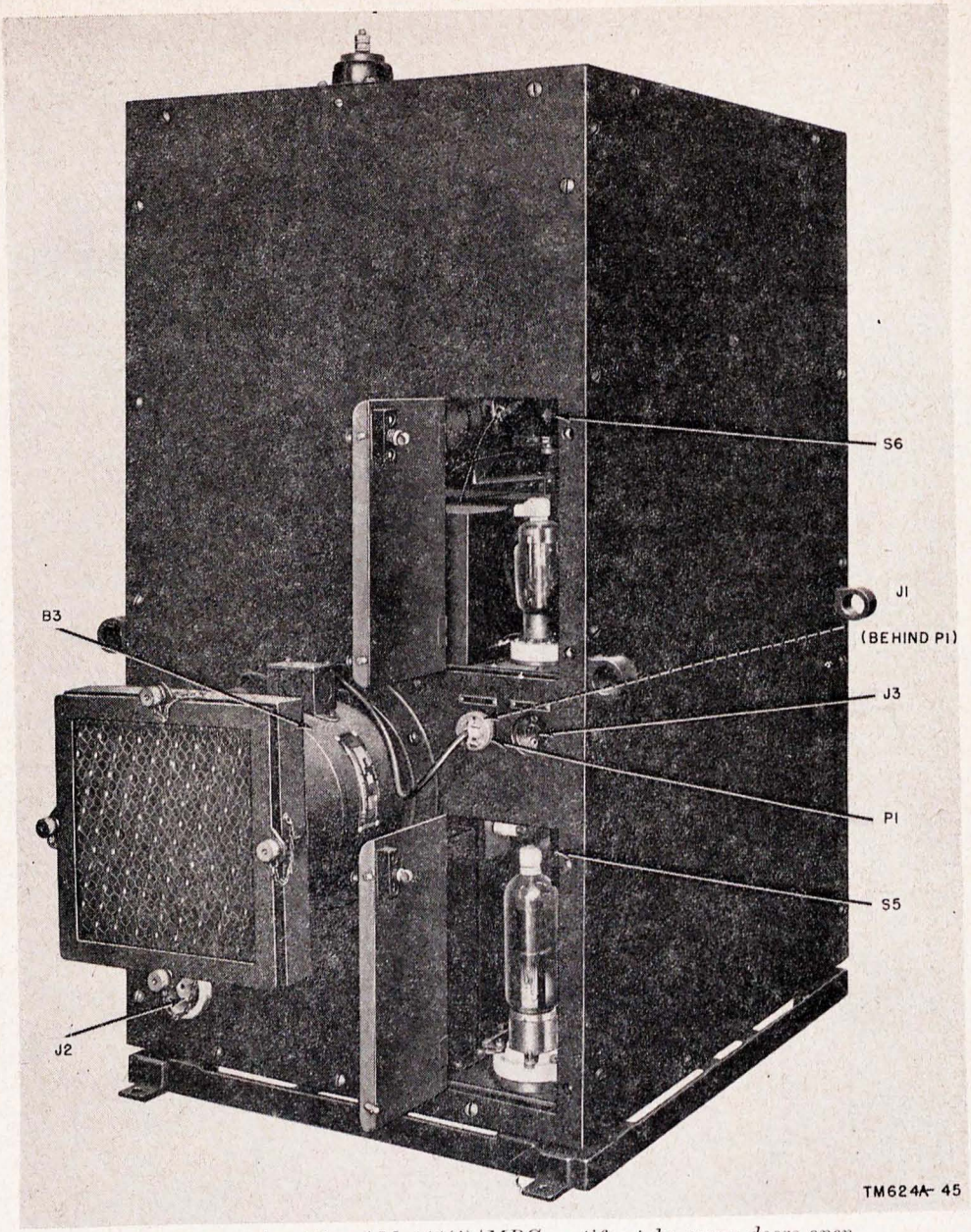


Figure 81. Amplifier AM–141(*)/MRC, rectifier tube access doors open.

any connections. These tubes become extremely hot during operation. *Do not attempt to remove a tube until it has cooled off.* To remove tube V1 or V2, proceed as follows:

(1) Loosen the knurled fasteners connected to the plate and grid caps.

(2) Carefully remove the connectors from the plate and grid caps. Do not bend or twist the connectors and do not use prying tools.

(3) Reach in beside the tube and loosen the knurled fasteners on the filament connectors. Grasp the tube firmly and pull it straight out. Do not bend or twist the tube because the seals at the filament leads break easily.

(4) Move the plate connector out of the way when removing the tube.

b. Installing Tubes. These tubes are held in place by their filament prongs which connect to adjustable clamps. To install a replacement tube see paragraph 17*a*(11).

137. Disassembly of High-Pressure Blower Motor for Lubrication

Caution: The amplifier should not be operated with the blower motor in an inoperative condition

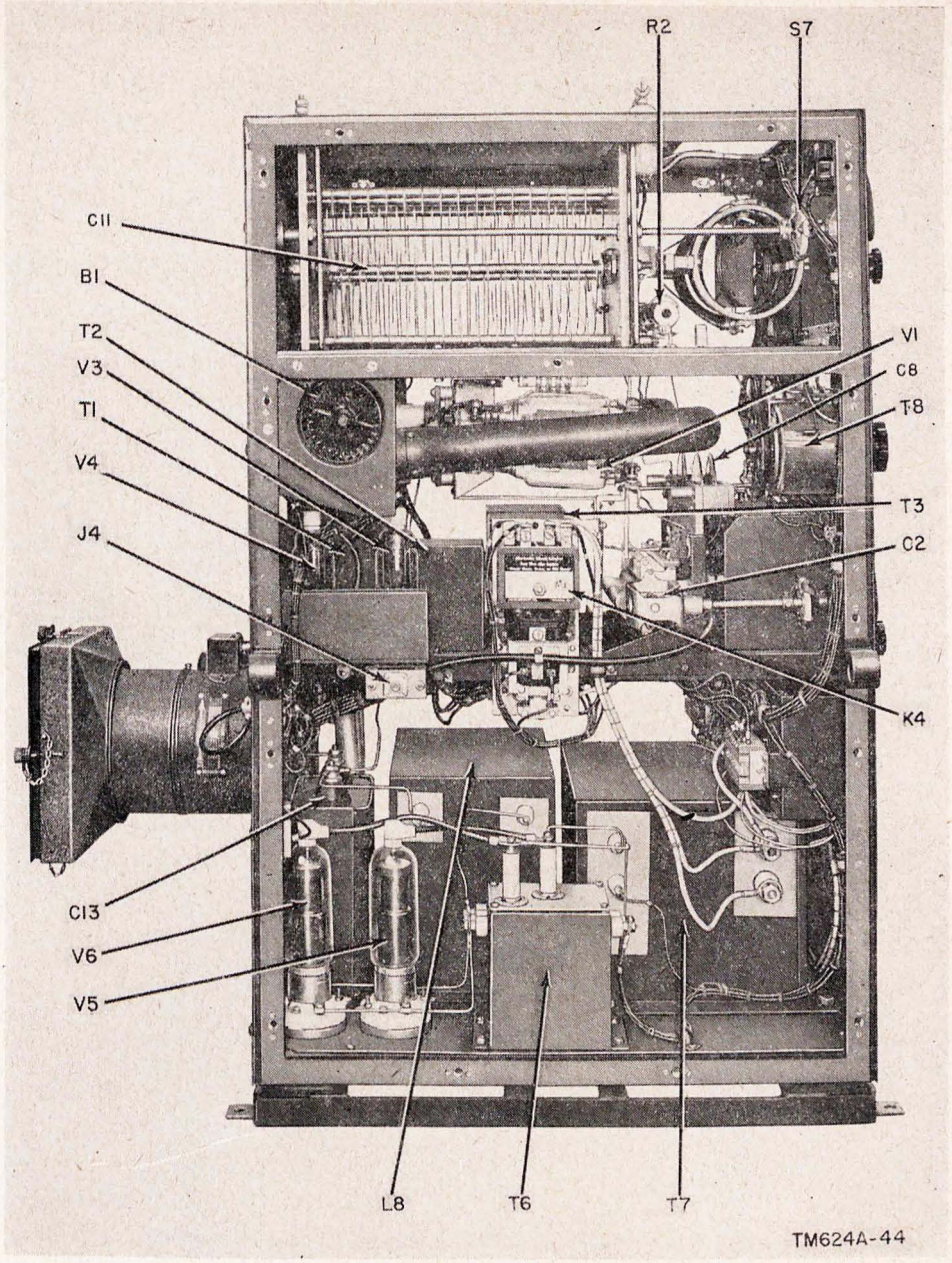


Figure 82. Amplifier AM–141(*)/MRC, left side panel removed.

over extended periods of time. Operation without the blower motor should be attempted only as an emergency measure until temporary repairs can be made to the blower motor.

a. Remove the high-pressure blower B3 air filter and blower housing (fig. 81) by unscrewing the ¼-inch machine screw and turning the five Air-loc studs counterclockwise.

b. Open the terminal box by removing the two screws holding the lid. Unsplice and disconnect the four leads from the motor. Push the motor cable inside the housing.

c. Completely unscrew and remove the two oiler tubes from the motor case. Remove the three Allen-head screws on the housing which hold the three motor support brackets. Unscrew the four thumb nuts holding the air filter in place and remove the filter. The fan and motor assembly now may be removed carefully to the rear, and thus removed.

d. Remove the two end plates from the motor housing by releasing the two long bolts holding this assembly together. Mark the end plates so that they can be replaced in their original positions when assembled.

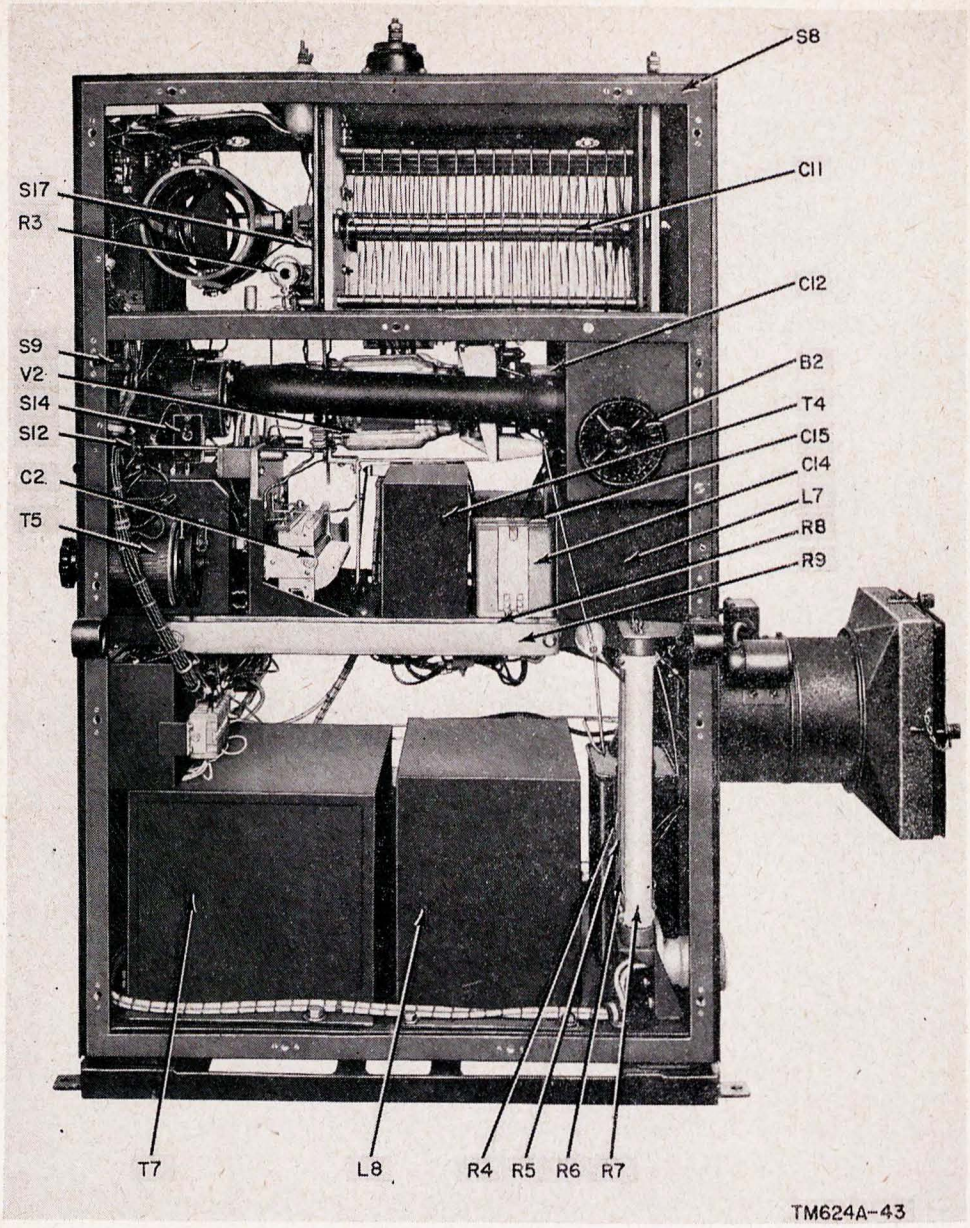


Figure 83. Amplifier AM–141(*)/MRC, right side panel removed.

e. To remove the two end bearings from the shaft, use pressure only against the inner race. Be careful when forcing bearings off or on the motor shaft. Never exert pressure on the outer race. Bearings must be handled carefully to avoid any possibility of dirt or foreign matter getting into them.

f. Lubricate the motor as described in paragraph 89*b*(5).

g. Reverse the procedure when reassembling the motor. Make sure that the motor shaft revolves freely, and that the fan clears the inside of the housing after assembly. If necessary, readjust the motor mounting brackets to insure fan clearance.

138. Emergency Repairs

It is necessary to become familiar with the radio set and each of its components in order to make emergency repairs. These emergency repairs will enable the operator to use at least a portion of the system's facilities, thereby maintaining radio contact. The first thought should be to substitute a component or part known to be good. Cw or radiotelephone operation may have to be used instead of teletypewriter operation if the units used in teletypewriter operation are disabled.

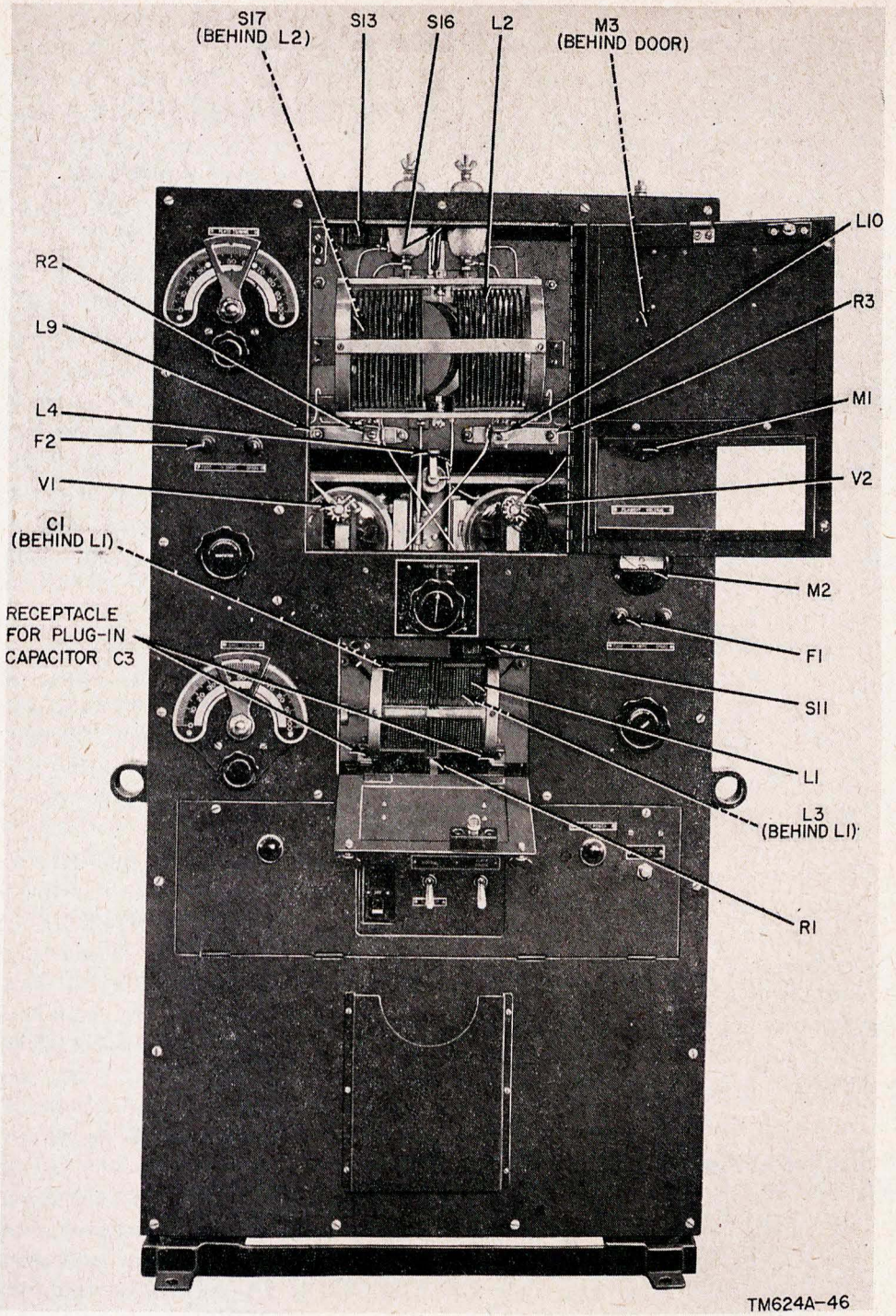


Figure 84. Amplifier AM–141(*)/MRC, grid and plate coil access doors.

a. Receiving Shelter. The resourceful operator should have little difficulty in keeping the set on the air under adverse conditions. For teletypewriter signal reception, satisfactory signals may be had (if fading is not severe) with only one channel of the dual diversity system in operation. One of each of the duplicated units could be disabled, and operation of the teletypewriters would be feasible. It may be necessary to change connections or locations of receivers, but one signal path from an antenna, through a receiver, through the dual diversity converter, to the control unit, and finally to a teletypewriter always should be available.

b. Operating Shelter.

(1) If the keying line to the transmitter is out, but the telephone is working, the LINE and EE–8 pairs can be switched so that sending is still possible, although there will be no intercommunication between the transmitting and operating shelters.

(2) If the teletypewriter equipment is not functioning, it is possible to use a hand key to send cw signals (pars. 74 and 76*d*).

c. Transmitting Shelter. In case of major failure at the transmitter location, emergency repairs probably will be more difficult, but are possible.

(1) The transmitter may be used without the amplifier, although the output power will be reduced to about one-fifth of that usually obtained with the amplifier. The antenna lead-in from a doublet antenna system is connected directly to the transmitter output binding post on the left side panel (pars. 75 and 76*b*).

(2) Any emergency repairs made on Amplifier AM–141(*)/MRC should be made by competent personnel. *Tinkering* may result in serious injury to personnel and damage to equipment.

d. Antennas. If spare masts are not available, broken masts may be replaced by poles, telephone posts, stout trees, or other supports. When replacing the masts, try to maintain the same height as the original. Use guy ropes to give adequate support. The broken wire often may be repaired by splicing the broken ends and soldering the joint. When wires are replaced, the lengths and method of feed should be as nearly like the original antenna as possible.

Section III. ALINEMENT AND ADJUSTMENT

139. General

a. From time to time the components of Radio Set AN/MRC–2(*) will require adjustment and/or alinement. These adjustments should not be confused with the normal operating adjustments described in chapter III. It is the responsibility of the repairman to see that all components are adjusted and alined properly. Improper adjustment can cause reduced output or otherwise unsatisfactory operation of the radio set.

b. The alinement and adjustment instructions of the various components (other than Amplifier AM–141(*)/MRC) may be found in the appropriate manuals listed in paragraph 1 and in the appendix.

140. Neutralization of Amplifier AM–141(*)/MRC

Warning: Be careful when working on the amplifier. There may be dangerous rf potentials present when the transmitter is on even though the amplifier is turned off. Use a grounding wire to discharge capacitors if in doubt of any circuit or apparatus. When working with high-potential voltages, always keep one hand in your pocket. Cross neutralization is used in the amplifier tubes to prevent self-oscillations. Reneutralization of the amplifier should be done only when a pa tube has been replaced or some work has been done in the rf section. Neutralization is accomplished as follows:

a. Tune up Radio Transmitter BC–610–I at a frequency of 2,500 kc. Use Transmitter Tuning Unit TU–48 and Coil Unit C–387–D. Follow the tuning procedure as outlined in TM 11–826 or paragraph 43 in this manual. Turn off the plate voltage.

b. Be sure that the proper grid and plate coil are in their sockets in the amplifier (par. 47*a*). Be sure that the BAND SWITCH is in position 1.

c. Open the plate-coil compartment door and throw the NEUT. SWITCH to the ON position. Disconnect the antenna transmission line.

d. Throw CIRCUIT BREAKER K5 on the amplifier to the ON position but do not turn on the plate power. Turn the radio transmitter PLATE POWER switch to the ON position (up).

e. Tune the GRID TUNING control of the amplifier to obtain a maximum reading on the GRID CURRENT meter and adjust the EXCITATION INCREASE variac for a reading of 200 ma on the GRID CURRENT meter.

f. Open the upper access door of the amplifier and hold the neutralizing indicator so that it is coupled to the plate coil. Do not couple the indicator too closely at first or the lamp may be burned out by excessive current. Avoid extreme brilliance of the indicator lamp. However, the indicator loop may be inserted in the coil frame if necessary. Turn the PLATE TUNING control from 0 to 100. If the neutralizing indicator lamp

does not light, the amplifier may be considered neutralized or the lamp may be burned out. If the lamp lights, the set probably is not neutralized. Proceed with the neutralizing as described in *g* through *l* below.

g. Turn off the PLATE POWER switch of the radio transmitter and the CIRCUIT BREAKER on the amplifier. Slightly loosen the two lock nuts on each of the grid plates of each neutralizing capacitor C8 and C9 (fig. 82). Adjust both capacitors equally; either reduce or increase the capacitance of each capacitor by the same amount.

h. Turn on the power and repeat the procedure described in *f* above. If the neutralizing indicator does not light, the amplifier may be considered neutralized. If it still lights, turn the neutralizing capacitors by means of the polystyrene neutralizing tool until the light goes out or minimum brilliance is obtained.

i. If it is impossible to neutralize the amplifier, obtain a minimum indication and repeat the neutralizing procedure; adjust one neutralizing capacitor at a time for a minimum indication. Adjustment of the second neutralizing capacitor should give complete neutralization. It may not be possible to obtain zero indication with the neutralizing indicator. In such cases, adjust for minimum brilliance of the indicator lamp.

j. When the amplifier is neutralized completely, turn off all power and carefully tighten the nuts on the grid plates of the neutralizing capacitors. Be careful not to allow the capacitor plates to move while tightening the lock nuts. Recheck the neutralization.

k. As a further check of the neutralization, apply plate power to the amplifier and hand key the transmitter while observing the PLATE CURRENT meter of the amplifier. If the plate current is much greater than 70 ma when the key is up, there is a tendency toward self-oscillation.

l. If a neutralizing indicator is not available or all lamps are burned out, the GRID CURRENT meter may be used as a neutralizing indicator. Tune for a *no-dip* in the GRID CURRENT meter reading rather than minimum brilliance as with the neutralizing indicator lamp. If a dip is observed in the GRID CURRENT meter reading as the PLATE TUNING dial is turned from 0 to 100, the amplifier is not neutralized.

141. Adjustment of Amplifier AM–141(*)/MRC

a. Tuning Dials. The two tuning dials and the BAND SWITCH on the amplifier must be handled very carefully. If either the BAND SWITCH or the dials are twisted beyond their stopping pins, the previous calibrations will be thrown off and readjustment of the amplifier to these frequencies will be necessary.

b. Relays. Three relays and a time-delay switch are provided for control and protection of the amplifier tubes. The protective relays must be adjusted properly to give adequate protection to the circuit elements that they guard. Refer to figures 82 and 85 for the relay locations. Adjustment points of relays K2 and K3 are shown in figure 86. These relays are tested and adjusted as follows:

(1) *Time-delay switch K1.* Switch K1 is mounted on the left side of the left relay mounting bracket behind the relay access door of the front panel (fig. 85). This and other relays may be tested without removing them from the amplifier. Time-delay switch S1 is a complete assembly, mounted in a hermetically sealed metal case. No adjustments are possible without destroying the seal. Normally, the unit should be replaced with a new one if it is found defective. To test the timing, close CIRCUIT BREAKER K5; observe the time required for a 115-volt lamp to light (the lamp should be placed across terminals 2 and 3). The lamp should light after a time interval of 45 to 60 seconds. Refer to paragraph 121*c* for the principle of operation of time-delay switch K1.

(2) *Bias protective relay K2* (figs. 85 and 86). Relay K2 may be tested and adjusted in the amplifier and observed through the open relay panel access door.

(*a*) Inspect the relay by tuning Radio Transmitter BC–610–I and the amplifier GRID TUNING control to resonance (see tuning procedure) and turning the EXCITATION INCREASE control completely counterclockwise. Turn off all equipment and remove the plate caps from bias rectifier tubes V3 and V4 of the amplifier. Place the NEUT. SWITCH in the ON position, turn on all equipment, and turn the EXCITATION INCREASE control until relay K2

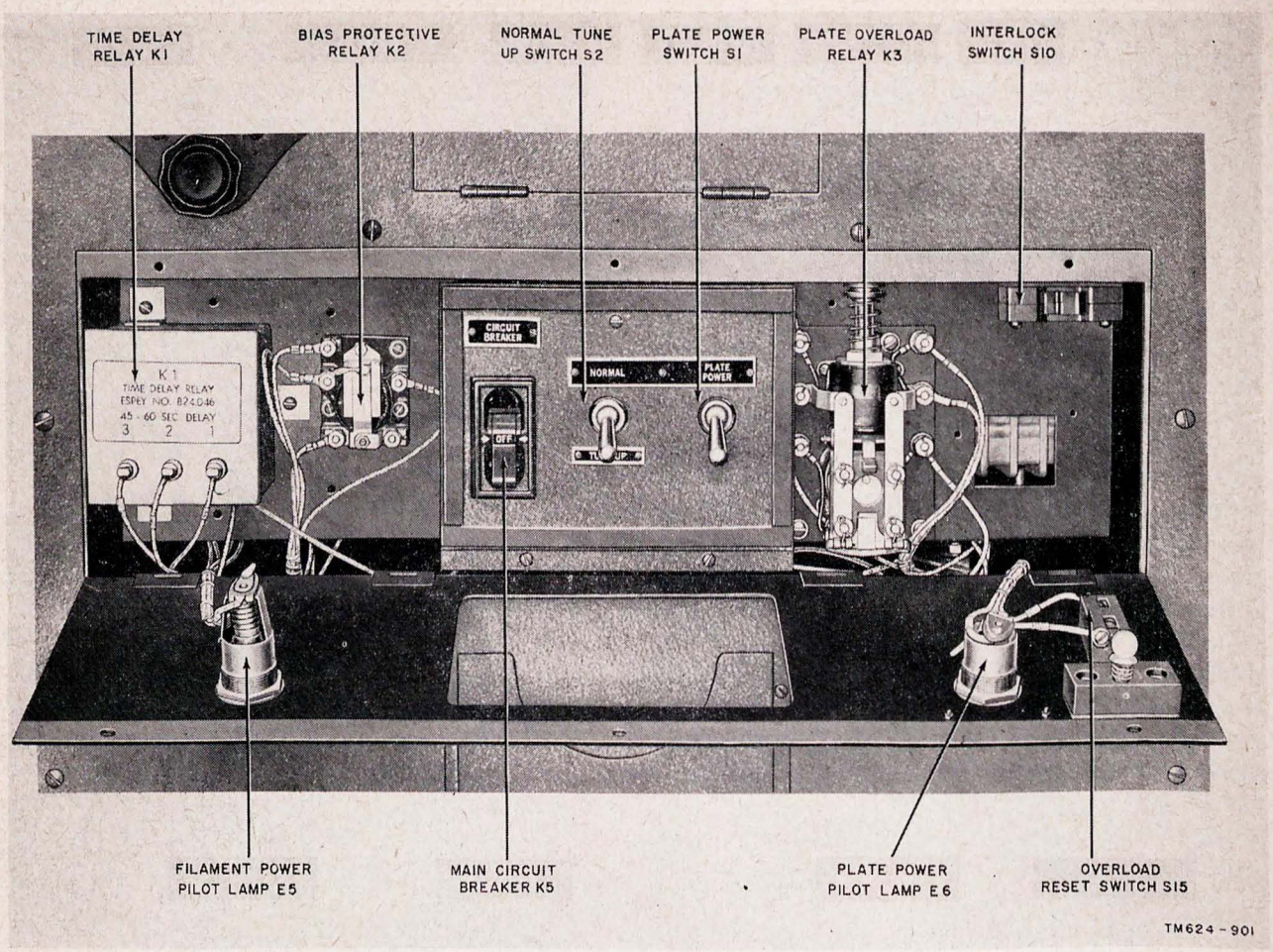


Figure 85. Amplifier AM–141(*)/MRC, relay panel.

closes. The current required to close K2 is read directly on the GRID CURRENT meter. The current should never exceed 210 ma, because tubes V1 and V2 could be damaged by overexcitation. If the relay does not close on 210 ma, it should be closed manually with an insulated prod. Unless the coil is defective, the relay should remain closed until the current drops to a value of 115 to 135 ma. If K2 does not close at 210 ma, the relay coil should be tested for continuity and the pole piece should be checked to determine that no rust or dirt is holding it partially open. Inspect the *pivots* and *springs* to insure free movement and ready return to the normal positions. Inspect the contacts to determine that they are clean and tight, and that both contacts seat simultaneously. Return the NEUT. SWITCH to the OFF position and replace the plate caps on tubes V3 and V4 when finished.

(*b*) Clean the relay gap at the pole pieces. If the poles are rusty, clean them with #000 sandpaper and lightly coat the bared iron with oil (PL Special). The contacts should be burnished thoroughly with a WECo No. 265C burnishing tool. If the contacts are pitted badly or otherwise defective, they should be replaced and adjusted as indicated in (*c*) below. Clean the pivots and springs by wiping or brushing them; scrape off any deposits of fungicidal lacquer.

(*c*) Adjustments may be made by loosening the spring tension on the armature tail and by lengthening or shortening the normally closed contact screw. Should the relay fail to drop out at 115 ma as the excitation is reduced,

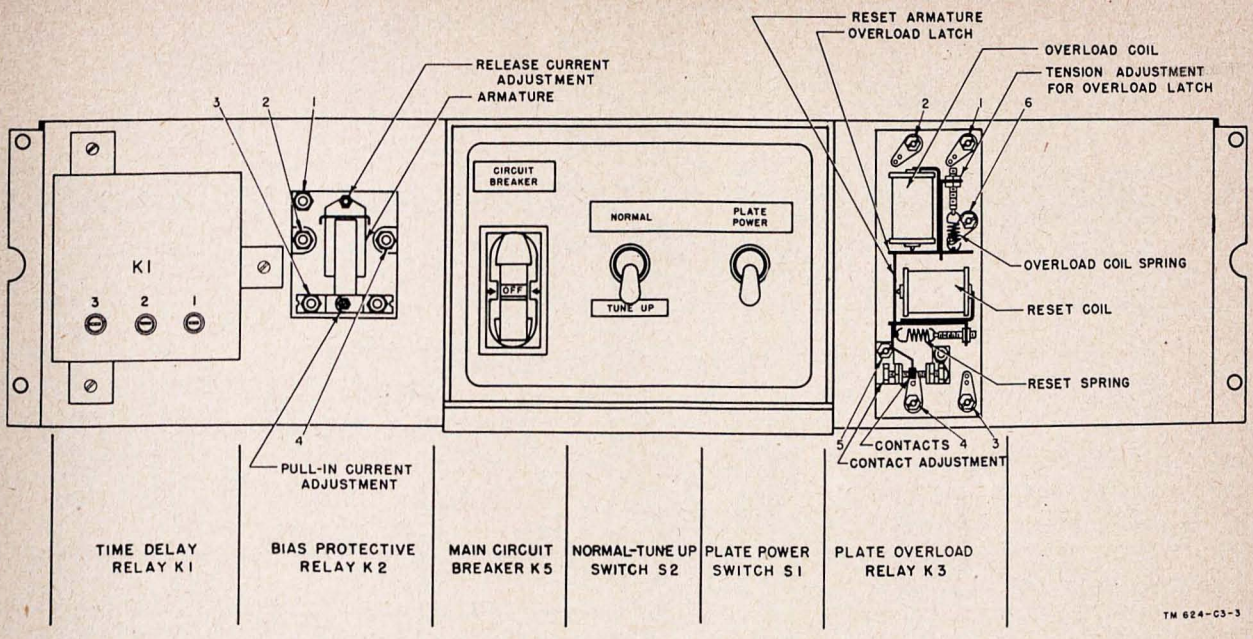


Figure 86. Amplifier AM–141(*)/MRC, relay K2 and K3 adjustment points.

the tension on the armature tail spring should be increased. If the relay drops out above 135 ma, the tail spring tension should be reduced. If the closing current is in excess of 210 ma, the contact screw (fig. 86) should be adjusted to reduce the space between the armature and the pole piece. If closing current is less than 190 ma, increase the space between the armature and the pole piece. If undue difficulty is encountered in the adjustments outlined above, remove and replace the relay.

(3) *Overload relay K3* (figs. 85 and 86).

(*a*) Relay K3 may be tested and adjusted in the amplifier through the relay panel access door. To test the relay, the amplifier plate current must be increased beyond the safe operating value, and NORMAL power plate voltage may be applied only for extremely short intervals. Place the equipment in operation and increase the antenna coupling until the PLATE CURRENT reads 1.075 to 1.100 amperes at resonance. Under this condition, the relay should not trip when NORMAL-TUNE UP switch S2 is changed from the TUNE UP to the NORMAL position several times. With the same antenna adjustment and the NORMAL-TUNE UP switch at the NORMAL position, tune the PLATE TUNING control rapidly off resonance and observe the PLATE CURRENT meter reading at which the overload trips the relay. This should occur at 1.300 to 1.400 amperes. If the relay does not trip between these values, inspect it for loose adjustments and dirty or defective parts. The lock nut must be tight. Inspect the relay mechanism to see that it moves freely and that the latch and armature on the relay are free. See that the contacts of the relay seat squarely and that there is very little sidewise motion of the armature.

(*b*) Remove dust, oil, lacquer, and rust from all parts of the relay where moving parts or contacts can be affected. Use a brush or wiping cloth to remove dust. Use solvent (SD) to remove grease or oil. Remove rust and lacquer by scraping or sandpapering. Iron or steel parts bared in cleaning should be lightly coated with oil (PL Special) to prevent rusting. Do not apply any abrasive to the relay mechanism.

(*c*) Adjustment of the relay to operate at the proper overload current is accomplished by adjustment of the thumb nut at the top of the plunger.

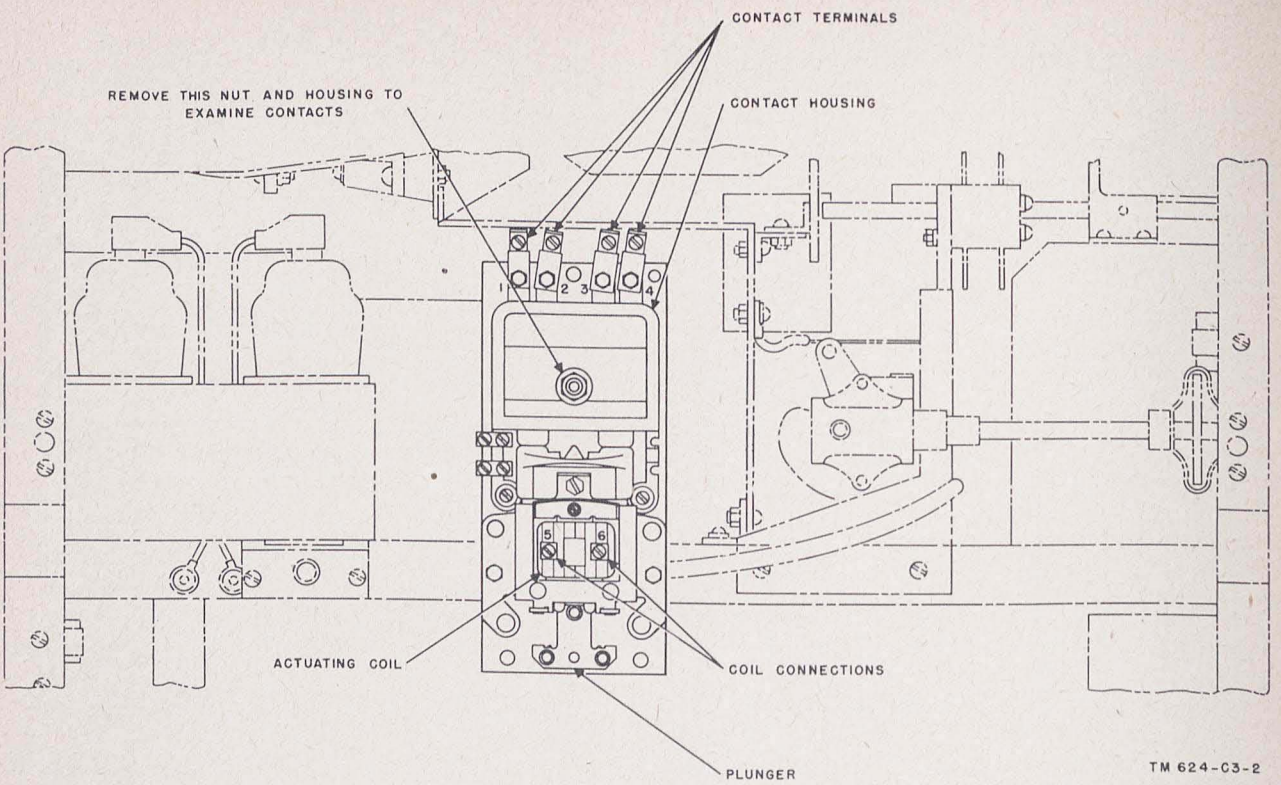


Figure 87. Power contactor relay K4.

Loosen the lock nut before making the adjustment. In (*a*) above, note the overload current needed to lock the plunger in the downward position. If the current needed is less than 1.3 amperes, tighten the thumb nut against the plunger spring to increase the spring tension. Release the latch and check the overload current again. Keep adjusting the thumb nut until the relay pulls in between 1.300 and 1.400 amperes. If the pull-in occurs at a current exceeding 1.400 amperes, unscrew the thumb nut until the proper range is reached. When the adjustment is satisfactory, tighten the lock nut against the adjustment thumb nut. Recheck the adjustment after tightening the lock nut.

(4) *Power contactor relay* K4 (figs. 82 and 87). Relay K4 is located on the left side of the bias (middle) shelf and is accessible only after the left side panel is removed. This relay is not critical of adjustment but is subject to troubles from dirt and broken or otherwise defective components; for these reasons, it should be inspected, cleaned, and tightened regularly. The plunger should be moved by hand to make sure that it is not binding because of dirt or deposits of fungicidal lacquer. Inspect the contacts to see that they are alined properly. Access to the contacts may be gained by removing the large nut that holds the name plate to the side of the contactor. Inspect the contact supports for breaks, evidences of flashovers, and dust.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

142. Material Requirements (Estimated)

Materials	Amount
Fiberboard, corrugated, single-faced (flexible).	2,000 sq ft.
Waterproof barrier material	60 sq ft.
Tape, water-resistant, pressure-sensitive 3-inch wide.	3 rolls.
Tape, gummed paper	6 rolls.
Preservative, hard-drying	2 qt.
Oil, engine grade	2 qt.
Cord, sash, cotton, solid braid natural, unfinished No. 8.	10 lb.
Cord, sash, cotton, solid braid natural, unfinished No. 24.	10 lb.
Bags, mailing (cotton)	2 doz.
Bags of silica gel desiccant	3 gross.

143. Disassembly and Repacking

The following instructions are recommended as a guide for preparing the three shelters and power units of the radio set for field transportation and storage.

a. General.

(1) Disconnect all outside field lines and power cords. Reel up the field wire.

(2) Wind all cables and cords into coils and tie in three places with the cotton sash cord. Secure the connectors to the coils with the ties.

(3) All bolts, nuts, washers, and other fastening devices removed during disassembly should, in individual groups, be inclosed in the draw-string cotton mailing bags. Secure each bag of fastening to the item from which removed.

(4) In each shelter secure all components to their mountings with fastenings provided. Place and secure covers, where provided, over the components.

(5) Disconnect the ground cables. Pull out the Ground Rod GP–26 and stow it in the holder provided in each shelter.

(6) Secure the chairs to the shelter operating tables or chests to prevent them from sliding around.

(7) Remove Canopy CW–153/U; fold and stow it on the shelter floor.

(8) Check all light bulbs for tightness.

(9) Place protective wrappings around the heater, fire extinguisher, and other components for which there is no space in the chests.

(10) Stow all loose items, such as headsets and technical manuals, in the chest compartments provided. Cushion accessories and spare parts by wrapping in flexible corrugated paper. Secure cushioning with gummed paper tape.

(11) Where caps over external connectors are provided, secure them in place. Close and secure all windows, hatches, blackout blinds, louver covers, and doors. Cover all openings remaining with three thicknesses of waterproof barrier material. Secure this with the 3-inch pressure-sensitive tape.

(12) Secure the shelter holddown tie rods with strips of the pressure-sensitive tape.

(13) Place bags of silica gel desiccant inside the chests. Protect the chest openings with pressure-sensitive tape.

(14) Figures 88 through 90 show the shelter interiors packed for shipment and illustrate a method of placing wooden props and bags of silica gel about the shelter.

b. Transmitting Shelter.

(1) Loosen the plate on the rear of the shelter through which power Cord CO–335 passes. Disconnect both ends of the cord and stow the cable on the floor of the shelter.

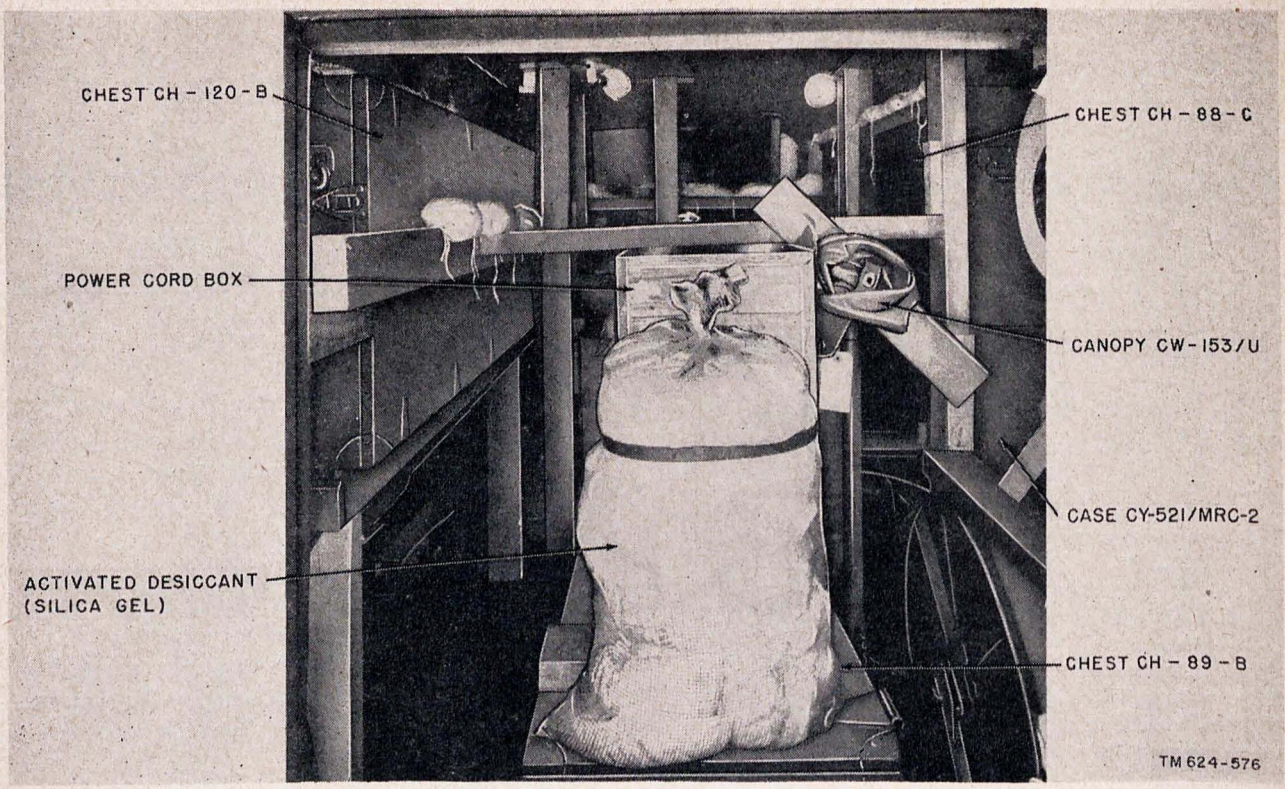


Figure 88. Interior of transmitting shelter of Radio Set AN/MRC–2C, packed for shipment.

(2) Dismantle the receiving whip antenna and stow it in the holder on the wall (AN/MRC–2D) or in seat CHEST CH–89–B (AN/MRC–2C).

(3) Disconnect the antenna coaxial cable, and screw the cap over the hole through which the cable normally passes.

(4) Remove tubes type 833–A from the amplifier, and stow them in the box provided in Case CY–521/MRC–2. Secure the plate and grid leads in the amplifier after removing the tubes.

(5) Remove the plate and grid coils from the amplifier and remove the plate coils and tuning units from the transmitter. Stow these items in the compartments provided in Case CY–521/MRC–2 and Chest CH–88–C.

(6) Make sure that Radio Receiver R–388/URR (AN/MRC–2D) or Radio Receiver BC–312–(*) (AN/MRC–2C) is fastened securely in place and that safety wires are in place.

(7) Before closing and locking the chests, stuff flexible corrugated paper into the compartments that require such material to prevent damage to the contents. After making sure that all stowed equipment is secure, check all chest fasteners and lock doors.

(8) Pack Typewriter MX–322/U in the carrying case and place it in the compartment under the table. Secure it in place with the strap.

(9) Disconnect Frequency Meter BC–221–(*) (AN/MRC–2C) and stow it in wall Case CY–521/MRC–2.

Note. Transmitting antenna components are repacked in accordance with the procedure outlined in TM 11–2620A and stowed in the operating shelter.

c. Receiving Shelter.

(1) Take down the antenna and repack it.

(2) Reel up the two coaxial antenna leads on the drums provided.

(3) Dismantle the whip antenna and stow it on the floor. Remove the mast base from the shelter and stow it in Cabinet CY–493/MRC–2.

(4) See that all receivers are locked securely in their cabinets.

d. Operating Shelter.

(1) Place Covers BG–198, BG–199 and BG–200 over the teletypewriter equipment (transmitter-distributor and typing reperforator).

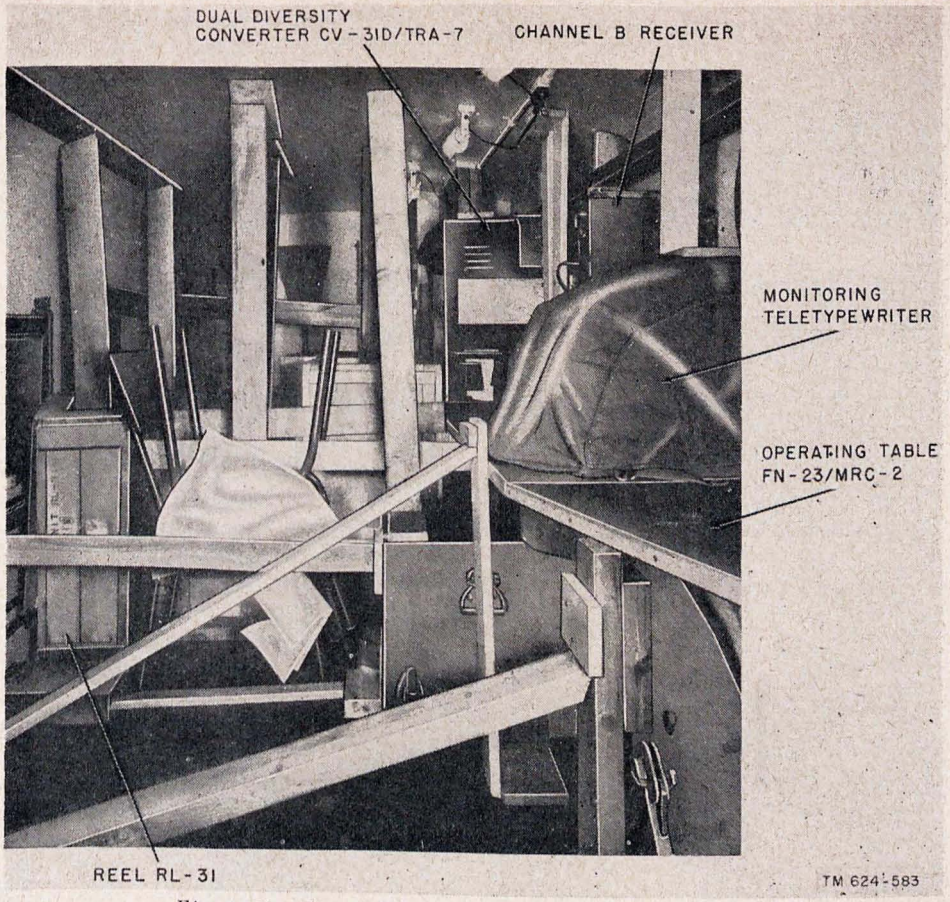


Figure 89. Interior of receiving shelter, packed for shipment.

(2) Remove all loose equipments from the operating bench and pack them securely in the storage cabinets.

(3) Disconnect Rectifier RA–87–A, place it in the carton, and stow it on the floor of the shelter.

(4) Securely pack the stamping clock in the tape compartment on the operating bench. Use the flexible corrugated paper and gummed paper tape.

(5) All loose cords and material may be stowed in the tape receptacle.

e. Power Units and Trailers.

(1) Drain the entire fuel system including carburetor, fuel pump, strainer, and lines. Drain the lubrication system; replace the drain plugs. Drain the cooling system, including the water pump and all engine low points. Replace all drain plugs. Refer to TM 11–904.

(2) Remove the spark plugs and pour 2 ounces of engine oil into each cylinder while turning the crankshaft by hand or starter. Rotate through at least two complete rotations of the crankshaft. Do *not* add oil through the carburetor or intake manifold. Replace the spark plugs.

(3) Seal all openings in the engine and accessories including air horn scoop, breathers, exhaust expansion joints, and openings in the starter and generator with the water-resistant, pressure-sensitive tape.

(4) Coat all ferrous (iron) metal parts not previously preserved or painted with a thin film of the hard-drying preservative (par. 142).

(5) Stow and secure the gasoline drums within the brackets in the trailer.

(6) Place the tarpaulin over the trailer ribs and secure in position with the fastenings provided.

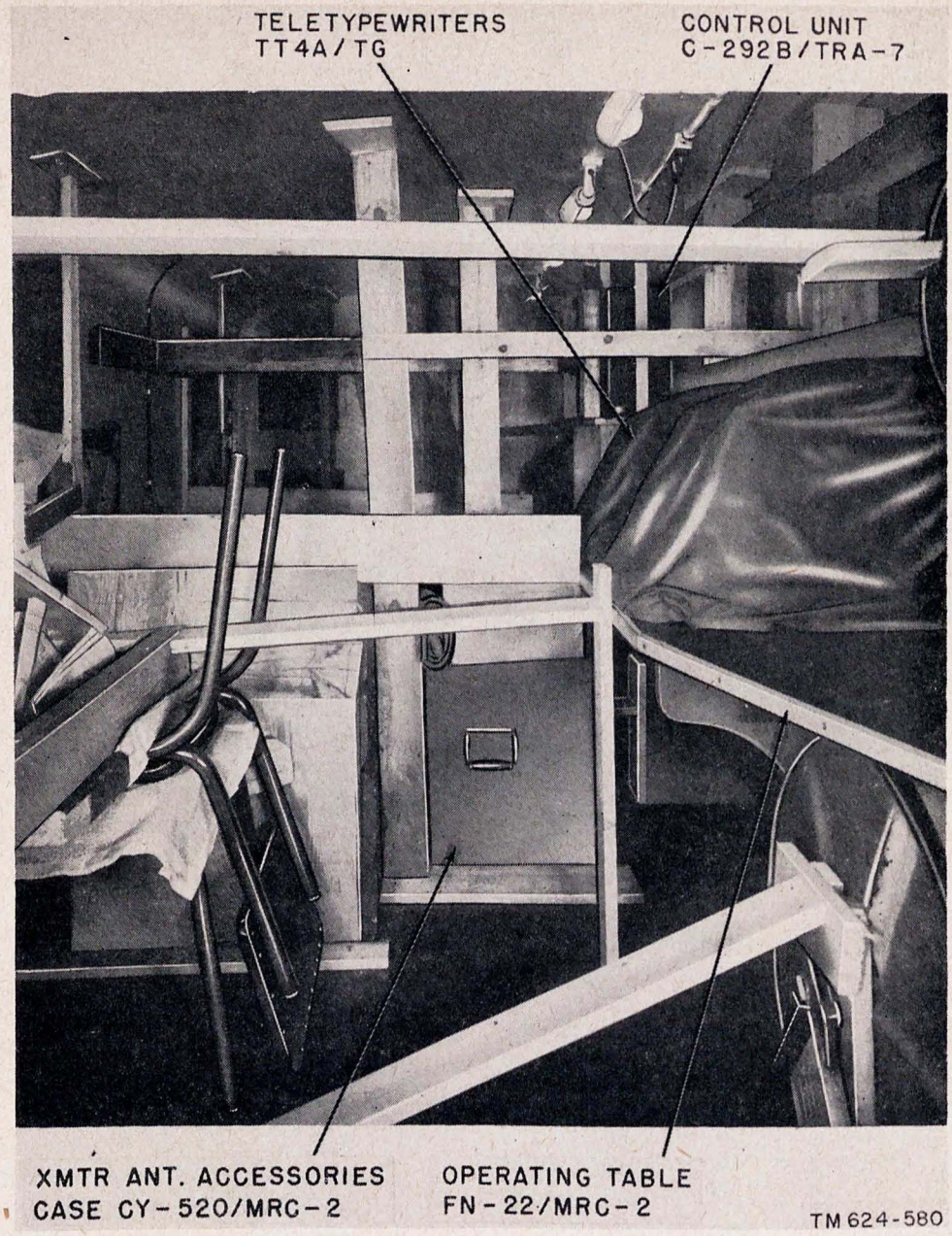


Figure 90. Interior of operating shelter, packed for shipment.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

144. General

The demolition procedures outlined in paragraph 145 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon order of the commander.

145. Methods of Destruction

a. Smash. Smash the crystals, controls, tubes, coils, switches, capacitors, transformers, and headsets; use sledges, axes, handaxes, hammers, crowbars, or other heavy tools.

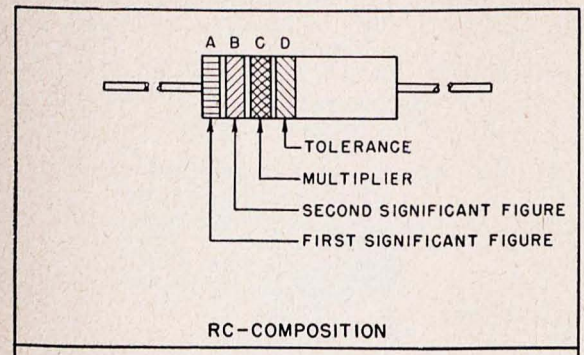
b. Cut. Cut cords, headsets, and wiring; use axes, handaxes, or machetes.

c. Burn. Burn cords, resistors, capacitors, coils, wiring, and technical manuals; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

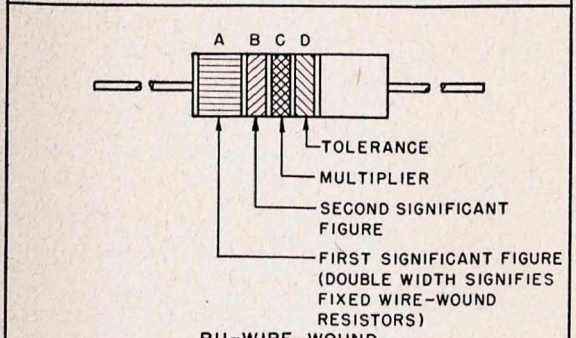
d. Bend. Bend panels, cabinet, and chassis.

RESISTOR COLOR CODE MARKING
(MIL-STD RESISTORS)

AXIAL-LEAD RESISTORS (INSULATED)

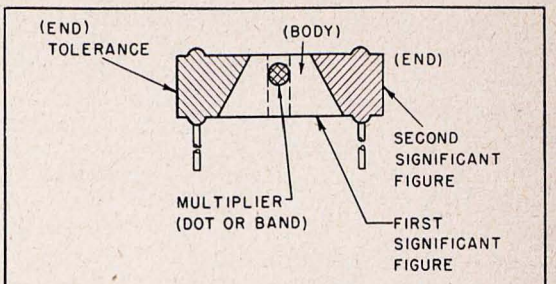


RC-COMPOSITION

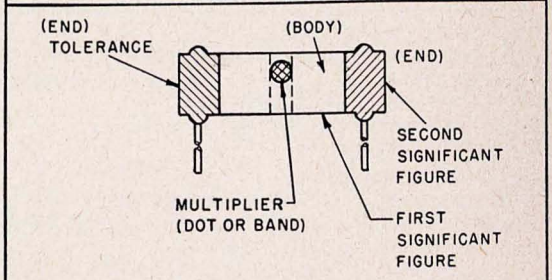


RU-WIRE-WOUND

RADIAL-LEAD RESISTORS (UNINSULATED)



RZ-COMPOSITION



RZ-COMPOSITION

RESISTOR COLOR CODE

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

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

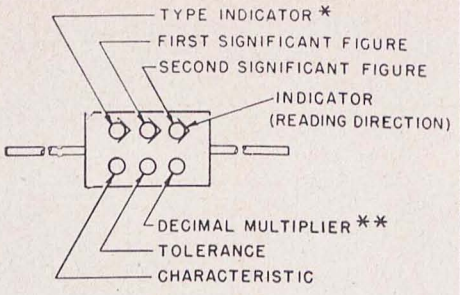
EXAMPLES (BAND MARKING):
10 OHMS ±20 PERCENT: BROWN BAND A; BLACK BAND B; BLACK BAND C; NO BAND D.
4.7 OHMS ±5 PERCENT: YELLOW BAND A; PURPLE BAND B; GOLD BAND C; GOLD BAND D.

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

STD-RI

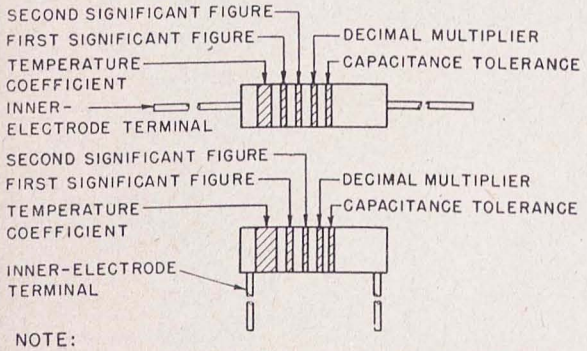
Figure 91. MIL-STD resistor color code.

CAPACITOR COLOR CODE MARKING
(MIL-STD CAPACITORS)



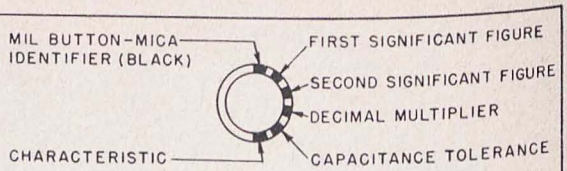
* BLACK DOT: MICA DIELECTRIC
SILVER DOT: PAPER DIELECTRIC
** INDICATES NUMBER OF ZEROS ON PAPER TYPE.

MICA (CM) AND PAPER (CN)

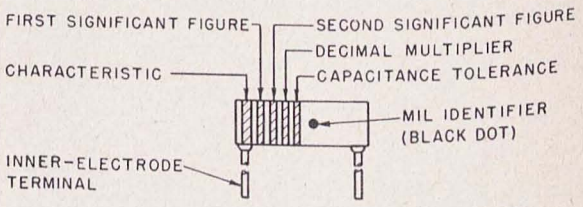


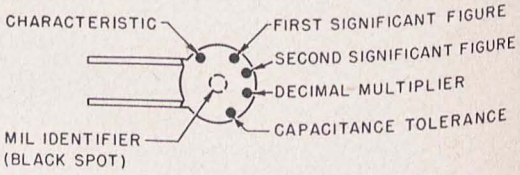
NOTE:
SPOTS MAY BE USED INSTEAD OF BANDS; TEMPERATURE COEFFICIENT MARKING IS LARGER.

CERAMIC-TEMPERATURE COMPENSATING (CC)



BUTTON-MICA (CB)





NOTES:
1. SPOTS MAY BE USED ON TUBULAR CAPACITORS; CHARACTERISTIC SPOT IS LARGER AND MIL IDENTIFIER IS ON SIDE DIAMETRICALLY OPPOSITE COLOR SPOTS.
2. MIL IDENTIFIER OF DISK TYPE IS ON REVERSE SIDE; CHARACTERISTIC SPOT IS LARGER OR SPACE BETWEEN CHARACTERISTIC AND TOLERANCE SPOTS IS THREE TIMES SPACE BETWEEN ADJACENT SPOTS.
3. TOLERANCE: YELLOW, +100%, -20%.

CERAMIC-GENERAL PURPOSE (CK)

CAPACITOR COLOR CODE

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

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

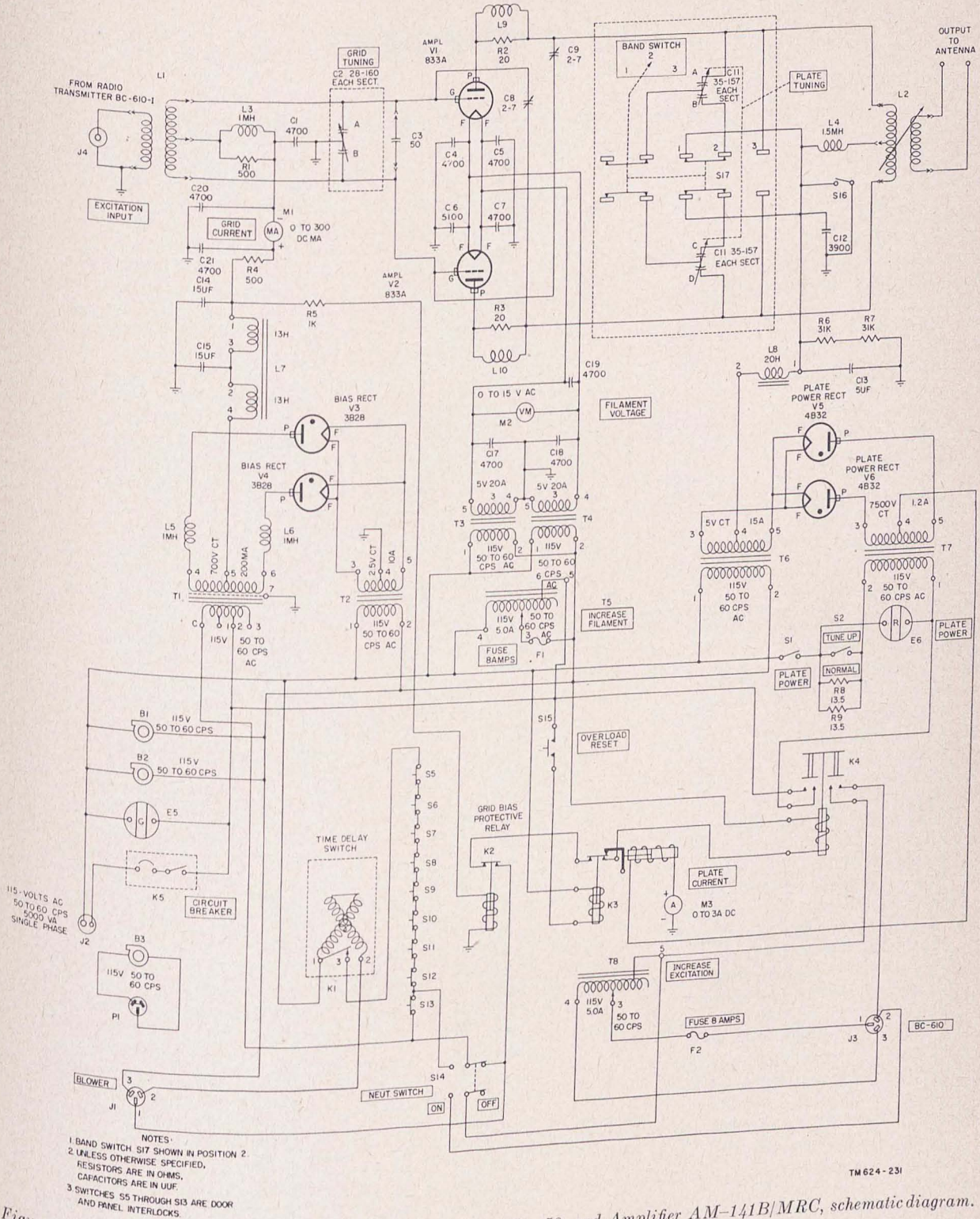
STD-CI

Figure 92. MIL-STD capacitor color code.

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

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

g. Destroy. Destroy everything.



NOTES:
1. BAND SWITCH SI7 SHOWN IN POSITION 2.
2. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
3. SWITCHES S5 THROUGH S13 ARE DOOR AND PANEL INTERLOCKS.

Figure 93. Amplifier AM–141A/MRC, on Order No. 19624–Phila–50, and Amplifier AM–141B/MRC, schematic diagram.

358551—55——13

APPENDIX

TABLE OF COMPONENTS

a. Transmitting Shelter.

Note. Column C refers to Radio Set AN/MRC–2C; column D to Radio Set AN/MRC–2D.

Component	No.	C	D	Height (in.)	Width (in.)	Depth (in.)	Weight
Adapter M–359	2	(*)	(*)				
Air Duct MX–665/MRC	1	(*)	(*)				
Amplifier AM–141(*)/MRC	1	(*)	(*)				
Antenna Tuning Unit BC–939–B	1	(*)					
Bench	1		(*)				
Box BX–19 containing	1	(*)					
Fuse FU–21A, 10 amp	4	(*)					
Fuse FU–27, 2 amp	3	(*)					
Lamp LM–27	2	(*)					
Tube, type 6C5	1	(*)					
Tube, type 6F6	1	(*)					
Tube, type 6K7	1	(*)					
Tube, type 6L7	1	(*)					
Tube, type 6R7GT	1	(*)					
Tube, type 5Y3GT	1	(*)					
Cabinet CY–1213/U	1		(*)				
Capacitor, vacuum, 12 μμf	1	(*)					
Capacitor, vacuum, 55 μμf	1	(*)					
Carrying bar for Amplifier AM–141(*)/MRC	1	(*)	(*)				
Canopy CW–153/U	1	(*)	(*)	5	64	3. 5	
Case CY–495/MRC–2	1		(*)				
Case CY–520/MRC–2 containing [a]	1	(*)	(*)	34	18	12	
Antenna Kit MX–852/MRC–2	1	(*)	(*)				
Connectors, solderless	30	(*)	(*)				
Cord CG–145A/MRC–1	1	(*)	(*)		1,200 lg		
Insulator, steatite 6⅛"	14	(*)	(*)				
Measuring tape	1	(*)	(*)		1,200 lg		
Reel DR–8–A	1	(*)	(*)				
Technical Bulletin 11–300–3	2	(*)					
Technical Manual TM 11–257	2	(*)	(*)				
Technical Manual TM 11–300	2	(*)					
Technical Manual TM 11–333	2	(*)	(*)				
Technical Manual TM 11–624A	2	(*)	(*)				
Technical Manual TM 11–826	2	(*)	(*)				
Technical Manual TM 11–850	2	(*)					
Technical Manual TM 11–854	2		(*)				
Technical Manual TM 11–904	2	(*)	(*)				
Technical Manual TM 11–957A	2	(*)	(*)				
Technical Manual TM 11–962E	2	(*)					
Technical Manual TM 11–2620A	2	(*)	(*)				
Technical Manual TM 11–5054	2	(*)	(*)				
Wire W–128 on Reel DR–8–A		(*)	(*)		12,000 lg		
Case CY–521/MRC–2 containing	1	(*)	(*)	32. 75	56. 5	12. 75	
Capacitor, vacuum, 55 μμf	1	(*)	(*)				
Carbon protector blocks	6	(*)	(*)				
Connector MX–195/U	1	(*)	(*)				
Connector UG–87/U	1	(*)	(*)				
Cord #7 AWG braid	2	(*)	(*)				

[a] Case CY–520/MRC–2 is stored in the operating shelter during shipment (fig. 90).

a. Transmitting Shelter—Continued

Component	No.	C	D	Height (in.)	Width (in.)	Depth (in.)	Weight
Case CY–521/MRC–2 containing—Continued							
Frequency Meter BC–221–(*)	1	(*)					
Fuse FU–50, 3 amp	20	(*)	(*)				
Fuse, 1.5 amp, Slo–Blo	5	(*)	(*)				
Inductor, plate coil (2–2.6 mc)	2	(*)	(*)				
Inductor, plate coil (2.6–3.6 mc)	2	(*)	(*)				
Inductor, plate coil (3.6–5.0 mc)	2	(*)	(*)				
Inductor, plate coil (5.0–7.0 mc)	2	(*)	(*)				
Inductor, plate coil (7.0–9.0 mc)	2	(*)	(*)				
Inductor, plate coil (9.0–12.0 mc)	2	(*)	(*)				
Inductor, plate coil (12.0–18.0 mc)	2	(*)	(*)				
Lamp LM–52, 6–8 v	3	(*)	(*)				
Lamp LM–53, 12–16 v	2	(*)	(*)				
Lamp, 2 v, Mazda #48	12	(*)	(*)				
Lamp LM–41, 120 v, 6 w	6	(*)	(*)				
Lamp, glow, NE–51	1	(*)	(*)				
Lamp, glow, NE–45	2	(*)	(*)				
Light, indicator type WN–98	2	(*)	(*)				
Rectifier RA–133–(*)	1	(*)					
Tool, neutralizing type WN–99	1	(*)	(*)				
Tube, type OC3/VR–105	4	(*)	(*)				
Tube, type 5R4GWA	2	(*)	(*)				
Tube, type 6AG7	2	(*)	(*)				
Tube, type 6AL5	2	(*)	(*)				
Tube, type 6E5	2	(*)	(*)				
Tube, type 6SA7GTY	2	(*)	(*)				
Tube, type 6SJ7Y	3	(*)	(*)				
Tube, type 833A	2	(*)	(*)				
Tube, type 4B32	2	(*)	(*)				
Chair, metal, operator's	2	(*)	(*)				
Chest CH–88–C containing	1	(*)	(*)	18. 25	56.5	12. 75	
Coil, grid (2.0–3.5 mc)	1	(*)	(*)				
Coil, grid (3.5–4.5 mc)	1	(*)	(*)				
Coil, grid (4.5–5.7 mc)	1	(*)	(*)				
Coil, grid (5.7–7.2 mc)	1	(*)	(*)				
Coil, grid (7.2–11.0 mc)	1	(*)	(*)				
Coil, grid (11.0–12.6 mc)	1	(*)	(*)				
Coil, grid (12.6–18 mc)	1	(*)	(*)				
Coil Unit C–387–D	2	(*)	(*)				
Coil Unit C–388–C	2	(*)	(*)				
Coil Unit C–389–C	2	(*)	(*)				
Coil Unit C–390–C	2	(*)	(*)				
Coil Unit C–447–B	2	(*)	(*)				
Coil Unit C–448–B	2	(*)	(*)				
Coil Unit C–449–B	2	(*)	(*)				
Fuse, cartridge, 6 amp, 250 v	6	(*)	(*)				
Fuse, plug, 20 amp, 125 v	6	(*)	(*)				
Fuse, plug, 25 amp, 125 v	12	(*)	(*)				
Lamp LM–27, GE #44	2	(*)	(*)				
Transmitter Tuning Unit TU–47	3	(*)	(*)				
Transmitter Tuning Unit TU–48	3	(*)	(*)				
Transmitter Tuning Unit TU–49	3	(*)	(*)				
Transmitter Tuning Unit TU–50	3	(*)	(*)				
Transmitter Tuning Unit TU–51	3	(*)	(*)				
Transmitter Tuning Unit TU–52	3	(*)	(*)				
Transmitter Tuning Unit TU–53	3	(*)	(*)				
Transmitter Tuning Unit TU–54	3	(*)	(*)				
Tube, type 3B28	2	(*)	(*)				

a. Transmitting Shelter—Continued

Component	No.	C	D	Height (in.)	Width (in.)	Depth (in.)	Weight
Chest CH–89–B containing	1	(*)		14. 75	78	19	
Adapter, RF, UG–27B/U	1	(*)	(*)				
Anti-corona ball	2	(*)	(*)				
Assembly, lead and clamp	3	(*)					
Axle RL–27–B	1	(*)	(*)				
Bench brush	1	(*)	(*)				
Bumper bracket	1	(*)	(*)				
Flashlight TL–122–D	1	(*)	(*)				
Hammer TL–39	1	(*)	(*)				
Hydrometer HY–2	1	(*)					
Knife TL–29	1	(*)	(*)				
Kit of miscellaneous hardware	1	(*)	(*)				
Lamp, 12 v, 50 w	2	(*)					
Lamp, trouble, 12 v	1	(*)					
Lamp, trouble, 115 v, w/25′ cord	2	(*)	(*)				
Lamp, 50w, 115 v, rough service	8	(*)	(*)				
Mast Base AB–15/GR	1	(*)	(*)				
Mast Base Bracket MP–50–A	1	(*)	(*)				
Mast Section MS–49	2	(*)					
Mast Section MS–50	2	(*)					
Mast Section MS–51	2	(*)					
Mast Section MS–52	2	(*)					
Mast Section MS–53	2	(*)					
Mast Section MS–54	2	(*)					
Mast Section MS–116–A	2	(*)	(*)				
Mast Section MS–117–A	2	(*)	(*)				
Mast Section MS–118–A	2	(*)	(*)				
Multimeter TS–297/U	1	(*)	(*)				
Oil (PL Special), 4 oz	1	(*)	(*)				
Pliers TL–103	1	(*)	(*)				
Pliers TL–370/U	2	(*)	(*)				
Relay tool kit	1	(*)	(*)				
Rope RP–5		(*)	(*)		600 lg		
Screw Driver (Stanley #121)	2	(*)	(*)				
Screw Driver TL–21	1	(*)	(*)				
Screw Driver TL–359/U	1	(*)	(*)				
Solder, 1 lb	1	(*)	(*)				
Soldering Iron TL–120	1	(*)	(*)				
Speaking tube assembly	1	(*)	(*)				
Strap, battery lift	1	(*)					
Strap ST–19–A	3	(*)					
Tape TL–83 (friction)	[1] 3	(*)	(*)				
Tape TL–192 (rubber)	[1] 1	(*)	(*)				
Torch TL–130	1	(*)	(*)				
Tube, type OD3/VR–150	1	(*)	(*)				
Tube, type 2A3	2	(*)	(*)				
Tube, type 5Z3	2	(*)	(*)				
Tube, type 6J5	1	(*)	(*)				
Tube, type 6L6Y	1	(*)	(*)				
Tube, type 6SN7GT	1	(*)	(*)				
Tube, type 6SQ7	1	(*)	(*)				
Tube 6SR7	1	(*)	(*)				
Tube, type 6V6	1	(*)	(*)				
Tube, type 80	1	(*)	(*)				
Tube, type 807	2	(*)	(*)				
Tube, type 100TH	2	(*)	(*)				
Tube, type 250TH	1	(*)	(*)				

[1] Roll.

a. Transmitting Shelter—Continued

Component	No.	C	D	Height (in.)	Width (in.)	Depth (in.)	Weight
Chest CH–89–B containing—Continued							
Tube, type 3B28	2	(*)	(*)				
Wrench, double-end, box	1	(*)	(*)				
Wrench, 8″ adjustable	1	(*)	(*)				
Wrench, #6 Allen	2	(*)	(*)				
Wrench, #8 Allen	2	(*)	(*)				
Wrench, #10 Allen cap screw	2	(*)	(*)				
Wrench, ½″ Allen	2	(*)	(*)				
Chair, metal, operator's	1	(*)	------	11. 75	25.5	9. 25	
Chest CH–109–A containing	2	(*)	------				
Battery BB–221/U, 6v	1	(*)	------				
Chest CH–120–B	1	(*)	(*)				
Chest CH–112 containing	2	(*)	(*)		100 lg		
Cord CO–316	1	(*)	(*)		1,200 lg		
Cord CO–313	3	(*)	(*)				
Tube, flexible nozzle	1	(*)	(*)				
Clock	1	(*)	(*)				
Cord CD–201–A	1	(*)	(*)				
Cord CD–318–A	1	(*)	------				
Cord CD–565	1	(*)	(*)				
Cord CD–605	1	(*)	(*)		1,200 lg		
Cord CD–652	1	(*)	------		126 lg		
Cord CD–659	1	(*)	(*)		156 lg		
Cord CD–763	1	(*)	(*)		180 lg		
Cord CD–764	1	(*)	(*)		120 lg		
Cord CD–1019	1	(*)	(*)		48 lg		
Cord CD–1251	1	------	(*)				
Cord CG–67/MRQ–2	1	(*)	(*)		48 lg		
Cord CG–65A/MRC–1	1	(*)	(*)		72 lg		
Cord CG–389A/U	1	(*)	(*)		36 lg		
Cord CG–390A/U	1	(*)	(*)				
Cord CO–335	1	(*)	------				
Cord, power, lamp housing	1	(*)	(*)				
Cord CX–135/MRC–1	1	(*)	(*)				
Cord CX–141/MRQ–2	1	(*)	(*)				
Cord CX–142/MRQ–2	1	(*)	------				
Cord CX–143/MRQ–2	1	(*)	(*)		72 lg		
Cord CX–911/U	1	(*)	(*)				
Cord CX–961/TRA–7 (red)	1	(*)	(*)				
Cord CX–961/TRA–7 (blue)	1	(*)	(*)				
Cord CX–962/TRA–7	1	(*)	(*)		144 lg		
Cord CX–1165/U	1	(*)	(*)		1,200 lg		
Cord CX–1166/U	1	------	(*)				
Cord CX–2152/U	1	------	(*)				
Cord CX–2155/U	1	(*)	------				
Electrical Lead CX–2141/U	1	(*)	(*)				
Fire extinguisher	1	(*)	(*)	14. 25	19	16. 75	
Frame FM–59 for Reels DR–4	1	(*)	(*)				
Frequency Shift Exciter 0–39(*)/TRA–7	2	(*)	(*)				
Fuse, cartridge, 8 amp	5	(*)	(*)				
Fuse, 1.6 amp, 250 v	1	------	(*)				
Gage TL–560/U	2	(*)	(*)	72			
Ground Rod GP–26	2	(*)	(*)				
Headset HS–30–U	1	(*)	(*)				
Heater, electric	1	------	(*)				
Holder, mast sections	1	(*)	(*)				
Junction Box JB–70–(*)	1	(*)	(*)				
Junction Box J–199/MRC–2							

a. Transmitting Shelter—Continued

Component	No.	C	D	Height (in.)	Width (in.)	Depth (in.)	Weight
Junction Box J–207/MRC–2	1	(*)	(*)				
Key J–37	1	(*)	(*)				
Lamp housing assembly	5	(*)	(*)				
Loudspeaker LS–3	1	(*)					
Microphone T–17–D	1	(*)	(*)				
Microphone T–45	1	(*)	(*)				
Microphone T–50	1	(*)	(*)				
Operating bench	1		(*)				
Padlock H–700	1	(*)	(*)				
Pick-Up Antenna AT–137/MRC–2	1	(*)					
Power Supply PP–886/G	1		(*)				
Radio Receiver BC–312–(*)	1	(*)		10	18	9	58
Radio Receiver R–388/URR	1		(*)				
Radio Transmitter BC–610–I w/two tuning chart sets.	1	(*)	(*)				400
Rectifier RA–63–E	1	(*)					
Rope RP–5		(*)	(*)		600 lg		
Shelter HO–17–(*)	1	(*)	(*)	66. 5	138	74. 6	
Skid Equipment MX–157/U	1	(*)	(*)				
Speech Amplifier BC–614–I	1	(*)	(*)				
Telephone EE–8–B	1	(*)	(*)				
Tool case	1		(*)				
Tube Puller TL–201	1		(*)				
Tube, type OA2	1		(*)				
Tube, type 5V4G	1		(*)				
Tube, type 6AK5	1		(*)				
Tube, type 6AQ5	1		(*)				
Tube, type 6BA6	1		(*)				
Tube, type 6BE6	1		(*)				
Tube, type 12AU7	1		(*)				
Tube, type 12AX7	1		(*)				
Typewriter MX–322/U	1	(*)	(*)				
Wire W–110–B or WD–1/TT on Reels DR–4	2	(*)	(*)				

b. Receiving Shelter.

Component	No.	Height (in.)	Width (in.)	Depth (in.)	Weight
Adapter M–359 (modified)	1				
Blower	1				
Broom, floor	1				
Cabinet CY–1214/U	1				
Cabinet CY–1213/U	1				
Case CY–517/MRC–2 containing:	2				
Reel DR–5 with RF Cable Assembly CG–557/U	2		6,000 lg		
Cabinet CY–493/MRC–2 containing:	1	60	24.69	24. 69	
Adapter M–359 (modified)	3				
Burnisher TL–557/U	1				
Burnisher (WECo 265C)	6				
Burnisher (WECo 266C)	6				
Carbon protector blocks	6				
Canopy CW–153/U	1	5	64	3. 5	
Clip board	1				
Clip, chart (WECo #5B)	3				

b. Receiving Shelter—Continued

Component	No.	Height (in.)	Width (in.)	Depth (in.)	Weight
Cabinet CY–493/MRC–2 containing—Continued					
Clip, paper, small	[1] 2				
Clip, paper, large	[1] 2				
Cloth, textile (cheese) 36 inch wide	6				
Cord, #7 AWG braid	2		120 lg		
Cord CD–605	3				
Cord CX–918/MRC–2	1				
Eraser, typewriter, w/brush	6				
Fuse, 1/8 amp, type 3AG	6				
Fuse, 1.6 amp, plug type	6				
Fuse, FU–37, 3 amp	30				
Fuse, cartridge, FU–64, 1 amp	10				
Headset HS–30–U	3				
Key J–45, w/Cord CD–201–A	1				
Knife TL–29	1				
Lamp LM–52, 6 v	7				
Lamp, 120 v, 50 watt	7				
Lamp, trouble, w/25 ft cord	1				
Mast Base MP–65–A	1				
Mast Base Bracket MP–50–A	1				
Mucilage, 4 oz	2				
Multimeter TS–297/U	1				
Oil, machine, 4 oz	2				
Paper, teletypewriter	39				
Paper, teletypewriter (multicopy)	39				
Pencil M–139, indelible	12				
Pencil M–140, #2 lead	24				
Pliers TL–103	1				
Pliers TL–370/U	1				
Plugs PL–258	2				
Plugs PL–259	4				
Relay tool kit, w/box	1				
Ribbon, typewriter	1				
Ring, holder for six thickness gages (.008, .010, .013, .015, .017, and .047).	1				
Screw Driver TL–21	1				
Screw Driver TL–359/U	1				
Solder M–31, 1 lb	1				
Soldering Iron TL–120	1				
Spring Tension Gauge TL–560/U	1				
Tape, teletypewriter, blank recording	[2] 120				
Tape TL–83, friction	[2] 2				
Tape TL–192, rubber	[2] 2				
Tape, measuring, 100 ft	1				
Technical Manual 11–261	1				
Technical Manual 11–333	1				
Technical Manual 11–854	1				
Technical Manual 11–2234	1				
Technical Manual 11–624A	2				
Tube OD3/VR–150	2				
Tube OA2	1				
Tube 5R4WGA	2				
Tube 5V4G	1				
Tube 5Y3GT/G	4				
Tube 6AK5	1				
Tube 6AQ5	1				
Tube 6BA6	1				

[1] Boxes.
[2] Rolls.

b. Receiving Shelter—Continued

Component	No.	Height (in.)	Width (in.)	Depth (in.)	Weight
Cabinet CY–493/MRD–2 containing—Continued					
Tube 6BE6	1				
Tube 6H6	4				
Tube 6SA7GT	4				
Tube 6SJ7Y	8				
Tube 6SL7GT	6				
Tube 6SQ7	2				
Tube 6Y6G	2				
Tube 12AU7	1				
Tube 12AX7	1				
Chairs, wood, folding	2				
Chairs, metal	2				
Circuit breaker	1				
Clock	1				
Cord CD–132	1				
Cord CD–1251	1		48 lg		
Cord CX–952/TRA–7 (red)	1				
Cord CX–953/TRA–7 (blue)	1				
Cord CX–954/TRA–7	1		72 lg		
Dual Diversity Converter	1	21	19	17. 5	
CV–31D/TRA–7 consisting of:					
Oscillator O–41A/TRA–7	1				
Rectifier Power Unit PP–193A/TRA–7	1				
Alignment tool					
Allen wrench #6					
Allen wrench #8					
Electrical Lead CX–2141/U	1				
Electrical Power Cable Assembly CX–1939/U	2				
Electrical Special Purpose Cable Assembly CX–1851/U	2				
Fire extinguisher	1				
Ground Rod GP–26	1	72			
Heater, electric	1				
Key J–37	1				
Loudspeaker LS–3 (2 in. Cabinet CY–1214/U)	3				
Mast AB–155A/U consisting of:	1				
Carrying device MX–387/GRA–4	1				
Cover CW–124/GRA–4	1				
Guy Fastener MX–379/U	4				
Guy Plate MX–378/U	3				
Guy MX–381/GRA–4	4				
Guy MX–382/GRA–4	4				
Guy MX–383/GRA–4	4				
Halyard MX–516/GRA–4	1				
Hammer HM–1	1				
Mast Base AB–154/U	1				
Mast Section MS–44	8				
Stake GP–101/U	6				
Stake, hickory	4				
Mast Section MS–116–A	6				
Mast Section MS–117–A	2				
Mast Section MS–118–A	2				
Operating Table FN–23/MRC–2	1				
Padlock H–700	1				
Power Cable Assembly CX–1165/U	1		600 lg		
Radio Receiver R–388/URR	3				
Reel RL–31–C	1				
RF Cable Assembly CG–562/U	2				
Shelter HO–17–(*)	1	66. 5	138	74. 6	

b. Receiving Shelter—Continued

Component	No.	Height (in.)	Width (in.)	Depth (in.)	Weight
Special Purpose Cable Assembly CX–1200/U	1				
Special Purpose Cable Assembly CX–1201/U	1				
Telephone EE–8–B	1				
Teletypewriter TT–4A/TG	1				
Tuning Fork, Kleinschmidt #TT–2–7–0–18	1				
Waste basket (fiber)	1				
Wire W–110–B or WD–1/TT on Reels DR–4	2				

c. Operating Shelter.

Component	No.	Height (in.)	Width (in.)	Depth (in.)	Weight
Antenna Support AB–38B/CR	4				
Broom, floor	1				
Bracket, metal, for Telephone EE–8–B	2				
Cabinet CY–494/MRC–2 containing	1	30. 5	15	13. 75	
Brush, bench	1				
Carbon protector blocks	14				
Cheesecloth, 36″ wide	6		108 lg		
Clip, chart (WECo #5)	3				
Clip board	1	12. 5	9	. 25	
Cord, #7AWG, wire braid	2		120 lg		
Cord CD–338	2		240 lg		
Cord CC–66	6		18 lg		
Cord CC–68	2		72 lg		
Erasers, typewriter	6				
Fuse FU–50, 3 amp	20				
Fuse, cartridge, 15 amp, 250 v	5				
Fuse, cartridge, ½ amp. 250 v	5				
Fuse, cartridge, ⅛ amp	6				
Fuse, cartridge, 1.6 amp, 125 v	6				
Fuse, plug, 1.6 amp, 125 v	12				
Lamp LM–52, Mazda #47	4				
Lamp 120 v, 15 w, GE #1577	3				
Lamp 120 v, 50 w, rough service	6				
Lamp, trouble w/25 foot cord	1				
Mucilage, 4 oz bottle	2				
Oil (PL Special), 4 oz cans	2				
Paper, bond, white	[1] 5				
Paper clips, small	[2] 2				
Paper clips, large	[2] 2				
Paper, tape, 11/16″ wide	40				
Pencils M–139, indelible	12				
Pencils M–140, #2 lead	36				
Plug, tri-prong, Hubbell #207	1				
Ribbon, typewriter	2				
Solder M–31, 1 lb roll	1				
Tape TL–83, friction	2				
Tape TL–192, rubber	2				
Technical Manual TM 11–262	2				
Technical Manual TM 11–333	2				
Technical Manual TM 11–624A	2				
Technical Manual TM 11–957A w/supplement	2				
Technical Manual TM 11–2201 w/C 1 and two supplements	2				
Technical Manual TM 11–2222 w/C 1	2				

[1] Reams. [2] Boxes.

c. Operating Shelter—Continued

Component	No.	Height (in.)	Width (in.)	Depth (in.)	Weight
Cabinet CY–494/MRC–2 containing—Continued					
Technical Manual TM 11–2223 w/C 1	2				
Technical Manual TM 11–2234	2				
Tool roll for teletypewriter TT–4A/TG	1				
Tube, type OC3/VR–105	2				
Tube, type OD3/VR–150	2				
Tube, type 5R4GWA	2				
Tube, type 6H6	2				
Tube, type 6SJ7Y	3				
Tube, type 6SL7GT	4				
Tube, type 6V6GTY	4				
Tube, type 6X5GT	4				
Tube, type 6Y6G	4				
Tuning fork, 90 cps	1				
Wire, hookup, #18 AWG stranded	[3] 1		600 lg		
Wire W–11, 2 conductor #12	[3] 1		300 lg		
Canopy CW–153/U	1	5	64	3. 5	
Case CY–495/MRC–2	1	8. 5	33. 5	10. 25	
Case CY–496/MRC–2	1	22	17	18	
Chairs, metal	2				
Chairs, wood, folding	2				
Circuit breaker	1				
Control Unit C–292B/TRA–7	1	12	21	17	
Cord CX–918/MRC–2	1				
Cord CX–956/TRA–7	1				
Cord CX–957/TRA–7	1				
Cord CX–958/TRA–7	1				
Cord CX–959/TRA–7	1				
Cover BG–198	1				
Cover BG–199	1				
Cover BG–200	1				
Fire extinguisher	1				
Frame FM–59 for Reels DR–4	1	14. 4	13. 5	5. 75	
Ground Rod GP–26	1	72			
Heater, electric	1				
Junction Box J–204/MRC–2	1				
Operating Table FN–22/MRC–2	1				
Padlock H–700	1				
Paper, teletypewriter	[4] 9				
Perforator-Transmitter TT–56/MGC	1				
Power Cable Assembly CX–1165/U	1		144 lg		
Rectifier RA–87–A	1				
Shelter HO–17–(*)	1	66. 5	138	74. 6	
Skid Equipment MX–157/U	1				
Special Purpose Cable Assembly CX–1200/U	2				
Special Purpose Cable Assembly CX–1201/U	2				
Telephone EE–8–B	2	10. 25	8	4. 25	
Teletypewriter TT–4A/TG	2	19	11. 25	22. 5	43. 25
Time Stamp MC–181	1				
Waste basket	1				
Wire W–110–B or WD–1/TT on Reels DR–4	2				
Wrench, Allen #8	1				

[3] Roll.
[4] Rolls.

Note. The list in this appendix is for general information only. See appropriate supply publications for information pertaining to requisition of spare parts.

INDEX

[AG 413.44 (22 Jul 55)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

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Armies (5)
Corps (2)
Tng Div (2)
Ft & Cp (2)
Gen & Br Svc Sch (5) except Sig Sch (25)
Gen Depots (2) except Atlanta Gen Depot (None)
Sig Sec, Gen Depots (10)
Sig Depots (20)
POE (2)
OS Sup Agencies (2)
Sig Fld Maint Shops (3)
Sig Lab (5)
Mil Dist (1)
Units organized under following TOE's:
11–7R, Sig Co Inf Div (2)
11–16R, Hq & Hq Co, Sig Bn, Corps or Abn Corps (2)
11–57R, Armd Sig Co (2)
11–95R, Sig Opr Bn (2)
11–98R, Rad Opr Co (2)
11–127R, Sig Rep Co (2)
11–128R, Sig Depot Co (2)
11–500R (AA–AE), Sig Svc Org (2)
11–557R, Abn Sig Co (2)
11–587R, Sig Base Maint Co (2)
11–592R, Hq & Hq Co, Sig Base Depot (2)
11–597R, Sig Base Depot Co (2)

NG: State AG (6); units—same as Active Army except allowance is one copy to each unit.
USAR: None.
For explanation of abbreviations used, see SR 320–50–1.

U. S. GOVERNMENT PRINTING OFFICE: 1955

RADIO SETS AN/MRC-2C AND AN/MRC-2D

TM 11-624A
TO 31R2-2MRC2-11
CHANGES No. 1

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON 25, D. C., *13 July 1956*

TM 11-624A/TO 31R2-2MRC2-11, 15 September 1955, is changed as follows:

The following information changes TM-11-624A/TO 31R2-2MRC2-11 so that the manual also applies to the following equipments.

Nomenclature	*Order No.*	*Serial No.*
Amplifier AM-141A/MRC	21751-Phila-56	1 through 54

Page 93, paragraph 77*a* (5). Line 1. Change "OFF" to read: **MVC.**

Page 139, section III.

Note. (Added) The amplifier procured on Order No. 21751-Phila-56 is similar to Amplifier AM/141(*)/MRC covered in the manual. Information in the technical manual applies to all Amplifiers AM/141(*)/MRC unless otherwise specified.

Page 139, paragraph 119*b*. Add the following after the last sentence:

Capacitors C20 and C21 are not used on amplifiers bearing Order No. 21751-Phila-56.

Page 140, paragraph 119*f*. Add the following after the last sentence:

Capacitor C19 is not used on amplifiers bearing Order No. 21751-Phila-56.

Page 141, figure 72. Add the following to the "NOTES":

3. C19, C20 AND C21 ARE NOT USED ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.
4. C4, C5, C6 AND C7 ARE 5100 MMF ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

Page 142, figure 73. Change "NOTE" to read: **NOTES.** Designate the existing note as **1.**

2. (Added) C20 AND C21 NOT USED ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

Page 169, figure 86. Add the following note:

THIS DOES NOT APPLY TO AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

Page 177, figure 93. Add the following to the "NOTES" in figure 93.

4. C19, C20 AND C21 NOT USED ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.
5. C1, C4, C5, C6 AND C7 ARE 5,100 MMF ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.
6. C17 AND C18 ARE 10,000 MMF ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

TAGO 288A—July 400465°—56

[AG 413.44 (9 Jul 56)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

OFFICIAL:

JOHN A. KLEIN,
Major General, United States Army,
The Adjutant General.

N. F. TWINING,
Chief of Staff, United States Air Force.

OFFICIAL:

E. E. TORO,
Colonel, United States Air Force,
Air Adjutant General.

DISTRIBUTION:

Active Army:

CNGB (1)
ASA (3)
Tec Svc, DA (1) except CSIGO (30)
Tec Svc Bd (1)
Hq CONARC (5)
CONARC Bd (Incl ea Test Sec) (1)
Army AA Comd (2)
OS Maj Comd (5)
OS Base Comd (5)
Log Comd (5)
MDW (1)
Armies (5)
Corps (2)
Ft & Cp (2)
Army Cml Cen (4)
Gen & Br Svc Sch (5) except Sig Sch (25)
Gen Depots (2) except Atlanta Gen Depot (None)
Sig Sec, Gen Depots (10)
Sig Depots (17)
US Army Trng Cen (2)
Trans Terminal Comd (2)
Army Terminals (2)
POE (OS) (2)
OS Sup Agencies (2)
Sp Wpn Comd (2)
Sig Fld Maint Shops (3)
Sig Lab (5)
Army Elct PG (1)
Mil Dist (1)
ACS (3)
Units organized under following TOE's:
11-7C (2)
11-16C (2)
11-57C (2)
11-95R (2)
11-98R (2)
11-127R (2)
11-128R (2)
11-500R (AA-AE) (2)
11-557C (2)
11-587R (2)
11-592R (2)
11-597R (2)

NG: State AG (6); units—same as Active Army except allowance is one copy per unit.
USAR: None.
For explanation of abbreviations used, see SR 320-50-1

TAGO 288A

U. S. GOVERNMENT PRINTING OFFICE: 1956

RADIO SETS AN/MRC-2C AND AN/MRC-2D

TM 11-624A
TO 31R2-2MRC2-11
CHANGES No. 2

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D.C., *20 September 1961*

TM 11-624A, 15 September 1955, is changed as follows:

Page 5, paragraph 3. Add the following subparagraph:

g. Any comments concerning omissions and discrepancies in appendix II and appendix III will be prepared on DA Form 2028 and forwarded direct to Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N.J.

The following information changes (as changed by C1, 13 Jul 56) TM-11-624A/TO 31R2-2MRC2-11 so that the manual also applies to the following equipments.

Nomenclature	*Order No.*	*Serial No.*
Amplifier AM-141A/MRC	21751-Phila-56	1 through 54

Page 93, paragraph 77*a* (5). Line 1. (As changed by C1, 13 Jul 56) Change "OFF" to read: **MVC.**

Page 139, section III

Note. (Added by C1, 13 Jul 56) The amplifier procured on Order No. 21751-Phila-56 is similar to Amplifier AM/141(*)/MRC covered in the manual. Information in the technical manual applies to all Amplifiers AM/141(*)/MRC unless otherwise specified.

Page 139, paragraph 119*b.* (Added by C1, 13 Jul 56) Add the following after the last sentence:

Capacitors C20 and C21 are not used on amplifiers bearing Order No. 21751-Phila-56.

Page 140, paragraph 119*f.* (Added by C1, 13 Jul 56) Add the following after the last sentence:

Capacitor C19 is not used on amplifiers bearing Order No. 21751-Phila-56.

Page 141, figure 72. (Added by C1, 13 Jul 56) Add the following to the "NOTES":

3. C19, C20 AND C21 ARE NOT USED ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.
4. C4, C5, C6 AND C7 ARE 5100 MMF ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

Page 142, figure 73. (As changed by C1, 13 Jul 56) Change "NOTE" to read: **NOTES.** Designate the existing note as **1.**

2. (Added by C1, 13 Jul 56) C20 AND C21 NOT USED ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

Page 169, figure 86. (Added by C1, 13 Jul 56) Add the following note:

THIS DOES NOT APPLY TO AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

Page 177, figure 93. (Added by C1, 13 Jul 56) Add the following to the "NOTES" in figure 93.

4. C19, C20 AND C21 NOT USED ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.
5. C1, C4, C5, C6 AND C7 ARE 5,100 MMF ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.
6. C17 AND C18 ARE 10,000 MMF ON AMPLIFIERS BEARING ORDER NO. 21751-PHILA-56.

Page 178. Designate the present appendix as appendix I and add the following:

*These changes supersede C 1, 13 July 1956.

APPENDIX II

MAINTENANCE ALLOCATION
RADIO SET AN/MRC-2, -2A, -2B, -2C, -2D

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

(1) *Component.* This column shows only the nomenclature or standard item name. Additional descriptive data is included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and the subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) are listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelons.

(a) Service. To clean, to preserve, and to replenish lubricants.

(b) Adjust. To regulate periodically to prevent malfunction.

(c) Inspect. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(d) Test. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) Replace. To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(f) Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(g) Aline. To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) Overhaul. To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by chiefs of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(j) Rebuild. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X placed in Columns 3 through 7 indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* The dagger (†) symbol in these columns indicates the echelons normally allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
RADIO SET AN/MRC-2, 2A, 2B, 2C, 2D	service		X				1,2	
	adjust		X				1	
				X			2	
	inspect		X					No facilities req'd
	test		X				1,3,12,8	
				X			2,3,4,5,7,9,13, 15,16,18,19,20	
					X		2,3,4,5,6,7,8,10, 13,14,16,18,20,21	
							3,4,5,6,7,8,10, 11,13,14,16,17,20; 21	
	align			X			2,5,7,16	
	rebuild					X		
SHELTER (TRANSMITTING) (FSN5410-392-3702)	replace		X					
	repair		X					
	rebuild					X		
AMPLIFIER, AF: SPEECH AMPLIFIER BC-614E,H,I	replace		X					
AMPLIFIER AM-141/MRC, AM-141A/MRC, AM/141B/MRC	service		X				1,2	
	adjust		X				1	
				X			2	
			X					No facilities required
				X			5,7,13	
					X		5,6,7,13	
	replace		X				1,2	
	repair			X				
	align			X			2,5,7	Plus alignment tool supplied with equipment
	rebuild					X		
ALIGNMENT TOOL TE-113	replace		X					
FAN CENTRIFUGAL	replace			X				
MOTOR, AC	replace			X				
ANTENNA KIT: MX-852/MRC-2	replace		X					
AWNING CANVAS: COVER, CANOPY CW-153/U	replace				X			
BASE, MAST: AB-15/GR	replace				X			See separate MAC
BASE, MAST: MP-47-A	replace			X				
BATTERY: BB-221/U	replace		X					
CHARGER, BATTERY: RECTIFIER POWER UNIT RA-63-E	replace		X					

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/MRC-2, 2A, 2B, 2C, 2D (continued)								
CLOCK, AIRCRAFT: MECHANICAL	replace		X					
FLASHLIGHT MX-991/U	replace	X						
GENERATOR SET, GASOLINE ENGINE PE-95	repair		X					
HEADSET HS-30	replace			X				
HEATER, SPACE, ELECTRIC	replace				X			
HYDROMETER, SYRINGE BATTERY	replace		X					
INTERCONNECTING BOX J-199/MRC-2	service		X				1,2	
	adjust		X				1	
				X			2	
	inspect		X					No facilities req'd
	test			X			5	
	replace			X				
	rebuild					X		
JUNCTION BOX J-207/MRC-2	service		X				1,2	
	adjust		X				1	
				X			2	
	inspect		X					No facilities req'd
	test			X			5	
	replace			X				
	rebuild					X		
JUNCTION BOX JB-70	replace			X				
KEY J-37	replace		X					
LIGHT, EXTENSION	replace		X					
LOUDSPEAKER LS-3	replace			X				
	rebuild					X		
MAST SECTIONS	replace		X					
MICROPHONES (T-50 AND M-52/U)	replace			X				See separate MACS
MOUNTING FT-178	replace		X					
MULTIMETER TS-297/U	replace		X					See separate MAC
OSCILLATOR, RF: FREQUENCY SHIFT EXCITER O-39/TRA-7	replace			X				
POWER SUPPLY PP-886/G	service		X				1,2	
	adjust		X				1	
				X			2	
	inspect		X					No facilities req'd
	test			X			5,13	
					X		5,13,21	
	replace			X				
	rebuild					X		

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/MRC-2, 2A, 2B, 2C, 2D (continued)								
POWER SUPPLY: RECTIFIER POWER UNIT RA-133	replace			X				See separate MAC
RECEIVER, RADIO: RADIO RECEIVER BC-312	replace			X				
RECEIVER, RADIO: RADIO RECEIVER R-388/URR	replace			X				
SHELTER HO-17A, HO-17B	replace					X		
	rebuild					X		
SUPPORT, ANTENNA AB-38B/GR	replace			X				
TELEPHONE EE-8	replace		X					See separate MAC
TRANSMITTER, RADIO: RADIO TRANSMITTER BC-610	replace			X				See separate MAC
TUNER, RF: ANTENNA TUNING UNIT BC-939	replace			X				See separate MAC
SHELTER (OPERATION) FSN5410-356-2279)	replace		X					
	repair		X					
	rebuild					X		
AWNING, CANVAS: COVER, CANOPY, CW-153/U	replace				X			
CLOCK, AIRCRAFT, MECHANICAL	replace		X					
	rebuild					X		
CONTROL, TELEGRAPH LINE: LINE UNIT BE-77A,B,C	replace			X				See separate MAC
CONTROL UNIT C-292B/TRA	replace			X				
GENERATOR SET PE-95	replace		X					
HEATER, SPACE ELECTRIC	replace		X					
JUNCTION BOX J-204/MRC-2	service		X				1,2	
	adjust		X				1,2	
	inspect		X					No facilities req'd
	test			X				
	replace			X				
	rebuild					X		
LIGHT, EXTENSION	replace		X					
PERFORATOR-TRANSMITTER TT-56/MGC	replace			X				See separate MAC
POWER SUPPLY: RECTIFIER RA-87	replace			X				See separate MAC
SHELTER HO-17	replace					X		
	rebuild					X		
TELEPHONE EE-8	replace		X					See separate MAC
TELETYPEWRITER TT-4/TG	replace			X				See separate MAC
TELETYPEWRITER TT-55/MGC	replace			X				
SHELTER (RECEIVER) (FSN5820-537-6942)	replace		X					
	repair		X					
	rebuild					X		
AWNING CANVAS: COVER, CANOPY CW-153/U	replace		X					

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/MRC-2, 2A, 2B, 2C, 2D (continued)								
BASE MAST: MAST BASE MP-65-A	replace				X			
BENCH FN-23/MRC-2	repair				X			
CLOCK, AIRCRAFT, MECHANICAL	replace		X					
	rebuild					X		
CONTROL BOX C-345/MRC-2	replace			X				See separate MAC
CONVERTER, FREQUENCY SHIFT: CONVERTER CV-31/TRA-7	replace			X				
COVER: BG-198	replace		X					
HEADSET HS-30	replace		X					See separate MAC
HEATER, SPACE, ELECTRIC	replace			X				
KEYS, TELEGRAPH: J-37	replace			X				
LIGHT, EXTENSION	replace		X					
LOUDSPEAKER LS-3	replace			X				
MAST AB-155/U	replace		X					See separate MAC
MULTIMETER TS-297/U	replace		X					See separate MAC
OSCILLATOR-AMPLIFIER: O-59/MRC	service		X				1,2	
	adjust		X				1,2	
	inspect		X					No facilities req'd
	test			X			5,9,15	
					X		5,10,21	
	replace		X					
	align			X			2,5,10	
	rebuild					X		

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/MRC-2, 2A, 2B, 2C, 2D (continued)								
POWER UNIT PE-75	replace		X					See separate MAC
RECTIFIER, RADIO: RADIO RECEIVER R-388/URR	replace			X				
RECEIVING SET, RADIO: RADIO RECEIVER ASSEMBLY OA-65/MRC-2	service		X				1,2	
	adjust			X			2	
	inspect		X					No facilities req'd
	test			X			2,5,7,9,15,16	
					X		2,5,6,7,10,14,16, 21	
	replace			X				
	align			X			2,5,7,16	
	rebuild					X		
MOUNTING MT-563/MRC	replace			X				
POWER SUPPLY: RECTIFIER RA-20	replace			X				See separate MAC
SHELTER HO-17	replace					X		
	rebuild					X		
TELEPHONE: EE-8	replace		X					See separate MAC
TELETYPEWRITER TT-55/MGC	replace			X				
TELETYPEWRITER TT-4/TG	replace			X				See separate MAC

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST ECH	(3) 2ND ECH	(4) 3RD ECH	(5) 4TH ECH	(6) 5TH ECH	(7) TOOL CODE	(8) REMARKS
AN/MRC-2, 2A, 2B, 2C, 2D (continued)							
TOOL EQUIPMENT TE-87/U		†					
TOOL EQUIPMENT TE-113/U			†	†	†	2	
TOOL EQUIPMENT TE-50B		†	†	†	†	3	
TOOL EQUIPMENT TE-114			†	†	†	4	
ELECTRONIC MULTIMETER TS-505/U			†	†	†	5	
ANALYZER, SPECTRUM TS-723/U				†	†	6	
AUDIO OSCILLATOR TS-382/U			†	†	†	7	
DISTROTION TEST SET TS-383/GG				†	†	8	
FREQUENCY METER AN/URM-32			†			9	
FREQUENCY METER AN/URM-79				†	†	10	
FREQUENCY METER, AN/USM-26					†	11	
MULTIMETER AN/URM-105		†				12	
MULTIMETER TS-352/U			†	†	†	13	
OSCILLOSCOPE AN/USM-50				†	†	14	
POWER SUPPLY PP-1243/U			†			15	
RF SIGNAL GENERATOR AN/URM-25			†	†	†	16	
TEST SET, ELECTRON TUBE TV-2/U					†	17	
TEST SET, ELECTRON TUBE TV-7/U		†	†	†	†	18	
TEST SET, TELETYPEWRITER TS-2/TG			†			19	
TEST SET, TELETYPEWRITER TS-917/GG			†	†		20	
VOLTMETER, METER ME-30A/U				†	†	21	

APPENDIX III

BASIS ISSUE ITEMS LIST FOR RADIO SET AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D

Section 1. INTRODUCTION

1. Scope

a. This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

b. Columns are as follows:

(1) *Source, Maintenance and recoverability code.* Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* The dagger (†) indicates the model in which the part is used, and further by its position designates the quantity used in each model where the quantity varies.

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(5) *Unit of issue.* The unit of issue is each, unless otherwise indicated, and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items are indicated by NX, expendable items are not annotated.

(7) *Quantity authorized.* Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares and Accessory Items", the quantities listed are those issue initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

(8) *Illustration.* The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

2. Other Service Stock Numbers

Other service items listed herein are authorized in accordance with AR 700–51.

3. Batteries

Dry batteries shown are used with the equipment but are not considered part of the equipment. They will not be preshipped automatically but are to be requisitioned in quantities necessary for the particular organization, in accordance with SB 11–6.

4. References

Additional instructions concerning maintenance of this equipment are contained in:

TM 11–826, Radio Trasmitters BC–610–E, –F, –H, –I, and Radio Transmitter T–213/GRC–26 and Antenna Tunning Units BC–939–A and –B.

TM 11–900, Power Units PE–75–C, –D, –J, –K, –P, –S, –T, –U, –W, –AA, –AB, –AC, and –AE.

Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart:

TM 11–6130–209–12P, Power Supply PP–1499/G (including RA–20, RA–20A, B).

TM 11-3895-201-12P, Axles RL-27-C and RL-27-D.

TM 11-5805-272-12P, Generators GN-38, -38A and -38B.

TM 11-5965-230-12P, Headsets HS-30-A, HS-30-B, HS-30-C, HS-30-D, HS-30-E, HS-30-F, HS-30-G, HS-30-J, HS-30-K, HS-30-L, HS-30-R, and HS-30-U.

TM 11-6625-321-12P, Multimeter TS-297/U.

TM 11-6625-235-12P, Rectifier Power Unit RA-133, RA-133-A-B.

TM 11-5805-200-12P, Telephone EE-8, -8A, -8B, -8C, -8D, and -8E.

TM 11-5820-257-12P, Antenna Tuning Unit BC-939-A,B and Tuner, Radio Frequency TN-339/GR.

TM 11-5985-230-12P, Mast Base AB-15/GR.

Operator's, Organizational, Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart:

TM 11-5965-216-15P, Handset TS-9-F.

TM 11-5965-218-15P, Microphone, Dynamic M-105/U.

Repair Parts and Special Tools List:

TM 11-5965-212-15P, Carbon Microphone M-52/U.

Technical Bulletin:

TB SIG 330, Microphone M-52/U.

Supply Manuals:

SIG 7 & 8 DM-21

SIG 7 & 8 R-388/URR

SIG 7 & 8 O-39/TRA-7

SIG 7 & 8 HO-17-A, B

SIG 7 & 8 BC-312

SIG 7 & 8 AB-38/CR

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL					(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS	
											FIGURE NO	ITEM NO
	5820-193-7118	1	2	3	4	5	RADIO SET AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D: AM and CW Radio Teletype, freq shift; 2 kw with amplr, 40 w CW, 300 w voice without ampr; xmtr 2 to 18 mc; rec 1.5 to 18 mc; power input 115 v, 50-60 cyc; installed in 3 Shelter HO-17		NX		1,1A	
							NOTE: Model Column 1 refers to AN/MRC-2; Column 2 refers to AN/MRC-2A; Column 3 refers to AN/MRC-2B; Column 4 refers to AN/MRC-2C; Column 5 refers to AN/MRC-2D					
							ITEMS COMPRISING AN OPERABLE EQUIPMENT					
	Ord thru AGC	†	†	†			TECHNICAL MANUAL TM 11-624			2		
	Ord thru AGC				†	†	TECHNICAL MANUAL TM 11-624A			2		
	5820-164-7138	†	†	†	†	†	AMPLIFIER AM-141/MRC, AM-141A/MRC, AM-141B/MRC: 2 to 18 mc freq range; 2 kw output; 50 w req for excitation; 115 v ac, 60 cyc single ph; metal case; 44 1/4 in lg x 23 1/2 in wd x 28 in d; rack mtd; moisture and fungus resistant Figure Nos: 8, 9, 140, 141, 144 to 149, 151 to 153, 8A		NX	1	See desc column	
	5410-392-3702	†	†	†	†	†	SHELTER: c/o Shelter HO or HO-17-A or HO-17-B; and components for operation of Radio Set AN/MRC-2, 2A, 2B, 2C and 2D in Transmitting Shelter		NX	1	3,5A, 6A,12A 13A	
	5820-250-6290	†	†	†	†	†	JUNCTION BOX J-199/MRC-2: 10 outlet and binding post type, 1/2 in 0.187 in dia cable entrances; galv steel; black wringkle E finish; rect shape; 7 1/2 in lg x 3 in wd x 3 1/4 in d o/a; B and W dwg No. NS-C-4003		NX	1		
	5820-404-2062			†	†	†	ANTENNA KIT MX-852/MRC-2: rhombic type; for Transmitting; copperweld wire ant; incl mat for 4 legs of ant, transmission line and terminating resistor kit (mast not incl); physical dim vary depending on distance range; fixed; freq range 6-18 mc; open wire transmission line (6 in spacing)		NX	1		
	5820-404-9452	†	†	†	†	†	JUNCTION BOX J-207/MRC-2: 6 outlet, jack and connector types 3/8 in, 1/2 in and 3/4 in dia cable entrances, galv steel; black wrinkle E finish; 7 1/2 in lg x 3 in wd x 3 1/3 in d; Hallicrafters part/dwg No. 41X16520			1		
	5820-548-1686						POWER SUPPLY PP-886/G: selenium type; full wave output dc, 12 v 200 ma at 60 ohm, 12 v, 150 ma at 80 ohm, 12 v, 92 ma at 135 ohm, 12 v, 63 ma at 200 ohm; input ac, 117 v, 60 cyc, single ph; 10 1/4 in lg x 4 1/2 in wd x 5 1/2 in d o/a; filter incl; table mtd, six 0.250 in dia mtg holes, 3 on ea end; on 9 7/8 in x 1 7/8 in mtg/c; Army Spec No. 71-3276		NX	1	9A	
	5410-356-2279	†	†	†	†	†	SHELTER: c/o Shelter HO-17 and components for operation of Radio Set AN/MRC-2, 2A, 2B, 2C and 2D in operating Shelter		NX	1	30	

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5820-537-3617	†	†	†	†	†	JUNCTION BOX J-204/MRC-2: 10 jack type 1/4 in dia cable entrances; galv steel; black wrinkle E finish; rectangular shape; 5 1/2 in lg x 6 in wd x 5.548 in h; B and W part/dwg No. WS-B-4005			1		
	5820-537-6942	†	†	†	†	†	SHELTER: c/o Shelter HO-17 and components for operation of Radio Set AN/MRC-2, 2A, 2B, 2C and 2D in Receiving Shelter		NX	1	23,15A	
	5815-164-7226	†	†	†	†	†	RADIO RECEIVER ASSEMBLY OA-65/MRC-2: F1, F2, F3 type of reception; freq 1.5 to 18 mc, 6 bands; oper power 100/120 v ac, 3 amp, 50-60 cyc single ph; 250 v dc 100 ma, 150 v 20 ma; table mtd; U.S. Army spec 71-3238		NX	1	25,131	
	5815-164-7225	†	†	†	†	†	RADIO RECEIVER ASSEMBLY OA-65A/MRC-2: F1, F2, F3 type of reception; freq 1.5 to 18 mc, 6 bands; oper power 110/120 v ac 3 amp, 50/60 cyc, single ph; 250 v dc 100 ma, 150 v 20 mc; table mtd; for Radio tt com; U.S. Army Spec 71-3238		NX	1		
	5820-194-4978	†		†			OSCILLATOR-AMPLIFIER O-59/MRC, O-59A/MRC: freq range 1.5 to 1.8 mc; approx 0.5 w output; 15 1/4 in lg x 2 7/8 in wd x 1 5/8 in d; intergral coil; receives 6.3 v ac for heaters and 250 v dc for plates; plugs into chassics		NX	1	26	
							SHELTER (FSN 5410-392-3702) C/O SHELTER HO-17 OR HO-17A,B					
	5820-164-7138	†	†				AMPLIFIER AM-141/MRC, AM-141A/MRC, RF: freq range 2 to 18 mc; 23 1/2 in x 28 in x 44 1/4 in o/a; MIL-R-13114		NX	1	8	
	5820-194-8300	†	†	†	†	†	AMPLIFIER, AUDIO FREQUENCY: Speech Amplifier BC-614E, BC-614H, 1; 0.5 w output Sig dwg No. SC-DL-34353		NX	1	4,7A	
	5820-404-2062			†	†	†	ANTENNA KIT MX-852/MRC-2: provides matl to permit fabrication of a transmitting rhombic ant; freq range 6 to 18 mc		NX	1		
	7230-634-4962	†	†	†	†	†	AWNING, CANVAS: weather shield; 4 ft 6 in lg o/a; Sig dwg No. ES-D-41130		NX	1		
	3950-162-1171	†	†	†	†	†	AXLE RL-27B, RL-27-C: hand wire laying and recovering device; Army Spec 71-665-C		NX	1		
	5920-233-3552	†	†	†	†		BALL, CORONA: 5/8 in dia; Hallicrafters dwg No. 77A008			2		
	5985-221-5544			†	†	†	BASE, MAST: Mast Base AB-15/GR; support mast section		NX	1		
	5985-221-5566	†	†	†	†		BASE, MAST: Mast Base MP-47-A; flexible mtg for ant; Sig dwg No. SC-D-11221		NX	1		
	5410-498-8944	†	†	†			BASE, SKID: Skid Equipment MX-157/U; for leading and unloading Shelter HO-17 or or HO-27 from 2 1/2 ton, 6 x 6 std cargo truck		NX	1		
	6140-107-6678	†	†	†	†		BATTERY BB-221/U: Storage, 6 v		NX	2		
	6140-240-2033	†	†	†	†		BATTERY BOX: chest CH-109-A; Sig dwg No. SC-D-19199		NX	1		
	5820-569-0360					†	BENCH FN-56/MRC-2: used as operator's table		NX	1		
	5920-160-4888		†	†	†		BLOCK, TELEPHONE PROTECTOR: lightning prot; carbon block; 1 1/4 in lg x 3/8 in wd x 1/4 in thk o/a; Auto Elec part/dwg No. D-67030			20		

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5210-223-5751	†	†	†	†	†	BLOWTORCH TL-608/U: gasoline; 1 pt cap; with pressure pump		NX	1		
	5820-324-8755			†	†		BRACKET: bumper Kit, holds socket and cord; straight shape; 10 11/16 in lg x 8 11/16 in wd x 2 15/16 in thk; Sig dwg No. SC-D-7402		NX	1		
	5985-404-2718			†	†	†	BRACKET: Mast Base Bracket MP-50-A; ant base support; inverted L shape, approx 65 deg between Mtg surface; Sig dwg No. SC-D-15919		NX	1		
		†	†	†	†	†	BRUSH, CLEANING: oblong; 8 in lg o/a; Dietzgen No. 4211A (Engr Stk No. 38-3706-400-130)		NX	1		
	5975-268-3819	†					CABINET, ELECTRICAL EQUIPMENT: steel; houses Frequency Shift Exciter O-39/TRA-7, 22 1/2 in lg x 16 7/8 in wd x 14 in h; B and W dwg No. WE-D-2002		NX	1		
	5815-503-0945			†	†	†	CABINET, ELECTRICAL EQUIPMENT, CY-1255/G: houses Frequency Shift Excitor O-39/TRA-17		NX	1		
	5995-160-7079	†	†	†	†		CABLE ASSEMBLY, POWER, ELECTRICAL: two No. 18 AWG stranded cond; 4 ft 1 in lg excluding term; Hallicrafters part/dwg No. 87B280 modified		NX	1		
	6150-549-4847				†	†	CABLE ASSEMBLY, POWER, ELECTRICAL: 2 No. 8 AWG strand cond 6 ft 5 in lg; Hallicrafters part/dwg No. 87B1954			1		
	5995-356-0163					†	CABLE ASSEMBLY, POWER, ELECTRICAL: 2 No. 8 AWG stranded cond; 6 ft 7 in lg o/a; Hallicrafters part No. 41A16579			1		
	5995-162-6952	†	†	†	†		CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CD-659; uses Cable type CO-02HGF(2/12)0605 per Spec MIL-C-3432; 10 ft 6 in lg o/a; Sig dwg No. SC-D-76643			1		
	5995-164-7692	†	†	†	†	†	CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CD-763; 2 No. 12 AWG stranded cond; 13 ft lg o/a; Sig dwg No. SC-D-27456			1		
	5995-162-6909	†	†	†	†	†	CABLE ASSEMBLY, POWER ELECTRICAL: Cord CD-1251; Uses Cordage CO-114; 4 ft lg excluding terminations; Sig dwg No. SC-D-13517			1		
	5995-164-6517	†	†	†	†	†	CABLE ASSEMBLY, POWER ELECTRICAL: Cord CX-135/MRC-1; uses Cable Stk No. 1B3006-2.1; 19 ft lg MIL-R-13114			1		
	5995-162-6868	†	†	†	†	†	CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CX-911/U; 3 No. 14 AWG stranded cond; 6 ft lg excluding term; Sig dwg No. SC-C-27399-2			1		
	5995-164-7902	†	†	†	†	†	CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CX-962/TRA-7; 3 No. 18 AWG, stranded cond 4 ft lg; Sig dwg No. SC-C-34601			1		W108
	5995-170-7943			†	†	†	CABLE ASSEMBLY, POWER, ELECTRICAL: Power Cable Assembly CX-1165/U; 2 No. 6 AWG cond; 12 ft lg, excluding term; Sig dwg No. SC-D-22669			1		
	5995-249-5669			†	†	†	CABLE ASSEMBLY, POWER, ELECTRICAL: Power Cable Assembly CX-1166/U; 2 No. 6 AWG stranded cond 100 ft 9 in lg o/a; Sig dwg No. SC-D-22672			1		
	5995-665-5893			†	†		CABLE ASSEMBLY, RADIO FREQUENCY: coax, 72 ohm impedance; No. 12 AWG Copper wire; 29 in lg excluding term; B and W part No. 222, dwg No. WS-D-4152			1		

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5995-188-0422	†	†	†	†	†	CABLE ASSEMBLY RADIO FREQUENCY: Cord CG-65A/MRC-1; uses Radio Frequency RG-11A/U; coax; 75 ohm impedance; 4 ft 2 in lg			1		
	5995-160-5953					†	CABLE ASSEMBLY, RADIO FREQUENCY: Cord CG-67/MRQ-2; uses Radio Frequency RG-11A; 9 ft lg o/a			1		
	5995-253-9677	†	†	†	†	†	CABLE ASSEMBLY, RADIO FREQUENCY: Cord CG-145A/MRC-1; uses RF Cable RG-34A/U; coax, 71 ohm impedance; 100 ft 10 1/2 in lg excluding term			1		
	5995-253-9676					†	CABLE ASSEMBLY, RADIO FREQUENCY: Cord CG-390A/U; uses Radio Frequency RG-58C/U, coax, 50 ohm impedance; 10 ft 4 in lg			1		
	5995-253-9671	†	†	†	†	†	CABLE ASSEMBLY, RADIO FREQUENCY: Cord CG-390A/U; uses RF Cable RG-58C/U; coax; 50 ohm impedance; 36 ft lg o/a			1		
	5995-238-3414	†	†	†	†	†	CABLE ASSEMBLY, RADIO FREQUENCY: Cord CG-389A/U; uses Radio Frequency Cable RG-63B/U; 6 ft lg excluding term; B and W dwg No. WEC-2180			1		
	5995-230-5540	†	†	†	†		CABLE ASSEMBLY, RADIO FREQUENCY: Pick-Up Antenna AT-137/MRC-2; coax; 50 ohm impedance approx, 5 ft lg o/a			1		
	5995-171-3090	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: copper braid; No. 7 B and S wire; braid 40 in lg x 1 in wd; Hallicrafters part/dwg No. 87A208 and 76B117			1		
	5995-163-0044	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CD-565; 2 No. 12 AWG and 2 No. 20 AWG stranded copper cond approx 4 ft 6 in lg			1		
	5995-162-7090	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CD-652; 4 No. 8 AWG and 2 No. 12 AWG stranded cond 100 ft lg excluding term Sig spec 71-1683			1		
	5995-193-9466	†	†	†	†		CABLE ASSEMBLY, SPECIAL PURPOSE: Cord CX-143/MRQ-2; uses Cordage CO-144 and and CO-146; 4 ft 6 1/2 in lg excluding term; Sig dwg No. SC-D-251561A			1		
	5995-163-1742	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-961/TRA-7; 4 No. 20 AWG stranded cond approx 4 ft lg; with red indentification, Sig dwg No. SC-C-34600			1		W107
	5995-163-1741	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-961/TRA-7; 4 No. 22 AWG; stranded cond 40 in lg with blue indentification; Sig dwg No. SC-C-34600			1		W106
	5995-164-6494	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CD-764; uses Cordage CO-213, 14 ft lg excel term; Sig dwg No. SC-D-27457			1		
	5995-161-8708	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CD-1019; uses Special Purpose Cable WD-28/U; 8 ft lg excluding term; Sig dwg No. SC-D-4822			1		
	5995-164-6569	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CO-335; 4 No. 8 AWG and 2 No. 12 AWG strand cond 14 ft lg excl term; Hallicrafter part/dwg No. 87C179			1		
	5995-399-7621					†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-2152/U; uses cordage CO-144 and CD-146; 5 ft 4 1/4 in lg o/a; Hallicrafter part/dwg No. 87C3541			1		

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		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5995-161-4666	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-141/MRQ-2; uses Cordage CO-213; approx 2 ft 5 in lg o/a; Sig dwg No. SC-C-7870			1		
	5995-162-6897	†	†	†	†	†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-142/MRQ-2; 2 No. 10 AWG and 2 No. 14 AWG; 600 v max; 4 ft 5 in lg o/a			1		
	5995-280-3041					†	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: CX-2155/U; 3 stranded No. 22 AWG cond 4 ft 3 7/8 in lg o/a			1		
	6625-568-9999	†	†	†	†		CALIBRATOR, FREQUENCY: Frequency Meter Set SCR-211; 12 1/2 in h x 9 1/16 in d x 10 in wd uses 6 ea BA-2 and 4, BA-23; xtal controlled; 125 to 20,000 kc range		NX	1		
	6810-223-2723			†	†		CARBON TETRACHLORIDE: liquid; 1 pt cntr; Fed spec O-C-141			1		
	5120-223-8455	†	†	†	†		CARRIER, STORAGE, HAND: strap type; 14 3/4 in lg; Snyder Mfg Co part No. 71XS		NX	1		
	5820-497-9802	†	†	†	†		CASE: Chest CH-88, CH-88A,B; for spare parts storage; Sig dwg No. SC-D-17066		NX	1		
	5820-497-9664	†	†	†	†		CASE, BOX BX-19, BX-19A: for radio accessories; Sig dwg No. SC-D-5767 or 5768		NX	1		
	5820-497-9802	†	†	†	†		CASE: Chest CH89, CH-89A,B; for radio spare parts and accessories; Sig dwg No. SC-D-16788-A		NX	1		
	5820-497-9809	†	†	†	†		CASE: Chest CH-120, CH-120A,B; houses component; Sig dwg No. SC-D-19406		NX	1		
	5820-404-2283	†	†	†	†	†	CASE CY250/MRC-2: storage for ant equip; wood; empty		NX	1		
	7110-408-0216					†	CASE CY-495/MRC-2: wood; empty; used as message holder		NX	1		
	5820-404-7318	†	†	†	†	†	CASE CY-521/MRC: for maint equip and running spares		NX	1		
	5820-330-9969					†	CASE CY-1260/G: for Radio Receiver R-388/URR; steel, black wrinkle finish; empty		NX	1		
						†	CHAIR: steel, olive drab painted; 32 in h x 14 1/4 in wd x 15 in d; Westmoreland Metal Mfg Co type No. 1052CB (Ord Stk. No. 6M216-1)		NX	2		
	6130-241-6312	†	†	†	†		CHARGER, BATTERY: Rectifier Power Unit RA-63-E; metallic disc type; 12 v charging; 15 amp max continuous charge; 115 v ac 50 to 60 cyc, single ph; Sig dwg No. SC-D-20123		NX	1		
	6645-303-4950	†	†	†	†	†	CLOCK, AIRCRAFT, MECHANICAL: 8 day movement; 2 3/8 in sq x 1 in d; Longines-Wittenauer type A-11		NX	1	20	
	5975-241-6236	†	†	†	†	†	CONNECTOR, CONDUCTOR: straight type; for 2 No. 8 AWG solid or stranded wires, approx 9/16 in dia oval head, with stud and head 7/8 in lg Burndy No. KS-15			30		
	5820-221-0199	†	†	†	†	†	CONTROL, RADIO SET: Junction Box JB-70, JB-70A; 19 in l x 12 5/8 in x 7 1/2 in o/a; individual cable entrance, without cover; rectangular shape; Army Spec 11-1683		NX	1	4,7A	
	5995-164-6648	†	†	†	†	†	CORD CD-201-A: headset, 2 tinsel cond; 5 ft 8 in lg o/a; Sig dwg No. SC-D-6609			1		
	6625-170-9608	†	†	†	†	†	CORD CD-605: headset; 2 cond; 6 ft 10 in lg o/a; Assembly-Elec; Sig dwg No. SC-A-7999E			1	11A	
	4020-408-4219	†	†	†	†	†	CORD, COTTON: Rope RP-5; 3/16 in dia	ft		50		
	5820-404-8593	†	†	†	†	†	DUCT: Air Duct MX-665/MRC, steel; approx 22 in lg with 90° bend		NX	1		

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		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)				FIGURE NO	ITEM NO
	6230-264-8261	†	†	†	†	†	FLASHLIGHT, MX-991/U: uses 2 Battery BA-30		NX	1		
	3895-240-7203	†	†	†	†	†	FRAME FM-59, FM-59A: reel support; Hallicrafter part/dwg No. 78D725		NX	1		
	6115-697-2417	†	†	†	†	†	GENERATOR SET, GASOLINE ENGINE: Power Unit PE-95, PE-95G, H, I; 12.5 kva at full load, 10 kw at 80% pf; 120/240 v ac, 60 cyc single ph, 2 wire 11% regulation		NX	1	37	
	5120-293-2200	†	†	†	†	†	HAMMER TL-39: carpenter's Nail; 16 oz; size No. 1 1/2; 13 in lg		NX	1		
	5820-356-4159	†	†	†	†	†	HARDWARE KIT: spares for maintaining radio equip			1		
	5965-164-7259	†	†	†	†	†	HEADSET HS-30, HS-30A,B,C,D,E,F,G,H,J,K,L,M,R AND U: magnetic, 250 ohm impedance		NX	1	17,11A	
	4520-224-7909	†	†	†	†	†	HEATER, SPACE, ELECTRIC: elec pri energy source; 115 v ac, 1500 w; 12 in lg x 12 1/2 in wd x 10 3/4 in h; Electric Air Heater Co type No. AAT-15		NX	1	21	
	4720-301-5908	†	†	†	†	†	HOSE, RUBBER: exhaust, rubber with cotton jacket; 23 1/2 in lg x 5 1/2 in od; Thermaid type No. 350			1		
	6630-243-3399	†	†	†	†		HYDROMETER, SYRINGE, BATTERY: graduated from 1.175 to 1.330 sp gr Edelman Cat No. 60-1		NX	1		
	5970-227-9056	†	†	†	†	†	INSULATOR, STRAIN: cyclindrical; brown glazed steatite; 6 1/8 in lg x 3/4 in d; grade L-4; JAN type NS4B5540			14		
	5970-184-2003	†	†	†	†	†	INSULATION TAPE, ELECTRICAL: Tape TL-83; black cotton adhesive materiel; 3/4 in wd x 0.015 in thk			3		
	5970-240-0617	†	†	†	†	†	INSULATION TAPE, ELECTRICAL: tape TL-192, two-ply synthetic rubber; adhesive; 3/4 in wd x 0.045 in thk, dark and white			1		
	5820-250-6290	†	†	†	†	†	JUNCTION BOX: Junction Box J-199/MRC-2; cable entrance outlet and binding post type 7 1/2 in lg x 3 in w x 3 1/4 in dia; B and W dwg No. WS-C-4003			1		
	5820-404-9452	†	†	†	†	†	JUNCTION BOX: Junction Box J-207/MRC-2; 7 1/2 in lg x 3 in w x 3 1/2 in dia; 6 cable entrances outlet, jack and connector type; Hallicrafters part/dwg No. 41X16520			1		
	5805-162-8232	†	†	†	†	†	KEY J-37: tg; manual			1	18	
	7340-240-5943	†	†	†	†	†	KNIFE TL-29: electricians; 3 3/4 in closed		NX	1		
	6240-186-3252	†	†	†	†		LAMP, INCANDESCENT: 12 v 50 w, 4.2 amp; med screw base; 4 15/16 in h o/a; GE type No. 50A21			1		
	6240-155-8634	†	†	†	†	†	LAMP, INCANDESCENT: 120 v, 50 w; 0.42 amp; med screw base; 3 15/16 in h o/a; GE Mazda No. 50A/RS			7		
	5995-252-3958	†	†	†	†		LEAD, ELECTRICAL: uses Beldon type "Facade" wire braid No. 7 AWG, 1 in wd x 0.040 in thk; 5 ft lg; B and W part/dwg No. 26-567B			1		
	5995-279-2576	†	†	†	†		LEAD, ELECTRICAL: single wire braid No. 7 AWG; 1 in wd x 0.040 in thk; 10 ft lg excluding terminations; Hallicrafters part/dwg No. 87B202			1		
	6230-240-3763	†	†	†	†	†	LIGHT, EXTENSION: general purpose; 25 ft lg; Daniel Woodhead part No. 2560		NX	2		

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		1	2	3	4	5					FIGURE NO	ITEM NO
							AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5965-163-1791	†	†	†	†	†	LOUDSPEAKER LS-3: 6 in cone; PM type; 8 1/4 in lg x 5 1/4 in w x 8 1/4 in h; Army Spec 71-958-C			1	14	
	5820-199-8842	†	†	†	†		MAST SECTION MS-49: ant Sig dwg No. SC-D-1241		NX	1		
	5820-155-8134	†	†	†	†		MAST SECTION MS-50: ant; Sig dwg No. SC-D-1241-2		NX	1		
	5820-155-8130	†	†	†	†		MAST SECTION MS-51: ant; Sig dwg No. SC-D-1241-3		NX	1		
	5820-155-8129	†	†	†	†		MAST SECTION MS-52: ant; Sig dwg No. SC-D-1241-4		NX	1		
	5820-156-1055	†	†	†	†		MAST SECTION MS-53: ant; Sig dwg No. SC-D-1241-5		NX	1		
	5820-199-8819	†	†	†	†		MAST SECTION MS-54: ant; Sig dwg No. SC-D-1241-6		NX	1		
	5820-199-8831			†	†	†	MAST SECTION MS-116, MS-116A: ant sect; Sig dwg No. SC-D-100588		NX	1		
	5820-199-8843			†	†	†	MAST SECTION MS-117, MS-117-A: ant sect; Sig dwg SC-D-100588		NX	1		
	5820-199-8841			†	†	†	MAST SECTION MS-118, MS-118-A: ant sect; 39 1/2 in lg x 0.246 in dia; Sig dwg No. SC-DL-100588		NX	1		
	5965-646-4678	†	†	†	†	†	MICROPHONE, CARBON: JCENS Microphone, type No. M-52/U; 40 to 100 ohms resistance 5 19/32 in lg x 2 7/8 in w x 1 1/64 in thk o/a; excl cable assy; MIL Spec No. MIL-M-11193B with amend No. 4		NX	1	15,10A	
							:					
	5965-170-5232	†	†	†	†	†	MICROPHONE DYNAMIC T-50: 25,000 ohm impedance; uni-directional; Electro Voice part No. 600D		NX	1	15,10A	
	5820-186-9474	†	†	†	†		MOUNTING FT-178: vehicular mtg for Radio rec snubber type; Sig dwg No. SC-D-2820		NX	6		
	6625-498-3677					†	MULTIMETER TS-297/U: ranges 0-1000 v ac and dc, 0-400 ma, 0-100,000 ohm; accuracy ± 5% ac v; ± 3% on dc v ohm and ma		NX	1	19	
	9150-257-5436	†	†	†	†		OIL, LUBRICATING: 4 oz			1		
	5820-194-9658	†					OSCILLATOR, RADIO FREQUENCY: Frequency Shift Exciter O-39/TRA-7, O-39A/TRA-7; 115 v, 50 to 60 cyc; 13 in x 16 7/8 in x 21 1/2 in o/a dim; Army spec 71-3276A		NX	1		
	5815-224-5287			†	†	†	OSCILLATOR, RADIO FREQUENCY: Frequency Shift Exciter O-39B/TRA-7; O-39C/TRA-7; 11 1/4 in x 17 11/16 in x 19 1/8 in o/a; freq range 2 to 6 mc, Sig dwg No. 33801		NX	1	5	
	5110-224-1896	†	†	†	†	†	PLIERS TL-103: diagonal cutting; 5 in lg		NX	1		
	5120-247-2057	†	†	†	†	†	PLIERS TL-370/U: rd nose, gas and burner type		NX	2		
	5820-548-1686					†	POWER SUPPLY PP-886/G: selenium type full-wave rectification output 12 v dc; input 117 v ac, 60 cyc, single ph; 10 1/4 in lg x 4 1/2 in w x 5 1/2 in d o/a		NX	1		
	6625-245-9673	†	†	†	†		POWER SUPPLY: Rectifier Power Unit RA-133, RA-133-A,B; Electronic type; output 121.5 v to 135 v dc, 20 ma regulated; 100 to 130 v or 200 to 260 v ac, 50-60 cyc, single ph, 15 w		NX	1	13	
	5820-164-7230	†	†	†	†		RECEIVER, RADIO: Radio Receiver BC-312; incl all suffix letters; cw or mcw; range 1500 to 18,000 kc; 8 45/64 in x 10 1/2 in x 18 in o/a; Army Spec No. 71-914		NX	1		

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5820-644-0990					†	RECEIVER, RADIO: Radio Receiver R-388/URR; A1, A2, A3, F1 reception, freq 0.5 to 30.5 mc; 30 bands; 600 ohms, 115 v 40 to 70 cyc		NX	1		
	8130-253-0105	†	†	†	†	†	REEL DL-4: holds wire; steel, olive drab finish		NX	2		
	5975-187-5301			†	†	†	ROD, GROUND: steel, zinc coated finish; 4 1/2 ft lg x 1/2 in dia; Hallicrafters part/dwg No. 74B454			1		
	5975-187-5295				†		ROD, GROUND: Ground Rod GP-26; G1; Sig spec 71 253A			1		
	5120-244-6934	†	†	†	†	†	SCREWDRIVER TL-21: for slot drive; 2 1/2 in blade; bit 3/16 in wd x 0.032 in thk		NX	1		
	5120-240-1545	†	†	†	†	†	SCREWDRIVER: for slot drive; 1 1/2 in blade; 3 1/2 in lg o/a; 5/32 in wd x 0.028 in thk bit; Stanley Tools No. 121		NX	2		
		†	†	†	†		SCREWDRIVER: slot drive; heavy duty; 6 in blade; 3/8 in wd tip x 0.050 in thk; Torbin Tool No. 38 (SigC Stk No. 6R16050)		NX	1		
	5120-293-3169		†				SCREWDRIVER: 6 in blade; electrician's; Fed spec GGG-S-121, type III, Class C		NX	1		
	5450-498-6558	†	†	†	†	†	SHELTER HO-17, HO-17A, HO-17B: for radio, radar and photographic use assembled		NX	1	4A	
	3375-224-3559	†	†	†	†	†	SOLDER M-31: general purpose; 40/60 tin lead; wire shape		NX	1		
	3375-241-3223	†	†	†	†		SOLDERING IRON TL-117: elec, 85 w ac, 118 v		NX	1		
	3375-241-3222	†	†	†	†	†	SOLDERING IRON, TL-120: 200 to 250 w		NX	1		
	3985-407-7859	†	†	†	†	†	SPOOL DR-8: for reeling in light field wire; steel		NX	1		
	8465-498-1713	†	†	†	†		STRAP ST-19, ST-19A: aw; carrying general purpose		NX	3		
	5985-240-6122	†	†	†	†		SUPPORT, ANTENNA AB-38B/CR: 50 ft h assembled; 0.397 in dia holes on 1 3/8 in rad c from top of base, 7 ea 27/32 in holes rect on 4 1/8 in mtg center		NX	1	38	
	6675-265-7451	†	†	†	†	†	TAPE MEASURING: steel; 100 ft lg; approx 4 1/2 in dia x 3/4 in thk o/a; Fed spec GGG-T-106, type 11, Class B		NX	1		
	5805-162-6251	†	†	†	†	†	TELEPHONE EE-8, EE-8-A, EE-8-B, EE-8-C: field set; self contained		NX	1	16	
	5820-503-3438	†	†	†	†	†	TRANSMITTER, RADIO: Radio Transmitter BC-610-H,E,F,G,H,I; 32 5/8 in lg x 21 3/8 in w x 39 7/8 in h o/a; A1 and A3 type emmission; 50/60 cyc, 2 to 18 mc freq range; Hallicrafter model HT-4 modified		NX	1	6,7	
	5820-223-4641	†	†	†	†		TUNER, RADIO FREQUENCY: Antenna Tuning Unit; BC-939, BC-939A,B; freq 2 to 18 mc; 21 1/4 in lg x 9/32 in wd x 13 5/6 in h o/a Sig dwg No. SC-DL-34409		NX	1		
	7430-221-0844					†	TYPEWRITER MX-322/U: Telegrapher's Keyboard, all capitals, 4 point Gothic characters; 10 characters per inch		NX	1	36	
	6145-160-7150	†	†	†	†	†	WIRE W-28: bare, single No. 12 AWG, cond (Authorized allowances will be a minimum of or a multiple of 1000 ft)	ft		1000		
	5120-240-5328	†	†	†	†	†	WRENCH TL-476/U: single end adj; 0.947 in cap; 8 1/2 in lg Fed spec GGG-W-631, type 1, Class A		NX	1		

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		1 2 3 4 5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5120-198-5392	+ + + +	WRENCH, SOCKET HEAD SCREW: set screw; Allen type; hex size 5/32 in across flats; short arm 15/16 in lg; long arm 2 19/32 in lg		NX	2		
	5120-224-4659	+ + + + +	WRENCH, SOCKET HEAD SCREW: set screw; Allen type; hex size 1/4 in across flats; L shape, short arm 1 7/32 in lg; long arm 3 11/32 in lg		NX	2		
	5120-224-2497	+ + + + +	WRENCH, SOCKET HEAD SCREW: hex type; 3/32 in across flats; "L" type handle; 2 3/16 in lg; Spec MIL-W-15751A, type XVII, style A, class No. 1		NX	2		
			AMPLIFIER AM-141/MRC, AM-141A/MRC, AM-141B/MRC					
	5120-333-9814	+ + +	ALIGNMENT TOOL, ELECTRONIC EQUIPMENT: 12 1/2 in lg x 7/8 in dia o/a; B and W part No. 129-70			2		
	5820-129-9674	+ +	BRACKET: amplr support, snubber arm; 13 3/4 in lg x 1 in wd x 1 in h L shaped angle iron, Hallicrafters part/dwg No. 67-1771			1		
	5820-129-9673	+ +	BRACKET: amplr support, front wall; "L" shaped iron; 20 3/8 in lg x 1 1/4 in wd x 3 3/4 in h; Hallicrafter part/dwg No. 67-1773			1		
	5820-129-9675	+ +	BRACKET: amplr support, snubber arm "L" shaped angle iron; 23 1/8 in lg x 1 in wd x 1 in h; Hallicrafters part/dwg No. 67-1770			1		
	5820-129-9676	+ +	BRACKET: amplr support, side wall "L" shaped angle iron; 23 3/4 in lg x 1 1/4 in wd x 3 3/4 in h; Hallicrafter part/dwg No. 67-1745			1		
	5910-160-0395	+ + +	CAPACITOR, FIXED, VACUUM DIELECTRIC: Vacuum Capacitor CA-423; 50 uuf + 2 uuf - 5 uuf, 20,000 v peak, 5 in lg x 2 1/4 in dia o/a; Jennings Radio type No. VC-50-20			1		C3
	5895-350-9964	+ + +	CHART: calibration, 7 7/8 in lg x 5 3/4 in wd x 1/32 in thk; B and W part No. 129-421, dwg No. WN-C-1072			2		N1
	6625-252-3367	+ + +	COIL, EXPLORING: neutralization; approx 5 7/8 in lg x 4 3/8 in dia B and W No. WN-B-1044			1		
	5960-108-0252	+ + +	ELECTRON TUBE: JAN type 3B28			2		
	5960-116-9965	+ + +	ELECTRON TUBE: JAN type 833A			2		V1, V2
	5960-188-0944	+ + +	ELECTRON TUBE: JAN type 4B32			2		V5, V6
	6240-186-6594	+ + +	LAMP LM-41: 110 v, 6 w, 0.50 amp; 1 7/8 in lg candelabra screw base; GE part No. 6S6			2		
	6240-155-7955	+ + +	LAMP, INCANDESCENT: 2.0 v, 0.06 amp; approx 1 3/16 in lg o/a; miniature screw base; Mazda No. 48			2		
	5950-236-3876	+ +	TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 4.5 to 5.7 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2355			1		L1
	5950-236-3875	+ +	TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 3.5 to 4.5 mc; 5 1/2 in lg x 6 1/8 in h x 4 1/4 in wd; B and W part No. 2354			1		L1

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		1	2	3	4	5					FIGURE NO.	ITEM NO.
							AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5950-236-3874		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 2.0 to 3.5 mc; 5 1/2 in lg x 6 1/8 in h x 4 1/4 in wd; B and W part No. 2353			1		L1
	5950-188-8818	†					TRANSFORMER, RADIO FREQUENCY: Coil C-448; plug-in type unshielded; 11.0 to 14.0 mc Hallicrafters dwg No. 51C543			1		L1
	5950-199-6236	†					TRANSFORMER, RADIO FREQUENCY: Coil C-447; plug-in type unshielded; 8.0 to 11.0 mc; Hallicrafters dwg No. 51C542			1		L1
	5950-188-8826						TRANSFORMER, RADIO FREQUENCY: Coil C-449; plug-in type, unshielded 14.0 to 18.0 mc; Hallicrafters dwg No. 51C544			1		L1
	5950-189-4990	†					TRANSFORMER, RADIO FREQUENCY: Sig Coil C-387-A; plug-in type; unshielded; 2.0 to to 3.5 mc; Hallicrafters dwg No. 51C538			1		L1
	5950-263-0887	†					TRANSFORMER, RADIO FREQUENCY: Coil C-390-A; plug-in type unshielded 5.7 to 8.0 mc Hallicrafters dwg No. 51C541			1		L1
	5950-188-8810		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 12.6 to 18 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2359			1		L1
	5950-188-8803		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 11.0 to 12.6 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2358			1		L1
	5950-345-5966	†					TRANSFORMER, RADIO FREQUENCY: Coil C-389-A; plug-in type; unshielded, 4.5 to 5.7 mc			1		
	5950-263-0889	†					TRANSFORMER, RADIO FREQUENCY: Coil C-388-A; plug-in type; unshielded; 3.5 to 4.5 mc Hallicrafters dwg No. 51C539A			1		L1
	5595-236-3877		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 5.7 to 7.2 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2356			1		L1
	5950-188-8802		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 7.2 to 11 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2357			1		
	5950-243-3856	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 12.0 to 18.0 mc; 8 in lg x 8 5/16 in h x 7 in wd; B and W part No. 1909			1		L2
	5950-263-0872	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 2.6 to 3.6 mc approx 9 in lg x 7 in wd x 8 3/8 in h o/a; U.S. Electronic part No. 249			1		L2
	5950-263-0873	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 5.0 to 7.0 mc approx 8 1/2 in lg x 6 in wd x 7 1/2 in h o/a; U.S. Electronics part No. 251			1		L2
	5950-263-0874	†	†	†			TRANSFORMER, VARIABLE RADIO FREQUENCY: plug-in type unshielded; 3.6 to 5.0 mc; approx 8 1/8 in x 6 in wd x 7 3/8 in h o/a; U.S. Electronics part No. 250			1		L2
	5950-263-0875	†	†	†			TRANSFORMER, VARIABLE RADIO FREQUENCY: plug-in type, unshielded; 2.0 to 2.6 mc approx 9 in lg x 7 in wd x 8 1/2 in h o/a; U.S. Electronics No. 248			1		L2
	5950-263-0876	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded 9.0 to 12.0 mc; approx 8 1/8 in lg x 6 in wd x 7 3/8 in h o/a; U.S. Electronics part No. 253			1		L2

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		1 2 3 4 5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5950-263-0877	† † †	TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 7.0 to 9.0 mc; approx 8 1/2 in lg x 6 in wd x 7 1/2 in h o/a; U.S. Electronics part No. 252			1		L2
	5120-240-5302	†	WRENCH, TL-567/U: for No. 5 and No. 6 set screw; MIL-W-15751, type No. XV11, Class 1, style A		NX	1		
	5120-240-5292	†	WRENCH, SOCKET, HEADSCREW: for use with Allen 1/4 in set screw; 1/8 in across flats, 3/4 in short arm, 2 1/4 in lg arm; MIL-W-15751, type No. XV11, Class 1, style A		NX	1		
	5120-224-2497	†	WRENCH, SOCKET HEADSCREW: for use with Allen No. 10 set screw; 3/32 in across flats 3/4 in short arm, 12 3/32 in lg arm; MIL-W-15751, type No. XV11, Class 1, style A		NX	1		
		†	WRENCH, SOCKET HEADSCREW: for use with Allen No. 8 set screw; 5/64 in across flats 45/64 in short arm, 1 31/32 in lg MIL-W-15751, type No. XV11, Class 1, style A (SigC Stk No. LR57-400)		NX	1		
			SHELTER (FSN 5410-356-2279) C/O SHELTER HO-17 AND COMPONENTS FOR OPERATION OF RADIO SET AN/MRC-2, 2A, 2B, 2C AND 2D					
	7230-634-4962	† †	AWNING, CANVAS: CW-153/U; 4 ft 6 in lg o/a; weather shield; Sig dwg ES-D-41130		NX	1		
	5410-498-8944	†	BASE, SKID: Skid Equipment MX-157/U; for loading and unloading Shelter HO-17 or HO-27 from 2 1/2 ton 6 x 6 std cargo truck		NX	2		
	5920-170-3576	† †	BLOCK, TELEPHONE PROTECTOR: lighting prot; bakelite body, with copper plate; 1 1/4 in lg x 3/8 in wd x 1/4 in thk; o/a; Cook Electric Co part No. 41-1907			14		
	5920-160-4888	† †	BLOCK, TELEPHONE PROTECTOR: lightning prot; carbon black; 1 1/4 in lg x 3/8 in wd x 1/4 in thk o/a; Auto Elec part/dwg No. D-67030			14		
	7920-223-7635	† †	BROOM: flat, floor sweeping; 5 ft x 10 in wd x 2 1/2 in thk o/a; Sear No. 11F06606			1		
	7920-285-9816	† †	BRUSH, CLEANING: oblong; 8 in lg bristle area, 14 in lg o/a x 3 1/2 in wd x 1/2 in thk; Dietzgen No. 4211A			1		
	7110-408-0216	† †	CABINET: Case CY-495/MRC-2; used as message folder		NX	1		
	5820-223-9851	†	CABINET: houses Control Unit C-292/TRA-7; 22 1/2 in lg x 16 7/8 in wd x 13 1/4 in h; B and W dwg No. WE-D-2930		NX	1		
	7110-408-0215	† †	CABINET CY-494/MRC-2: for storage of stationery supplies		NX	1		
	5815-503-0944	†	CABINET, ELECTRICAL EQUIPMENT CY-1257/G: steel; houses Control Unit C-292/TRA-7		NX	1		
	5995-279-6231	†	CABLE ASSEMBLY, POWER ELECTRICAL: 2 stranded No. 8 AWG cond; 32 1/8 in lg o/a; Hallicrafters part/dwg No. 87B1921			1		
	5995-164-6575	† †	CABLE ASSEMBLY, POWER ELECTRICAL: Cord CD-338; uses Cord CO-144; 20 ft lg o/a			2		

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL 1	2	3	4	5	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ILLUSTRATIONS ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5995-644-3106	†	†				CABLE ASSEMBLY, TELEPHONE: 4 cond No. 18 AWG; 10 ft 8 in lg excluding terminations Hallicrafters part/dwg No. 87C1917			1		
	5995-162-6869	†	†				CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CX-918/MRC-2; 2 No. 10 AWG stranded cond; 25 ft lg excluding termination; Sig dwg No. SC-D-26548			1		
	5995-164-6598	†	†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-956/TRA-7; 5 No. 22 AWG stranded cond; 6 ft lg o/a			1		
	5995-161-4673	†	†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-957/TRA-7; 4 No. 22 AWG stranded cond 6 ft lg excluding terminations			1		
	5995-163-1740	†	†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-958/TRA-7; 4 No. 22 AWG stranded cond 6 ft lg			1		
	5995-163-0035	†	†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-959/TRA-7; uses Cordage CO-145; 6 ft 4 in lg o/a; Hubbell Connector No. 7572			1		
	5995-279-3839	†	†				CABLE ASSEMBLY, POWER, ELECTRICAL: Power Cable Assembly CX-1165/U; 2 No. 6 AWG stranded cond; 51 ft lg o/a; ± 2 in; Sig dwg No. SC-D-22669			1		
	6145-112-8669	†	†				CABLE, POWER, ELECTRICAL: two No. 12 AWG stranded cond; UL type Sper U.S. Army Spec No. 71-4945 (Authorized allowances will be a minimum of or a multiple of 25 ft)	ft		25		
	6145-160-7796	†	†				CABLE, TELEPHONE: Wire WD-1/TT; field com; 1 mile lg on Reel DR-4; ins; U.S. Army Spec 71-3266			1		
	7110-290-1177	†	†				CHAIR: 32 in h x 14 1/4 in wd x 15 in d; Westmoreland Metal Mfg No. 1052CB		NX	2		
		†	†				CHAIR: folding wood; 33 5/8 in lg x 17 1/2 in wd x 2 1/4 in h folded; Fed spec AA-C-311 (QM Stk No. 26-C-7920)		NX	2		
	5925-498-4084	†	†				CIRCUIT BREAKER: air; DPST; 20 amp; 120/240 v ac 60 cyc; 5 7/8 in h x 3 7/8 in wd x 2 7/8 in d; Square "D" Co type No. MO2-161722S			1		
	5820-221-5434	†	†				CLIP: chart; 17/32 in max jaw opening; 2 7/16 in lg x 5/16 in wd; WF Co No. 5-D Ticket Holder			3		
	7510-161-4292	†	†				CLIP, PAPER: Noestring No. 2			2		
	7510-223-6809	†	†				CLIP, PAPER: bulldog type; 2 1/2 in lg			2		
		†	†				CLIPBOARD: holds messages and paper; 12 1/2 in lg x 9 in wd (QM Stk No. 53-F-2296)		NX	1		
	8305-170-5062	†	†				CLOTH, TEXTILE: cheesecloth; Fed spec CCC-C-271, type 11, class B	yd		6		
	5935-222-7927		†				CONNECTOR, ADAPTER: 8 flat cont, 6 female and 2 male; straight type; adapts single connector to accom 2 plugs; 1 5/16 in sq x 1 1/8 in thk excluding cont; Federal Spec No. W-R-151 styles No. 751			1		
	5815-404-7315	†	†				CONTAINER: Case CY-496/MRC-2; used as receptacle for teletype type		NX	1		
		†	†				CONTAINER: waste paper; office type (QM Stk No. 53-P-29306)		NX	1		

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL					(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS	
		1	2	3	4	5					FIGURE NO	ITEM NO
							AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5805-162-6302	†					CONTROL, TELEGRAPH LINE: Line Unit BE-77A,B,C; connects station equip to neutral or polarential lines, repeats signals; measures and adjust cur and v			1		
	5815-162-1301	†	†				CONTROL UNIT C-292/TRA. changes neutral to polar signals and polar to neutral for tt operation		NX	1	31,16A	
	5995-162-0437	†	†				CORD CC-66: uses Cordage CO-144; 2 No. 18 AWG stranded cond; approx; 21 in lg o/a; Sig dwg No. SC-D-1128			6		
	5995-162-0436	†	†				CORD CC-68: 2 No. 18 AWG stranded cond; approx 6 ft 3 in lg o/a; Sig dwg No. SC-D-1128			2		
	5815-498-7933	†	†				COVER BG-199: weather protection; 21 3/4 in lg x 17 5/8 in wd x 13 1/8 in h o/a; Sig dwg No. SC-D-19828			1		
	5815-498-7958	†	†				COVER BG-200: weather protection; 17 1/2 in lg x 9 in w x 10 1/4 in h; Sig dwg No. SC-D-19830-A			1		
	5820-240-7203	†	†				FRAME FM-59, FM-59A: reel support		NX	1		
	6115-697-2417	†	†				GENERATOR SET, GASOLINE: Power Unit PE-95, PE-95G, H, I; 12.5 kva at full load, 10 kw at 80% pf; 120/240 v ac; 60 cyc single ph; 2 wire 11% regulation		NX	1	37	
	4520-224-7709	†	†				HEATER, SPACE, ELECTRIC: elec pri energy source; 115 v ac, 1500 w; 12 in lg x 12 1/2 in wd x 10 3/4 in h; Electric Air Heater Co type No. AAT-15		NX	1		
	5970-184-2003	†	†				INSULATION TAPE, ELECTRICAL: Tape TL-83; black cotton adhesive material; 3/4 in wd x 0.015 in thk			2		
	5970-240-0617	†	†				INSULATION TAPE, ELECTRICAL: Tape TL-192; two-ply synthetic rubber; adhesive; 3/4 in wd x 0.045 in thk; dark and white			2		
	5820-537-3617	†	†				JUNCTION BOX J-204/MRC-2: 10 cable entrances; jack type, cable 1/4 in dia			1		
	6240-155-8634	†	†				LAMP, INCANDESCENT: 120 v, 50 w; 0.42 amp; med screw base; 3 15/16 in h; GE Mazda No. 50A/RS			5		
	5995-279-2576	†	†				LEAD, ELECTRICAL: single wire braid No. 7 AWG; 1 in wd x 0.040 in thk; 10 ft lg excluding termination; Hallicrafters part/dwg No. 87B202			2		
	6230-240-3763	†	†				LIGHT, EXTENSION: general purpose; 25 ft lg; Daniel Woodhead Co part No. 2560		NX	1		
	5820-392-5917		†				MOUNTING: secures canopy CW-153/U to roof of shelter; 4 ft 6 in lg x 2 1/2 in wd x 1 in thk; Hallicrafters part/dwg No. 78D725		NX	1		
		†	†				MUCILAGE: 4 oz bottle (QM Stk No. 53-M-1634)			2		
	9150-257-5436	†	†				OIL, LUBRICATING: 402 can			2		
	5815-128-1673	†	†				OPERATING TABLE FN-22/MRC-2: provides mtg space for tt equip and control and house components		NX	1		
		†	†				PAPER, BOND: 8 1/2 in wd x 10 1/2 in lg (QM Stk No. 53-P-22624-20)			5		
	7510-222-1259	†	†				PENCIL M-139: indelible			12		

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	7510-240-8697	†	†				PENCIL M-140: general purpose, black No. 2 lead med			48		
	5815-198-9033	†	†				PERFORATOR-TRANSMITTER TT-56/MGC: std commercial type arrangement with PQ; 5 unit code		NX	1	32,17A	
	5110-224-1896	†	†				PLIERS TL-103: diagonal cutting; 5 in lg		NX	1		
	5110-247-2057	†	†				PLIERS TL-370/U: rd nose; gas and burner type		NX	1		
	5815-230-7257	†	†				POWER-SUPPLY: Rectifier RA-87, RA-87A; metallic disk type; output 115 v dc 400 ma, 115 v ac, 500 va at 50/60 cyc; input 95-125 or 190-250 v, 50/60 cyc, ac, 600 w		NX	1		
	5975-187-5295	†	†				ROD, GROUND: Ground Rod GP-26; Gl; Sig spec 7l-253A			1		
	5120-293-3169	†	†				SCREWDRIVER: 6 in blade; electricians; Fed spec GGG-S-121; type III, Class C		NX	1		
	5120-244-6934	†	†				SCREWDRIVER TL-21: for slot drive; 2 1/2 in blade; bit 3/16 in wd x 0.032 in thk		NX	1		
	5410-498-6558	†	†				SHELTER HO-17, HO-17A, HO-17B: for radio, radar and photographic use; assembled		NX	1		
	3432-269-9611	†	†				SOLDER M-31: general purpose; 40/60 tin-lead; wire shape			1		
	3375-241-3223	†	†				SOLDERING IRON TL-117: elec; 85 w ac; 118 v		NX	1		
	8135-408-4347		†				STRAP, RETAINING: for folding chair; 10 in lg x 1 in wd x 1/8 in thk; Sig dwg No. SC-D-19825			4		
	5835-194-9727	†	†				TAPE, BLANK RECORDING: teletype 11/16 in wd 8 in od roll x 2 in id core			1		
	5815-129-1922	†	†				TAPE, PAPER, INK RECORDER: 8 1/2 in wd approx 350 ft roll; canary yellow smooth finish; Fed spec UU-P-547C, type 1, class A			7		
	7570-255-1354	†	†				TAPE, PAPER, INK RECORDER: 8 1/2 in wd x 4 1/2 in od, approx 350 ft roll; 3 canary yellow copies spec UU-P-547C			7		
	5805-162-6251	†	†				TELEPHONE EE-8, EE-8-A, EE-8-B, EE-8-C: field set; self contained		NX	2		
	7430-164-1421	†	†				TYPEWRITER MX-322/U: telegrapher's keyboard, all capitals; 4 points Gothic characters; 10 characters, per inch; (Not required on Order 3164-P-51)		NX	1	36	
	5815-198-4438	†	†				TELETYPEWRITER TT-4/TG, TT-4A/TG: std commercial keyboard; English characters; sending and receiving; (required for Operating Shelters Serial No. 468 thru Serial No. 483 only on Order 1908-PH-51-01)		NX	2		
	5815-198-4442	†	†				TELETYPEWRITER TT-55/MGC: std commercial keyboard with PQ; English characters; sending and receiving (Not required for Operating Shelters Serial No. 468 thru Serial No. 483 on Order 1908-PH-51-01-C)		NX	2		
	6145-160-5180	†	†				WIRE, ELECTRICAL: ins; No. 18 AWG, 7 strand No. 26 AWG colored red; JAN type WL-1-1/2(7)-18C2	ft		50		
	5120-240-5328	†	†				WRENCH TL-476/U: single end adj; 0.947 in cap; 8 1/2 in lg; Fed spec GGG-W-631, type, class A		NX	1		

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		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
							SHELTER (FSN 5820-337-6942) C/O SHELTER HO-17 AND COMPONENTS (RECEIVING SHELTER)					
	5935-201-3087	†					ADAPTER, CONNECTOR: male 1 end, female other end; 1 rd male and 1 rd female cont; 90° angle type adapts Plug PL-259 to Shield Binding Post Assembly; 1 1/4 in lg x 1 1/8 in wd x 25/32 in h; B and W part/dwg No. WS-C-4166			2		
	5935-237-3751	†	†				ADAPTER, CONNECTOR: R.F. Cable; Plug PL-258; 1 rd female cont; 1 1/8 in lg x 0.625 in dia; straight type; Sig dwg No. SC-D-5887			2		
	5935-355-8529		†				ADAPTER, CONNECTOR: reduces cable opening of plug type connector; 1 in lg x 0.445 in max od o/a; 0.207 in id; 7/16 in -14NC-2 ext thd x 1/4 in lg; NAVY dwg No. RE-49A-355			2		
	7230-643-4962	†	†				AWNING, CANVAS: CW-153/U; weather shield; 4 ft 6 in lg o/a; Sig dwg No. ES-D-41130		NX	1		
	5820-221-5553	†	†				BASE MAST: Mast Base MP-65-A; for whip Antenna		NX	1		
	5410-498-8944	†					BASE, SKID: Skid Equipment MX-157/U; for loading and unloading Shelter HO-17 or 27 from 2 1/2 ton 6 x 6 std cargo truck		NX	1		
	5820-128-1675	†	†				BENCH: operating Table FN-23/MRC-2		NX	1		
	5920-170-3576	†	†				BLOCK, TELEPHONE PROTECTOR: lightning prot; bakelite body with copper plate; 1 1/4 in lg x 3/8 in wd x 1/4 in thk; Cook Electric Co part No. 41-1907			6		
	5920-160-4888	†	†				BLOCK, TELEPHONE PROTECTOR: lightning prot; carbon block; 1 1/4 in lg x 3/8 in wd x 1/4 in thk; o/a; Cook Electric Co No. 41-2001			12		
	5985-404-2718	†	†				BRACKET: Mast Base Bracket MP-50-A; ant base support; inverted L shape; approx 65° between mtg surface, Sig dwg No. SC-D-15919		NX	1		
	5805-252-7066	†	†				BRACKET: holder for Telephone EE-8, table mtg; rectangular shape; 8 1/4 in lg x 4 1/2 in wd x 7 1/4 in h; B and W part No. 3A, dwg WS-B-4000			1		
		†	†				BRUSH, CLEANING: oblong; 8 in lg bristle area, 14 in lg o/a x 3 1/2 in wd x 1/2 in thk; Dietzgen No. 4211A (Engr Stk No. 38-3706.400-130)		NX	1		
	7920-223-7635	†	†				BROOM: flat, floor sweeping; 5 ft lg x 10 in wd x 2 1/2 in thk; Sears No. 11F06606		NX	1		
	7110-408-0214	†	†				CABINET CY-493/MRC-2: stores stationery supplies		NX	1		
	5820-378-5599		†				CABINET, ELECTRICAL EQUIPMENT: Electrical Equipment Cabinet CY-1213/U; houses 1 radio rec		NX	1		
	5820-378-5600		†				CABINET, ELECTRICAL EQUIPMENT: Electrical Cabinet CY-1214/U; houses 2 radio rec and 2 loudspeakers		NX	1		
	5820-221-2425		†				CABINET, ELECTRICAL EQUIPMENT CY-1256/G: houses CV-31/TRA-7		NX	1		

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5995-279-6231		†				CABLE ASSEMBLY, POWER, ELECTRICAL: 2 stranded No. 8 AWG cond; 2 ft 8 1/2 in lg o/a; Hallicrafters No. 87B1921			1		
	5995-537-5532		†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-2141/U; uses Wire W-128; one No. 14 AWG stranded cond 5 ft 7 7/8 in lg o/a			1		
	5995-237-8039	†	†				CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CD-132; uses Cordage CD-132; uses Cordage CD-144; 11 in lg excluding terminations			1		
	5995-170-6879	†					CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CO-145; 13 in lg excluding terminations			1		
	5995-161-0687	†					CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CD-564 2 No. 16 AWG cond stranded 3 ft lg o/a			1		
	5995-162-6909	†	†				CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CD-1251; uses Cordage CO-144; 4 ft lg excluding termination			1		
	5995-196-9758	†					CABLE ASSEMBLY, RADIO FREQUENCY: RF Cable Assembly CG-406A/TRA-7; uses Radio Frequency Cable RG-58C/U; 8 ft lg excluding termination			2		
	5995-170-5551	†	†				CABLE ASSEMBLY, RADIO FREQUENCY: RF Cable Assembly CG-557/U; uses Radio Frequency Cable RG-11A/U; 500 ft 8 in lg o/a; Sig dwg No. SC-D-22840			2		
	5995-171-2817		†				CABLE ASSEMBLY, RADIO FREQUENCY: RF Cable Assembly CG-562A/U; uses RF Cable RG-58G/U; 8 ft lg excluding terminats; Hallicrafters part/dwg No. 87C3594			2		
	5995-162-6869	†	†				CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CX-918/MRC-2; two No. 10 AWG stranded cond; 25 ft lg excluding termination; Sig dwg No. SC-D-26548			1		
	5995-162-7175	†	†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-952/TRA-7; 4 No. 22 AWG stranded cont; 6 ft 3 in lg o/a			1		
	5995-161-4674	†	†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-953/TRA-7, 5 No. 22 AWG stranded cond 6 ft lg			1		
	5995-161-4675	†	†				CABLE ASSEMBLY, POWER, ELECTRICAL: Cord CX-954/TRA-7; 3 No. 18 AWG stranded cond; 6 ft lg o/a			1		
	5995-161-4670	†					CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-955/TRA-7; uses Cordage CO-122-A, 7 ft 3 in lg o/a			2		
	5995-279-3839	†	†				CABLE ASSEMBLY, POWER, ELECTRICAL: Power Cable Assembly CX-1165/U; 2 No. 6 AWG stranded cond; 51 ft lg o/a; ± 2%; Sig dwg No. SC-D-22669			1		
	5995-280-4188		†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-1851/U; 3 No. 22 AWG stranded cond; 8 ft 4 3/4 in lg o/a; Hallicrafters part/dwg No. 87C3570			2		
	5995-256-9968		†				CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Cord CX-1939/U; 2 No. 18 stranded cond 5 ft 3 7/8 in o/a; Sig dwg No. SC-C-68578			3		

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		1	2	3	4	5					FIGURE NO	(9) ITEM NO
							AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	6145-112-8669	†	†				CABLE, POWER, ELECTRICAL: 2 No. 12 AWG stranded cond; UL type No. S-SC U.S. Army Spec No. 71-4945 (Authorized allowances will be a minimum of or a multiple of 25 ft)	ft		25		
	6145-160-7796	†	†				CABLE, TELEPHONE: Wire WD-1/TT; field com; 1 mile lg on Reel DR-4; ins; U.S. Army Spec No. 71-3266			2		
	5820-497-9664	†					CASE: Box BX-19; BX-19-A; radio accessories		NX	3		
	5820-497-8601	†	†				CASE CY-517/MRC-2: ant equip; Sig dwg No. SC-D-14134		NX	2		
	5820-497-8602	†					CASE CX-517/MRC-2: ant equip; Wood; Sig dwg SC-D-14142		NX	2		
	5820-221-2425	†		-			CASE: for converter; 22 in lg x 20 5/8 in wd x 25 1/4 in h o/a; B and W dwg No. WE-B-2400-3		NX	1		
		†	†				CEMENT: 4 oz bottle; Fed spec No. JJJ-M-7912 (QM Stk No. 53-M-1634)			2		
		†	†				CHAIR: 32 in h x 14 1/4 in wd x 15 in d; Westmoreland and Metal Mfg Co No. 1052CB (QM Stk No. 6M216-1)		NX	2		
		†	†				CHAIR: folding wood, 33 5/8 in lg x 17 1/2 in wd x 2 1/2 in h folded; Fed spec AA-C-331 (QM Stk No. 26-C-7920)		NX	2		
	5925-498-4084	†	†				CIRCUIT BREAKER: air DPST; 20 amp 120/240 v ac 60 cyc; 5 7/8 in h x 3 7/8 in wd x 2 7/8 in d square D Co type No. MO2-161722S			1		
	5820-221-5434	†	†				CLIP: chart; 17/32 in max jaw opening; 2 7/16 in lg x 5/16 in wd; WE Co No. 5D; Ticket Holder			3		
		†	†				CLIPBOARD: holds message and paper; 12 1/2 in lg x 9 in wd (QM Stk No. 53-F-2296)		NX	1		
	7510-161-4292	†	†				CLIP, PAPER: Noestring No. 2			2		
	7510-223-6809	†	†				CLIP, PAPER: bulldog type; 2 1/2 in lg			2		
	6645-303-4950	†	†				CLOCK, AIRCRAFT, MECHANICAL: 8 day movement; 2 3/8 in sq x 1 in d; Longines-Wittenauer type A-11		NX	1		
	8305-170-5062	†	†				CLOTH, TEXTILE: cheesecloth; Fed spec CCC-C-271, type 11, class B	yd		6		
	5935-149-3981	†	†				CONNECTOR, PLUG ELECTRIC: Plug PL-259-A; 1 21/32 in lg; 1 rd male cont straight type; Navy dwg No. RF49F167			7		
		†	†				CONTAINER: waste paper; office type (QM Stk No. 53-P-29306)		NX	1		
	5820-162-6330	†					CONTROL BOX C-345/MRC-2, C-345A/MRC-2: controls audio output of 2 Radio Receivers BC-342		NX	1		
	5815-194-9388	†	†				CONVERTER, FREQUENCY SHIFT: Dual Diversity Converter CV-31/TRA-7; CV-31A,B and C/TRA-7 provides dual diversity operation from modified std rec and converts signal to dc pulses for oper tt		NX	1	23	
	6625-170-9608	†	†				CORD, ASSEMBLY ELECTRIC: CD-605; headset; 2 cond, 6 ft 10 in lg o/a; Sig dwg No. SC-A-7999B			3	11A	

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		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5815-404-8438	†	†				COVER BG-198: for Teletypewriter TG-7-B or TT-55/MGC; Sig dwg No. SC-D-19826		NX	1		
	5820-404-8442	†					CRADLE, CHASSIS: supports radio chassics; 17 3/16 in wd x 19 in h x 17 in d; B and W dwg No. WE-D-2420			1		
		†	†				ERASER: typewriter (QM Stk No. 53-E-5808)			6		
	5820-240-7203	†	†				FRAME, FM-59, FM-59-A: reel support		NX	1		
	5965-164-7259	†	†				HEADSET HS-30, HS-30-A,B,C,D,E,F,G,H,J,K,L,M,R AND U: magnetic; 250 ohm impedance		NX	3		
	4520-224-7909	†	†				HEATER, SPACE, ELECTRIC: elec pri energy source; 115 v ac, 1500 w; 12 in lg x 12 1/2 in wd x 10 3/4 in h, Electric Air Heater Co type No. AAT-15		NX	1		
	5970-184-2003	†	†				INSULATION TAPE, ELECTRICAL: Tape TL-83; black cotton adhesive material, 3/4 in wd x 0.045 in thk, dark and white			2		
	5805-162-8332	†	†				KEY J-37: tg; manual; 5 1/4 in lg x 2 3/4 in w x 1 in h; Sig dwg No. RL-D-59323			1	18	
	6240-155-8634	†	†				LAMP, INCANDESCENT: 120 v 50 w; med screw base; Hallicrafters part/dwg No. 39A001			3		
	5995-279-2576	†	†				LEAD, ELECTRICAL: single wire braid No. 7 AWG; 1 in wd x 0.040 in thk; 10 ft lg excluding terminations; Hallicrafters part/dwg No. 87B202			2		
	6230-240-3763	†	†				LIGHT, EXTENSION: general purpose; 25 ft lg; Daniel Woolhead part No. 2560		NX	1		
	5965-636-1761	†	†				LOUDSPEAKER: 6 in cone; PM type; 8 in lg x 8 in w x 4 in dia o/a; MIL-C-13073		NX	3 2		
	5820-251-2366	†	†				MAST AB-155/U, AB-155A/U: supports double Antenna		NX	6	39,19A	
	5820-199-8831	†	†				MAST SECTION MS-116, MS-116-A: ant sect; Sig dwg No. SC-DL-100588			3		
	5820-199-8843	†	†				MAST SECTION MS-117, MS-117-A: ant sect; Sig dwg No. SC-DL-100588			1		
	5820-199-8841	†	†				MAST SECTION MS-118, MS-118-A: ant sect; Sig dwg No. SC-DL-100588			1		
	5820-186-9474	†					MOUNTING FT-178: vehicular Mtg for Radio rec, Snubber type Sig dwg No. SC-D-2820		NX	4		
	6625-498-3677	†	†				MULTIMETER TS-297/U: portable; batt operated, 1.5 v; 0 to 1000 v ac in 6 steps; 0 to 1000 v dc in 6 steps; 0-400 ma in 4 steps; 0-100,000 ohm in 3 steps, MIL-M-10263		NX	1		
	9150-257-5436	†	†				OIL, LUBRICATING: 4 oz can			2		
	7510-222-1259	†	†				PENCIL, M-139: indelible			12		
	7510-240-8697	†	†				PENCIL, M-140: general purpose; black No. 2 lead; med			48		
	6115-228-5815	†	†				POWER UNIT PE-75, PE-75C,D,J,K,M,S,T,U,W,AA,AB,AC,AD AND AE: rated 2.5 kva, 2500 w, 100% pf; 120 v single ph, 60 cyc, 3 wire		NX	1		
	5815-164-7226	†					RECEIVING SET, RADIO: Radio Receiver Assembly, OA-65A/MRC-2; F1, F2 and F3 type of reception; freq 1.5 to 18 mc; 6 bands		NX	1		
	5820-644-0990		†				RECEIVER, RADIO: Radio Receiver R-388/URR; A1, A2, A3 and F1 reception; 0.5 to 30.5 mc, 30 bands, mc ea band		NX	2		
	8130-253-0106	†	†				REEL DR-5: holds Wire W-110-B		NX	1		

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL					(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS	
											FIGURE NO	(9) ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	3895-252-6896	†	†				REEL UNIT, RL-31, RL-31A,B,C AND D: accom 1 reel DR-5 or DR-15 or 2 Reel DR-4		NX	1		
	5985-499-8765	†	†				REEL RL-122/GRA-4: ant; Sig dwg No. SC-C-34892		NX	4		
	5975-187-5301	†	†				ROD, GROUND: steel, cad pl; 4 ft 6 in lg x 1/2 in dia; B and W part No. 26			1		
	5410-498-6558	†	†				SHELTER HO-17, HO-17A, HO-17B: for radio, radar and photographic use, assembled		NX	1		
	3432-269-9611	†	†				SOLDER M-31: general purpose; 40/60 tin-lead; wire shape			1		
	5815-510-4618	†	†				STRAP, RETAINING: for folding chair; 12 in lg x 1 in wd x 1/8 in thk o/a; Sig dwg No. SC-D-19825-Group-1			4		
	5210-265-7451	†	†				TAPE, MEASURING: steel; 100 ft lg approx 4 1/2 in dia x 3/4 in thk o/a; Fed spec GGG-T-106, type 11, Class B			2		
	7510-255-1354	†	†				TAPE, PAPER, INK RECORDER: 8 1/2 in wd x 4 1/2 in od, approx 350 ft roll; 3 canary yellow copies; Spec UU-P-547c			1		
	5815-129-1922	†	†				TAPE, PAPER, INK RECORDER: 8 1/2 in wd approx 50 ft roll; canary yellow smooth finish; Fed Spec UU-P-547c, type 1 Class A			1		
	5805-162-6251	†	†				TELEPHONE EE-8-A, EE-8-B, EE-8-C: field set; self-contained		NX	1		
	5815-198-4442	†					TELETYPEWRITER TT-55/MRC: std commercial keyboard; English characters; sending and receiving; (Not required for Receiving Shelters Serials No. 442 thru Serial No. 457 on Order No. 1908-PH-51-01-C)		NX	1		
	5815-198-4438	†	†				TELETYPEWRITER TT-4/TG, TT-4A/TG: std commercial keyboard; English characters; sending and receiving; required for Receiving Shelters Serial No. 442 thru No. 457 only on Order No. 1908-PH-51-01-C)		NX	1		
	6145-160-5180	†	†				WIRE, ELECTRICAL: ins; No. 18 AWG, 7 strands No. 26 AWG colored red JAN type WL-1-1/2(7)-18C2	ft		50		
	6145-160-5114	†	†				WIRE W-128: ins; single No. 14 AWG cond; Sig spec 71-726	ft		6		
							RADIO RECEIVER ASSEMBLY OA-65/MRC-2 AND OA-65A/MRC-2					
	Ord thru AGC	†	†	†			TECHNICAL MANUAL TM 11-850			2		
	5935-500-6569		†	†			ADAPTER, TUBE SOCKET: male 1 end, open shell other end; 8 prong male octal cont; straight type; adapts octal sockets to sockets tops 1 1/2 in od x 1 in id x 13/16 in h less cont; Amphenol part No. 50-8SD			1		P2
	5960-188-8500	†	†	†	†		ELECTRON TUBE: JAN type 6C5			2		VT-65
	5960-188-5960	†	†	†	†		ELECTRON TUBE: JAN type 6F6			2		

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		1	2	3	1	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5960-114-3866	†		†			ELECTRON TUBE: JAN type 6J5			1		VT-94
	5960-188-8535	†	†	†	†		ELECTRON TUBE: JAN type 6K7			8		VT-86
	5960-188-8527	†	†	†	†		ELECTRON TUBE: JAN type 6L7			2		VT-87
	5960-188-8637	†	†	†	†		ELECTRON TUBE: JAN type 6R7			2		
	5920-356-2188	†	†	†	†		FUSE, CARTRIDGE: 1/8 amp, 250 v; 1 1/4 in lg x 1/4 in dia; Littlefuse part No. 312.125			2		F2
	5920-280-4466	†	†	†	†		FUSE, CARTRIDGE: 2 amp; 250 v; 1 1/4 in lg x 1/4 in dia; Buss type No. AGC-2			2		
	6240-057-2887	†	†	†	†		LAMP LM-27: incandescent; 6-8 v, 0.25 amp miniature bayonet base			4		LM2 LM3
	6240-179-1812	†	†	†	†		LAMP, GLOW: 1/4 w, 65 v ac and 90 v dc striking v; 1 1/2 in lg o/a; double cont bayonet base; GE type NE-48			2		LM1
	5820-194-4978	†		†			OSCILLATOR-AMPLIFIER O-59/MRC, O-59A/MRC: RF; freq 1.5 to 1.8 mc; approx 0.5 w output; U.S. Army spec 71-3238		NX	1		
	5820-230-7304	†	†	†	†		POWER SUPPLY: Rectifier RA-20, RA-20-A,B; electronic type; output 250 v, unregulated DC at 75 ma, 150 v regulated DC at 20 ma, 12.5 v ac at 3 amp and 5 v ac at 3 amp; input 110 v ac 50-60 cyc; U.S. Army spec 71-3260		NX	2		
							JUNCTION BOX J-199/MRC-2					
	5920-160-4888						BLOCK, TELEPHONE PROTECTOR: 1 1/4 in lg x 3/8 in wd x 1/4 in thk o/a; Auto Elec part/dwg No. D-67030			6		
	5920-160-5208						BLOCK, TELEPHONE PROTECTOR: 2 carbon blocks with perforated acetate dielectric, sealed together; rect shape; 1 1/4 in lg x 3/8 in wd x 1/2 in thk o/a; Cookeco No. 41-1767			6		
	6140-240-2033						CHEST CH-109-A: 9 3/4 in wd x 11 1/2 in h o/a; Sig dwg No. SC-D-19199		NX	1		
	5920-240-4123						FUSE, PLUG: 25 amp; 1 time, med screw base; 1 7/32 in lg x 1 3/16 in dia; Fed spec No. W-F-831 type No. II			1		
							ANTENNA KIT MX-852/MRC-2					
	5940-194-7747						CLIP, ELECTRIC: fuse clip; 1 7/32 in lg x 7/8 in wd x 0.750 in h; o/a; 13/16 in jaw opening, 30 amp, 250 v; Littlefuse type No. 129001			24		
	8030-221-3826						INSULATING COMPOUND: sealing type paste; 8 oz			2		
	5985-405-0296						PLATE, MOUNTING: panel for resistor assy; Sig dwg No. SC-C-47958			1		
	5905-253-5276						RESISTOR, FIXED, COMPOSITION: 250 ohm ± 10%, 86 w, Globar type CX			12		

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5940-156-7302						TERMINAL LUG: ring type; for No. 10 AWG wire; 1 3/32 in lg x 1/2 in wd x 11/32 in h o/a; term hole 0.196 in dia, wire opening 5/64 in dia with clamping ears for 7/32 in dia			2		
	5940-549-9291						TERMINAL LUG: ring type; for No. 10 AWG; 1 3/32 in lg x 1/2 in wd x 11/32 in h o/a; term hole 0.264 in dia wire opening 3/32 in dia			4		
	6145-160-5114						WIRE W-128: ins; single No. 14 AWG cond	ft		20		
	6145-164-6934						WIRE, ELECTRICAL: bare; single No. 18 AWG (provides mechanical tying of spreader insulators to transmission of ant) Spec Fed No. QQ-W-341	ft		200		
							POWER SUPPLY PP-886					
	6145-284-0582						CABLE, POWER ELECTRICAL: 2 strand No. 10 AWG cond, 2 stranded No. 14 AWG cond; 0.510 in dia o/a; per Spec MIL-C-3432A, type CO-04AGFC			5		
	5920-351-7264						CAP ELECTRICAL: for fuseholder; 3/4 in lg x 21/32 in dia; Bussman part No. 9327			1		
	5920-280-3172						FUSE, CARTRIDGE: 1.6 amp, 250 v; 9/32 in dia x 1 1/4 in lg; Littlefuse cat No. 41301			1		F1
	6240-223-9100						LAMP, GLOW: 1/25 w, 65 v ac; 1 7/8 in lg; GE type No. NE-51			1		
							OSCILLATOR-AMPLIFIER O-59/MRC, O-59A/MRC					
	5960-188-3551						ELECTRON TUBE: JAN type 6AK6			1		V2
	5960-235-8215						ELECTRON TUBE: JAN type 6C4W			1		V1
							RUNNING SPARES AND ACCESSORY ITEMS					
							RADIO SET AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D					
							SHELTER (FSN 5410-392-3702) C/O SHELTER HO-17 OR HO-17A,B					
	5920-160-4888		†	†	†		BLOCK, TELEPHONE PROTECTOR: lightning prot; carbon block; 1 1/4 in lg x 3/8 in wd x 1/4 in thk o/a; Auto Elec part/dwg No. D-67030			20		
	5975-241-6236	†	†	†	†	†	CONNECTOR, CONDUCTOR: straight type; for 2 No. 8 AWG solid or stranded wires, approx 9/16 in dia oval head, with stud and head 7/8 in lg Burndy No. KS-15			10		
	5965-164-7259	†	†	†	†	†	HEADSET HS-30, HS-30A,B,C,D,E,F,G,H,J,K,L,M,R, AND U: magnetic, 250 ohm impedance		NX	1	17,11A	
	6240-186-3252	†	†	†	†		LAMP, INCANDESCENT: 12 v 50 w 4.2 amp; med screw base; 4 15/16 in h o/a; GE type No. 50A21			2		

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		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	6240-155-8634	†	†	†	†	†	LAMP, INCANDESCENT: 120 v 50 w; 0.42 amp; med screw base; 3 15/16 in h o/a; GE Mazda No. 50A/RS			6		
	5820-199-8842	†	†	†	†		MAST SECTION MS-49: ant Sig dwg No. SC-D-1241		NX	1		
	5820-155-8134	†	†	†	†		MAST SECTION MS-50: ant; Sig dwg No. SC-D-1241-2		NX	1		
	5820-155-8130	†	†	†	†		MAST SECTION MS-51: ant; Sig dwg No. SC-D-1241-3		NX	1		
	5820-155-8129	†	†	†	†		MAST SECTION MS-52: ant; Sig dwg No. SC-D-1241-4		NX	1		
	5820-156-1055	†	†	†	†		MAST SECTION MS-53: ant; Sig dwg No. SC-D-1241-5		NX	1		
	5820-199-8819	†	†	†	†		MAST SECTION MS-54: ant; Sig dwg No. SC-D-1241-6		NX	1		
	5820-199-8831			†	†	†	MAST SECTION MS-116, MS-116A: ant sect; Sig dwg No. SC-D-100588		NX	1		
	5820-199-8843			†	†	†	MAST SECTION MS-117, MS-117-A: ant sect; Sig dwg SC-D-100588		NX	1		
	5820-199-8841			†	†	†	MAST SECTION MS-118, MS-118-A: ant sect; 39 1/2 in lg x 0.246 in dia; Sig dwg No. SC-DL-100588		NX	1		
	5975-187-5301			†	†	†	ROD, GROUND: steel, zinc coated finish; 4 1/2 ft lg x 1/2 in dia; Hallicrafters part/dwg No. 74B454			1		
							AMPLIFIER AM-141/MRC, AM-141A/MRC, AM-141B/MRC					
	5960-108-0252	†	†	†			ELECTRON TUBE: JAN type 3B28			2		
	5960-116-9965	†	†	†			ELECTRON TUBE: JAN type 833A			2		V1 V2
	5960-188-0944	†	†	†			ELECTRON TUBE: JAN type 4B32			2		V5 V6
	6240-186-6594	†	†	†			LAMP LM-41: 110 v, 6 w, 0.50 amp; 1 7/8 in lg candelabra screw base; GE part No. 6S6			1		
	6240-155-7955	†	†	†			LAMP, INCANDESCENT: 2.0 v, 0.06 amp; approx 1 3/16 in lg o/a; miniature screw base; Mazda No. 48			1		
	5950-236-3876		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 4.5 to 5.7 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2355			1		L1
	5950-236-3875		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 3.5 to 4.5 mc; 5 1/2 in lg x 6 1/8 in h x 4 1/4 in wd; B and W part No. 2354			1		L1
	5950-236-3874		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 2.0 to 3.5 mc; 5 1/2 in lg x 6 1/8 in h x 4 1/4 in wd; B and W part No. 2353			1		L1
	5950-188-8818	†					TRANSFORMER, RADIO FREQUENCY: Coil C-448; plug-in type unshielded; 11.0 to 14.0 mc Hallicrafters dwg No. 51C543			1		L1
	5950-199-6236	†					TRANSFORMER, RADIO FREQUENCY: Coil C-447; plug-in type unshielded; 8.0 to 11.0 mc; Hallicrafters dwg No. 51C542			1		L1
	5950-188-8826	†					TRANSFORMER, RADIO FREQUENCY: Coil C-449; plug-in type, unshielded 14.0 to 18.0 mc; Hallicrafters dwg No. 51C544			1		L1
	5950-189-4990	†					TRANSFORMER, RADIO FREQUENCY: Sig Coil C-387-A; plug-in type; unshielded; 2.0 to to 3.5 mc; Hallicrafters dwg No. 51C538			1		L1

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											FIGURE NO	ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5950-263-0887	†					TRANSFORMER, RADIO FREQUENCY: Coil C-390-A; plug-in type unshielded 5.7 to 8.0 mc Hallicrafters dwg No. 51C541			1		L1
	5950-188-8810		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 12.6 to 18 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2359			1		L1
	5950-188-8803		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 11.0 to 12.6 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2358			1		L1
	5950-345-5966	†					TRANSFORMER, RADIO FREQUENCY: Coil C-389-A; plug-in type; unshielded; 4.5 to 5.7 mc			1		
	5950-263-0889	†					TRANSFORMER, RADIO FREQUENCY: Coil C-388-A; plug-in type; unshielded; 3.5 to 4.5 mc Hallicrafters dwg No. 51C539A			1		L1
	5595-236-3877		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 5.7 to 7.2 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2356			1		L1
	5950-188-8802		†	†			TRANSFORMER, RADIO FREQUENCY: plug-in type; unshielded; 7.2 to 11 mc; 5 1/2 in lg x 5 in h x 3 5/16 in wd; B and W part No. 2357			1		
	5950-243-3856	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 12.0 to 18.0 mc; 8 in lg x 8 5/16 in h x 7 in wd; B and W part No. 1909			1		L2
	5950-263-0872	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 2.6 to 3.6 mc approx 9 in lg x 7 in wd x 8 3/8 in h o/a; U.S. Electronic part No. 249			1		L2
	5950-263-0873	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 5.0 to 7.0 mc approx 8 1/2 in lg x 6 in wd x 7 1/2 in h o/a; U.S. Electronics part No. 251			1		L2
	5950-263-0874	†	†	†			TRANSFORMER, VARIABLE RADIO FREQUENCY: Plug-in type unshielded; 3.6 to 5.0 mc; approx 8 1/8 in x 6 in wd x 7 3/8 in h o/a; U.S. Electronics part No. 250			1		L2
	5950-263-0875	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type, unshielded; 2.0 to 2.6 mc approx 9 in lg x 7 in wd x 8 1/2 in h o/a; U.S. Electronics No. 248			1		L2
	5950-263-0876	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded 9.0 to 12.0 mc; approx 8 1/8 in lg x 6 in wd x 7 3/8 in h o/a; U.S. Electronics part No. 253			1		L2
	5950-263-0877	†	†	†			TRANSFORMER, VARIABLE, RADIO FREQUENCY: plug-in type; unshielded; 7.0 to 9.0 mc; approx 8 1/2 in lg x 6 in wd x 7 1/2 in h o/a; U.S. Electronics part No. 252			1		L2
							SHELTER (FSN 5410-356-2279) C/O SHELTER HO-17 AND COMPONENTS FOR OPERATION OF RADIO SET AN/MRC-2, 2A, 2B, 2C AND 2D					
	5920-170-3576	†	†				BLOCK, TELEPHONE PROTECTOR: lighting prot; bakelite body, with copper plate; 1 1/4 in lg x 3/8 in wd x 1/4 in thk; o/a; Cook Electric Co part No. 41-1907			10		
	5920-160-4888	†	†				BLOCK, TELEPHONE PROTECTOR: lightning prot; carbon black; 1 1/4 in lg x 3/8 in wd x 1/4 in thk o/a; Auto Elec part/dwg No. D-67030			10		

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		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	6240-155-8634	†	†				LAMP INCANDESCENT: 120 v, 50 w; 0.42 amp; med screw base; 3 15/16 in h; GE Mazda No. 50A/RS			6		
							SHELTER (FSN 5820-337-6942) C/O SHELTER HO-17 AND COMPONENTS (RECEIVING SHELTER)					
	5920-170-3576	†	†				BLOCK, TELEPHONE PROTECTOR: lightning prot; bakelite body with copper plate; 1 1/4 in lg x 3/8 in wd x 1/4 in thk; Cook Electric Co part No. 41-1907			10		
	5920-160-4888	†	†				BLOCK, TELEPHONE PROTECTOR: lightning prot; carbon block; 1 1/4 in lg x 3/8 in wd x 1/4 in tnk; o/a; Cook Electric Co No. 41-2001			10		
	5935-149-3981	†	†				CONNECTOR, PLUG ELECTRIC: Plug PL-259-A; 1 21/32 in lg; 1 rd male cont straight type; Navy dwg No. RF49F167			4		
	6240-155-8634	†	†				LAMP, INCANDESCENT: 120 v 50 w; med screw base; Hallicrafters part/dwg No. 39A001			7		
	5820-251-2366	†	†				MAST AB-155/U, AB-155A/U: Supports double Antenna		NX	2	39,19A	
	5820-199-8831	†	†				MAST SECTION MS-116, MS-116-A: ant sect; Sig dwg No. SC-DL-100588			2		
	5820-199-8843	†	†				MAST SECTION MS-117, MS-117-A: ant sect; Sig dwg No. SC-DL-100588			1		
	5820-199-8841	†	†				MAST SECTION MS-118, MS-118-A: ant sect; Sig dwg No. SC-DL-100588			1		
	5820-644-0990		†				RECEIVER, RADIO: Radio Receiver R-388/URR; A1, A2, A3 and F1 reception; 0.5 to 30.5 mc, 30 bands, mc ea band		NX	1		
	7510-255-1354	†	†				TAPE, PAPER, INK RECORDER: 8 1/2 in wd x 4 1/2 in od, approx 350 ft roll; 3 canary yellow copies; Spec UU-P-547c			23		
	5815-129-1922	†	†				TAPE, PAPER, INK RECORDER: 8 1/2 in wd approx 50 ft roll; canary yellow smooth finish; Fed spec UU-P-547c, type 1 Class A			23		
							RADIO RECEIVER ASSEMBLY OA-65/MRC-2 AND OA-65A/MRC-2					
	5960-188-8500	†	†	†	†		ELECTRON TUBE: JAN type 6C5			1		VT-65
	5960-188-5960	†	†	†	†		ELECTRON TUBE: JAN type 6F6			1		
	5960-114-3866	†		†			ELECTRON TUBE: JAN type 6J5			1		VT-94
	5960-188-8535	†	†	†	†		ELECTRON TUBE: JAN type 6K7			4		VT-86

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL 1	2	3	4	5	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ILLUSTRATIONS ITEM NO
		1	2	3	4	5	AN/MRC-2, AN/MRC-2A, 2B, 2C, 2D (continued)					
	5960-188-8527	†	†	†	†		ELECTRON TUBE: JAN type 6L7			1		VT-87
	5960-188-8637	†	†	†	†		ELECTRON TUBE: JAN type 6R7			1		
	5920-356-2188	†	†	†	†		FUSE, CARTRIDGE: 1/8 amp, 250 v; 1 1/4 in lg x 1/4 in dia; Littlefuse part No. 312.125			8		F2
	5920-280-4466	†	†	†	†		FUSE, CARTRIDGE: 2 amp; 250 v; 1 1/4 in lg x 1/4 in dia; Buss type No. AGC-2			5		
	6240-057-2887	†	†	†	†		LAMP LM-27: incandescent; 6-8 v, 0.25 amp miniature bayonet base			2		LM2, LM3
	6240-179-1812	†	†	†	†		LAMP, GLOW: 1/4 w, 65 v ac and 90 v dc striking v; 1 1/2 in lg o/a; double cont bayonet base; GE type NE-48			1		LM1
							JUNCTION BOX J-199/MRC-2					
	5920-160-4888						BLOCK, TELEPHONE PROTECTOR: 1 1/4 in lg x 3/8 in wd x 1/4 in thk o/a; Auto Elec part/dwg No. D-67030			6		
	5920-160-5208						BLOCK, TELEPHONE PROTECTOR: 2 carbon blocks with perforated acetate dielectric, sealed together; rect shape; 1 1/4 in lg x 3/8 in wd x 1/2 in thk o/a; Cookeco No. 41-1767			6		
	5920-240-4123						FUSE, PLUG: 25 amp; 1 time, med screw base; 1 7/32 in lg x 1 3/16 in dia; Fed spec No. W-F-831 type No. II			6		
							POWER SUPPLY PP-886					
	5920-280-3172						FUSE, CARTRIDGE: 1.6 amp, 250 v; 9/32 in dia x 1 1/4 in lg; Littlefuse cat No. 41301			5		F1
	6240-223-9100						LAMP, GLOW: 1/25 w, 65 v ac; 1 7/8 in lg; GE type No. NE-51			2		
							OSCILLATOR-AMPLIFIER O-59/MRC, O-59A/MRC					
	5960-188-3551						ELECTRON TUBE: JAN type 6AK6			3		V2
	5960-235-8215						ELECTRON TUBE: JAN type 6C4W			3		V1

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The Adjutant General.

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Colonel, United States Air Force,
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CURTIS E. LEMAY,
Chief of Staff, United States Air Force.

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Atlanta GENDEP (None)
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USAOMC (3)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
AMS (1)
Sig Fld Maint Shops (2)
JBUSMC (2)

Units org under fol TOE:
(2 each UNOINDC)

11-7
11-16
11-57
11-95
11-97
11-98
11-117
11-155
11-500 AA-AE (4)
11-557
11-587
11-592
11-597

NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

☆U. S. GOVERNMENT PRINTING OFFICE: 1961—610792/501

RADIO SETS AN/MRC-2C and AN/MRC-2D

TM 11-624A
TO 31R2-2MRC2-11
CHANGES No. 3

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D.C., *24 April 1962*

TM 11-624A/TO 31R2-2MRC2-11, 15 September 1955, is changed as follows:

ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

Page	Action	1	7
		Tools required for maintenance functions	Tool code
178	(Page 9 of C 2) Add column 7	TOOL EQUIPMENT TE-87/U	1

Page	Action	2	3					4	6	7	9
		Federal stock No.	Designation by model					Description	Expendability	Quantity authorized	Illustration
			1	2	3	4	5				Item No.
	(Page 12 of C 2) Add column 6.	5820-404-9452	---	---	---	---	---	JUNCTION BOX J-207/MRC-2: * * *	NX		
	(Page 12 of C 2) Add column 3.	5820-548-1686	†	†	†	†	†	POWER SUPPLY PP-886/G: * * *			
	(Page 13 of C 2) Add column 6.	5830-537-3617	---	---	---	---	---	JUNCTION BOX J-204/MRC-2: * * *	NX		
								AMPLIFIER AM-141/MRC, AM-141A/MRC, AM-141B/MRC			
	(Page 20 of C 2) Add item.	5920-537-6669	---	†	†	---	---	FUSE, CARTRIDGE: 8 amp, 125v, 1¼ in. lg x ¼ in. dia; Littlefuse type No. 312008.	------	2	F1, F2
	(Page 21 of C 2) Add column 3-1.	5950-188-8826	†	---	---	---	---	TRANSFORMER, RADIO FREQUENCY: * * *			
								SHELTER (FSN 5820-537-6942)			
	(Page 26 of C 2) Change heading column 4.	----------	---	---	---	---	---	C/O SHELTER HO-17 AND COMPONENTS (RECEIVING SHELTER).			
	(Page 28 of C 2) Change column 4.	5820-497-8602	---	---	---	---	---	CASE CY-517/MRC-2: * * *			
	(Page 29 of C 2) Add item.	5970-240-0617	†	†	---	---	---	INSULATION TAPE, ELECTRICAL: tape TL-192; two-ply synthetic rubber; adhesive ¾ in. wd x 0.045 in. thk, dark and white.	------	2	
								AMPLIFIER AM-141/MRC, AM-141A/MRC, AM-141B/MRC			
	(Page 33 of C 2) Add item.	5920-537-6669	---	†	†	---	---	FUSE, CARTRIDGE: 8 amp, 125v, 1¼ in. lg x ¼ in. dia; Littlefuse type No. 312008.	------	2	F1, F2
								SHELTER (FSN 5820-537-6942)			
	(Page 35 of C 2) Change heading column 4.	----------	---	---	---	---	---	C/O SHELTER HO-17 AND COMPONENTS (RECEIVING SHELTER).			

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EMC (1)
Yuma Test Sta (2)
USACA (3)
USASSA (20)
USASSAMRO (1)
USASEA (1)
USARCARIB Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
USA Corps (3)
Def Log Svc Cen (1)
JBUSMC (2)
Units organized under following TOE's (2 copies unless otherwise indicated):
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11–57
11–95
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11–597

NG: None.
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For explanation of abbreviations used, see AR 320–50.

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