DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TM11-624

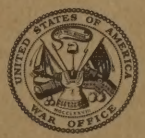
TO16-30MRC2-7

RADIO SETS

AN/MRC-2

AN/MRC-2A

AND AN/MRC-2B





DEPARTMENTS OF THE ARMY AND THE AIR FORCE

DECEMBER 1953

RADIO SETS AN/MRC–2, AN/MRC–2A, AND AN/MRC–2B

TM 11–624
TO 31R2–2MRC2–1
CHANGES No. 3

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *30 November 1956*

TM 11–624/TO 31R2–2MRC2–1, 18 December 1953, is changed as follows:

94.1 Antijamming Procedures for Radio Receiver BC–312 (*)

(Added)

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

a. Am Signals Jammed by Cw, Pulse, Fm, Bagpipe, or Other Type Sharp Noise Signals.

(1) Detune the receiver several degrees on either side of the desired signal, by using the VERNIER control knob. Some separation of the desired signals and the jamming signals may be effected.

(2) Turn the CRYSTAL PHASING control knob clockwise, about one-third of a turn to make the receiver more selective. Repeat the instructions in (1) above.

(3) Set the OFF-M.V.C.-A.V.C. control knob to the M.V.C. position. Repeat the instructions in (1) above. The desired signals may become readable.

(4) Position the transmitting shelter so that a large object such as a hill, tank, or tree is between the receiving antenna and the source of the jamming signals. The strength of the jamming signal at the antenna may be decreased and permit copy of the desired signal.

(5) If reception of the desired signals is still unsatisfactory after performing the above procedures, proceed as follows:

(*a*) Change to the alternate frequency and call sign. At each change to a different frequency, adjust the ALIGN INPUT control knob for maximum signal strength of the desired signal.

(*b*) Request the use of cw signals. These signals are less easily jammed.

(6) Vary the VOL control in both directions. This action may decrease the volume of the jamming signal and permit copy of the desired signal.

(7) If the jamming action is so thorough that reception is impossible, report the fact to the immediate superior officer. Continue to operate the equipment.

b. Cw Signals Jammed by Other Cw, Pulse, or Sharp Noise Signals.

(1) Set the C.W.-OSC. toggle switch to the OSC. position. Clearer signals may be obtained. If not, set the switch to the C.W. position. Continue moving the switch from one position to the other, at intervals. The desired signal may reach a degree of intelligibility whereby it may be copied.

(2) Repeat the instructions in *a*(1) through (4), (5)(*a*), (6), and (7) above.

(3) If it is possible, request the use of voice signals and repeat the instruction in *a*(1) above.

94.2 Antijamming Procedures for Radioteletype Reception

(Added)

a. At Radio Receiver Assembly OA–65(*)/MRC–2, follow the instructions in paragraph 94.1*a*.

b. At the dual diversity converter try to obtain legible reception as follows:

(1) Turn the BANDWIDTH switch to the NARROW position.
(2) Slowly vary the CHANNEL A FINE TUNING and/or the CHANNEL B FINE TUNING until best teletypewriter reception is obtained.
(3) If dual diversity is used, try channels A and B separately, and then in diversity reception, in addition to the procedures above.
(4) Use that type of operation which gives the best teletypewriter reception.

[AG 413.44 (15 Nov 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)
Sp Wpn Comd (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 Tng Cen (2)
POE (OS) (2)
Trans Terminal Comd (2)
Army Terminals (2)
OS Sup Agencies (2)
Army Elct PG (1)
Sig Fld Maint Shops (3)
Sig Lab (5)
ACS (3)
Mil Dist (1)
Units organized under following TOE's:
11-7C, Sig Co, Inf Div (2)
11-16C, Hq & Hq Co, Sig Bn, Corps or Abn Corps (2)
11-57C, Armd Sig Co (2)
11-127R, Sig Rep Co (2)
11-128C, Sig Depot Co (2)
11-500R, Sig Svc Org (2)
11-557C, 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: 1956

RADIO SETS AN/MRC–2, AN/MRC–2A, AND AN/MRC–2B

TM 11–624
TO 31R2–2MRC2–1
CHANGES No. 2

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON 25, D. C., *12 July 1956*

TM 11–624/TO 31R2–2MRC2–1, 18 December 1953, is changed as follows:

The following information changes TM 11–624/TO 31R2–2MRC2–1 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 162, paragraph 93.1*a*(3), line 2. (C 1). Change "OFF" to read: **MVC.**

Page 218. Section IV.

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 220, paragraph 151*b*. Add the following after the last sentence:

Capacitors C20 and C21 are not used on amplifiers bearing Order No. 21751–Phila–56.

Page 221, figure 133. 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 5,100 MMF ON AMPLIFIERS BEARING ORDER NO. 21751–PHILA–56.

[AG 413.44 (9 Jul 56)

Page 222, paragraph 151*e*. Add the following after the last sentence:

Capacitor C19 is not used on amplifiers bearing Order No. 21751–Phila–56.

Page 223, figure 134. 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 224, figure 136 (fold-out). Add the following after note 1:

ALSO APPLIES TO AMPLIFIERS BEARING ORDER NO. 21751–PHILA–56.

Page 253, figure 152. Upper right-hand corner. Delete arrow and call out PLATE CONTACTOR K4.

Page 259, figure 153. Add the following note:

THIS DOES NOT APPLY TO AMPLIFIERS BEARING ORDER NO 21751–PHILA–56.

Page 328, figure 162. Add the following to the "NOTES":

5. C19 C20, AND C21 NOT USED ON AMPLIFIERS BEARING ORDER NO. 21751–PHILA–56.
6. C1, C4, C5, C6, AND C7 ARE 51100 MMF ON AMPLIFIERS BEARING ORDER NO. 21751–PHILA–56.
7. C17 AND C18 ARE 10,000 MMF ON AMPLIFIERS BEARING ORDER NO. 21751–PHILA–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:

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CNGB (1)	Armies (5)	Army Terminals (2)	11–57C (2)
ASA (3)	Corps (2)	POE (OS) (2)	11–95R (2)
Tec Svc, DA (1) except CSIGO (30)	Ft & Cp (2)	OS Sup Agencies (2)	11–98R (2)
	Army Cml Cen (4)	Sp Wpn Comd (2)	11–127R (2)
Tec Svc Bd (1)	Gen & Br Svc Sch (5) except Sig Sch (25)	Sig Fld Maint Shops (3)	11–128R (2)
Hq CONARC (5)		Sig Lab (5)	11–500R (AA-AE) (2)
CONARC Bd (incl ea Test Sec) (1)	Gen Depots (2) except Atlanta Gen Depot (None)	Army Elct PG (1)	11–557C (2)
		Mil Dist (1)	11–587R (2)
Army AA Comd (2)		ACS (3)	11–592R (2)
OS Maj Comd (5)	Sig Sec, Gen Depots (10)	Units organized under following TOE's:	11–597R (2)
OS Base Comd (5)	Sig Depots (17)		
Log Comd (5)	US Army Tng Cen (2)	11–7C (2)	
MDW (1)	Trans Terminal Comd (2)	11–16C (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.

U. S. GOVERNMENT PRINTING OFFICE: 1956

RADIO SETS AN/MRC–2, AN/MRC–2A, AND AN/MRC–2B

TM 11–624
TO 31R2–2MRC2–1
CHANGES No. 1

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON 25, D. C., *27 October 1955*

TM 11–624/TO 31R2–2MRC2–1, 18 December 1953, is changed as follows:

93.1. Antijamming Procedures

(Added)

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

a. AM Signals Jammed by Cw, Pulse, FM, Bagpipe, or Other Type Sharp Noise Signals.

(1) Detune the jammed receiver, or receivers, several degrees on either side of the desired signal by using the VERNIER control knob. Some separation of the desired signals and the jamming signals may be effected.

(2) Operate the CRYSTAL PHASING control knob clockwise, about one-third turn. This control is on all Radio Receivers BC–342–(*) and some Radio Receivers BC–312–(*). Operation of the control renders the receiver very selective. Repeat the procedures given in (1) above.

(3) Operate the OFF-M. V. C.-A. V. C. control knob to the OFF position. Repeat the procedure given in (1) above. The desired signals may become readable.

(4) If a whip type antenna is in use, maneuver the equipment so that an object such as a hill, tank, jeep, or tree will be between the receiving equipment and the source of the jamming signals. Change the position of the antenna from a horizontal plane to that of vertical plane, or vice versa. Do this in gradual stages. The strength of the jamming signal may be decreased and permit copy of the desired signal.

(5) Change the direction, height, and length of a long wire antenna. This may permit separation of the jamming and desired signals. Repeat the procedure given in (1) above.

(6) If the reception of the desired signals is still unsatisfactory after performing the above procedures, proceed as follows:

(*a*) Request a change in frequency and call sign. Do this repeatedly if necessary. At each change to a different frequency, adjust the ALIGN INPUT control knob for maximum signal strength of the desired signal. It is not likely that the operator of the equipment at the source of the jamming signals will change frequency.

(*b*) Request the use of cw signals. These signals are jammed less easily.

(7) Vary the VOL control in both directions. This action may decrease the volume of the jamming signal and permit copy of the desired signal.

(8) If the jamming action is so thorough that communication is impossible, report the incident to the immediate superior officer and use another means to get the message through. Continue to operate the equipment.

b. Cw Signals Jammed by Other Cw, Pulse, or Sharp Noise Signals.

(1) Operate the CW–OSC toggle switch to the OSC position. Clearer desired signals may be obtained. If not, operate the switch to the CW position. Continue varying the switch from one position to the other at intervals. The desired signal may reach a degree of intelligibility whereby it may be copied.

(2) Repeat the procedures given in *a*(1) through (5), (6)(*a*), (7), and (8) above.

(3) If it is possible, request the use of voice signals and repeat the procedure in *a*(1) above.

c. Jammed Dual Diversity Converter.

(1) Perform the instructions outlined in *a* above.

(2) Turn the BANDWIDTH switch to NARROW position.

(3) Slowly vary the controls marked CHANNEL "A" FINE TUNING and/or CHANNEL "B" FINE TUNING until the best teletypewriter reception is obtained.

(4) If dual diversity is being used, try channel "A" and "B" separately, and then in diversity reception, in addition to all procedures indicated above.

(5) Use the type operation that gives the best teletypewriter reception.

[AG 413.44 (4 Oct 55)]

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.

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E. E. TORO,
Colonel, United States Air Force,
Air Adjutant General.

DISTRIBUTION:

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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)
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 (3)
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.

GPO 916016

TECHNICAL MANUAL
No. 11-624
TECHNICAL ORDER
No. 16-30MRC2-7

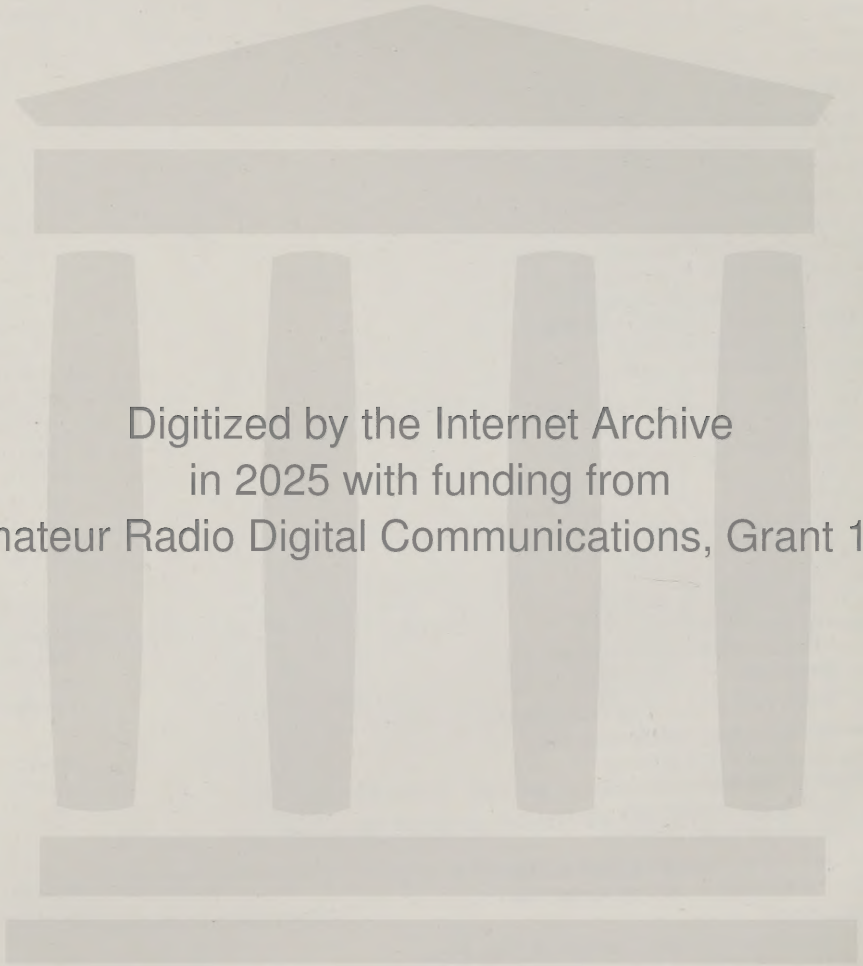
DEPARTMENTS OF THE ARMY
AND THE AIR FORCE

WASHINGTON 25, D. C., *18 December 1953*

RADIO SETS AN/MRC-2, AN/MRC-2A, AND AN/MRC-2B

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*This manual supersedes TM 11-624, 10 November 1947, including C 1, 24 August 1948, C 2, 2 March 1949, and C 3, 19 October 1951.



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WARNING

HIGH VOLTAGE

is used in the operation of
this equipment

DEATH ON CONTACT

may result if operating personnel
fail to observe safety precautions.

Be careful not to contact high-voltage connections or 115-volt input connections when working on or near this equipment. When working inside the equipment, after the power has been turned off, always short-circuit the high-voltage capacitors.

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:
Radio Transmitter BC–610–(*)
Amplifier AM–141(*)/MRC

ARTIFICIAL RESPIRATION

GENERAL PRINCIPLES

1. Seconds count! Begin at once! Don't take time to move the victim unless you must. Don't loosen clothes, apply stimulants or try to warm the victim. Start resuscitation! Get air in the lungs! You may save a life!

2. Place the victim's body in a prone position, so that any fluids will drain from the respiratory passages. The head should be extended and turned sideward *never flexed forward;* the chin shouldn't sag, since obstruction of the respiratory passages may occur.

3. Remove any froth or debris from the mouth with your fingers. Draw the victim's tongue forward.

4. Begin artificial respiration. Continue it rhythmically and without any interruption until natural breathing starts or the victim is pronounced dead. Try to keep the rhythm smooth. Split-second timing is not absolutely essential.

5. When the victim starts breathing, or when additional help is available loosen the clothing; remove it, if it's wet; keep the victim warm. Shock should receive adequate attention. Don't interrupt the rhythmical artificial technique for these measures. Do them only when you have help or when natural breathing has started.

6. When the victim is breathing, adjust your timing to assist him. Don't fight his efforts to breathe. Synchronize your efforts with his. After resuscitation, keep him lying down until seen by a physician or until recovery seems certain.

7. Don't wait for mechanical resuscitation! If an approved model is available, use it, but, since mechanical resuscitators are only slightly more effective than properly performed "push-pull" manual technique, *never* delay manual resuscitation for it.

BACK-PRESSURE ARM LIFT METHOD

1. *Position of Victim.* Place the victim in the prone (face-down) position. Bend his elbows; place one hand upon the other. Turn his face to one side, placing his cheek upon his hands.

2. *Position of Operator.* Kneel on your left or right knee, at the victim's head, facing him. Your knee should be at the side of the victim's head close to his forearm, your foot should be near his elbow. Kneel on both knees if you find it more comfortable, with one knee on each side of the head. Place your hands on the flat of the victim's back so that their heels are just below the lower tip of his shoulder blades. With the tip of your thumbs touching spread your fingers downward and outward. (See A)

3. *Compression Phase.* Rock forward until your arms are approximately vertical and allow the weight of the upper part of your body to exert a slow, steady, even, downward pressure upon your hands. This forces air out of the lungs. Keep your elbows straight and press almost directly downward on the back. (See B)

4. *Expansion Phase.* Release the pressure, avoid any finish thrust, and commence to rock backward slowly. Place your arms upon the victim's arms just above the elbows, and draw his arms upward and toward you. Apply just enough lift to feel resistance and tension at the victim's shoulders.

Don't bend your elbows. As you rock backward, the victim's arms will be drawn toward you. (The arm lift expands the chest by pulling on the chest muscles, arching the back and relieving the weight on the chest.) Drop the arms gently to the ground or floor. This completes the cycle. (See C and D). Now, repeat the cycle.

5. *Cycle Timing and Rhythm.* Repeat the cycle 10 to 12 times per minute. Use a steady uniform rate of Press, Release, Lift, Release. Longer counts of about equal length should be given to the "Press" and "Lift" steps of the compression and expansion phases. Make the "Release" periods of minimum duration.

6. *Changing Position or Operator.*

(*a*) Remember that you can use either or both knees or can shift knees during the procedure, provided you don't break the rhythm. Observe how you rock forward with the back-pressure and backward with the arm-lift. The rocking motion helps to sustain the rhythm and adds to the ease of operation.

(*b*) If you tire and another person is available, you can "take turns." Be careful not to break the rhythm in changing. Move to one side and let your replacement come in from the other side. Your replacement begins the "Press-Release" after one of the "Lift-Release" phases, as you move away.

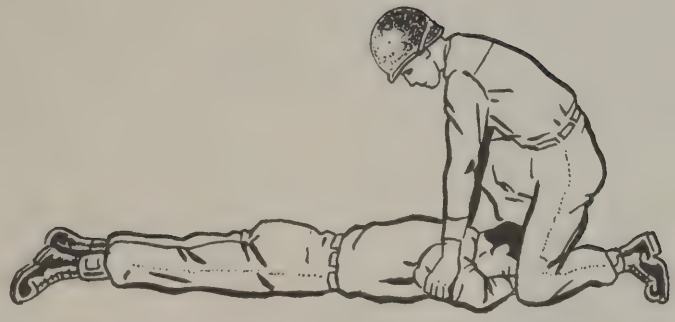
TM AR-3



A Position of operator and victim



B Compression phase



C Expansion phase (arm lift)



D Expansion phase (arm release)



Figure 1. Radio Set AN/MRC–2(*)

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

This technical manual contains instructions for the installation, operation, and maintenance of Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B (fig. 1). A chapter on theory, which develops the theory of individual circuits and components as part of the overall system, is included. Detailed theory and field maintenance instructions are included for all units and components not covered by individual technical manuals. In addition to these instructions, there are two appendixes containing a list of references and an identification table of parts.

2. Nomenclature

a. Radio Set AN/MRC–2, serial numbers 1 to 26, inclusive, produced by CSL (Coles Signal Laboratory), consists of Amplifier AM–141/MRC, Frequency Shift Exciter O–39/TRA–7, Dual Diversity Converter CV–31/TRA–7, Control Unit C–292/TRA–7, Radio Receiver Assembly OA–65/MRC–2, and associated teletypewriter equipments in addition to the components of a modified Radio Set SCR–399–A.

b. Most of the Radio Sets AN/MRC–2A, bearing serial numbers 1 to 87, inclusive, on Order No. 8975–Phila–46, consist of Amplifier AM–141A/MRC, Frequency Shift Exciter O–39A/TRA–7, Dual Diversity Converter CV–31A/TRA–7, Control Unit C–292A/TRA–7, Radio Receiver Assembly OA–65A/MRC–2, and associated teletypewriter equipments in addition to the components of a modified Radio Set SCR–399–A.

c. Eleven Radio Sets AN/MRC–2A on Order No. 8975–Phila–46 are supplied with the following components instead of the models indicated in *b* above:

(1) Control Unit C–292/TRA–7.
(2) Dual Diversity Converter CV–31/TRA–7.
(3) Frequency Shift Exciter O–39/TRA–7.
(4) Radio receiver assembly.

d. Amplifier AM–141B/MRC has been procured on Order No. 25495–Phila–49 for storage and issue purposes. It is directly interchangeable with Amplifier AM–141/MRC and AM–141A/MRC, and it may be issued with Radio Set AN/MRC–2(*) in place of either of the other models.

e. The following table lists the principal differences in nomenclature and serial numbers of components of most Radio Sets AN/MRC–2, –2A, and –2B.

Component	Radio set AN/MRC-2 (CSL equipment)		Radio set AN/MRC-2A			Radio set AN/MRC-2B		
	Nomenclature	Serial No. (inclusive)	Nomenclature	Serial No. (inclusive)		Nomenclature	Serial No. (inclusive)	
				Order No. 8975-P-46	Order No. 11779-P-48		Order No. 19624-P-50	Order No. 1908-P-51
Radio set	AN/MRC-2	1 to 26	AN/MRC-2A	1 to 87	88 to 94	AN/MRC-2B	1 to 135	1 to 26.
Frequency shift exciter	O-39/TRA-7	1 to 26	O-39/TRA-7	1 to 76	77 to 83	O-39B/TRA-7	1 to 135	
						O-39C/TRA-7		436 to 461.
Control unit	C-292/TRA-7	1 to 26	C-292A/TRA-7	1 to 76	77 to 83.	C-292B/TRA-7	1 to 135	143 to 168.
Dual diversity converter	CV-31/TRA-7	1 to 26	CV-31A/TRA-7	1 to 162	[a] 203 to 209	CV-31C/TAR-7	1 to 135	
						CV-31D/TRA-7		1 to 26.
Power unit (for dual diversity converter).	PP-193/TRA-7	1 to 26	PP-193A/TRA-7	1 to 162	[a] 203 to 209	PP-193A/TRA-7	1 to 135	504 to 529.
Oscillator (tone for dual diversity converter).	O-41/TRA-7	1 to 26	O-41A/TRA-7	1 to 162	[a] 203 to 209	O-41A/TRA-7	1 to 135	504 to 529.
Amplifier	AM-141/MRC	1 to 26	AM-141A/MRC	1 to 87	88 to 94	AM-141A/MRC	1 to 135	
						AM-141B/MRC		34 to 59.
Antenna support (for transmitting antenna).	AB-38/CR	None	AB-38A/CR	None	None	AB-38B/CR	None	None.
Radio receiver assembly	OA-65/MRC-2	Below 45	OA-65A/MRC-2	1 to 174	175 to 188	OA-65A/MRC-2	1 to 270	277 to 328.
Control box	C-345/MRC-2	None	C-345A/MRC-2	1 to 87	88 to 94	C-345A/MRC-2		262 to 287.
Rectifier	RA-20-A	Below 130	RA-20-B	1 to 313	314 to 341	RA-20-B	1 to 270	1,029 to 1,132.
Oscillator amplifier	O-59/MRC	Below 40	O-59/MRC	1 to 174	175 to 188	O-59A/MRC	1 to 135	142 to 192.
Operating table	FN-22/MRC-2	1 to 26	FN-22/MRC-2	30 to 116	117 to 123	FN-22/MRC-2		
Operating table	FN-23/MRC-2	1 to 26	FN-23/MRC-2	30 to 116	117 to 123	FN-23/MRC-2		
Speech amplifier	BC-614-E					BC-614-H (BC-614-I on Order No. 1908-P-51).	1 to 135	436 to 461.
Antenna tuning unit	BC-939-A		BC-939-A			BC-939-B	1 to 135	1,408 to 1,433.
Radio transmitter	BC-610-E		BC-610-E			BC-610-H (BC-610-I on Order No. 1908-P-51).	1 to 135	101 to 126.
Rectifier power unit	RA-133		RA-133			RA-133-A		1, 993 to 2,018
Reperforator transmitter	TG-26-A		TG-26-A			TT-56/MGC		975 to 1,000.
Teletypewriter	TG-7-B		TG-7-B			TT-55/MGC		2,084 to 2,161.
Rectifier	RA-63		RA-63-C			RA-63-E		973 to 998.
Shelter	HO-17		HO-17			HO-17-A		406 to 481.
Rectifier	RA-87		RA-87			RA-87		

[a] Serial No. 163 to 202 on Order 12702-Phila-47.

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

Radio Set AN/MRC–2(*): Basic, A, and B models.
Frequency Shift Exciter O–39(*)/TRA–7: Basic, A, B, and C models.
Amplifier AM–141(*)/MRC: Basic, A, and B models.
Radio Transmitter BC–610–(*): E, H, and I models.
Rectifier RA–63–(*): Basic, C, and E models.
Rectifier Power Unit RA–133–(*): Basic and A models.
Shelter HO–17–(*): Basic and A models.
Dual Diversity Converter CV–31(*)/TRA–7: Basic, A, B, C, and D models.
Radio Receiver Assembly OA–65(*)/MRC–2: Basic and A models.
Control Box C–345(*)/MRC–2: Basic and A models.
Control Unit C–292(*)/TRA–7: Basic, A, and B models.
Antenna Support AB–38(*)/CR: Basic, A, and B models.
Antenna Tuning Unit BC–939–(*): A and B models.
Oscillator-Amplifier O–59(*)/MRC: Basic and A models.
Rectifier RA–20–(*): Basic, A, and B models.
Power Unit PE–95–(*): G and H models.
Chest CH–120–(*): Basic, A, and B models.
Chest CH–88–(*): Basic, A, B, and C models.
Chest CH–89–(*): Basic, A, and B models.
Chest CH–109–(*): Basic and A models.

g. Official nomenclature followed by ( ) is used to indicate all models of equipment regardless of procurement.

h. Since each model of the radio set indicated in Radio Set AN/MRC–2(*) is made up of a number of component equipments, the technical publications listed in paragraphs 2 and 5, appendix I, should be used as reference during operation of the radio set.

3. Forms and Records

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

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

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

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

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. 107).

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. 108).

f. DA Form 11–262, Operator First Echelon Maintenance Check List for Signal Corps Equipment—Teletype Central Office Set, will be prepared in accordance with instructions on the back of the form (fig. 109).

g. DA Form 11–263, Second and Third Echelon Check List for Signal Corps Equipment—Teletype Central Office Set, will be prepared in accordance with instructions on the back of the form (fig. 110).

h. 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 RTT (Radioteletype) station with a transmitter power output of approximately 2 kw (kilowatts) and capable of operating over a frequency range of 2 to 18 mc (megacycles). Figure 1 illustrates this radio set arranged for use as a semipermanent station.

b. The complete radio set is transportable and requires three 2½-ton 6 x 6, cargo trucks. Each truck carries a Shelter HO–17–(*). One shelter contains the transmitting equipment; one contains the receiving equipment; and another 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 oversea shipment, these components are stored in the operating shelter. Three Power Units PE–95–(*) with trailers and one spare Power Unit PE–75–( ) without a trailer are furnished with the radio set. The Power Unit PE–95–(*) from either the receiving or the operating shelter can be replaced with Power Unit PE–75–( ) and used as a spare for the transmitting shelter power unit.

c. Radio Set AN/MRC–2(*) provides RTT communication in either net or point-to-point operation. RTT operation is on an FS (frequency shift) basis on either a full-duplex, a half-duplex, or a one-way reversible circuit. The radio set will provide emergency c-w (continuous-wave) communication at ranges up to 1,000 miles. Voice operation within a range of 100 miles or more may be achieved by disconnecting Amplifier AM–141(*)/MRC and connecting Radio Transmitter BC–610–(*) directly to the transmitting antenna. On an emergency basis, a whip or long wire transmitting antenna may be used. 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.

5. Technical Characteristics

a. Transmission.

Frequency range	2 to 18 mc.
Type of signal	Normal: FS radioteletype. Emergency: C-w on full power or c-w and voice without Amplifier AM–141(*)/MRC.
Distance range	1,000 miles or more depending on conditions of terrain, ionosphere, atmosphere, and frequency.
Type of modulation	Normal: FS (850 cycles). Emergency: C-w and a-m (amplitude modulation).
R-f output	2 kw (approx).
Antenna	Normal: Doublet or rhombic. Emergency: Whip or long wire.

b. Reception.

Frequency range	1.5 to 18 mc.
Type of signal	Normal: FS radioteletype. Emergency: C-w and voice.
Type of modulation	Normal: FS (850 cycles). Emergency: C-w and a-m.
Antenna	Normal: Two Doublets on a dual diversity basis. Emergency: Whip on a single-channel basis, receiving c-w or voice.

c. Power Requirements.

Input:	
Transmitter shelter	7.5 kw (approx).
Receiving shelter	2.5 kw (approx).
Operating shelter	2 kw (approx).
Source	115 volts 60 cycles a-c.

6. Table of Components for Radio Set AN/MRC–2(*)

The following tables list the components that are supplied with the radio set. Some of the radio sets may have components that differ from those listed below. These differences may appear because the latest replacement part does not necessarily have to be identical in nomenclature with the original component as listed in the table of components.

a. Transmitting Shelter.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Shelter HO–17–(*)	1	66. 5	74. 6	138	397	
Air Duct MX–665/MRC (installed)	1					
Chest CH–120–(*) containing	1	22. 6	17	50	11. 1	
Lamp housing assembly	5					
Key J–37	1					
Loudspeaker LS–3	1					
Junction Box JB–70–A	1					
Speech Amplifier BC–614–(*)	1					
Cord CX–141/MRQ–2	1					
Cord CX–142/MRQ–2	1					
Cord CX–143/MRQ–2	1					
Cord CD–201 (Key J–37 cord)	1					
Microphone T–17–( )	1					
Microphone T–45	1					
Headset HS–30–( )	2					
Cord CD–318–( )	1					
Cord CD–605	1					
Cord CD–1019 or CD–607	1			120		
Cord CD–1251	1			48		
Cord CD–565	1					
Cord power lamp housing	1					
Microphone T–50	1					
Telephone EE–8–( )	1					
Radio Receiver BC–312–( )	1					
Box BX–19	1					
Tube, type 6C5	1					
Tube, type 6K7	1					
Tube, type 6L7	1					
Tube, type 6R7	1					
Lamp LM–27	2					
Fuse FU–21A	4					
Chest CH–109–(*) containing	1	11. 75	9. 25	25. 5	1. 6	
Battery BB–221/U	2 (6-v)					
Fuse, 115-v, 25-amp, plug type	1					
Frequency Shift Exciter O–39(*)/TRA–7	1					
Cord CX–962/TRA–7	1			48		
Cord CX–961/TRA–7 (red)	1					
Cord CX–961/TRA–7 (blue)	1					
Pick-Up Antenna AT–137/MRC–2	1					
Junction Box J–207/MRC–2	1					
Junction Box J–199/MRC–2	1					
Cord CD–764	1			180		
Cord CD–659	1			126		
Cord CD–763	1			168		
Cord CG–389/U	1			72		
Cord CG–390/U	1			36		
Power Cable Assembly CX–1165/U or Cord CX–136/MRC–1	1			144		
Rectifier RA–63–(*)	1					
Frame FM–59	1	14. 25	16. 75	19	2. 62	
Wire W–110–B or WD–1/TT (on Reels DR–4)	2					
Radio Transmitter BC–610–(*)	1					
Tuning Charts for BC–610–(*) sets	2					
Amplifier AM–141(*)/MRC	1					
Antenna Tuning Unit BC–939–(*)	1					
Cord CG–65/MRC–1	1			48		
Cord CX–911/U	1			72		
Cord CX–135/MRC–1	1					

a. Transmitting Shelter—Continued

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Capacitor, vacuum, 12-$\mu\mu$f	1					
Capacitor, vacuum, 55-$\mu\mu$f	1					
Cable assembly, r-f	1					
Canopy CW–153/U	1	5	3. 5	64	647	
Cord CD–652	1			1, 200		
Cord CD–335	1					
Power Cable Assembly CX–1166/U or Cord CX–137/MRC–1	1			1, 200		
Skid Equipment MX–157/U (stored outside of shelter)	1					
Chest CH–89–(*) containing	1	14. 75	19. 0	78. 0	12. 6	
Oil, lubricating, 4-oz	1					
Strap, battery lift	1					
Hydrometer HY–2	1					
Assembly, lead and clamp	3					
Lamp, trouble, 12-v (less bulb)	1					
Lamp, rough service (50-w, 115-v)	12					
Lamp (50-w, 12-v)	2					
Strap ST–19–A	3					
Torch TL–130	1					
Soldering Iron TL–120	1					
Mast Base MP–48 or AB–15/GR	1					
Rope RP–5	1			600		
Pliers TL–370/U	2					
Friction Tape TL–83	3					
Rubber Tape TL–192	1					
Wrench, ½-in. Allen	2					
Wrench, #6 Allen	2					
Wrench, #8 Allen	2					
Solder M–31, 1 lb	1					
Screwdriver TL–21	1					
Pliers TL–103, diagonals w/cutters	1					
Screwdriver TL–359/U	1					
Wrench, 8-in. adjustable	1					
Axle RL–27–B	1					
Knife TL–29	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	2					
Mast Section MS–117	2					
Mast Section MS–118	2					
Anti-Corona ball	2					
Lamp, trouble, 115-v, w/25-ft extension cord	2					
Tube, type OD3	1					
Tube, type 2A3	2					
Tube, type 5Z3	2					
Tube, type 6L6Y	1					
Tube, type 6V6Y	1					
Tube, type 100TH	2					
Tube, type 250TH	1					
Tube, type 807	2					
Tube, type 3B28 or 866A	2					
Tube, type 6J5	1					
Tube, type 6SN7GT	1					
Tube, type 6SR7	1					
Tube, type 6SQ7	1					

a. Transmitting Shelter—Continued

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Chest CH–89–(*) containing—Continued						
Tube, type 80	1					
Bracket, bumper	1					
Brush, bench	1					
Adapter, RF, UG–27B/U	1					
Kit of hardware	1					
Mast Base Bracket MP–50–( ) w/mtg hardware	1					
Capacitor CA–423, 50-$\mu\mu$f	2					
Test Set TS–297/U	1					
Flashlight TL–122–D	1					
Claw Hammer TL–39	1					
Screwdriver (Stanley #121)	2					
Wrench, #10 Allen cap screw	2					
Kit, relay tool (in a box)	1					
Adjuster, spring (.015 slot)	1					
Adjuster, spring (.032 slot)	1					
Burnisher TL–557/U	1					
Burnisher, contact (WECo 266B)	6					
Burnisher, contact (WECo 266C)	6					
Spring Tension Gage TL–560/U	1					
Ring, for holding six thickness gages (.008, .010, .013, .015, .017, and .047)	1					
Wrench, double-end box	1					
Speaking tube assembly	1					
Chest CH–88–(*) containing	1	18. 25	12. 75	56. 5	7. 6	
Tank Coil C–387–D	2					
Tank Coil C–388–C	2					
Tank Coil C–389–C	2					
Tank Coil C–390–C	2					
Tank Coil C–447–B	2					
Tank Coil C–448–B	2					
Tank Coil C–449–B	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					
Fuse FU–50, 250-v, 3-amp	6					
Fuse, 250-v, 6-amp	6					
Fuse, 125-v, 20-amp	6					
Fuse, 125-v, 25-amp	12					
Lamp LM–27 (6–8-v, 250-ma) type GE #44	2					
Lamp LM–41, 115-v, 6-w	2					
Tube, type 3B28 or 866A	2					
Case CY–521/MRC–2 containing	1	32. 75	12. 75	56. 5	13. 6	
Frequency Meter BC–221–( )	1					
Capacitors, vacuum (55-$\mu\mu$f, +2 −5 $\mu\mu$f)	1					
Coil, r-f (2.6–3.6 mc)	2					
Coil, r-f (3.6–5 mc)	2					
Coil, r-f (2–2.6 mc)	2					
Coil, r-f (5–7 mc)	2					
Coil, r-f (7–9 mc)	2					
Coil, r-f (9–12 mc)	2					
Coil, r-f (12–18 mc)	2					
Light indicator, type WN–98	2					

a. Transmitting Shelter—Continued

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Case CY—521/MRC–2 containing—Continued						
Lamp, 2-v, .06-amp, Mazda #48	12					
Lamp, 110-v, 6-w, 5–6 clear, LM–41	6					
Tool, neutralizing, type WN–99	1					
Tube, type 833A	2					
Lamp, glow (105–120-v, 1/25-w, type NE–51)	1					
Lamp, glow (105–125-v, 1/4-w, type NE–45)	2					
Tube, type OC3	4					
Tube, type 5R4GY	2					
Tube, type 6AL5	2					
Tube, type 6E5	2					
Tube, type 6SA7GT	2					
Tube, type 6SA7Y	3					
Tube, type 6AG7	2					
Block, carbon protector	6					
Lead, electrical ground	2					
Tube, type 4B32 or 872A	2					
Rectifier Power Unit RA–133–(*)	1					
Cord CG–319/U	1			28		
Cord CG–391/U	1			36		
Cord CG–392/U	1			7		
Connector UG–87/U	1					
Connector MX–195/U	1					
Fuse FU–50, 250-v, 3-amp	20					
Lamp LM–52, 6–8-v, .15-amp	2					
Lamp LM–53, 12–16-v, .1-amp	2					
Tube, type 6X5GT	1					
Tube, type OD3	1					
Output cable	1					
Antenna Kit MX–852/MRC–2	1					
Case CY–520/MRC–2 containing	1	34	12	18	4.25	
Connector, solderless	30					
Cord CG–145/MRC–1	2			1,200		
Insulator, spreader	14					
Tape, measuring	1			1,200		
Assembly, wire and reel	1					
Wire, W–128 or equal, 1,000-ft	1					
Reel DR–8–A	1					
Technical Manual 11–624	1					
Technical Manual 11–257	1					
Technical Manual 11–333	2					
Technical Manual 11–359	2					
Technical Manual 11–850	1					
Technical Bulletin 11–300–3	2					
Technical Manual 11–826	2					
Technical Manual TM 11–957	2					
Technical Manual TM 11–962	2					
Technical Manual TM 11–5054	2					
Technical Manual 11–2201	2					
Technical Manual 11–2222	2					
Technical Manual 11–2223	2					
Technical Manual 11–2620	2					
Technical Manual 11–352	2					
Chest CH–112 containing	1					
Cord CO–316	2			100		
Cord CO–313	1			1,200		
Tube, flexible nozzle	3					

a. Transmitting Shelter—Continued

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Box BX–19–( ) containing	1					
Fuse FU–27, 250-v, 2-amp	3					
Lamp LM–27	2					
Tube, type 5Y3GT	1					
Fuse FU–21A, 250-v, 10-amp	1					
Tube, type 6C5	1					
Tube, type 6F6	1					
Tube, type 6K7	2					
Tube, type 6L7	1					
Tube, type 6R7GT	1					

b. Receiving Shelter.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Shelter HO–17–(*)	1	66. 5	74. 6	138	397	
Radio Receiver Assembly OA–65–(*)/MRC–2	2					
Oscillator-Amplifier O–59–(*)/MRC–2	1					
Rectifier RA–20–(*)	4					
Loudspeaker LS–3	2					
Frame FM–59–A	1	14. 25	16. 75	19. 0	2. 62	
Wire W–110–B or WD–1/TT on Reels DR–4	2					
Control Box C–345(*)/MRC–2	1					
Cord CD–135–A	1					
Telephone EE–8–( )	1					
Cord CD–1251	1			48		
Dual Diversity Converter CV–31(*)/TRA–7	1					
Cord CX–953/TRA–7 (blue)	1					
Cord CG–406/TRA–7	2					
Cord CX–952/TRA–7 (red)	1					
Cord CX–954/TRA–7	1			72		
Cord CX–955/TRA–7	2					
Adapter M–359 (modified)	1					
Key J–37	1					
Cord CD–132 or CD–133	1					
Teletypewriter TT–55/MGC or TG–7–B	1					
Bag BG–198	1					
Cabinet CY–493/MRC–2 containing		60	24. 69	24. 69	21. 2	
Board, clip	1					
Brush, bench	1					
Lead, electrical	2			120		
Cord CD–135–A	1					
Cord CD–605	3					
Cord CX–918/MRC–2	1					
Mucilage, 4-oz	2					
Clip, chart (WECo #5B)	3					
Clip, paper (Ideal Pattern) box	2					
Clip, paper (type 1, class A) (box of 100)	2					
Cloth, textile (cheese) 36 in. wide, type 2, Class B, 3 yd lg	2					
Kit, relay tool w/box	1					
Burnisher TL–557/U	1					
Burnisher, contact (WECo 265C)	6					
Burnisher, contact (WECo 266C)	6					
Spring Tension Gauge TL–560/U	1					

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight lb
Cabinet CY–493/MRC–2 containing—Continued						
Ring, holder for six thickness gages (.008, .010, .015, .017, and .047)	1					
Fuse, cartridge, FU–64 (1A)	10					
Tube, type 6SL7GT	2					
Fuse, FU–37, 250-v, 3-amp	30					
Lamp LM–52	4					
Tube, type OD3	2					
Tube, type 5R4GY	2					
Tube, type 5Y3GT	4					
Tube, type 6C4	1					
Tube, type 6AK6	1					
Tube, type 6SJ7	2					
Tube, type 6V6GT	2					
Tube, type 6H6	4					
Tube, type 6SA7GT	4					
Tube, type 6SJ7Y	6					
Tube, type 6SL7GT	4					
Tube, type 6SQ7	2					
Tube, type 6Y6G	2					
Headset HS–30–( )	3					
Key J–45	1					
Lamp, 120-v, 50	1					
Lamp, trouble (115-v w/25-ft cord)	1					
Mast Base MP–65–( ) or MP–48	1					
Mast Base Bracket MP–50–( ) w/mtg hardware and leads	1					
Block, telephone protector	6					
Plugs PL–258	2					
Plugs PL–259	4					
Oil, machine, 4-oz						
Paper, teletypewriter	22					
Paper, teletypewriter (multicopy)	22					
Pencil M–139	12					
Pencil M–140	24					
Fuse FU–27, 250-v, 2-amp	3					
Tube, type OA2	4					
Tube, type 5Y3GT	1					
Fuse FU–21–A, 25-v, 10 amp	9					
Tube, type 6C5	1					
Tube, type 6F6	1					
Tube, type 6K7	2					
Tube, type 6L7	1					
Tube, type 6R7GT	1					
Tube, type 6J5	2					
Wire, hookup, ft	50					
Wire W–11, two-conductor #12 (25 ft)	1					
Tape, teletypewriter, blank recording (rolls)	120					
Tape TL–83	2					
Tape TL–192	2					
Solder M–31, 1-lb	1					
Fuse, 125-v, 1.6-amp, plug type	3					
Ribbon, typewriter	3					
Eraser, typewriter w/brush	6					
Adapter M–359 (modified)	3					
Technical Manual 11–624	2					
Technical Manual 11–352	1					
Technical Manual 11–333	1					
Technical Manual 11–850	1					

b. Receiving Shelter—Continued

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Cabinet CY–493/MRC–2 containing—Continued						
Fuse, 250-v, ⅛-amp, type 3AG	2					
Canopy CW–153/U	1	5	3. 5	64	. 647	
Power Cable Assembly CX–1165/U or Cord CX–136/MRC–1	1			144		
Receiving Antenna Mast Assemblies	8					
(Refer to par. 12*b* for description of mast assemblies supplied with the various models of Radio Set AN/MRC–2(*))						
Mast Section MS–116–A (transmitter) stored in receiving shelter	6					
Mast Section MS–117–A (transmitter) stored in receiving shelter	2					
Mast Section MS–118–A (transmitter) stored in receiving shelter	2					
Reel RL–31–C	1					
Tool Equipment TE–113	1					
Waste basket (fiber)	1					
Skid Equipment MX–157/U stored outside the shelter	1					
Box BX–19–A containing:	2	3. 75	4	13		
Fuse FU–27, 250-v, 2-amp	6					
Lamp LM–27	4					
Tube, type 5Y3GT	2					
Fuse FU–21–A, 25-v, 10-amp	2					
Tube, type 6C5	2					
Tube, type 6F6	2					
Tube, type 6K7	4					
Tube, type 6L7	2					
Tube, type 6R7GT	2					
Fuse, 250-v, ⅛-amp, type 3AG	2					
Case CY–519/MRC–2 containing:	1	11. 6	21. 5	35	5. 06	
Reel Assembly RL–122/GRA–4 w/antenna wire	4					
Tape, measuring 100 ft	1					
Case CY–517/MRC–2 containing:	1	21. 75	21. 4	19. 75	5. 3	
Reel DR–5	1					
RF Cable Assembly CG–557/U, 500-ft. roll or Cord CG–338	2					
Chest CH–112 containing:	1					
Cord CO–316	2			94		
Cord CO–313–A	1			1, 200		
Tube, flexible nozzle	3					

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c. Operating Shelter.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Shelter HO–17–(*)	1	66. 5	74. 6	138	397	
Case CY–495 (for message forms)	1	8. 5	10. 25	33. 5	1. 735	
Telephone EE–8–( ) w/connecting cord	2	10. 25	4. 25	8	. 20	
Case CY–494/MRC–2 containing	1	30. 5	13. 75	15	3. 64	
Brush, bench	1					
Fuse, FU–50, 3-amp	20					
Board, clip	1					
Lamp, LM–52, Mazda #47	4					
Blocks, protector, carbon	14					
Tube, type 5R4GY	2					
Cheesecloth	2			108		
Tube, type 6H6	2					
Clip, paper (box of 12)	2					
Tube, type 6SJ7Y	3					
Clip, paper (box of 100)	2					
Tube, type 6SJ7Y	4					
Lead, electrical ground braid	2			120		
Tube, type 6V6GT	4					
Patch Cord CC–66	6					
Tube, type 6X5GT	4					
Patch Cord CC–68	2					
Tube, type 6Y6G	4					
Tube, type OD3	2					
Tube, type OC3	2					
Fuse, 125-v, 1.6-amp, plug type	12					
Lamp, 115-v, 50-w, rough service	11					
Cord CD–338	2			140		
Paper, bond, white ream	5		8½	10½		
Trouble lamp, 115-v, w/(25-ft cord)	1					
Fuse, 250-v, 15-amp	5					
Mucilage, 4-oz	2					
Fuse, 250-v, ½-amp	4					
Oil, lubricating, preservative, 4-oz	2					
Wire W–11, 2-conductor #12 roll	1			300		
Pencil M–139 (indelible)	12					
Pencil M–140	34					
Ribbon, teletypewriter	9					
Solder, M–31, 1-lb	1					
Tape TL–83 (friction)	2					
Tape TL–192 (rubber)	2					
Technical Manual 11–262	2					
Technical Manual 11–333	1					
Technical Manual 11–352	2					
Technical Manual 11–624	2					
Technical Manual 11-2201	2					
Technical Manual 11–359	2					
Wire, hook-up (stranded #18)	50					
Clip, chart (WECo #5B)	3					
Plug, three-prong	1					
Tool Equipment TE–50 (in case)	1	14. 75	6. 0	19. 5	1. 0	
Frame FM–59 (for wire reels)	1	14. 25	5. 75	13. 5	2. 62	
Wire W–110–B or WD–1/TT on Reels DR–4	2					
Case CY–496/MRC–2 (for used tape)	1					
Cable, 2 conductor (Tirex 27 in. lg w/plug)	1					
Junction Box J–204/MRC–2	1					

c. Operating Shelter—Continued

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu ft)	Unit weight (lb)
Perforator-Transmitter TT–56/MGC or Reperforator-Transmitter TG–26–A containing:	1					
Bag BG–199	1					
Transmitter distributor	1					
Bag BG–200	1					
Teletypewriter TT–55/MGC or TG–7–B	2					
Bag BG–198	1					
Typewriter MX–322/U	1	14. 25	16. 75	19	. 64	
Rectifier RA–87	1					
Line Unit BE–77–( )	2					
Time Stamp MC–181–A	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					
Control Unit C–292B(*)/TRA–7	1					
Antenna Support AB–38(*)/CR	4					
Canopy CW–153/U	1	5	3. 5	64	. 64	
Electrical Power Cable Assembly CX–1165/U or Cord CX–136/MRC–1	1			144		
Cord CX–918/MRC–2	1			300		
Skid Equipment MX–157/U	1					
Chest CH–112 containing	1					
Cord CO–316	2			100		
Cord CO–313–A	1			1, 200		
Tube, flexible nozzle	3					

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

7. System Application

The primary function of Radio Set AN/MRC–2(*) is to provide high-speed point-to-point radio-teletype circuit facilities for the handling of large volumes of both tactical and administrative traffic by taking advantage of ideal transmission periods. Additional functions of the radio set enable it to operate as part of a net of three or more similar radio sets, or as a point-to-point facility, by means of c-w telegraphy, manual FS telegraphy, or a-m voice. The latter types of operation usually are utilized as emergency measures or when the radio set must communicate with other stations having a similar type of operation. A typical system application of the radio set is illustrated in figure 2, where Radio Set AN/MRC–2(*) is shown in communication (by RTT) with a mobile Radio Set AN/GRC–26A, and is maintaining periodic contact (when not in actual communication with Radio Set AN/GRC–26A) with a mobile Radio Set AN/GRC–38 by means of manual c-w telegraphy and a-m voice. In addition, as shown in figure 2 and as described in detail in paragraph 93, the radio set can serve as the terminal of an extension circuit, either for c-w, a-m, or RTT operation. The radio set can serve also as an intermediate radio relay station, to supplement any point-to-point station which might at the time be unable to communicate with its outlying station (par. 38)

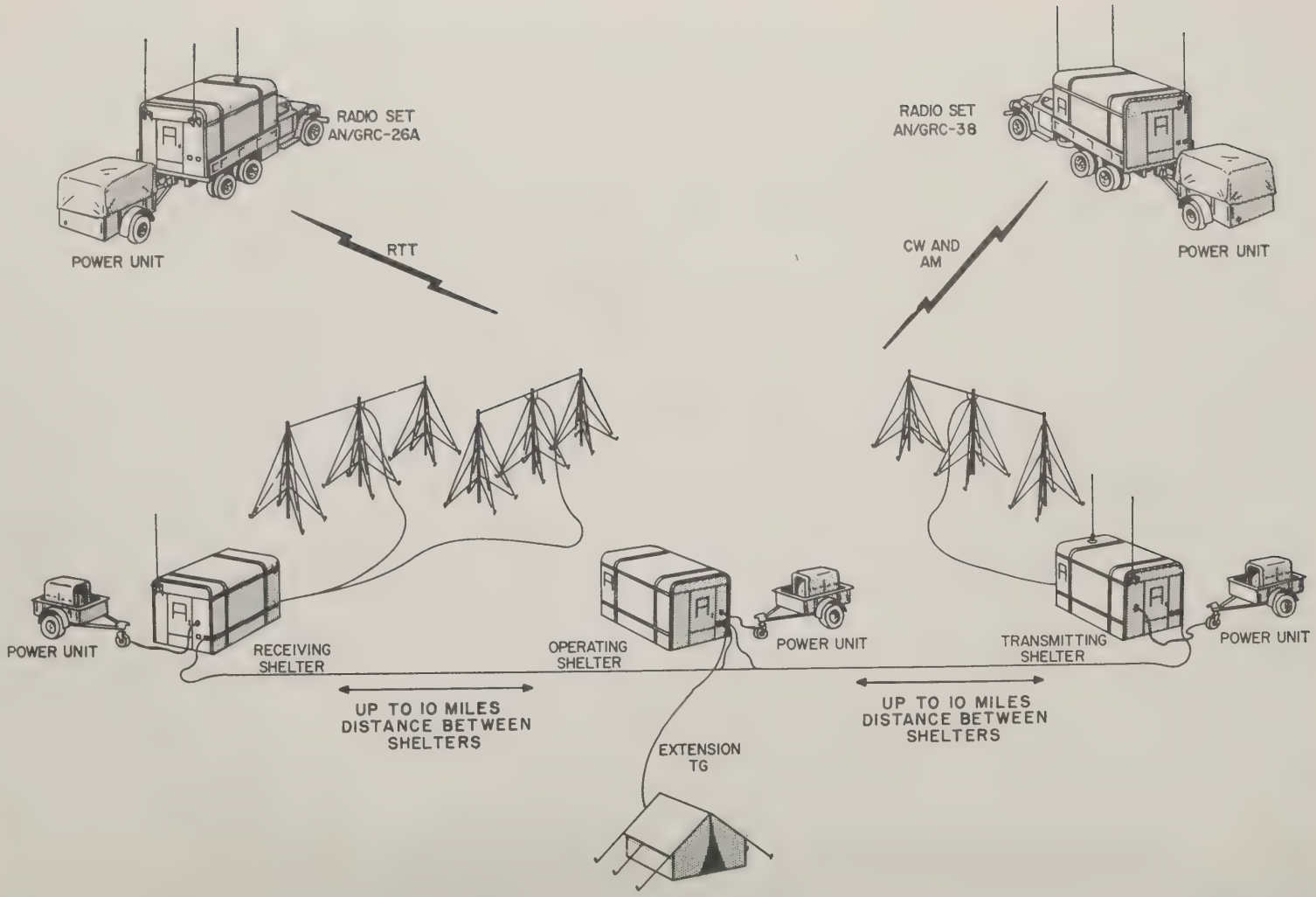


Figure 2. Radio Set AN/MRC-2(*), system application.

8. Transmitting Shelter

The transmitting shelter houses the equipment necessary for the transmission of RTT 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 components housed within it.

a. Housing. Shelter HO–17–(*) is used as the housing for all transmitting shelter equipment (fig. 3). Shelter HO–17–(*) is a steel and plywood structure designed for mounting 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 also with a built-in louver assembly for ventilation. Lighting is provided by four ceiling fixtures. Chest CH–120–(*), which opens up to provide an operating table, houses some of the components. This chest is located along the roadside wall.

b. Junction Box JB–70–A (fig. 4). Junction Box JB–70–A is located in Chest CH–120–(*) (fig. 3). Power for the transmitting shelter is connected by a cable fed through a fair-lead in the rear wall to Junction Box JB–70–A, which serves as the power distribution point and control center for the shelter components.

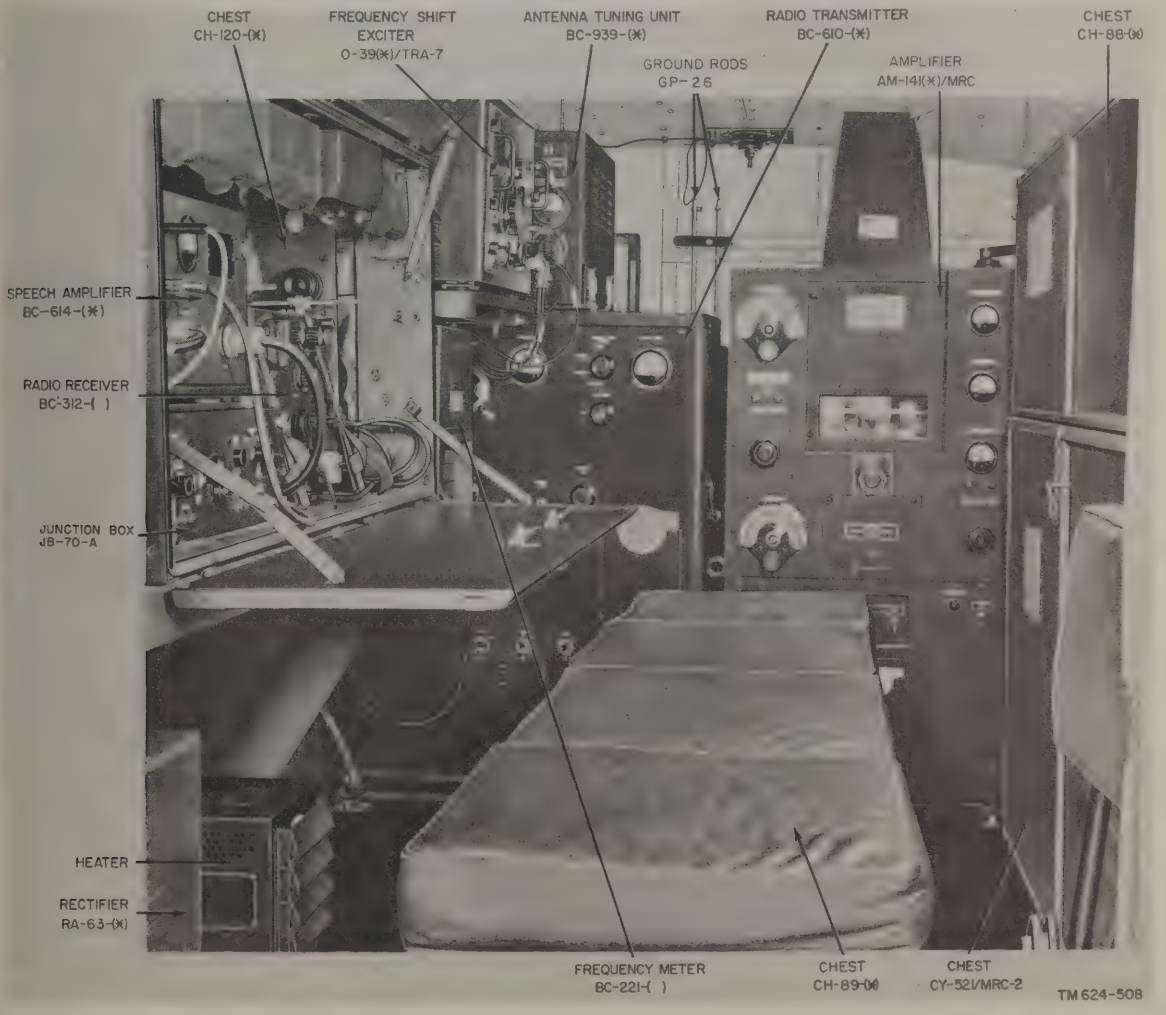


Figure 3. Radio Set AN/MRC–2(*), interior view of transmitting shelter.



Figure 4. Junction Box JB–70–A and Speech Amplifier BC–614–I.

c. Speech Amplifier BC–614–(*) (fig. 4). Speech Amplifier BC–614–(*) is shock-mounted directly to the top of Junction Box JB–70–A. Four hasps on the sides of the amplifier cabinet anchor it securely to the shock mount. The basic purpose of the speech amplifier is to raise a microphone output to a level suitable to drive the input of the audio circuit in Radio Transmitter BC–610–(*). It also provides sidetone for headset monitoring of c-w transmissions.

d. Radio Receiver BC–312–( ). Radio Receiver BC–312–( ), shock-mounted to Chest CH–120–(*), is located to the right of Junction Box JB–70–A and the speech amplifier (fig. 3). This receiver, which operates from a 12-volt d-c (direct-current) source, is used to monitor the local transmitter or to receive c-w or a-m (voice) signals on a two-way emergency communication basis. A dynamotor, located in the radio receiver, converts the 12-volt d-c source to the required plate voltage necessary for operation of the receiver circuits. The ALT. SIG. ANT. connector is connected to Mast Base MP–48 or AB–15/GR, or is mounted on the shelter wall by Wire W–128 or equal.

e. Frequency Shift Exciter O–39(*)/TRA–7 (fig. 5). Frequency Shift Exciter O–39(*)/TRA–7, shock-mounted to a shelf on the roadside wall, is located to the right of Chest CH–120–(*) (fig. 3). This FS exciter, assembled on a single chassis, is housed in a black enameled sheet metal cabinet provided with a metal pocket. This pocket holds the calibration chart used to set approximately the oscillator tuning and FS dial. The FS exciter output is connected by a cord to the transmitter tuning unit crystal socket, and controls the frequency of the transmitter for mark and space signals. An audio monitoring circuit, built into this unit, provides a means, in conjunction with a frequency meter, for continuously checking the amount of FS of the transmitter.

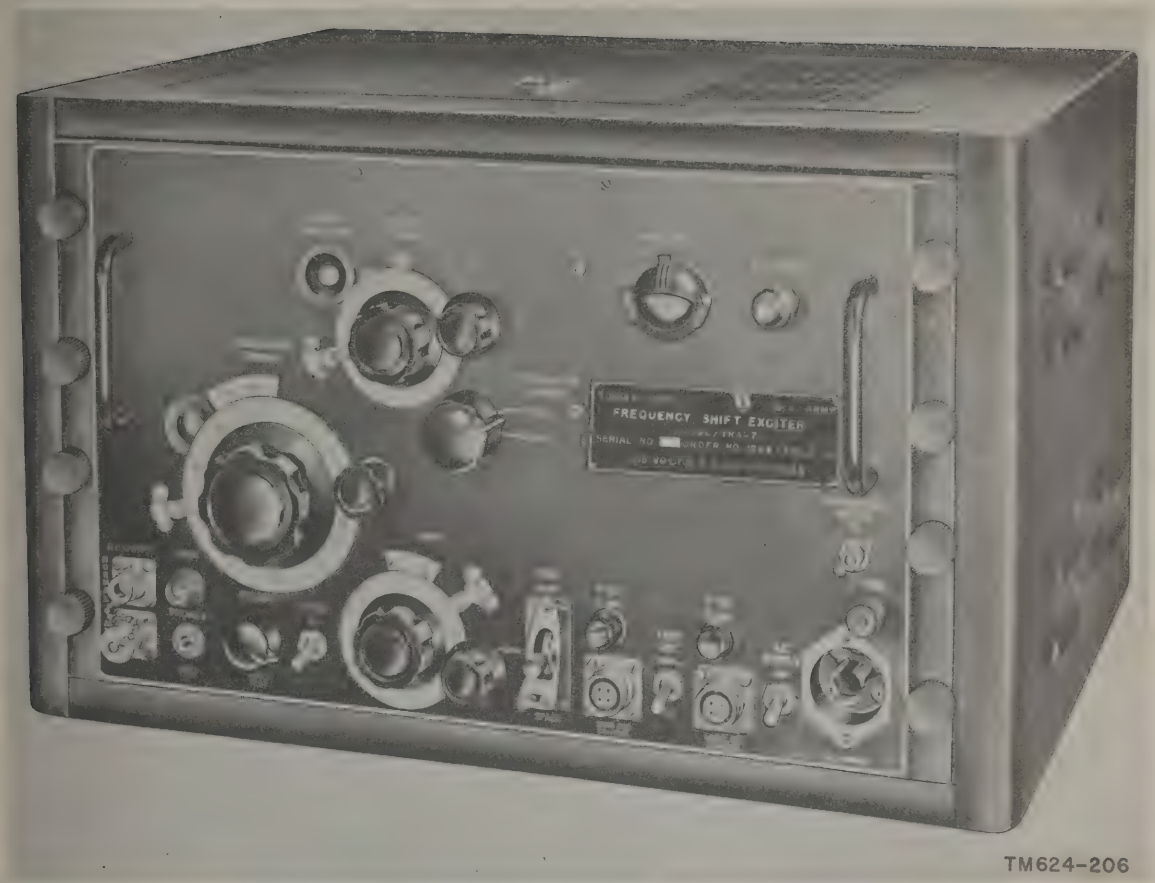


Figure 5. Frequency Shift Exciter O–39C/TRA–7.

f. Radio Transmitter BC–610–(*) (figs. 6 and 7).

(1) Radio Transmitter BC–610–(*), secured to a cradle frame by wrench nuts, is located in the front end of the shelter (fig. 3). The transmitter consists of three decks inclosed 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 RTT signals operating over a frequency range of 2 to 18 mc. The frequencies developed by the FS exciter (2 to 6 mc) are multiplied or amplified in the transmitter to a range of 2 to 18 mc. In an emergency, the master oscillator or crystal oscillator in the radio transmitter is available for cw with Amplifier AM–141(*)/MRC or am (voice) and cw without the amplifier.

(3) Normal operation is the transmission of RTT signals in conjunction with Amplifier AM–141(*)/MRC. The transmitter alone with the transmitting doublet, or with Antenna Tuning Unit BC–939–(*) which uses a whip or long wire antenna, is used when voice communication is desired.

g. Antenna Tuning Unit BC–939–(*) (figs. 6 and 7). The antenna tuning unit is mounted and secured to the top of the radio transmitter by four wingnuts. The output of the transmitter is connected to the tuning unit by a coaxial cable, and the output of the antenna tuning unit is connected to a whip or long wire antenna. The purpose of this component is to match the impedance of the antenna to the impedance of the transmitter r-f (radio-frequency) output circuit.

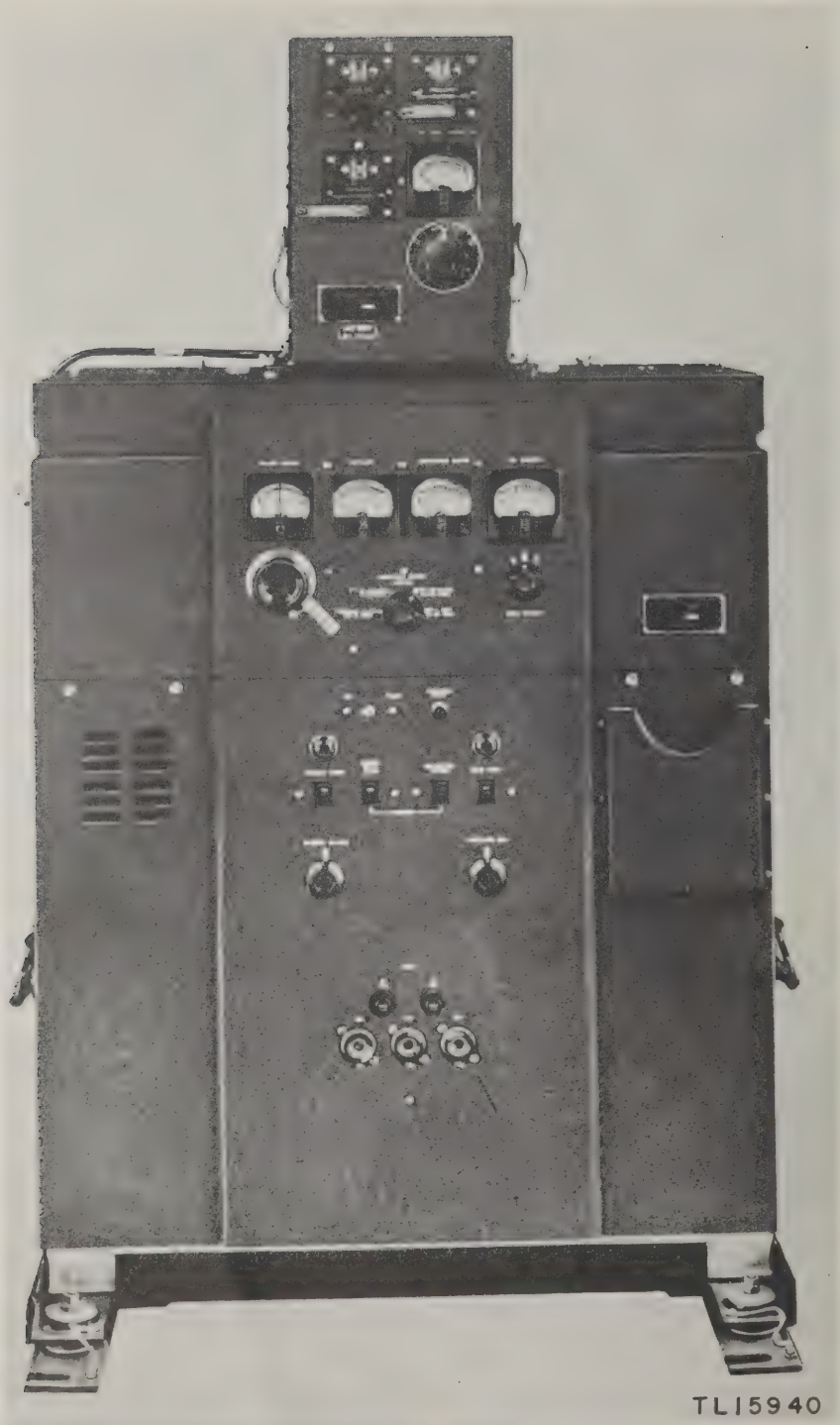


Figure 6. Radio Transmitter BC–610–E and Antenna Tuning Unit BC–939–A.



Figure 7. Radio Transmitters BC–610–H, –I, and Antenna Tuning Unit BC–939–B.

h. Amplifier AM–141(*)/MRC (figs. 8 and 9).

(1) Amplifier AM–141(*)/MRC is bolted to a cradle frame shock-mounting base which is anchored to the floor beside the radio transmitter (fig. 3). Air Duct MX–665/MRC 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 which open the plate power circuit. A metal bar, actuated by the plate coil access door, discharges the filter capacitors when the door is opened. Power is brought in directly from the power unit, by a cable through a feed-through connector in the rear wall.

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

(3) Air Duct MX–665/MRC exhausts the unwanted hot air generated in the amplifier. A control allows the air to be



Figure 8. Amplifiers AM–141/MRC and AM–141A/MRC.



Figure 9. Amplifiers AM–141A/MRC on Order No. 19624–Phila-50 and AM–141B/MRC.

exhausted either inside or outside the shelter, according to the operator's choice.

i. Rectifier RA–63–(*) (fig. 10). Rectifier RA–63–(*), located on the floor under Chest CH–120–(*), is connected to Junction Box JB–70–A (fig. 3). Ac (alternating current) from the junction box is converted to dc which supplies a charging current to the batteries in Chest CH–109–(*).

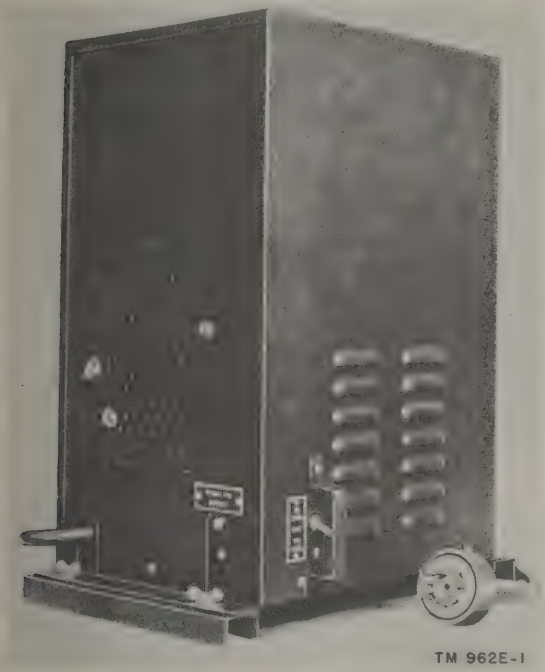


Figure 10. Rectifier RA–63–(*).

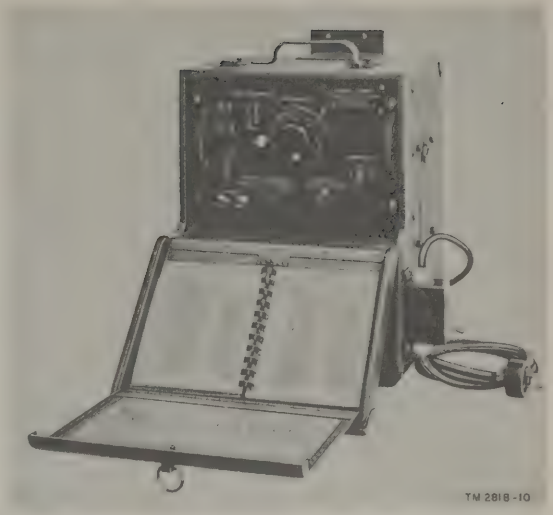


Figure 11. Frequency Meter BC–221–AK.

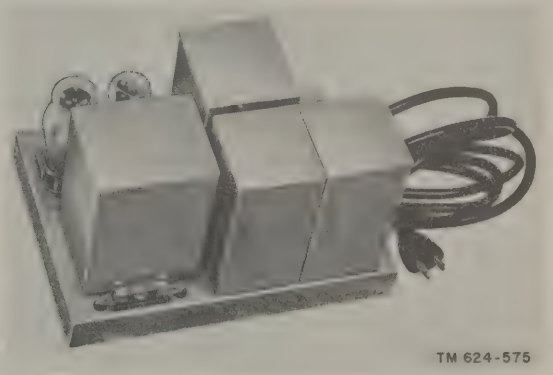


Figure 12. Power Supply PP–79/U.

j. Frequency Meter BC–221–( ) (fig. 11). The frequency meter, inclosed in a metal or wood housing, is located on a shelf to the right of Chest CH–120–(*) and directly beneath the FS exciter (fig. 3). This component is used to tune the transmitter to the assigned frequency and to check the FS of the transmitter output.

k. Power Supply PP–79/U (fig. 12). This rectifier is installed in the frequency meter case and supplies the necessary power for operating the frequency meter. The power cord attached to the unit plugs into an a-c outlet. A 1-ampere fuse protects the primary of the power transformer from damage due to overloads. This power supply may be found in some of the frequency meters issued with the early models of Radio Set AN/MRC–2(*).

l. Rectifier Power Unit RA–133–(*) (fig. 13). The rectifier power unit chassis is mounted in the frequency meter case in the battery compartment. This unit supplies the necessary voltages for the operation of the frequency meter. The power cord contains a metal box which is mounted on the side of the case. This metal box contains a pilot lamp and a switch. Rectifier Power Unit RA–133–(*) is supplied with the newer models of Radio Set AN/MRC–2(*).

m. 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 provide for connection of the telephone, the control, and the teletypewriter signal lines coming from the operating shelter. Line protection is afforded by lightning protector blocks and a ground strap.

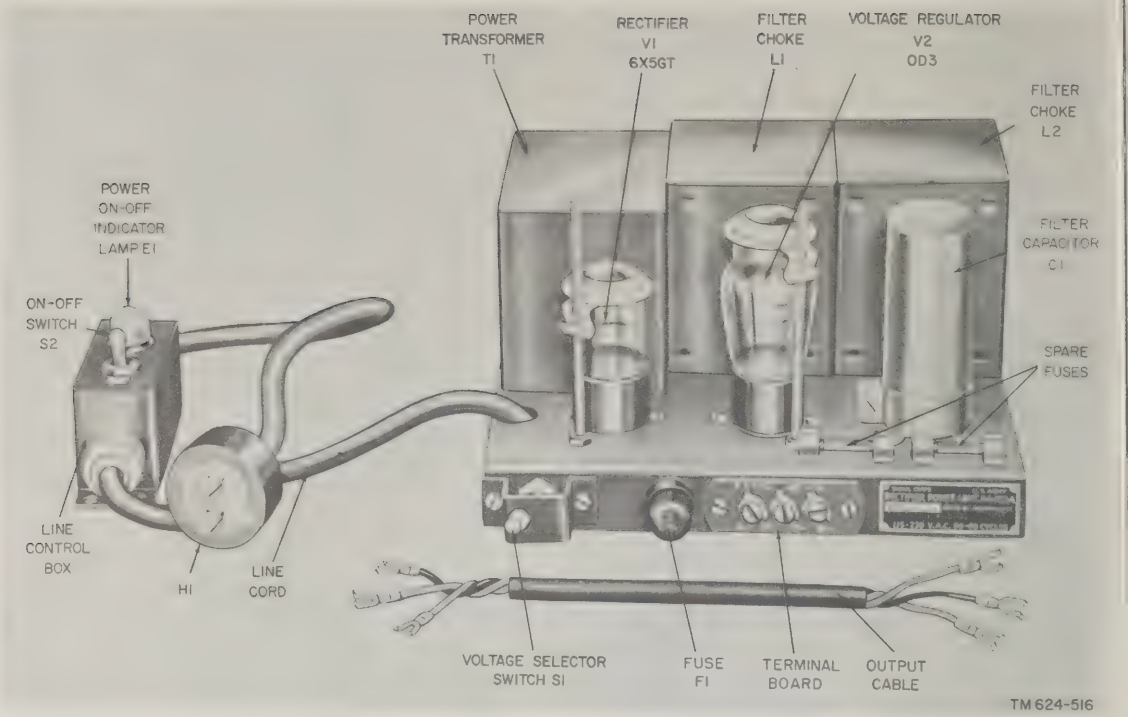


Figure 13. Rectifier Power Unit RA–133–A.

n. Junction Box J–207/MRC–2. Junction Box J–207/MRC–2 is located on the roadside shelter wall, under the shelf below the FS exciter. This junction box provides jacks and connectors for a control cable, telephone, cords to the FS exciter, and a telegraph key.

o. Loudspeaker LS–3 (fig. 14). Loudspeaker LS–3, a permanent-magnet type speaker, housed in a steel case, is mounted on the roadside wall, at the rear of the shelter. An impedance-matching transformer (voice coil to 8,000 ohms impedance) mounted inside the case serves to match the output impedance of the radio receiver to the impedance of the voice coil. This loudspeaker is connected by a cord to Radio Receiver BC–312–( ).

p. Microphones (fig. 15). The following microphones are used for voice modulation of the transmitter, through the speech amplifier.

(1) *Microphone* T–17–( ). Microphone T–17–( ) 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. This microphone is plugged into the CARBON MIC. 1 jack of the speech amplifier.



Figure 14. Loudspeaker LS–3.

The microphone matches a 35- to 90-ohm circuit.

(2) *Microphone T–45.* Microphone T–45 is a lightweight, noise-canceling, single-button microphone. The T–45 is equipped with a harness which loops around the ears of the operator and positions the microphone directly in front of the lips. Microphone T–45 is designed for use under a gas mask, for voice transmission in noisy locations, and for any application where free use of the hands is necessary. The impedance of this microphone is between 50 and 125 ohms. This microphone is plugged into the speech amplifier CARBON MIC. 1 jack.

(3) *Microphone T–50.* Microphone T–50 is a dynamic, high-impedance (21,000 ohms), hand microphone. It is provided with a 6-foot cord which terminates in a three-pin coaxial type 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. This microphone is connected to the DYNAMIC MIC. 2 connector of the speech amplifier.

q. Telephone EE–8–( ) (fig. 16). Telephone EE–8–( ) is encased in a weatherproofed canvas or leather case and is installed in a bracket in Chest CH–120–(*). The handset is provided with a switch for talking or for listening and connected by a cord to the terminals at the top of the telephone proper. Turning the handle generates the power for ringing. Two Batteries BA–30 (not supplied with the telephone) are fixed in position when the handpiece has been removed from the case. Each battery is held in place by a coil spring. Telephone EE–8–( ) is used to communicate with the other shelters.

r. Headset HS–30–( ) (fig. 17). Headset HS–30–( ) is a light-weight headset of 256 ohms impedance. Cord CD–605, which includes a matching transformer, 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 to exclude outside noises. The headband is adjustable to the contour of the operator's head. The headset is used mainly in setting up and adjusting the FS exciter. It also may be used in the PHONES output of the radio receiver.

s. Key J–37 (fig. 18). Key J–37 is a manually operated telegraph key with a three-way adjustable lever and two binding posts. Keying posi-

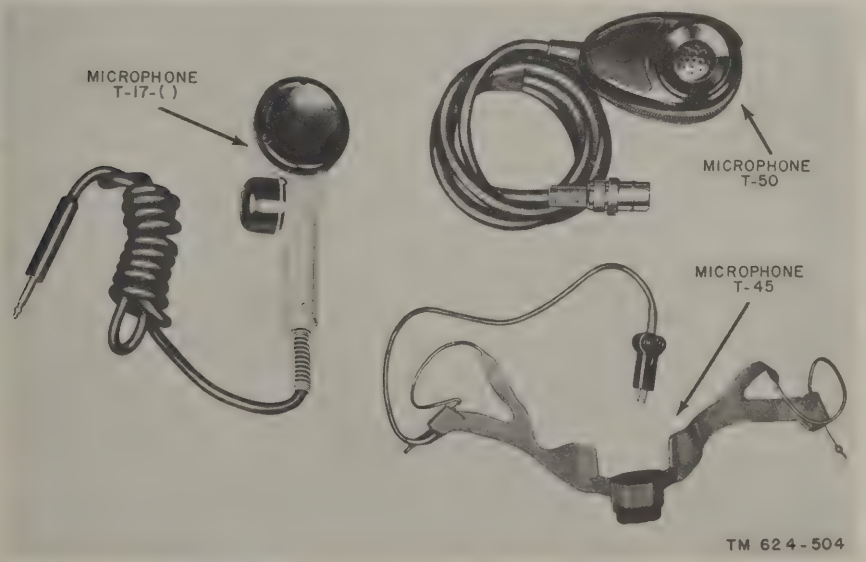


Figure 15. Microphones T–17–( ), T–45, and T–50.



Figure 16. Telephone EE–8–B.

tions are at the speech amplifier and at Junction Box JB–70–A and Junction Box J–207/MRC–2.

t. 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. 3). In it are stored the articles listed under Case CY–521/MRC–2 in the table of components (par. 6*a*). Most of the items stored in this case are spares and operating components for the r-f amplifier.

(2) *Chest CH–88–*(*). Chest CH–88–(*) is mounted directly upon Case CY–521/MRC–2 and is secured to the curbside wall by hasps (fig. 3). Two sliding doors on the front of the chest provide access to the interior compartments where transmitter timing units, coil units, amplifier coil units, and other items are stored. A complete listing of the contents is given under Chest CH–88–(*) in the table of components (par. 6*a*).

(3) *Chest CH–89–*(*). This chest is mounted by wing bolts to the floor of the shelter (fig. 3). The top of the chest is divided into three parts. Each part is provided with a seat cushion for the convenience of the operators. Under each cushion is a compartment used for storage of 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 paragraph 6*a*.

(4) *Chest CH–120–*(*). This chest, mounted on the roadside wall, houses Junction Box JB–70–A, Speech Amplifier BC–614–(*), Radio Receiver BC–312–( ), and Telephone EE–8–( ) (fig. 3). It also contains some storage shelves. The lower hinged door folds down and provides an operating table. The top hinged door folds upward for access to the storage shelves.

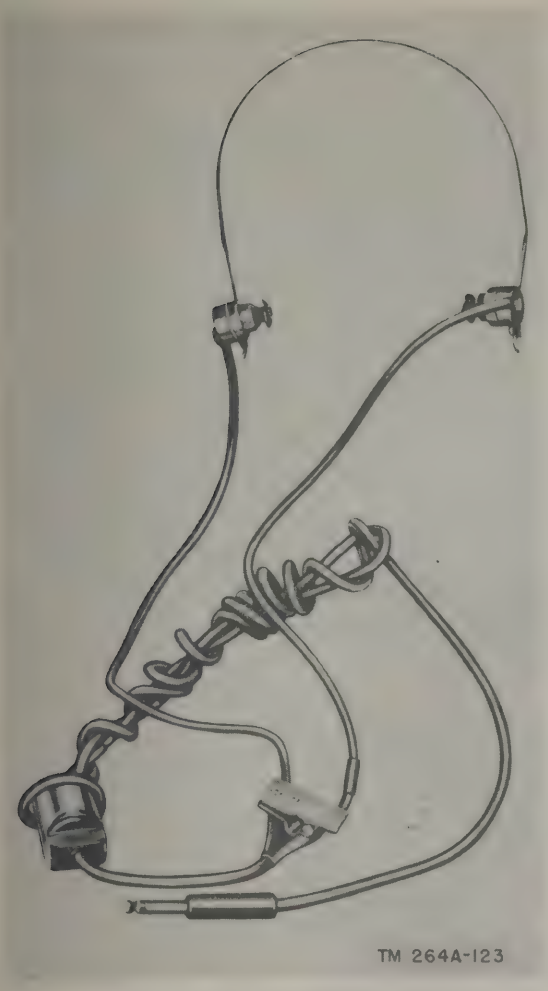


Figure 17. Headset HS–30–U.

(5) *Case CY–520/MRC–2.* Case CY–520/MRC–2 is stored on the shelter floor. The contents of the case, principally technical manuals, are listed under Case CY–520/MRC–2 in the table of components (par. 6*a*).

(6) *Case CY–495/MRC–2.* Case CY–495/MRC–2 is a six-compartment shelf assembly built into Chest CH–120–(*). The case serves as a file for message forms.

(7) *Chest CH–109–*(*). This chest, containing two 6-volt storage batteries connected in series, is located under Chest CH–120–(*) near the transmitter. This 12-volt d-c source supplies power to Junction Box JB–70–A for operating the relay in the junction box and power for operating Radio Receiver BC–312–( ).

u. Multimeter TS–297/U (fig. 19). Multimeter TS–297/U is a multirange test instrument for measuring a-c or d-c voltage, d-c milliamperes, and resistance. With the addition of 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 are supplied with the multimeter. Multimeter TS–297/U is used for the maintenance and repair of electronic equipment.

v. Clock (fig. 20). 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.

w. Heater (fig. 21). An electric heater is located near the front door and is secured per-

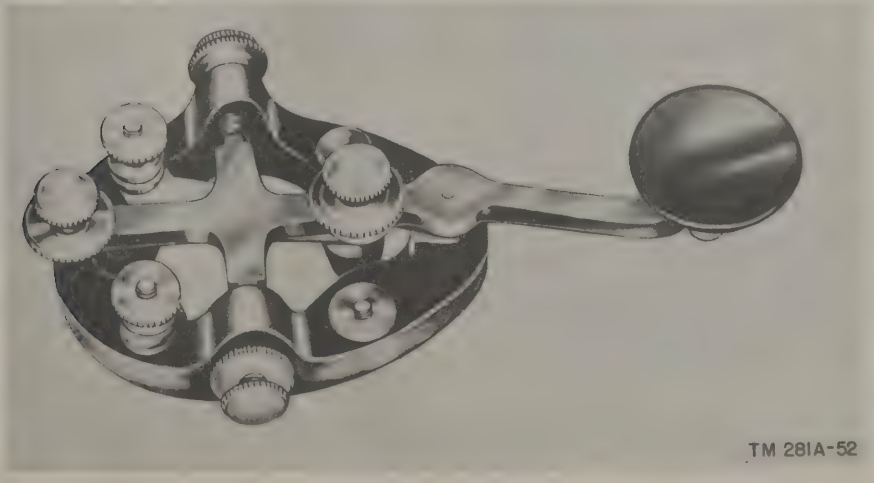


Figure 18. Key J–37.

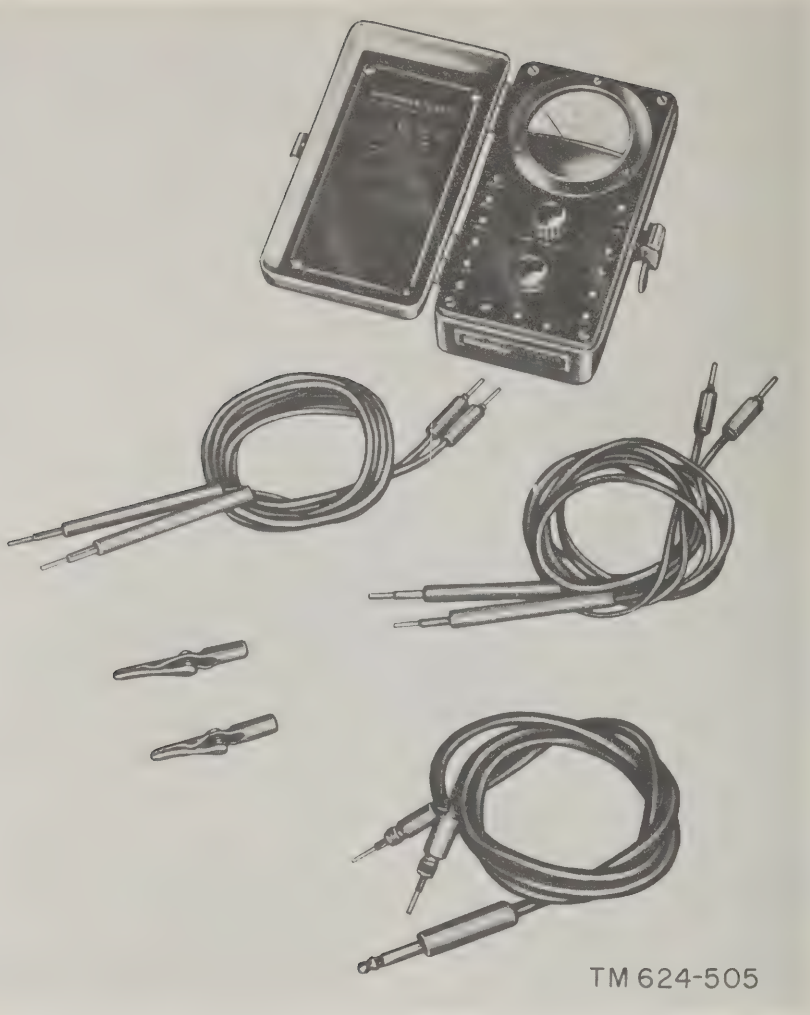


Figure 19. Multimeter TS–297/U.

manently to the floor by four wingnuts. Operation is on 115-volt, 60-cycle ac, with a power consumption of 1,500 watts. A fan mounted in front of the heater element is designed to circulate 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.

x. 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.

y. Fire Extinguisher (fig. 22). A fire extinguisher, with a 4-pound charge of carbon dioxide, is set in a holder mounted on the rear shelter wall.

z. Tools. A special toolbox containing tools for servicing Frequency Shift Exciter 0–39(*)/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 dual diversity reception of RTT signals (figs. 23 and 24). Operation is in conjunction with two doublet receiving antennas spaced



Figure 20. Clock.

approximately 3 wavelengths 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.

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

b. Power Distribution. Power for the operation of the receiving shelter is connected to a circuit breaker by a feed-through 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 Assembly OA–65(*)/MRC–2 (fig. 25).

(1) The operating radio receiver assembly is mounted on the curbside wall between the dual diversity converter and the monitoring teletypewriter (fig. 23). The spare radio receiver assembly is located on a shelf to the left of the door and is secured to the wall by a mounting bracket (fig. 24).

(2) Each radio receiving assembly consists of two modified Radio Receivers BC–342–( ) connected by a common Oscillator-Amplifier 0–59(*)/MRC (fig. 26), which is referred to as an oscillator coupling amplifier. The bottom receiver is designated as the Channel A receiver and the top receiver is designated as the Channel B receiver. One of the receiving antennas is connected to the SIG. ANT. connector of the Channel A receiver and the other receiving antenna is connected to the SIG. ANT. connector of the Channel B receiver, providing space diversity reception.

(3) Each receiver contains a Rectifier RA–20–(*) (fig. 27) which supplies the necessary operating voltages for the receiver. This rectifier is connected to an a-c power source by means of a power cord. RTT, c-w, and a-m signals are amplified and converted to an i. f. (intermediate-frequency) in the receivers separately. The RTT i-f signals are connected to the dual diversity converter. The af (audio frequencies) (voice) are removed from the carrier, amplified and fed to Control Box C–345(*)/MRC–2. Beat notes, resulting from c-w signals, also are fed to Control Box C–345(*)/MRC–2. The spare radio receiver assembly is used for monitoring purposes.

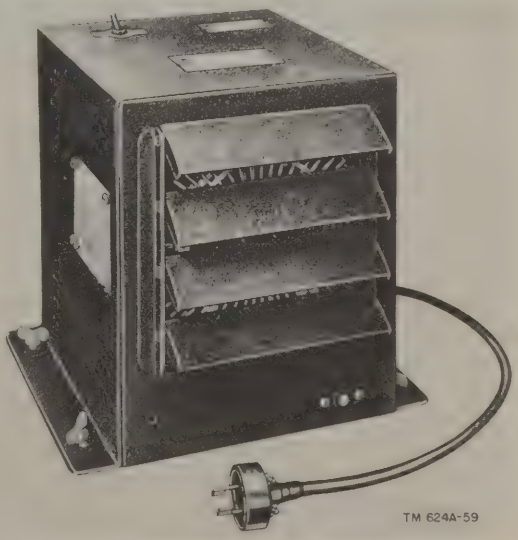


Figure 21. Heater.



Figure 22. Fire Extinguisher.

d. Control Box C–345(*)/MRC–2. Control Box C–345(*)/MRC–2 is a sheet metal box containing jacks and volume controls. Two cords, each connected to a volume control, are used to connect to the audio output of the Channel A and Channel B receivers. The controls adjust the volume of the audio signals which are connected to the loudspeaker or phones.

e. Dual Diversity Converter CV–31(*)/TRA–7 (fig. 28).

(1) Dual Diversity Converter CV–31(*)/TRA–7 is made up of Rectifier Power Unit PP–193(*)/TRA–7, Oscillator O–41(*)/TRA–7, and a dual diversity converter unit. In some models, the power unit and the oscillator are not given a nomenclature. All three are assembled on a single chassis and housed in a metal cabinet. The cabinet, shock-mounted to the operating table, is located on the curbside wall of the shelter (fig. 23). The dual diversity converter provides polar signals for the control unit in the operating shelter and neutral signals for operation of the monitoring teletypewriter.

(2) Dual Diversity Converters CV–31C/TRA–2 and CV–31D/TRA–7 are provided with disabling switches which disable the Channel A and Channel B converter circuit. In Dual Diversity Converter CV–31C/TRA–7, the panel marking on the front panel reads CHANNEL A DISABLING and CHANNEL B DISABLING. In Dual Diversity Converter CV–31D/TRA–7, the panel marking on the front panel reads CHANNEL A, OPERATE-DISABLED, and CHANNEL B, OPERATE-DISABLED. Dual Diversity Converters CV–31/TRA–7, CV–31A/TRA–7, and CV–31B/TRA–7 do not have the disabling switch feature.

(3) Dual Diversity Converter CV–31/TRA–7 does not have the MARK HOLD LEVEL switch. This switch is located behind the hinged door on the front panel. The Channel A and B input and oscillator tuning capacitors (CHAN A and CHAN B OSC and CHAN A and CHAN B INPUT) behind the hinged panel are located on the chassis in Dual Diversity Converters CV–31/TRA–7, CV–31A/TRA–7 and CV–31B/TRA–7

f. Teletypewriter TG–7–B or TT–55/MGC. Teletypewriter TT–55/MGC is a modified Teletypewriter TG–7–B. It is modified by the addition of noise filters in the power circuit. Teletypewriter TG–7–B or TT–55/MGC, shock-mounted to the operating table (fig. 23), is a standard communications, page printing teletypewriter capable of sending or receiving messages. This teletypewriter receives neutral signals from the dual diversity converter and translates them into mechanical movements of the typing bars. The movement of the typing bars produces typewritten messages corresponding to the message received, and therefore, monitors the received messages.

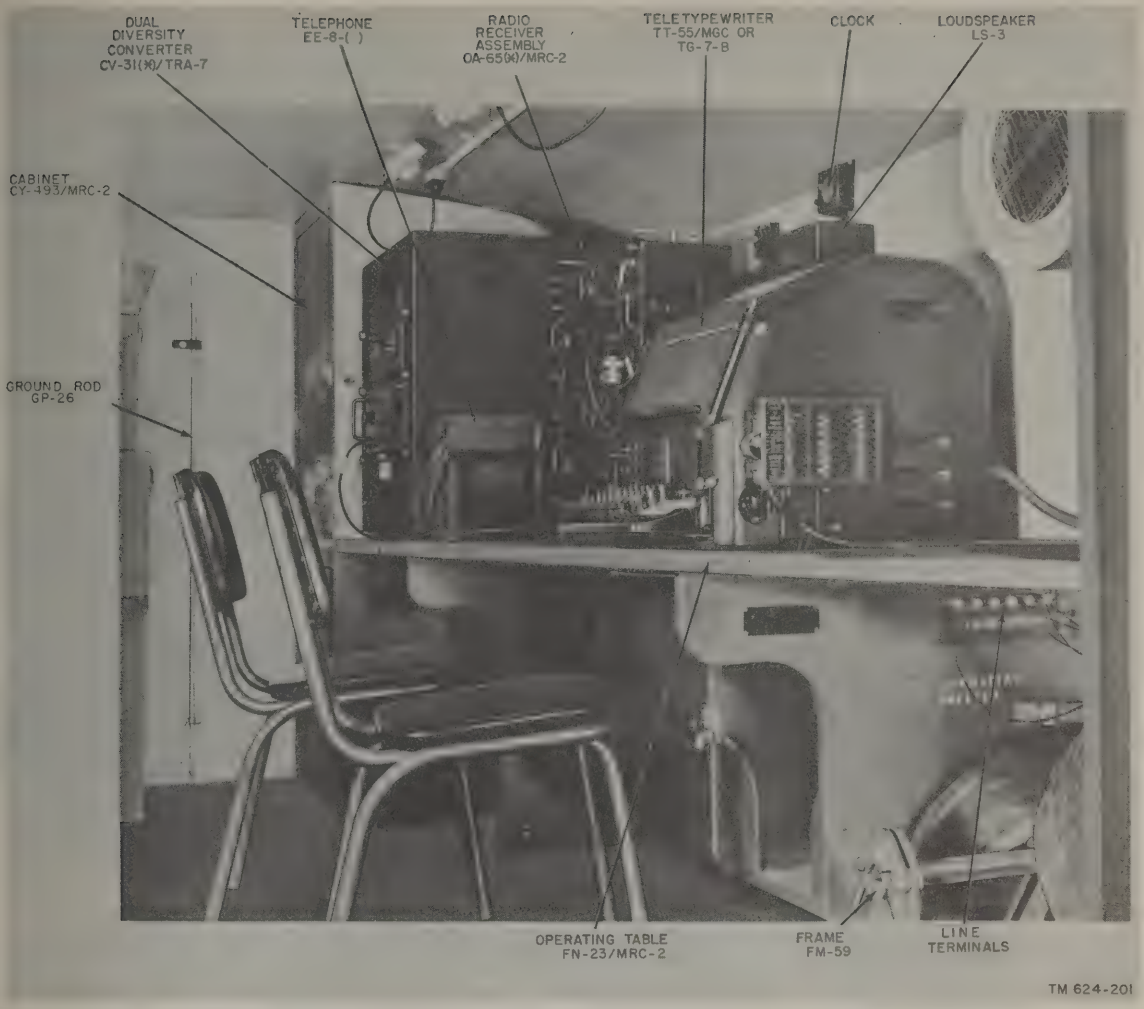


Figure 23. Radio Set AN/MRC-2(*), interior front view of receiving shelter.

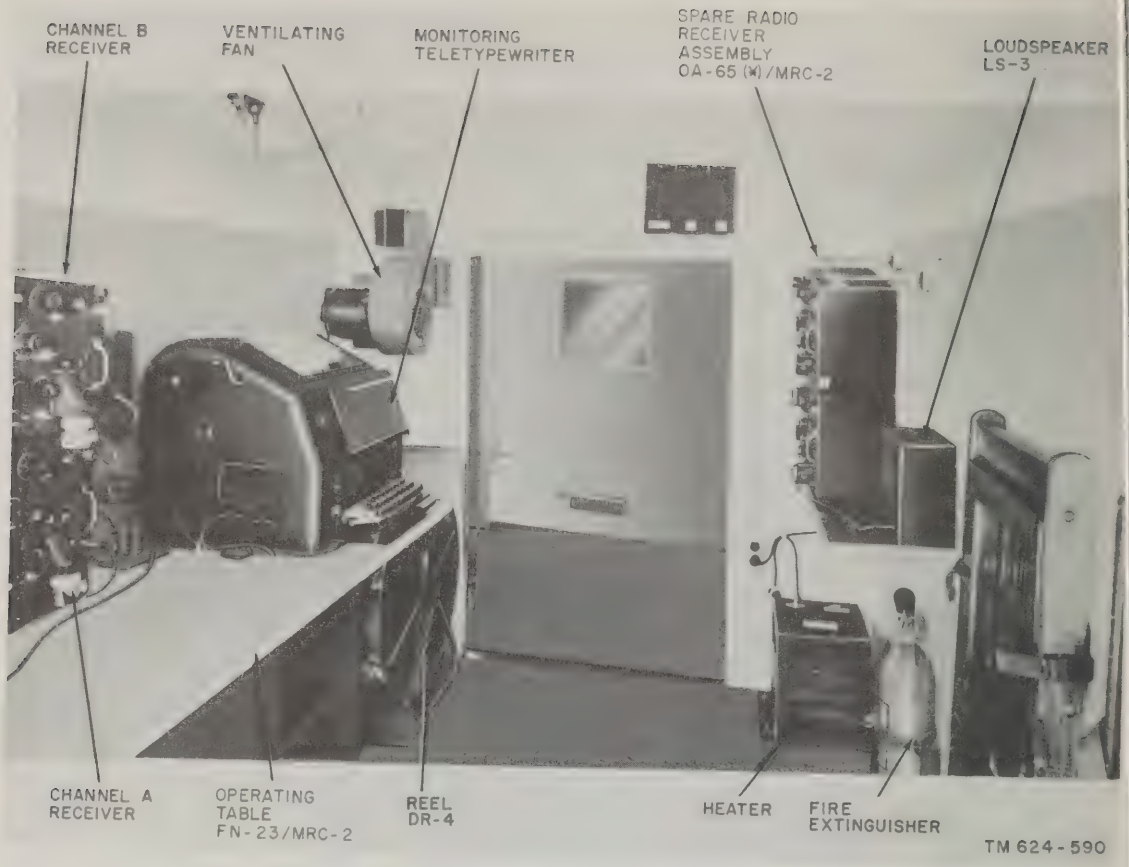


Figure 24. Radio Set AN/MRC–2(*), interior rear view of receiving shelter.

g. Operating Table FN–23/MRC–2. Operating Table FN–23/MRC–2 extends along the curbside wall of the receiving shelter (fig. 23). Compartments are provided underneath the table for storage of 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 (fig. 23), provides binding post connections for three pairs of wire lines from the operating shelter. One pair of binding posts is for the telephone lines, another pair is for the control lines, and the third pair is for the signal line. Protection against lightning is afforded 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 provides a means of connecting the control line and a keying circuit from the dual diversity converter, and the BLUE connector provides a means of connecting the polar and neutral signals' 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 on 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.

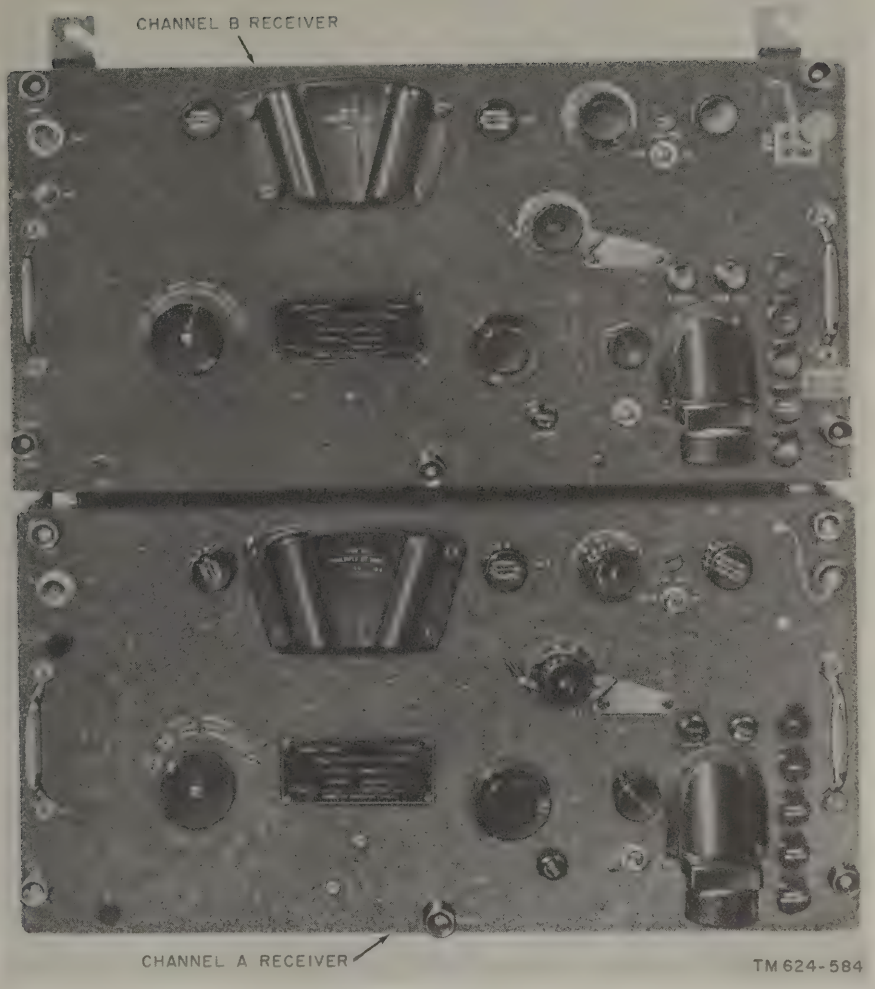


Figure 25. Radio Receiver Assembly OA–65(*)/MRC–2.

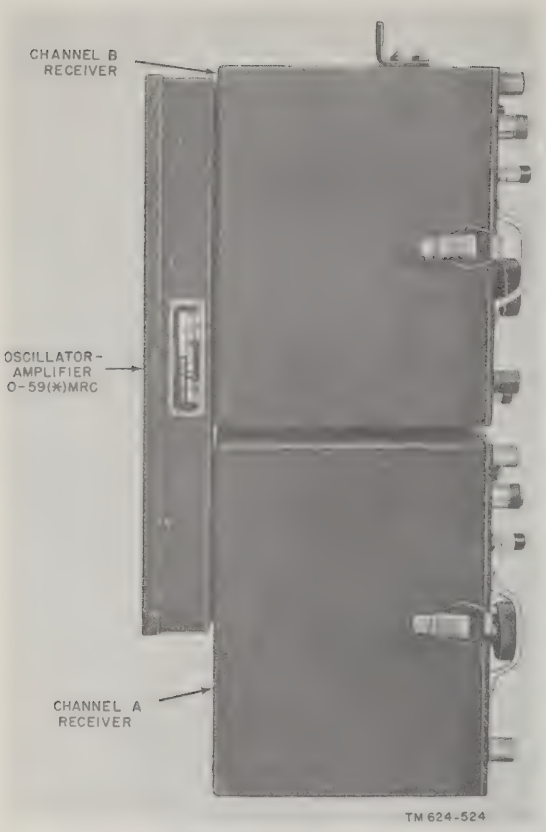


Figure 26. Oscillator-Amplifier O–59(*)/MRC.

(4) *A-c 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 and the outlet closest to the source of a-c power is connected to a rubber-covered cord which is terminated in a plug. This plug 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.

h. Cabinet CY–493/MRC–2. Cabinet CY–493/MRC–2 is installed between the operating table and the front wall of the shelter (fig. 23). The contents of this cabinet, mainly tools, spare parts, and operating accessories, are listed under Cabinet CY–493/MRC–2 in the table of components (par. 6*b*).

i. Telegraph Keys. The following telegraph keys are used for emergency hand keying of the radio set.

(1) *Key J–45* (fig. 29). Key J–45 is a manually operated telegraph key with a leg clip which slips over the operator's thigh. It has a three-way adjustable lever and two binding posts.

(2) *Key J–37* (fig. 18). Key J–37 is a manually operated telegraph key with a three-way, adjustable lever and two binding posts.

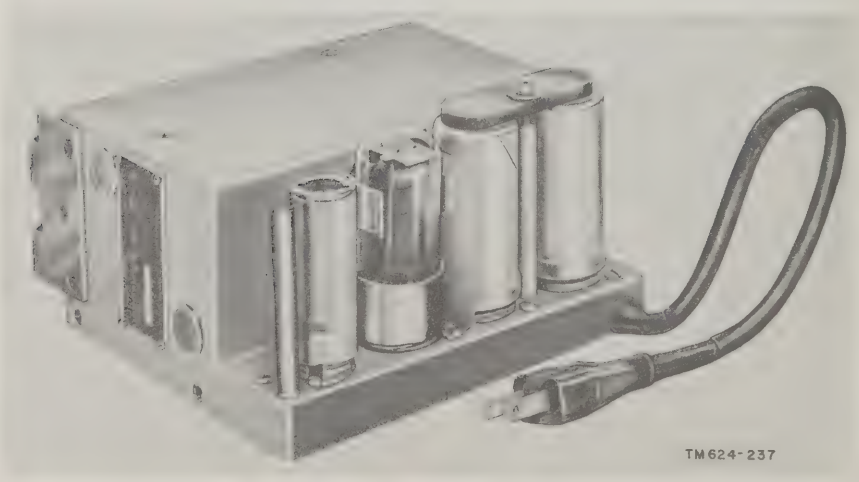


Figure 27. Rectifier RA–20–B.

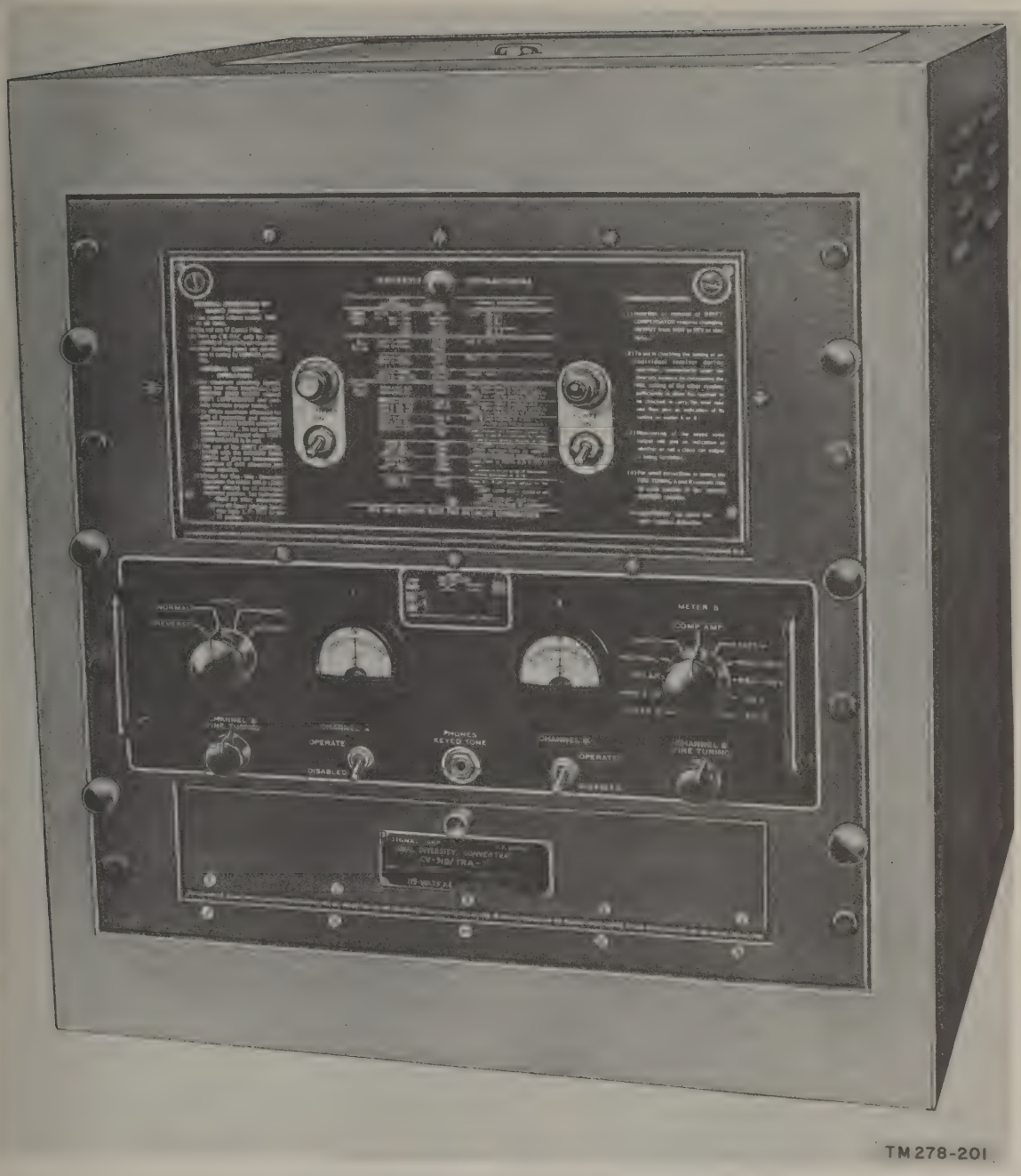


Figure 28. Dual Diversity Converter CV–31D/TRA–7.

j. Accessory Equipment. The following equipment is identical with corresponding components described for transmitting shelter use.

(1) *Loudspeaker LS–3.* One Loudspeaker LS–3 is mounted on the wall above the control box (fig. 23). Another Loudspeaker LS–3 is secured to the roadside wall of the shelter to the right of the spare radio receiver (fig. 24) (par. 8*m*).

(2) *Telephone EE–8–( ).* In the receiving shelter, this telephone is mounted in a bracket between the dual diversity converter and the radio receiver assembly (fig. 23). Refer to paragraph 8*q*.

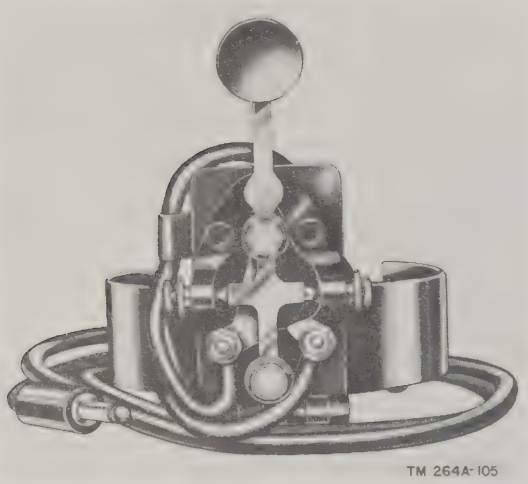


Figure 29. Key J–45.

(3) *Headset HS–30–( ).* Refer to paragraph 8*r*.

(4) *Multimeter TS–297/U.* Refer to paragraph 8*u*.

(5) *Clock.* The location of this clock is on the curbside wall, above the operating table. Refer to paragraph 8*v*.

(6) *Heater.* Refer to paragraph 8*w*.

(7) *Blower.* Refer to paragraph 8*x*.

(8) *Fire extinguisher.* The fire extinguisher is mounted on the roadside wall, at the rear of the shelter (fig. 24) (par. 8*y*).

10. Operating Shelter

The operating shelter serves as the control center of the system. It may be located up to 10 miles from both the transmitting and the receiving shelter, with interconnections made by wire lines. The following is a general description of the operating shelter and of components housed within it (fig. 30).

a. Housing. Shelter HO–17–(*) is used as the housing for 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–292(*)/TRA–7 (fig. 31). Control Unit C–292(*)/TRA–7 is located on a shelf directly above the center of the operating table (fig. 30). The unit is inclosed in a black metal cabinet which is shock-mounted to the shelf. The control unit converts polar signals received from the dual diversity converter into neutral signals for operation of a receiving teletypewriter. It also converts the neutral signals from the sending teletypewriter into polar signals for transmission over a wire line to the FS exciter. In addition, the control unit provides facilities for establishing full-duplex, half-duplex, one-way reversible service and normal, or emergency, operation.

d. Teletypewriters TT–55/MGC or TG–7–B. Two teletypewriters, mounted on the operating table (fig. 30), are physically and electrically identical with the one in the receiving shelter. One of the teletypewriters normally is used for sending and the other for receiving messages. However, by changing the patching arrangements, these can be reversed, or both can be used to receive messages. The sending teletypewriter produces neutral signals for the control unit, and the receiving teletypewriter translates neutral signals from the control unit into typewritten characters which are printed on paper.

e. Perforator-Transmitter TT–56/MGC or Reperforator-Transmitter TG–26–A (fig. 32). This equipment, mounted on the operating table, is located at the front end of the shelter (fig. 30). Perforator-Transmitter TT–56/MGC is a Reperforator-Transmitter TG–26–A, modified by the addition of a filter capacitor for r-f noise suppression in the typing reperforator. Each of these equipments consists of a typing reperforator, a transmitter-distributor, and a connection box.

(1) *Typing reperforator.* This unit is a motor driven device for receiving and transmitting neutral signals. During sending

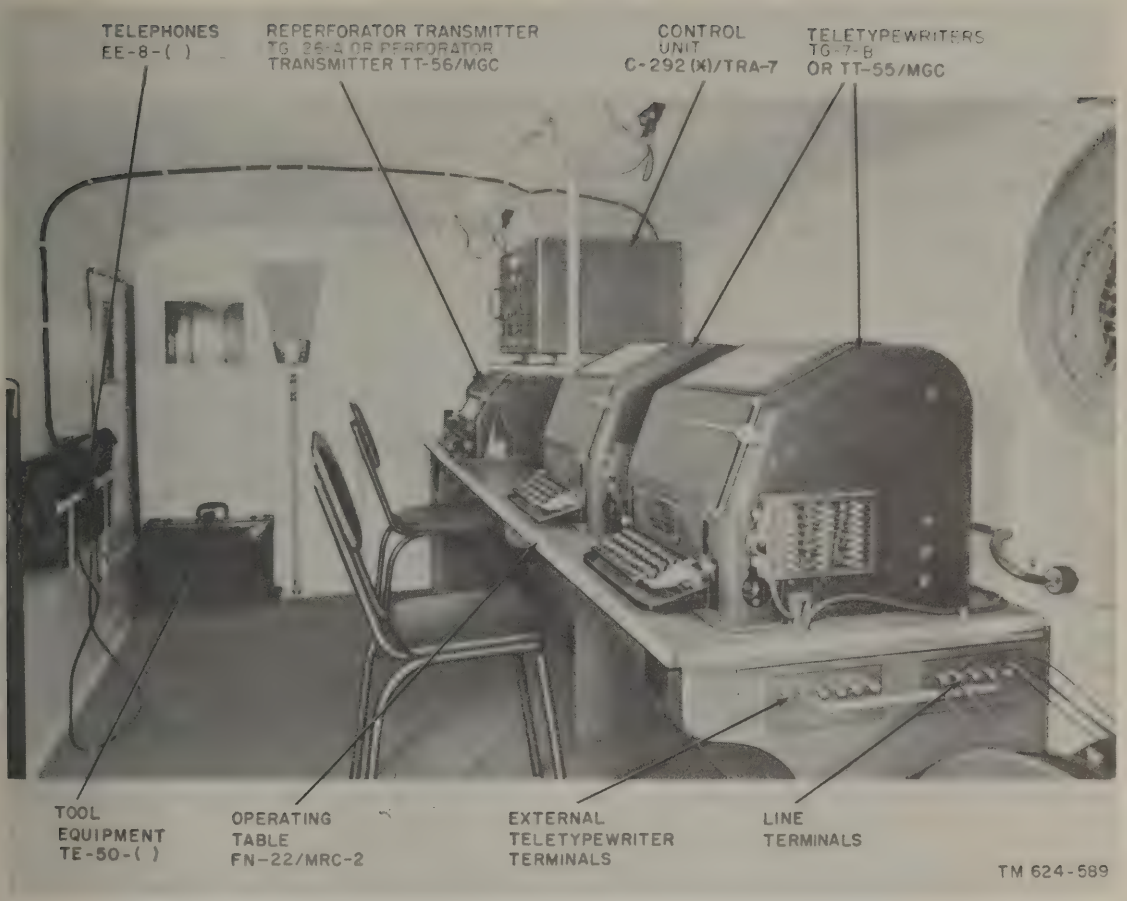


Figure 30. Radio Sets AN/MRC-2(*), interior view of operating shelter.

operations, the typing reperforator produces neutral signals for the control unit and simultaneously prepares a paper tape with printed characters and code perforations; during receiving operations, it translates neutral signals from the control unit into typewritten characters and code perforations. The unit also can be used for perforating tape which is used for transmission by the transmitter-distributor.

(2) *Transmitter-distributor.* This unit, mounted on the operating table to the left of the typing reperforator, is a motor-driven sending device designed only for transmission of messages from perforated tape. Perforated tape permits storing of messages of lower precedence for transmission by the transmitter-distributor when the priority message traffic is relieved.

(3) *Connection box.* This sheet metal box is mounted in the rear of the typing reperforators. One cord with a nonpolarized plug connects power to the typing reperforator and transmitter-distributor. A selector switch provides a means of matching the drive motor input circuit with the type of power available. Another cord with a polarized plug is used to connect two sets of jacks (local circuit 1 and 2) to a 115-volt d-c source in Rectifier RA-87. Two sets of cords, each set consisting of one black shell and one red shell plug, are connected to two jacks (line 1 and 2). The local circuit jacks are used to supply a 60-ma (milliampere) direct current for the typing



Figure 31. Control Unit C–292B/TRA–7.



Figure 32. Reperforator-Transmitter TG–26–A or Perforator-Transmitter TT–56/MGC.

reperforator when it is used for cutting tape only.

f. Rectifier RA–87 (fig. 33). Rectifier RA–87 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. A-c power is connected to the rectifier and converted to d-c power. Three outlets provide a connection for 115-volt alternating current and two polarized outlets provide a connection for 115-volt direct current. The d-c outlets are used to supply a 60-ma current to the connection box.



Figure 33. Rectifier RA–87.

g. Operating Table FN–22/MRC–2. Operating Table FN–22/MRC–2 extends along the curbside wall of the operating shelter (fig. 30). Compartments are provided underneath the table for storage of 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 E–1.* This bakelite terminal board, mounted on the front end of the operating table, is provided with six binding posts for connections to three pairs of wire lines to the transmitting shelter. One pair, labeled EE–8, is for the telephone line, one pair, labeled CONTROL, is for the control line, and one pair, labeled LINE, is for the teletypewriter signal line. For identification, TO TRANSMITTING SHELTER is stenciled on the operating table.

(2) *Shelter Junction Box E–2.* This bakelite terminal board, mounted on the rear end of the operating table (fig. 30), is provided with six binding posts for connection to the receiving shelter. These three pairs are used for the purpose indicated in (1) above. For identification, TO RECEIVING SHELTER is stenciled on the operating table.

(3) *Teletypewriter Junction Box E–3.* This bakelite terminal board, mounted on the operating table to the left of Junction Box E–2 (fig. 30), is provided with six binding posts. The connections to these posts are determined by the location of the teletypewriter equipment used. For identification, TO EXTERNAL EQUIPMENT WHEN REQ is stenciled on the terminal board.

(4) *Junction Box J–204/MRC–2.* Junction Box J–204/MRC–2, mounted on the operating table to the right of the typing reperforator, is a sheet metal box containing several jacks. This junction box provides 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 teletypewriter equipments, and for received neutral signals from the control unit.

(5) *Teletypewriter jack panel.* This bakelite panel provided with four jacks 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.

(6) *Telephone and control jack panels.* 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 for communication between all the shelters from any telephone.

(7) *A-c power outlets.* The power outlets, mounted on the back panel of the operating table, are connected mechanically 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.

h. 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. In it are stored technical manuals, stationary supplies, tools, and operating spares. These articles are listed under Cabinet CY–494/MRC–2 in the table of components (par. 6*c*).

(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. The exact contents of this case are listed in paragraph 6*c*.

i. Stamp MC–181–A (fig. 34). Stamp MC–181–A is a manually operated time stamp which prints the words MSG CENTER followed by the name of the organization, the 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.

j. Line Unit BE–77–( ) (fig. 35). Line Unit BE–77–( ) consists of a line relay, rheostat, milliammeter, and other parts assembled in a wooden housing. Line connections, binding posts, rheostat knob, and meters are mounted on the top cover of the line unit. The top is hinged to a base so that by releasing a hook the cover can be raised. This permits access to the line relay and the switch panel. It is connected between teletypewriter equipment and land lines. It is designed to measure and adjust line current and adjust the quality (bias) of received signals.

k. Typewriter MX–322/U (fig. 36). This is a standard model, portable typewriter supplied for typing messages and logs.

l. Accessory Equipment. The following equipment is identical with corresponding article described for transmitting shelter use.

(1) *Telephone EE–8–( ).* In the operating shelter, two telephones are mounted in brackets on the roadside wall (fig. 30) Refer to paragraph 8*q*.

(2) *Heater.* Refer to paragraph 8*w*.

(3) *Blower.* Refer to paragraph 8*x*.

(4) *Fire extinguisher.* Refer to paragraph 8*y*.

11. Power Units and Trailers

The power units supplied with Radio Set AN/MRC–2(*) consist of three Power Units PE–95–(*) and one Power Unit PE–75–( ). Each of the three Power Units PE–95–(*) is mounted on a two-wheel Trailer K–52 (fig. 37). Power Unit PE–75–( ) is stored in the receiving shelter.

a. Power Unit PE–95–( ) (fig. 37). Power Unit PE–95–(*) is a complete, self-contained, a-c generating unit. The unit consists of an a-c generator with a built-in d-c exciter. It is driven by a four-cylinder, liquid-cooled gasoline engine which is coupled directly to the generator. A control panel is mounted at one end of the unit on which all necessary meters, terminals, and controls are mounted. Case CH–112, containing Cord CO–316, Cord CO–313–A, 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 to enable the operator to reach any part of the equipment.

b. Power Unit PE–75–( ). Power Unit PE–75–( ) is a self-contained, compact, portable, manually started gasoline-engine-powered generating plant of the self-excited type. This generator is designed to deliver 2,500 watts. The output voltage is 120-volt, 60-cycle alternating current. This power unit is used as a spare for the receiving and operating shelters, permitting a Power Unit PE–95–(*) to be used as a spare for the transmitting shelter. Power Unit PE–75–( ) is assembled on a welded-steel skid base. Tubular end members of the skid base frame provide handles for hand carrying the power unit. Two twist lock receptacles provide a connection to the generated current.

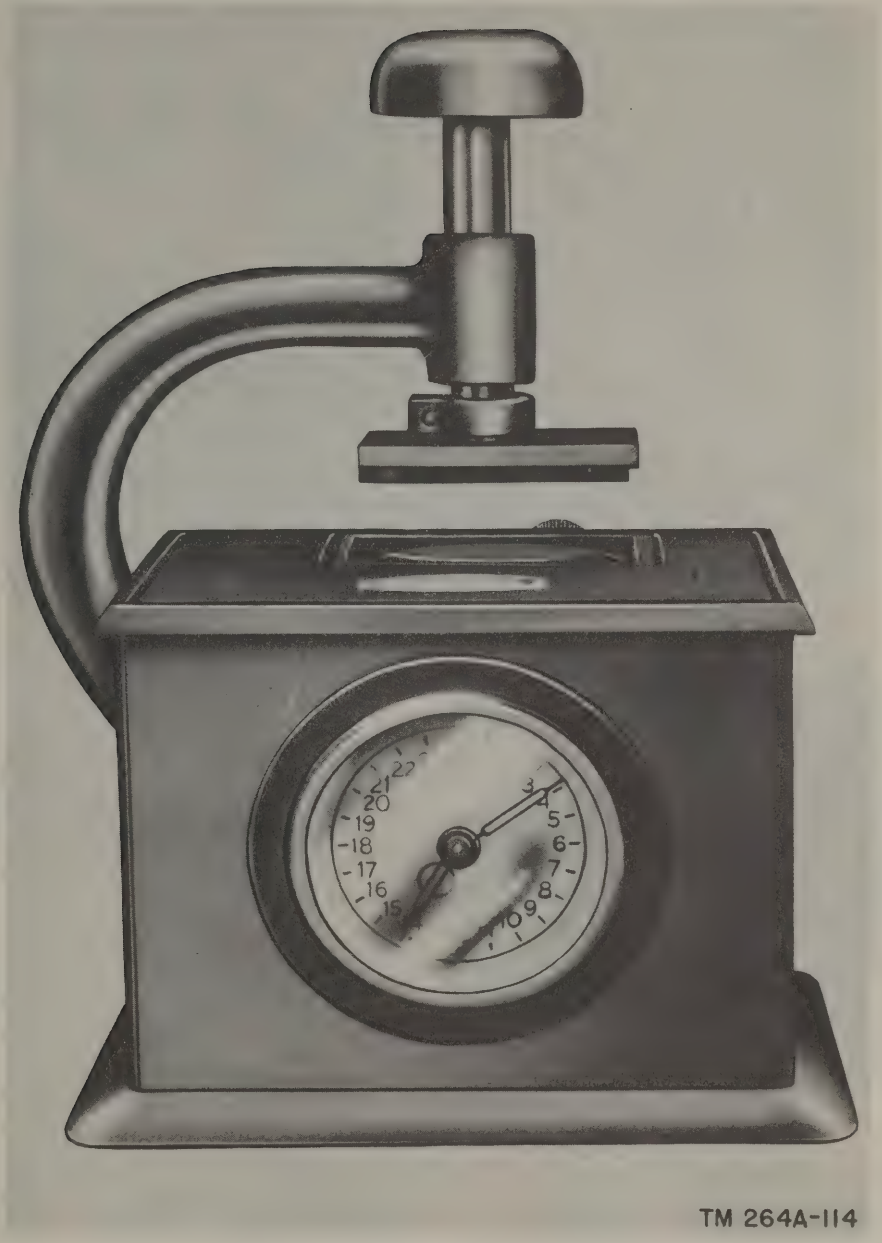


Figure 84. Time Stamp MC–181–A.

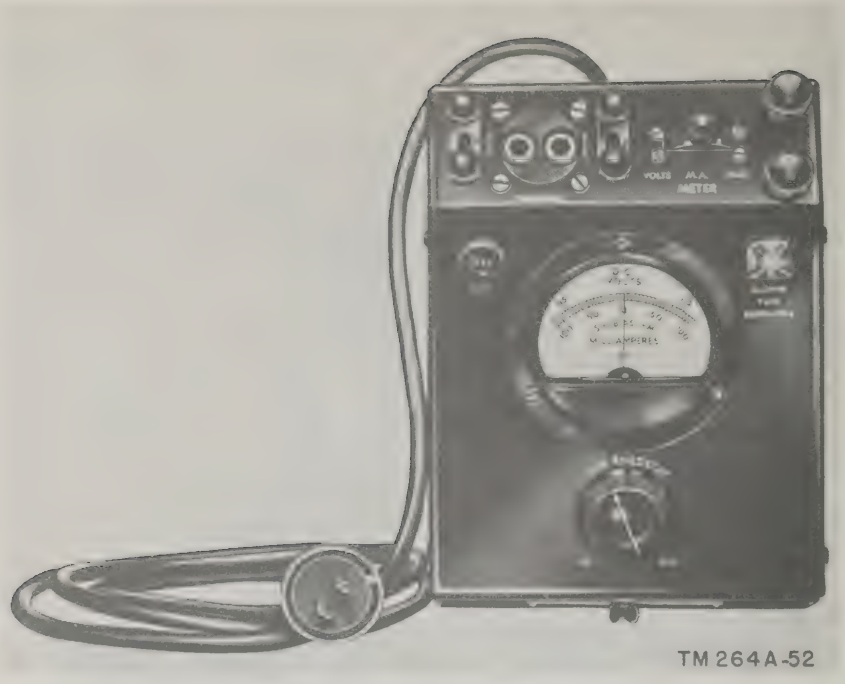


Figure 35. Line Unit BE–77–( ).



Figure 36. Typewriter MX–822/U.

12. Antenna Equipment

a. Transmitting Antennas.

(1) A single half-wave doublet antenna is used for transmission. This antenna may be located up to 70 feet from the transmitting shelter. The antenna wire, cut to the proper length for the frequency desired, is supported by three masts approximately 50 feet high. Antenna Support AB–38/CR is supplied with Radio Set AN/MRC–2, Antenna Support AB–38A/CR is supplied with Radio Set AN/MRC–2A, and Antenna Support AB–38B/CR (fig. 38) is supplied with Radio Set AN/MRC–2B. The antenna is fed by a coaxial cable (Cord CG–145/MRC–2).

(2) Antenna Kit MX–852/MRC–2 is used for construction of a rhombic transmitting antenna in the 6- to 18-mc range. A rhombic antenna constructed from this kit gives high signal gain in one direction and substantially improves communication at locations when the doublet transmitting antenna does not provide sufficient signal strength.

b. Receiving Antennas. Two doublet receiving antennas are supported 35 feet high in Radio Sets AN/MRC–2 and –2A, and 40 feet high in Radio Set AN/MRC–2B, by three antenna supports. The masts for Radio Set AN/MRC–2A may be raised to 40 feet by adding the spare mast section. Radio Set AN/MRC–2A uses supports made up from antenna equipment which is essentially the same as Mast AB–155A/U (fig. 39) used with Radio Set AN/MRC–2B. The two receiving

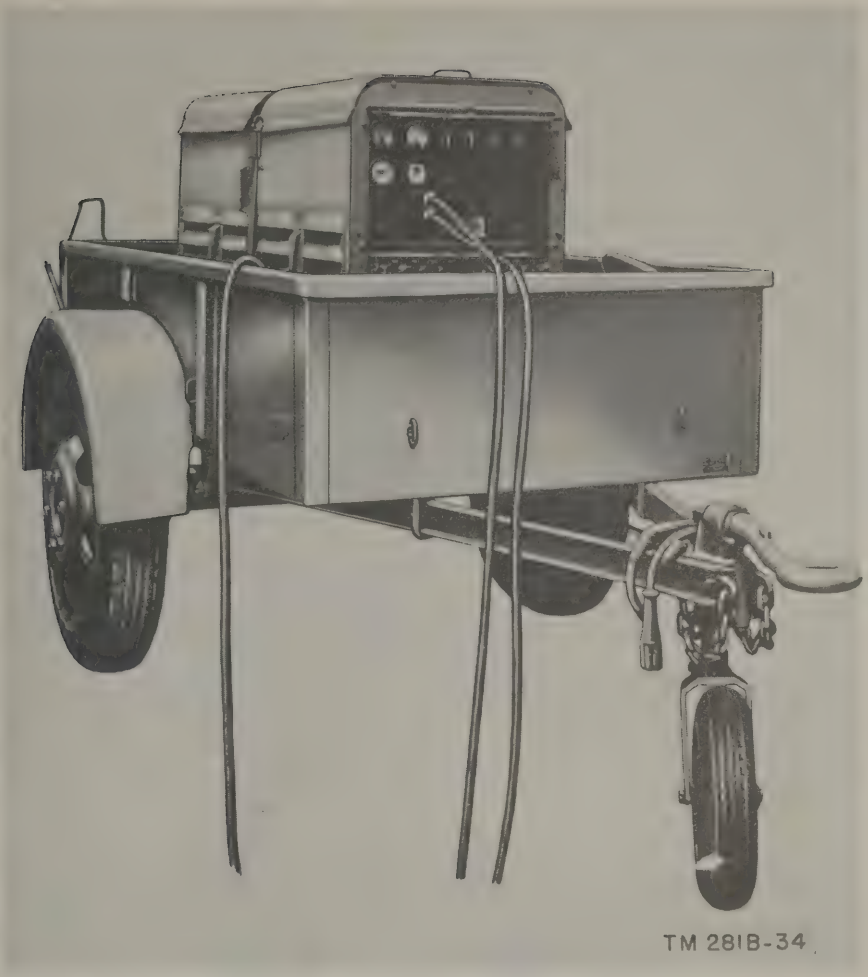


Figure 37. Power Unit PE–95–(*) and Trailer K–52.

antennas are separated by a maximum of 1,000 feet for efficient reception. Two 500-foot coaxial cables, Cord CG–388/MRC–2, or RF Cable Assembly CG–557/U, are used to connect the antennas to the receivers. The antennas should be oriented so that the antenna wires are at right angles to the direction of the incoming signal and parallel to each other. Three supports are necessary for each antenna. The following is a list of parts supplied for one mast.

Radio Set AN/MRC–2:

- 7 Mast Sections MS–44–A
- 6 Stakes GP–2
- 3 Guy Plates MP–20
- 1 Mast Base MP–19
- 2 Guys GY–22–A
- 1 Guy GY–24–A (antenna)
- 4 Guys GY–41

Radio Set AN/MRC–2A:

- 1 Carrying Device MX–387/GRA–4
- 1 Cover CW–124/GRA–4
- 5 Guy Plates MX–378/U. (Two are spares.)
- 4 Guys MX–381/GRA–4 (40 feet long) white
- 4 Guys MX–382/GRA–4 (31 feet long) blue
- 4 Guys MX–383/GRA–4 (50 feet long) red
- 5 Guy Fasteners MX–379/U. (One is a spare.)
- 1 Halyard MX–516/GRA–4

8 Mast Sections MS–44. (One is a spare.)
1 Mast Base MP–19
6 Stakes GP–2
4 stakes, hickory*
1 hammer

Note. Case CY–519/MRC–2 is used to carry the hammer, stakes, and other antenna components not accommodated by Carrying Device MX–387/GRA–4.

Radio Set AN/MRC–2B:
1 Carrying Device MX–387/GRA–4
1 Cover CW–124/GRA–4
6 Guy Fasteners MX–379/U. (Two are spares.)
5 Guy Plates MX–378/U. (Two are spares.)
4 Guys MX–381/GRA–4 (40 feet long), white
4 Guys MX–382/GRA–4 (31 feet long), blue
4 Guys MX–383/TRA–4 (50 feet long), red
1 Halyard MX–516/GRA–4
1 Hammer HM–1
1 Mast Base AB–154/U
8 Mast Sections MS–44
6 Stakes GP–101/U. (Two are spares.)
4 stakes, hickory*

*These stakes are used in lieu of the metal stakes when the antenna is erected on soft ground.

c. Whip Antennas. Three whip antennas are used in Radio Set AN/MRC–2(*). One receiving whip antenna is used for the spare receiver assembly in the receiving shelter, and one is used for the receiver in the transmitting shelter. The transmitting whip antenna is used with the antenna tuning unit in the transmitting shelter on an emergency basis. Each receiving whip antenna is constructed of individual Mast Sections MS–116–A, MS–117–A, and MS–118–A. The transmitting whip antenna is composed of Mast Sections MS–49 through MS–54.

13. Differences in Models

Radio Sets AN/MRC–2, –2A, and –2B are the same as far as application and operation are concerned. The differences in the models are concerned with the receiving and transmitting antenna equipment originally supplied with each radio set, and the models of the individual components, supplied with these radio sets. The differences in Amplifier AM–141/MRC, AM–141A/MRC, and AM–141B/MRC are found in paragraph 152. For differences in models of the other components refer to the individual technical manuals.

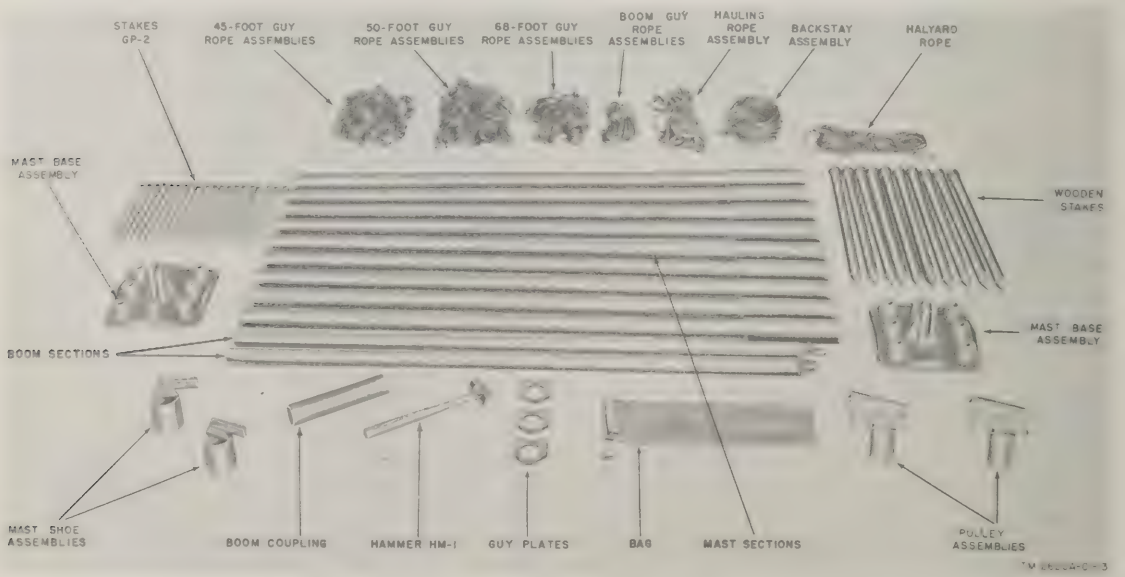


Figure 38. Antenna Support AB–38B/CR.

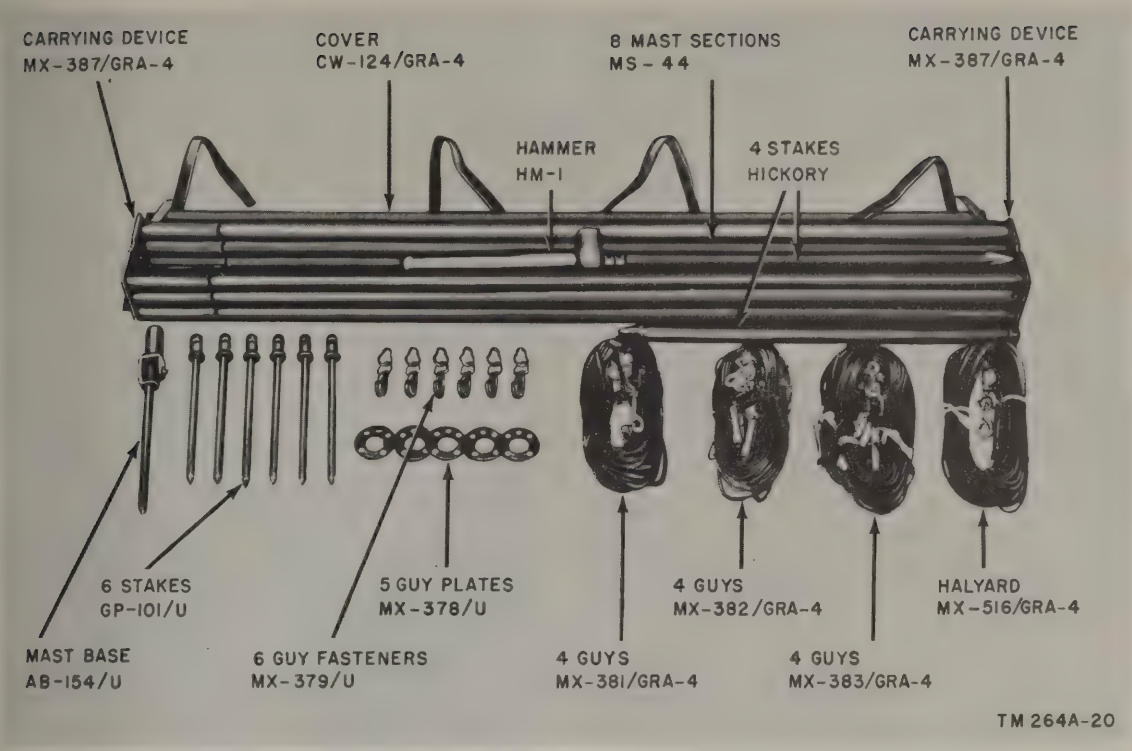


Figure 39. Mast AB–155A/U.

CHAPTER 2

INSTALLATION

Section I. INTRODUCTION

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 in order to obtain the best results during transmission and reception of signals. Section II deals with uncrating, unpacking, and checking equipment, connections and interconnections in the three shelters, and construction and installation of antennas.

15. Siting

a. Radio Set AN/MRC–2(*) normally is operated from three Shelters HO–17–(*) mounted on 2½-ton cargo trucks. The shelters need not be located together but can be separated 10 miles with normal wire facilities. Sufficient wiring is provided with the radio set to provide for a separation of one-half mile. Additional wire may be requisitioned if greater spacing is desired.

b. The only requirement for siting of the radio set is that sufficient, clear, level ground be available for installing the transmitting and receiving antennas (fig. 40). Each antenna will require a relatively level area approximately 200 feet by 400 feet, the long dimension being perpendicular 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 being in the direction of transmission. The area selected for the transmitting antenna should be within 70 feet of the transmitting shelter. The shelter should be located within 70 feet of the center mast and the area selected for the two receiving antennas should be approximately three wavelengths or 1,000 feet apart with the receiving shelter located



Figure 40. Siting.

at the midpoint between the two receiving antennas (fig. 41). If possible, the receiving antenna should be erected off the ends rather than in the transmission path of the transmitting antenna. The choice of location for the erection of antennas will depend on tactical considerations. For best operating results, select a location away from power lines, tall trees, or other obstructions. Avoid obstructions which are 2° or 3° above the horizontal plane of the antenna in the direction of desired transmission or reception. This is approximately 200 to 300 feet at a distance of 1 mile from the antenna. Necessity for cover, however, will not always permit the selection of the best location.

c. The shelters may be removed readily from the vehicles and operated on the ground. The equipment in the receiving and operating shelters is designed for easy removal in event that operation without a shelter is desired. The operating benches in the receiving and operating shelters may be removed intact, complete with all wiring, so that it is necessary only to connect the operating table to the power source wire lines when removed from the shelter. To remove the operating tables, unscrew the red-headed screws holding the tables to the shelter and slide the tables forward away from the wall. Removal of the equipment from the transmitting shelter is not practicable.

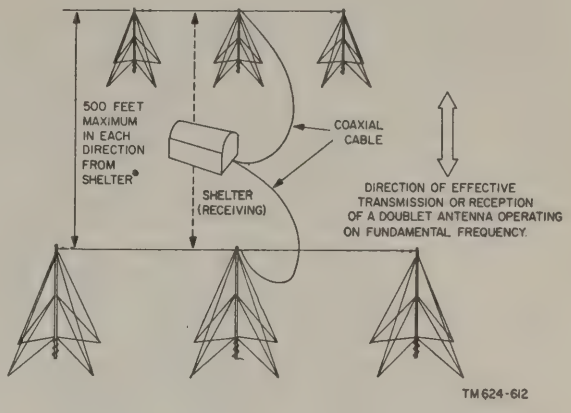


Figure 41. Orientation of receiving antennas.

Section II. SERVICE UPON RECEIPT OF EQUIPMENT

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 moisture-proofing.

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 the 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 around 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 which hold the separately packaged items (antenna tuning unit, mast, etc.) 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 the radio transmitter and the power amplifier.

(11) Unpack and check Antenna Tuning Unit BC–939–(*) which is strapped to the seat chest.

(12) Unpack the mast bases, mast brackets, and bumper clamps which are strapped to the seat bench.

(13) Remove the packing from all chests and boxes. In some models of Radio Set AN/MRC–2(*), the amplifier is shipped without tubes type 833–A. Unpack the two type 833–A tubes which are packed in Case CY–520/MRC–2.

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 for export shipment. Unpack the antenna equipment and, if the antenna is not going to be installed immediately, place the equipment in a separate vehicle.

(4) Remove and uncrate Power Unit PE–75–( ) according to the instructions given in TM 11–900. This unit may be carried either in this shelter or in a separate vehicle if available.

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) Remove the chests strapped to 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 given in TM 11–904. The power units may be shipped with or without batteries. If no batteries are shipped with the units, they will be put in a separate wooden crate. Unpack the batteries and the battery electrolyte.

e. 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 export shipment. Unpack the bags carefully; be sure that no small parts are lost. If the antenna is not going to be installed immediately, place it in a separate truck along with the receiving antennas.

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

If this 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, some other means of lifting the shelter onto the body must be provided.

(3) Two oak skids (part of Skid Equipment MX–157/U) are provided with each shelter for the purpose of 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 nearby 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 the Antenna Tuning Unit BC–939–(*) on top of the transmitter. Secure it in place with the four wingnuts.

(6) Frequency Shift Exciter 0–39(*)/TRA–7 is mounted in position on the upper shelf next to the Chest CH–120–(*) (fig. 3).

(7) Unpack the storage battery and the electrolyte. Charge the battery in accordance with the instructions on the card attached to the battery.

Caution: If electrolyte spills on the skin or clothing, wash off immediately with cold water. If bicarbonate of soda or ammonia is available, apply them to the affected parts.

(8) The components located in Chest CH–120–(*) already are installed in this chest.

(9) Place a Battery BA–30 in Telephone EE–8–( ).

(10) Bolt Mast Base Bracket MP–50–( ) with Mast Base MP–48 or AB–15/GR to the shelter. 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 make the joint tight. Apply a serving of ¾-inch friction tape around the joint. Screw Mast Section MS–118–A into Mast Section MS–117–A; use two pairs of gas pliers to make the joint tight and apply a serving of ¾-inch friction tape around the joint. Screw Mast Section MS–116–A into Mast Base AB–15/GR or MP–48.

(11) Bolt Mast Base MP–47–A in place on the roof of the shelter. If a whip or long wire antenna is going to be used for transmission, assemble Mast Sections MS–49, MS–50, and MS–51 by screwing Mast Section MS–49 into Mast Section MS–50. Use two pairs of gas pliers to make the joint tight. Apply a serving of ¾-inch friction tape around the joint. Repeat this procedure with Mast Sections MS–51, MS–52, and MS–53.

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

(12) In the radio sets which do not have tubes type 833–A installed in Amplifier AM–141(*)/MRC, remove the cartons containing the tubes from Chest CY–520/MRC–2. Remove the tubes from the cartons. 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 plate connector attached to the neutralizing capacitor bracket in Amplifier AM–141/MRC (to the rear of the grid assembly in Amplifiers AM–141A/MRC and AM–141B/MRC) fastens to the lower tube cap (grid). Use the knurled fasteners to make the grid and plate connectors fingertight. Do not use pliers or a wrench to make them tight.

(13) Secure the heater to the shelter floor with the wingnuts provided.

(14) Make certain that all the components in the transmitting shelter have the vacuum tubes properly seated. See figures 42 through 49.

(15) Make certain that all the components in the transmitting shelter have the proper value fuses inserted in the fuseholders. See the following chart for location and value of fuses.

Transmitting shelter fuse chart

Component	Fuse symbol	Rating (amp)	Reference
Radio Transmitter BC–610–(*).	FS1	25	Figs. 77 and 78.
	FS2	25	
	FS3	20	
	FS4	6	
	FS5	3	
Amplifier AM–141(*)/MRC	F1	8	Fig. 81.
	F2	8	
Frequency Shift Exciter 0–39(*)/TRA–7.	F101	3	Fig. 82.
	F102	3	
Radio Receiver BC–312–( )	F1	10	Fig. 87.
	F2	10	(Lamps, DYN, FIL.)
Rectifier Unit RA–133–(*)	F1	3/8	Fig. 48.
Power Supply PP–79/UR	F1	1	Fig. 49.

b. Receiving Shelter. Install the components of the receiving shelter in the following manner:

(1) Install the components in place on Operating Table FN–23/MRC–2 (fig. 24). In some radio sets these components may be shipped already installed.

(2) Mount three Mast Base Brackets MP–50–A with Mast Bases MP–65–( ) or MP–48 in place on the outside shelter wall.

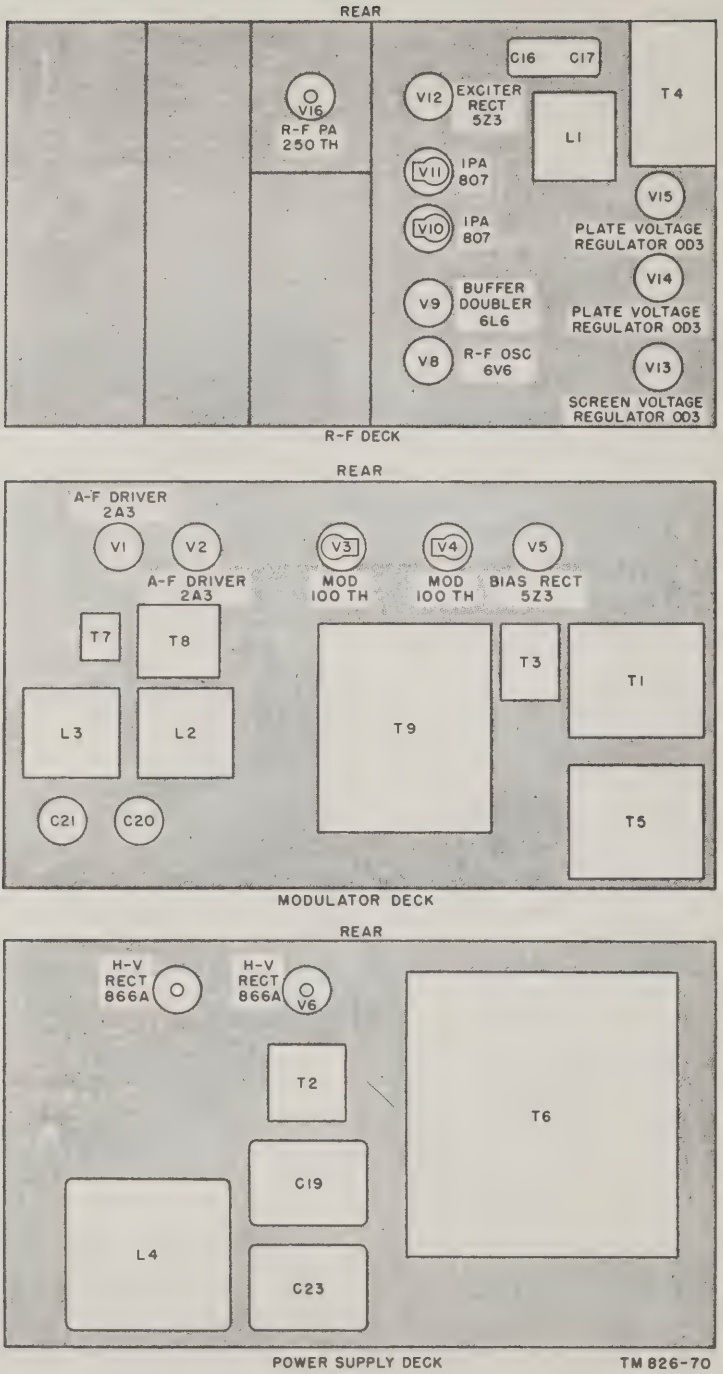
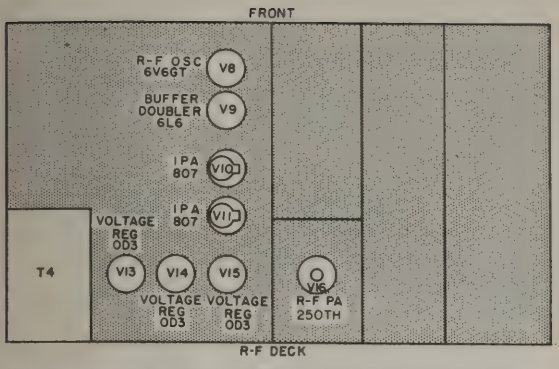
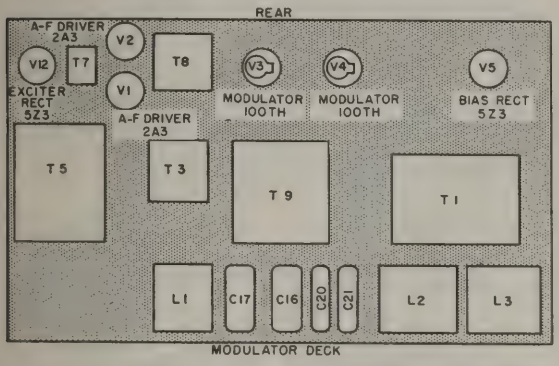
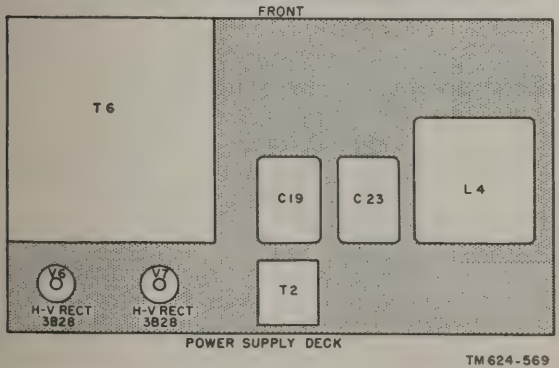


Figure 42. Radio Transmitter BC–610–E, tube location.

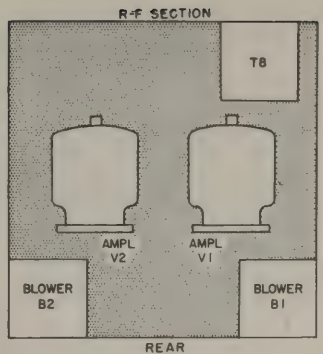


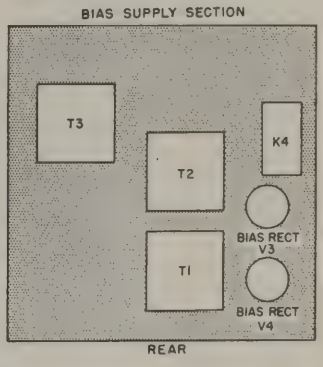


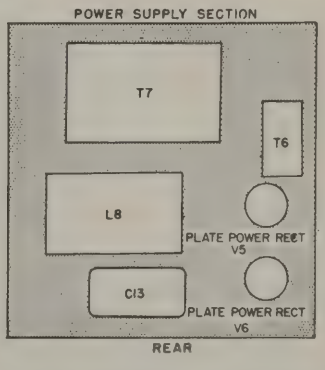


TM 624-569

Figure 43. Radio Transmitter BC-610–H and –I, tube location.







NOTES:

1. IN AMPL AM-141/MRC AND AM-141A/MRC:
   V1 AND V2 ARE TYPE 833A,
   V3 AND V4 ARE TYPE 866A,
   V5 AND V6 ARE TYPE 872A.
2. IN AMPL AM-141B/MRC:
   V1 AND V2 ARE TYPE 833A,
   V3 AND V4 ARE TYPE 3B28,
   V5 AND V6 ARE TYPE 4B32.

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Figure 44. Amplifier AM–141(*)/MRC, tube location.

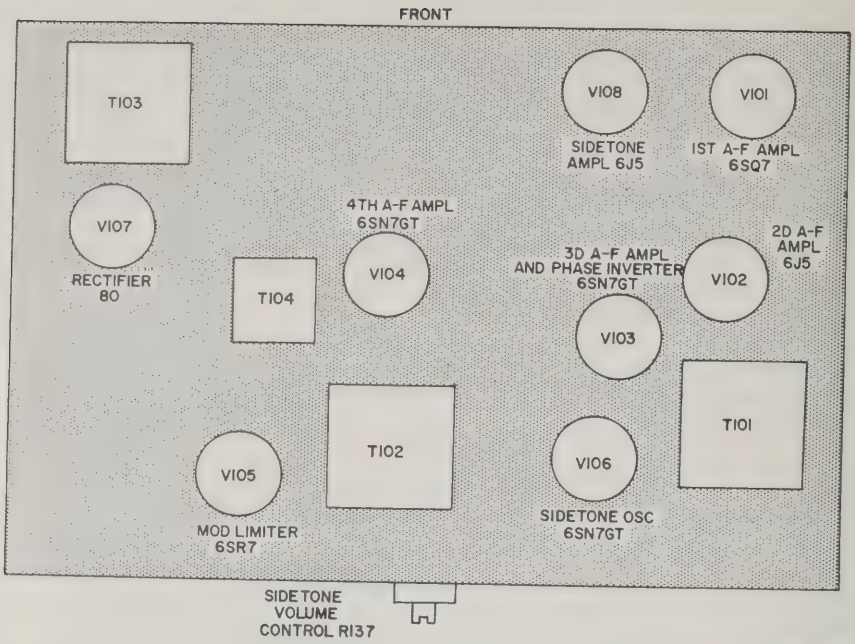


Figure 45. Speech Amplifier BC–614–(*), tube location.

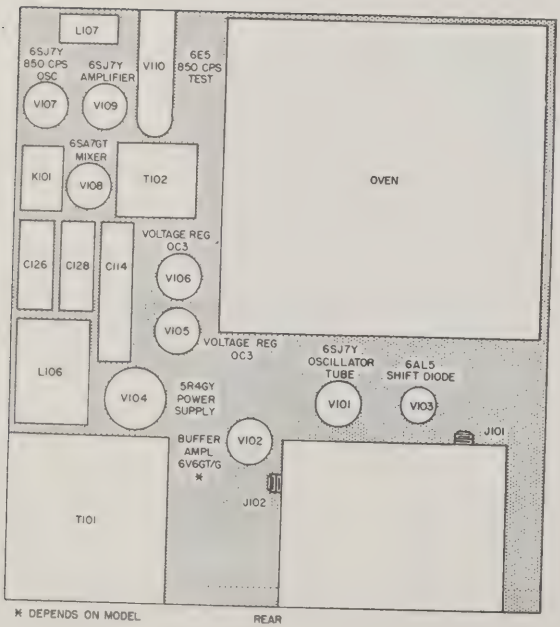


Figure 46. Frequency Shift Exciter O–89(*)/TRA–7, tube location.

(3) Plug the oscillator coupling amplifier (fig. 50) into the receptacles at the rear of the radio receiver assembly in use. Mount the assembly on the shelter wall above the operating table.

(4) Assemble Mast Sections MS–116–A, MS–117–A, and MS–118–A and screw the assembly into Mast Base MP–65–( ) or MP–48 as described in *a*(10) above.

(5) Install the heater on the floor of the shelter with the wingnuts 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.

(6) Check to see that all the components in the receiving shelter have the vacuum tubes seated properly. See figures 47, 51, and 52.

(7) Check to see that all the components in the receiving shelter have the proper value fuses inserted in fuseholders. See the following chart for location and value of fuses.

Component	Fuse symbol	Rating (amp)	Reference
Radio Receiver Assembly OA–65(*)/MRC–2.	F1_____	⅛	Fig. 87.
	F2_____	2	
Dual Diversity Converter CV–31(*)/TRA–7.	F301___	3	Fig. 89.
	F302___	3	
	F401___	1	Fig. 91.

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. 30).

(2) Remove Rectifier RA–87 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 on the keyboard are identical or have been lined up to match. To do this, unlock the carriage.

(4) Install the heater on the floor of the shelter, with the wingnuts provided.

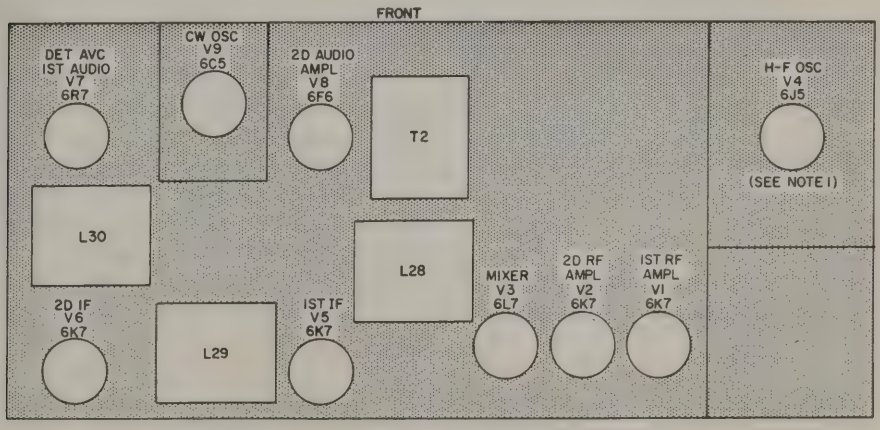
(5) If mobility is desired, place the shelter on a 2½ ton, 6 x 6 cargo truck and attach a trailer and Power Unit PE–95–(*) as described in *a*(1) through (4) above.

(6) Check to see that all the components in the operating shelter have the vacuum tubes seated properly. See figure 53.

(7) Check to see that all the components in the operating shelter have the proper value fuses inserted in fuseholders. See the following table for location and value of fuses.

Component	Fuse symbol	Rating (amp)	Reference
Control Unit C–292(*)/TRA–7.	F101_____	3	Fig. 93.
	F102_____	3	
Rectifier RA–87_____	_____	15	Fig. 98.
	_____	5	
Reperforator-Transmitter TG–26–A or Perforator-Transmitter TT–56/MGC (connection box).	Fusetron_	1⅘10	Fig. 95.
	Fusetron_	1⅘10	

d. Power Unit PE–95–(*). The installation instructions for Power Unit PE–95–(*) are contained in TM 11–904, and the installation instructions



NOTES

1. IN CHANNEL B RECEIVER V4 IS REPLACED BY A PLUG FOR CONNECTING TO OSCILLATOR-AMPLIFIER O-59(*)/MRC.
2. RECEIVER RECTIFIER TUBE V10 AND VOLTAGE REGULATOR TUBE V11 ARE CONTAINED IN RECTIFIER RA-20-(*).

TM624-591

Figure 47. Radio Receiver BC–342–( ), BC–312–( ), tube location.

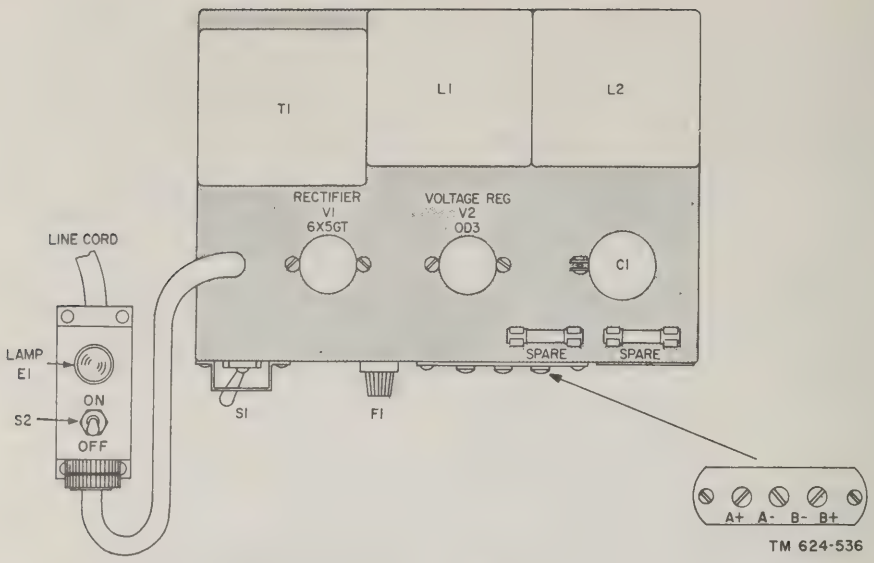


Figure 48. Rectifier RA–133–(*), tube location.

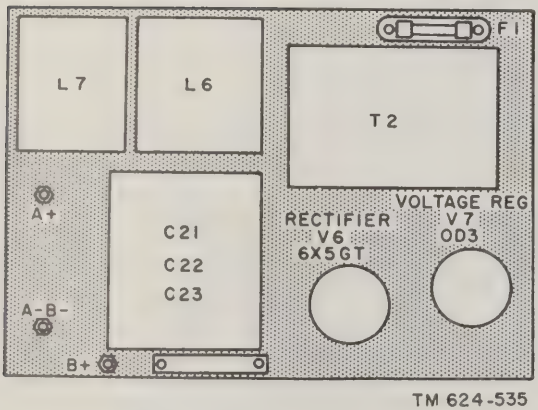


Figure 49. Power Supply Unit PP–79/U, tube location.

for Power Unit PE–75–(.) are contained in TM 11–900. The power units may be shipped with or without batteries. Batteries not shipped with these units are packed in a separate wooden crate. These batteries are shipped dry-charged. Charge them in accordance with the instruction given by the manufacturer on the card attached to the battery.

18. General Connections and Interconnection Data

When the radio set is unpacked and the components are mounted in the appropriate shelters, the equipment is ready for cabling. In cases where 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 tables list the cords and their connections to the components in the three shelters:

a. Transmitting Shelter Cords.

Item No.	Cord	Radio Sets			Required No.	Length	Connects—	
		AN/MRC-2	AN/MRC-2A	AN/MRC-2B			From—	To—
1	Cord CD–335	(*)	(*)	(*)	1	14 ft	Junction Box JB–70–A (S 200)	Cord CD–652.
2	Cord CD–652	(*)	(*)	(*)	1	100 ft	Cord CO–335	Cord CO–316.
3	Cord CO–316	(*)	(*)	(*)	1	8 ft. 4 in	Cord CD–652	Power Unit PE–95–(*) (AC terminals).
4	Wire W–128	(*)	(*)		1	20 ft	Mast Base MP–48	Radio Receiver BC–312–( ) (SIG. ANT.).
5	Wire W–128		(*)	(*)	1	20 ft	Mast Base AB–15/GR	Radio Receiver BC–312–( ) (SIG. ANT.).
6	Cord CX–135/MRC–1	(*)	(*)	(*)	1	18 ft	Feedthrough receptacle in shelter wall.	Amplifier AM–141(*)/MRC (a-c input).
7	Cord CX–137/MRC–1	(*)	(*)		1	100 ft	Feedthrough receptacle in shelter wall.	Cord CX–136/MRC–1.
8	Power Cable Assembly CX–1166/U.			(*)	1	100 ft	Feedthrough receptacle in shelter wall.	Power Cable Assembly CX–1165/U.
9	Cord CX–136/MRC–1	(*)	(*)		1	12 ft	Cord CX–137/MRC–1	Power Unit PE–95–(*) (AC terminals).
10	Power Cable Assembly CX–1165/U.			(*)	1	12 ft	Power Cable Assembly CX–1166/U.	Power Unit PE–95–(*) (AC terminals).
11	Cord CX–142/MRQ–2	(*)	(*)	(*)	1		Junction Box JB–70–A (SO 203).	Rectifier RA–63–(*) (TS 500).
12	Cord CD–659	(*)	(*)	(*)		10 ft. 6 in	Junction Box JB–70–A (SO 206).	Chest CH–109–(*) (SO 600).
13	Cord CG–145/MRC–1	(*)	(*)	(*)	1	100 ft	Amplifier AM–141–(*)/MRC r-f output terminals.	To transmitting antenna.
14	Cord CG–65/MRC–1	(*)	(*)	(*)	1	4 ft	Radio Transmitter BC–610–(*) (r-f output terminal).	Amplifier AM–141–(*)/MRC (EXCITATION INPUT J4).
15	Cord CX–911/U	(*)	(*)	(*)	1	6 ft	Radio Transmitter BC–610–(*) (TS 15 or TS 3).	Amplifier AM–141–(*)/MRC (BC–610).
16	Cord CD–565	(*)	(*)	(*)	1		Junction Box JB–70–A (SO 204).	Radio Receiver BC–312 (SO 1).
17	Cord CD–201	(*)	(*)	(*)	1		Key J–37	Junction Box J–207/MRC–2 (KEY).
18	Cord CD–318–( )	(*)	(*)	(*)	1		Microphone T–50	Speech Amplifier BC–614–(*) (DYNAMIC MIC. 2).
19	Cord CD–605	(*)	(*)	(*)	1		Headset HS–30–( )	Frequency Shift Exciter 0–39 (*)/TRA–7 (PHONES–850 TEST).
20	Cord CD–607	(*)	(*)	(*)	1		Junction Box J–207/MRC–2 (DISABLING).	Speech Amplifier BC–614–(*) (CARBON MIC. 1).
21	Cord CD–1019		(*)	(*)	1		Junction Box J–207/MRC–2 (DISABLING).	Speech Amplifier BC–614–(*) (CARBON MIC. 1).

a. Transmitting Shelter Cords—Continued

Item No.	Cord	Radio Sets			Required No.	Length	Connects—	
		AN/MRC-2	AN/MRC-2A	AN/MRC-2B			From—	To—
22	Cord CX-143/MRQ-2	(*)	(*)	(*)	1		Junction Box JB-70-A (TS200).	Loudspeaker LS-3 Radio Receiver BC-312-( ) (2ND AUDIO) and Telephone EE-8-( ) (L1 and L2).
23	Cord CX-141 MRQ-2	(*)	(*)	(*)	1		Junction Box JB-70-A (TS 200).	Speech Amplifier BC-614-(*) (TO JB-70).
24	Cord CX-764	(*)	(*)	(*)	1	14 ft	Speech Amplifier BC-614-(*) (TO BC-610).	Radio Transmitter BC-610-(*) (SO 5).
25	Cord CD-1251	(*)	(*)	(*)	1	4 ft	Junction Box J-207/MRC-2 (EE-8).	Telephones EE-8-( ) (L1 and L2).
26	Cord CD-763	(*)	(*)	(*)	1	10 ft	Junction Box JB-70-A (SO 201).	Radio Transmitter BC-610-(*) (SO 6).
27	Cord CX-962/TRA-7	(*)	(*)	(*)	1	4 ft	Shelter (a-c outlet)	Frequency shift Exciter O-39(*) TRA-7 (AC).
28	Cord CX-961/TRA-7 (red)	(*)	(*)	(*)	1	4 ft	Frequency Shift Exciter 0-39(*) TRA-7 (LOCAL CW CONTROL).	Junction Box J-207/MRC-2 (RED).
29	Cord CX-961/TRA-7 (blue)	(*)	(*)	(*)	1	4 ft	Frequency shift Exciter 0-39(*) TRA-7 (SEND AND CONTROL).	Junction Box J-207/MRC-2 (BLUE).
30	Cord CG-389/U	(*)	(*)	(*)	1	6 ft	Frequency shift Exciter 0-39(*) TRA-7 (NORM).	Radio Transmitter BC-610-(*) (tuning unit).
31	Cord CG-390/U	(*)	(*)	(*)	1	3 ft	Frequency shift Exciter 0-39(*) TRA-7 (FREQUENCY METER IN).	Frequency Meter BC-221-( ) (PHONES).
32	Cord CO-313-A		(*)	(*)	1	100 ft	Cord CD-652	Power unit (AC terminal).
33	Power cord	(*)	(*)	(*)	1		Junction Box JB-70-A (SO 208).	A-c receptacle in shelter ceiling.
34	Power cord	(*)	(*)	(*)	1		Ventilating Blower	A-c receptacle in shelter ceiling.
35	Power cord	(*)	(*)	(*)	1		Lamp	A-c receptacle in shelter ceiling.
36	Power cord	(*)	(*)	(*)	1		Junction Box JB-70-A (SO 202).	Heater.
37	Power cord	(*)	(*)	(*)	1		Junction Box JB-70-A (SO 207).	A-c outlet in shelter wall.
38	Power cord	(*)	(*)	(*)	1		Lamp	A-c outlet in shelter wall.
39	Power cord	(*)	(*)	(*)	1		Rectifier Power Unit RA-133-(*).	A-c outlet in shelter wall.
40	Pickup Antenna AT-137/-MRC-2.	(*)	(*)	(*)	1		Frequency Meter BC-221-( ).	Clip on wall by transmitter.
41	Power cord	(*)	(*)	(*)	1		Amplifier blower	Blower socket on amplifier.
42	Power cord	(*)	(*)	(*)	1		Junction Box JB-70-A (SO 209).	Lamp.

b. Receiving Shelter Cords.

Item No.	Cord	Radio Sets			Required No.	Length	Connects—	
		AN/MRC-2	AN/MRC-2A	AN/MRC-2B			From—	To—
1	Cord CD–133	(*)			1		Key J–37	Operating Table FN–23/MRC–2 (KEY).
2	Cord CD–135–A	(*)	(*)	(*)	1		Loudspeaker LS–3 (jack)	Control Box C–345(*)/MRC–2 (SPEAKER).
3	Cord CD–605	(*)	(*)	(*)	1		Headset HS–30–( )	Control Box C–345(*)/MRC–2 (PHONES).
4	Cord CD–1251	(*)	(*)	(*)	1		Telephone EE–8–( ) (L1 and L2).	Operating Table FN–23/MRC–2 (EE–8).
5	Cord CX–136/MRC–1	(*)	(*)		1	50 ft	Feedthrough receptacle in shelter wall.	Power Unit PE–95–(*) (AC terminals).
6	Power Cable Assembly CX–1165/U.			(*)	1	50 ft	Feedthrough receptacle in shelter wall.	Power Unit PE–95–(*) (AC terminal).
7	Cord CX–918/MRC–2	(*)	(*)	(*)	1	25 ft	Feedthrough receptacle in shelter wall.	Power Unit PE–75–( ) (AC receptacle).
8	Cord CG–388/MRC–2	(*)	(*)		2	500 ft	Radio Receiver Assembly OA–65–(*)/MRC–2 Channels A and B (SIG. ANT.).	Receiving antennas.
9	RF Cable Assembly CG–557/U.			(*)	2	500 ft	Radio Receiver Assembly OA–65(*)/MRC–2 Channels A and B (SIG. ANT.).	Receiving antennas.
10	Cord CD–132		(*)	(*)	1		Key J–37	Operating Table FN–23/MRC–2 (KEY).
11	Cord CX–953/TRA–7 (blue)	(*)	(*)	(*)	1		Dual Diversity Converter CV–31(*)/TRA–7 (J103).	Operating Table FN–23/MRC–2 (BLUE).
12	Cord CG–406/TRA–7	(*)	(*)	(*)	1		Dual Divirsity Converter CV–31 (*)/TRA–7 (J102).	Radio Receiver Assembly OA–65(*)/MRC–2 Channel B (J107).
13	Cord CG–406/TRA–7	(*)	(*)	(*)	1		Dual Diversity Converter CV–31(*)/TRA–7 (J101).	Radio Receiver Assembly OA–65(*)/MRC–2 Channel A (J107).
14	Cord CX–952/TRA–7 (red)	(*)	(*)	(*)	1		Dual Diversity Converter CV–31(*)/TRA–7 (J404).	Operating Table FN–23/MRC–2 (RED).
15	Cord CX–954/TRA–7	(*)	(*)	(*)	1	6 ft	Dual Diversity Converter CV–31(*)/TRA–7 (J104).	A-c outlet in shelter.
16	Cord CX–955/TRA–7	(*)	(*)	(*)	1		Dual Diversity Converter CV–31(*)/TRA–7 (J403).	Radio Receiver Assembly OA–65(*)/MRC–2 Channel B (SO 1).
17	Cord CX–955/TRA–7	(*)	(*)	(*)	1		Dual Diversity Converter CV–31(*)/TRA–7 (J402).	Radio Receiver Assembly OA–65(*)/MRC–2 Channel A (SO 1).

b. Receiving Shelter Cords—Continued

Item No.	Cord	Radio Sets			Required No.	Length	Connects—	
		AN/MRC-2	AN/MRC-2A	AN/MRC-2B			From—	To—
18	Power cords	(*)	(*)	(*)	2		Radio Receiver Assembly OA–65(*)/MRC–2 Channels A and B.	To a-c outlet in shelter.
19	Audio cords	(*)	(*)	(*)	2		Control Box C–345(*)/MRC–2. (TO REC. A and TO REC. B).	Radio Receiver Assembly OA–65(*)/MRC–2 Channels A and B (SPEAKER 2ND AUDIO).
20	Power cord	(*)	(*)	(*)	1		Teletypewriter TG–7–B or TT–55/MGC.	Operating Table FN–23/MRC–2 (a-c outlet).
21	Signal cord (red shell)	(*)	(*)	(*)	1		Teletypewriter TG–7–B or TT–55/MGC.	Operating Table FN–23/MRC–2 (Red).
22	Signal cord (black shell)	(*)	(*)	(*)	1		Teletypewriter TG–7–B or TT–55/MGC.	Operating Table FN–23/MRC–2 (BLACK).
23	Power cord	(*)	(*)	(*)	1		Ventilating blower	To a-c outlet in shelter.
24	Cord CD–135–A	(*)	(*)	(*)	1		Radio Receiver Assembly OA–65(*)/MRC–2 (spare) (SPEAKER 2ND AUDIO) Channel A.	Loudspeaker LS–3.
25	Power cord	(*)	(*)	(*)	1		Operating Table FN–23/MRC–2 (a-c outlet).	A-c outlet in shelter.
26	Power cord	(*)	(*)	(*)	1		Heater	A-c outlet in shelter.
27	Wire W–128	(*)			1		Spare Radio Receiver Assembly OA–65(*)/MRC–2 Channel A (SIG. ANT.).	Mast Base MP–48.
28	Wire W–128		(*)	(*)	1		Spare Radio Receiver Assembly OA–65(*)/MRC–2 Channel A (SIG. ANT.).	Mast Base MP–65–( ).

c. Operating Shelter Cords.

Item No.	Cord	Radio Sets			Required No.	Length	Connects—	
		AN/MRC-2	AN/MRC-2A	AN/MRC-2B			From—	To—
1	Cord CC–66	(*)	(*)	(*)	6	1 ft 6 in	Junction Box J–204/MRC–2 (SEND or REC. TTY).	Junction Box J–204/MRC–2 (SEND or REC. EXT.).
2	Cord CC–68	(*)	(*)	(*)	2	6 ft	Junction Box J–204/MRC–2 (SEND or REC. EXT.).	Connection box.
3	Cord CX–918/MRC–2	(*)	(*)	(*)	1	25 ft	Feedthrough receptacle in shelter.	Power Unit PE–75–( ).

4	Cord CX–956/TRA–7	(*)	(*)	(*)	1	6 ft	Control Unit C–292(*)/TRA–7 (J103).	Operating Table FN–22 MRC–2 (YELLOW).
5	Cord CX–957/TRA–7	(*)	(*)	(*)	1	6 ft	Control Unit C–292(*)/MRC–2 (J101).	Operating Table FN–22/MRC–2 (BLACK).
6	Cord CX–958/TRA–7	(*)	(*)	(*)	1	6 ft	Control Unit C–292(*)/TRA–7 (J102).	Operating Table FN–22/MRC–2 (GREEN).
7	Cord CX–959/TRA–7	(*)	(*)	(*)	1	6 ft	Control Unit C–292(*)/TRA–7 (J107).	A-c outlet in shelter.
8	Power Cable Assembly CX–1165/U.			(*)	1	50 ft	Feedthrough receptable in shelter wall.	Power Unit PE–95–(*) (AC terminals).
9	Cord CX–136/MRC–1	(*)	(*)		1	50 ft	Feedthrough receptable in shelter wall.	Power Unit PE–95–(*) (AC terminals).
10	Power cord	(*)	(*)	(*)	1		Ventilator blower	A-c outlet in shelter.
11	Power cord	(*)	(*)	(*)	1		Operating Table FN–22/MRC–2 (a-c outlet).	A-c outlet in shelter.
12	Power cord	(*)	(*)	(*)	2		Teletypewriters TG–7–B or TT–55/MGC (send and receive).	Operating Table FN–22/MRC–2 (a-c outlet).
13	Signal cords (red shell)	(*)	(*)	(*)	2		Teletypewriter TG–7–B or TT–55/MGC (send and receive).	Operating Table FN–22/MRC–2 (SEND TTY RED and REC. TTY RED).
14	Signal cords (black shell)	(*)	(*)	(*)	2		Teletypewriter TG–7–B or TT–55–MGC (send and receive).	Operating Table FN–22/MRC–2 (SEND TTY BLACK and REC. TTY BLACK).
15	Signal cords (red shell)	(*)	(*)	(*)	1		Typing reperforator	Junction Box J–204/MRC–2 or connection box.
16	Signal cords (black shell)	(*)	(*)	(*)	1		Typing reperforator	Junction Box J–204/MRC–2 or connection box.
17	Signal cord (gray shell)	(*)	(*)	(*)	1		Transmitter-distributor	Junction Box J–204/MRC–2 or connection box.
18	Power cord	(*)	(*)	(*)	1		Connection box	A-c outlet in shelter.
19	Power cord	(*)	(*)	(*)	1		Connection box	Rectifier RA–87 (d-c outlet).
20	Power cord	(*)	(*)	(*)	1		Rectifier RA–87	A-c outlet in shelter.
21	Signal cord (red shell)	(*)	(*)	(*)	2		Connection box	Junction Box J–204/MRC–2.
22	Signal cord (black shell)	(*)	(*)	(*)	2		Connection box	Junction Box J–204/MRC–2.
23	Power cord	(*)	(*)	(*)	1		Heater	A-c outlet in shelter.
24	Telephone cord	(*)	(*)	(*)	2		Operating Table FN–22/MRC–2 (EE–8).	Telephones EE–8–( ) (L1 and L2).

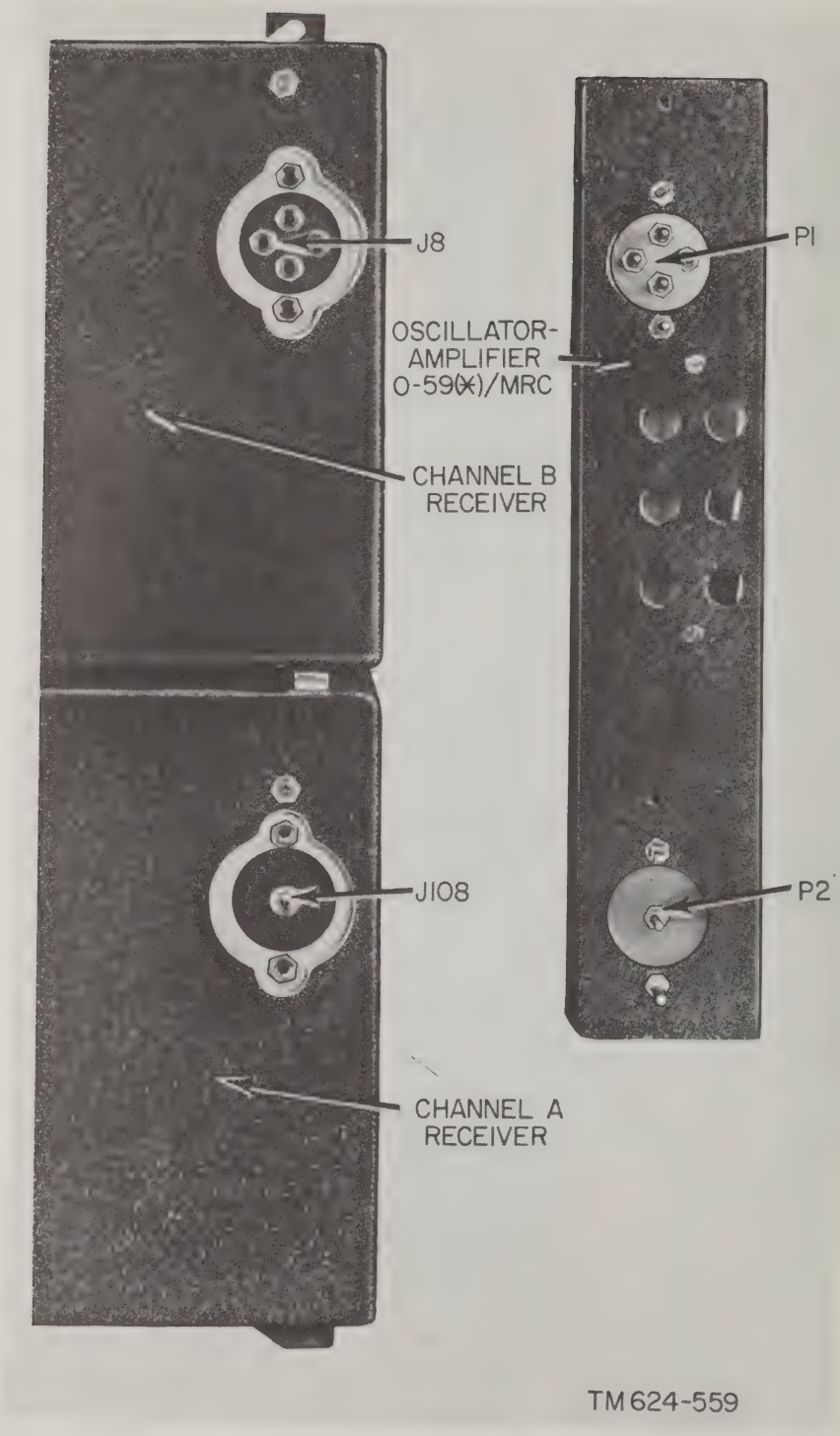


Figure 50. Oscillator coupling amplifier connection.

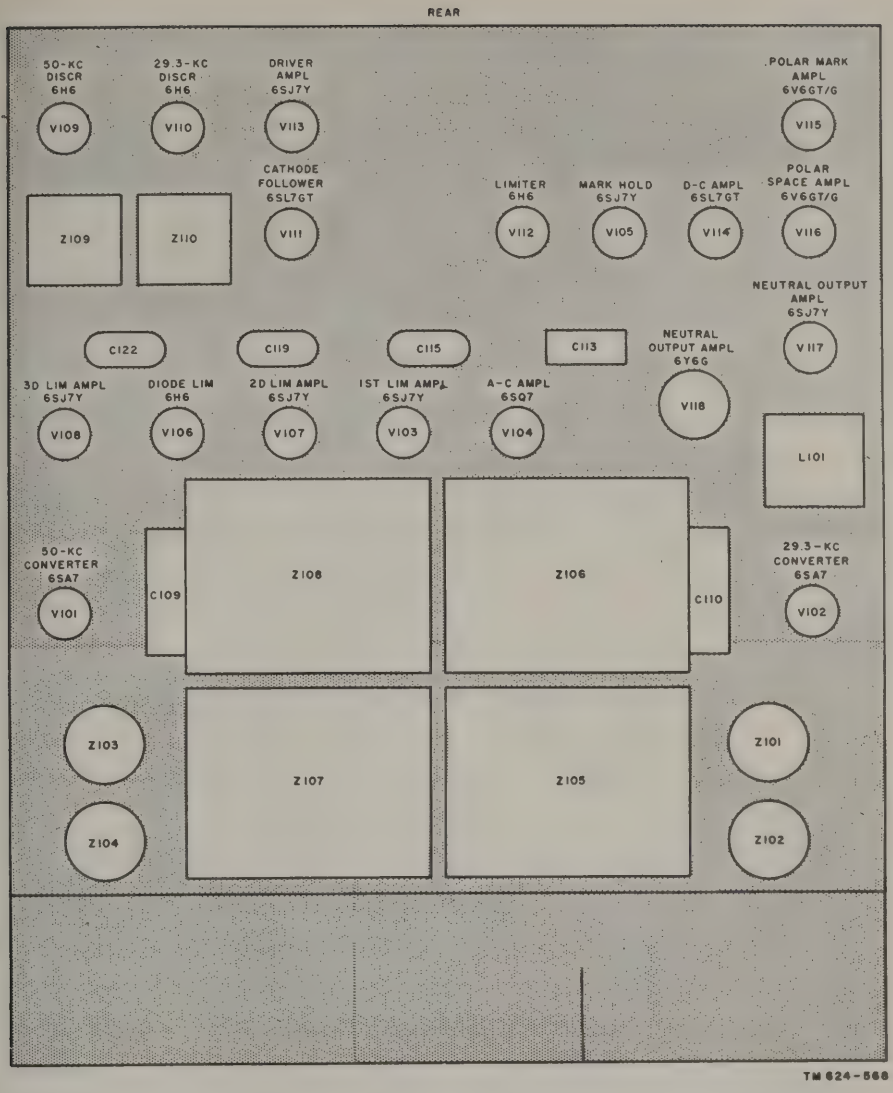


Figure 51. Dual Diversity Converter CV–31(*)/TRA–7, main chassis, tube location.

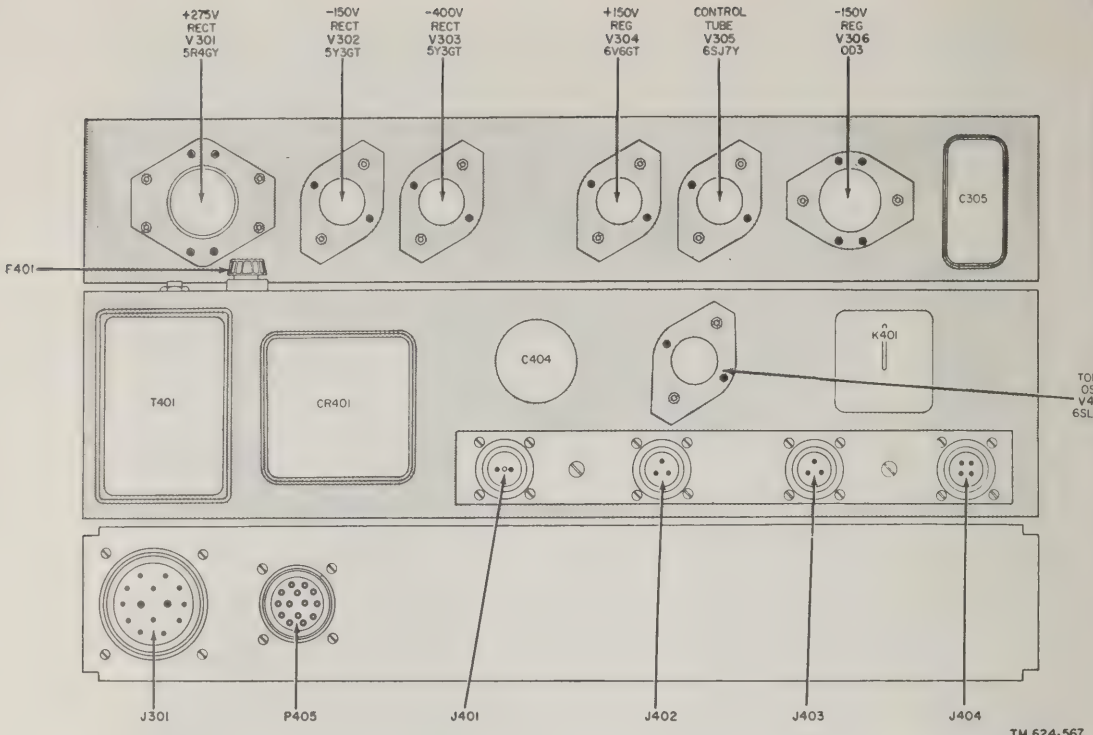


Figure 52. Rectifier Power Unit PP-193(*)/TRA-7 and Oscillator O-41(*)/TRA-7, tube location.

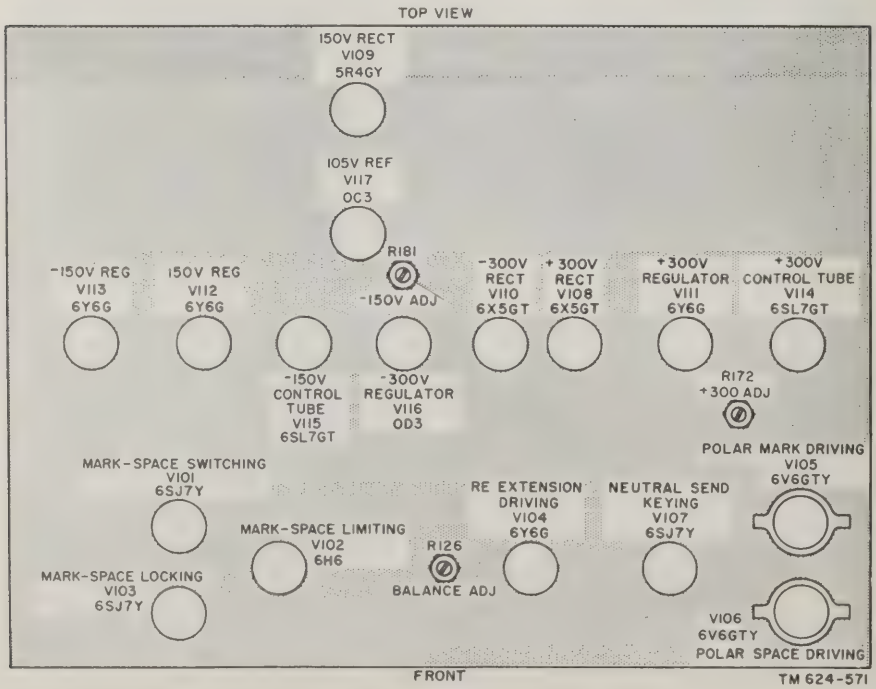


Figure 53. Control Unit C-292(*)/TRA-7, tube location.

19. Transmitting Shelter Connections (fig. 54)

a. The variac excitation circuit of Amplifier AM–141(*)/MRC is connected to Radio Transmitter BC–610–(*) by Cord CX–911/U. Figure 55 shows the connection of this cord between the amplifier and the radio transmitter. When Radio Transmitter BC–610–E is used, connect Cord CX–911/U as follows:

(1) Remove the black lead from terminal 1 on terminal strip TS3 of the radio transmitter and bolt it to the lug on the green conductor. Apply a serving of tape to this connection.

(2) Connect the white conductor to terminal 1.

(3) Connect the black conductor to terminal 2.

(4) Plug the other end of Cord CX–911/U into the BC–610 socket located on the rear panel of the amplifier.

b. Connect the FS exciter to the radio transmitter and to Junction Box J–207/MRC–2 which is located directly above the FS exciter as shown in figure 56.

(1) Connect the RF OUTPUT NORMAL connector on the FS exciter to the XTAL socket on the appropriate tuning unit in Radio Transmitter BC–610–(*) by means of Cord CG–389/U. Secure the cable clamp on Cord CG–389/U under the wingnut on the top of the radio transmitter.

(2) Connect the FREQUENCY METER IN connector of the FS exciter to the PHONES jack on Frequency Meter BC–221–( ) using Cord CG–390/U.

(3) Connect the LOCAL CW CONTROL connector labeled RED on Junction Box J–207/MRC–2 using Cord CX–961/TRA–7 (red).

(4) Connect the SEND AND CONTROL connector on the FS exciter to the connector labeled BLUE on Junction Box J–207/MRC–2 using Cord CX–961/TRA–7 (blue).

(5) Connect the AC SUPPLY socket on the FS exciter to the a-c outlet below Junction Box J–207/MRC–2 using Cord CX–962/TRA–7.

c. Make the following connections to Radio Transmitter BC–610–(*) (fig. 55).

(1) Connect socket SO 5 on the radio transmitter to the socket on Speech Amplifier BC–614–(*) labeled TO BC–610 with Cord CD–764.

(2) Connect the radio transmitter r-f terminals to the EXCITATION INPUT socket on the amplifier using Cord CG–65/MRC–1.

(3) Connect socket SO 6 of the radio transmitter to socket SO 201 of Junction Box JB–70–A with Cord CD–763.

d. Make the following connections to the amplifier (fig. 54).

(1) The 115 volts A. C. 60 CYCLE, 5000 V. A. SINGLE PHASE socket on the amplifier is connected, by Cord CX–135/MRC–1, to Power Cable Assembly CX–1166/U in Radio Set AN/MRC–2B or CX–137/MRC–1 in Radio Sets AN/MRC–2 or –2A. Power Cable Assembly CX–1165/U is connected between the AC terminals of Power Unit PE–95–(*) and Power Cable Assembly CX–1166/U in Radio Set AN/MRC–2B. Cord CX–136/MRC–1 is connected between the AC terminals of Power Unit PE–95–(*) and Cord CX–137/MRC–1 in Radio Sets AN/MRC–2 and –2A.

(2) Connect the blower on the amplifier to the socket labeled BLOWER in the rear of the amplifier with the power cord connected to the blower.

(3) Connect Cord CG–145/MRC–1 to the amplifier. The outer shield connection should be made to the antenna terminal nearest the right (curb) side of the amplifier. The grounding braid lug also is connected to this terminal.

e. Complete the following connections to Junction Box J–207/MRC–2 (fig. 56).

(1) Connect the CARBON MIC. 1 jack on the speech amplifier to the jack marked DISABLING on the junction box with Cord CD–1019 in Radio Set AN/MRC–2A and –2B or Cord CD–607 in Radio Set AN/MRC–2.

(2) Connect Key J–37 to the KEY jack on the junction box, using Cord CD–201.

Note. This step applies only to emergency c-w operation from the transmitting shelter. Do not connect for normal teletypewriter operation.

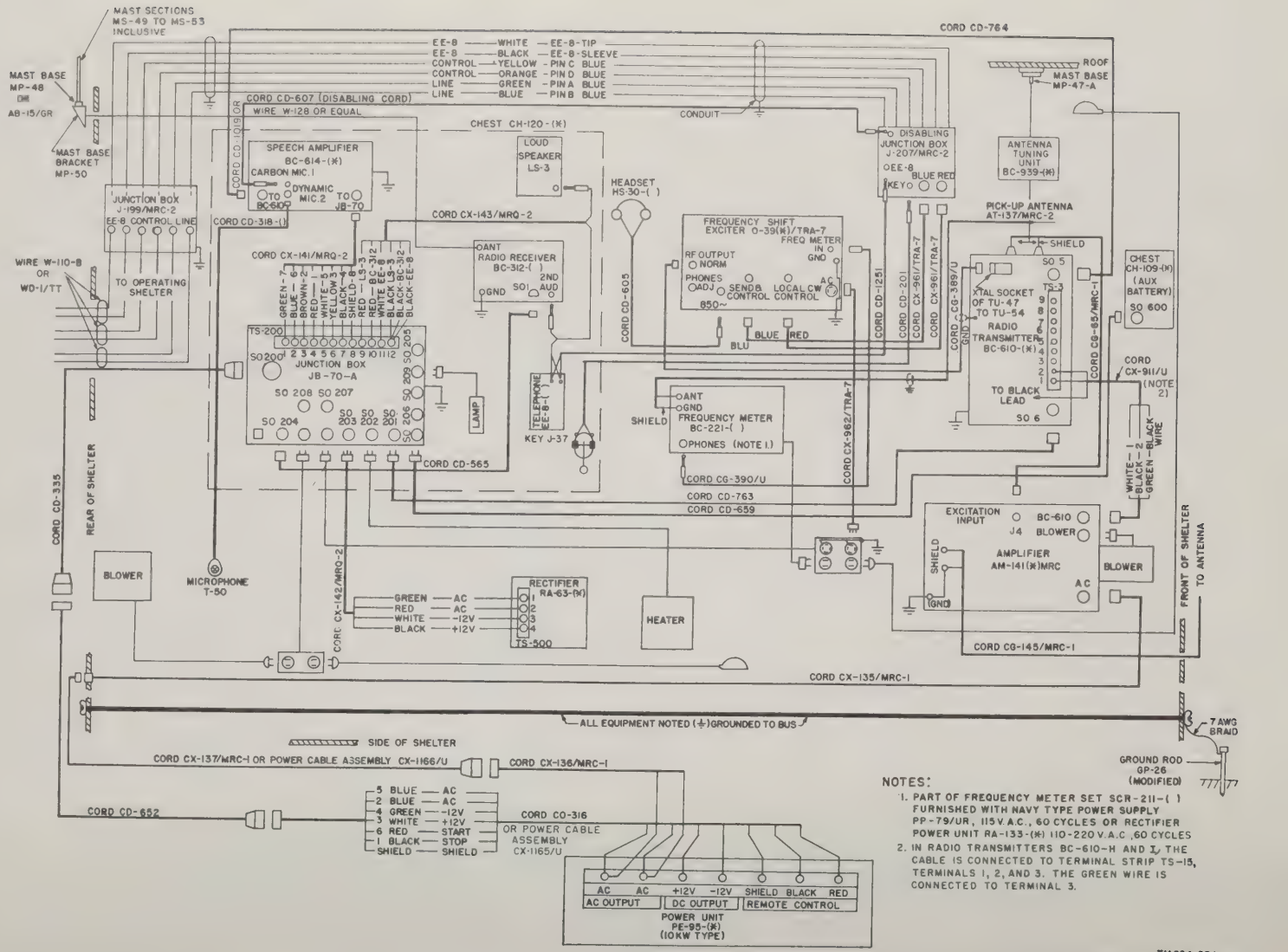


Figure 54. Transmitting shelter wiring and cording diagram.

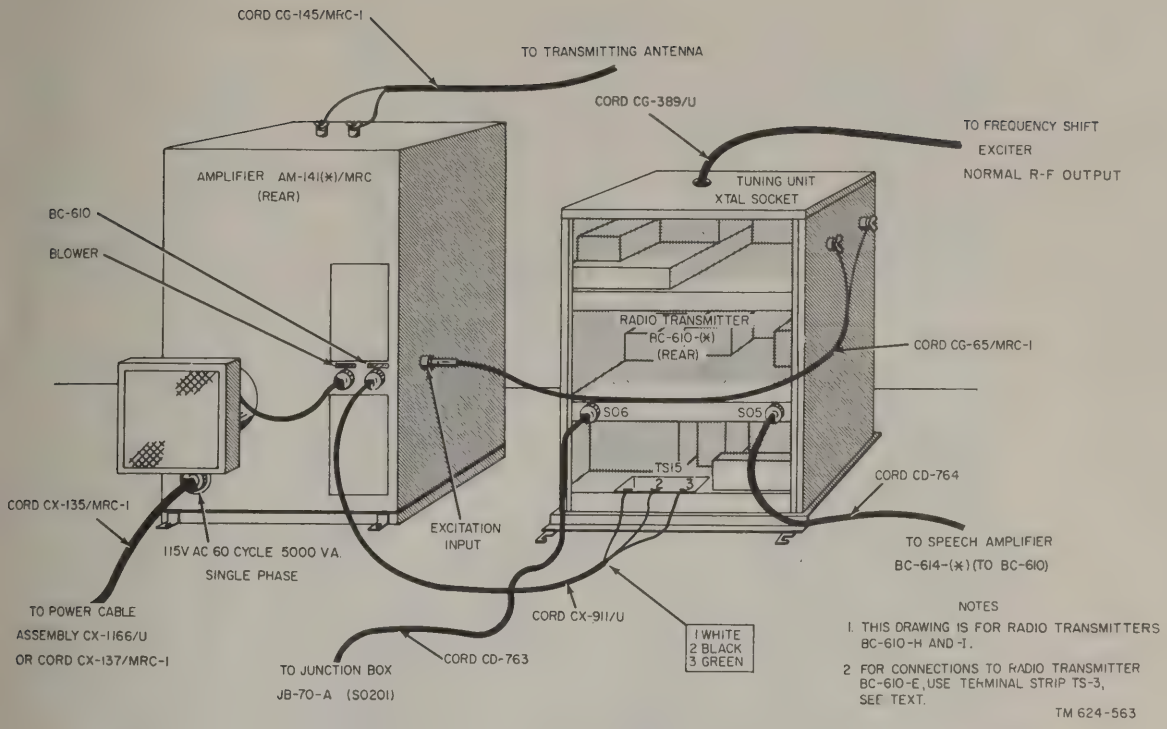


Figure 55. Connections between Amplifier AM–141(*)/MRC and Radio Transmitter BC–610–(*).

(3) Connect the line terminals of Telephone EE–8–( ) to the EE–8 jack on the junction box with Cord CD–1251.

f. Complete the following connections to Junction Box JB–70–(*) (fig. 57).

(1) Connect socket SO 203 of Junction Box JB–70–A to terminal strip TS500 of Rectifier RA–63–(*), with Cord CX–142/MRQ–2.

(2) Connect socket SO 206 of Junction Box JB–70–A to socket SO 600 of Chest CH–109–(*) with Cord CD–659.

(3) Connect socket SO 200 of Junction Box JB–70–A to Cord CO–335. Cord CD–652 and Cord CO–316 are connected between Power Unit PE–95–(*) and Cord CO–335.

(4) Connect terminal strip TS200 of Junction Box JB–70–A to the connector on the speech amplifier labeled TO JB–70 with Cord CX–141/MRQ–2.

(5) Connect terminal strip TS200 of Junction Box JB–70–A to Loudspeaker LS–3, to the jack labeled SPEAKER 2ND AUDIO on Radio Receiver BC–312, and to the line terminals of Telephone EE–8–( ) with Cord CX–143/MRQ–2.

(6) Connect socket SO 204 of Junction Box JB–70–A to socket SO 1 of Radio Receiver BC–312 by means of Cord CD–565.

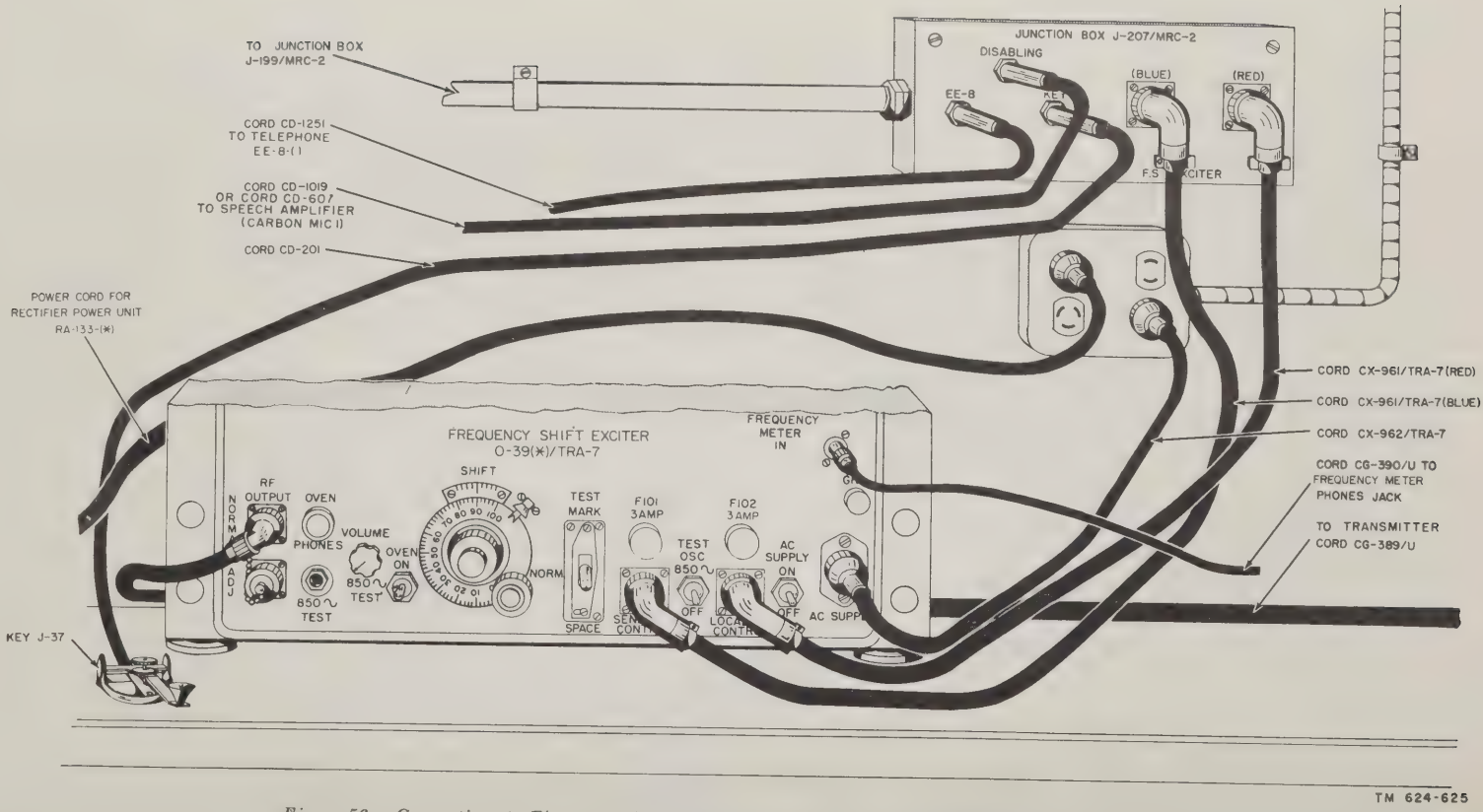


Figure 56. Connections to Frequency Shift Exciter O–39(*)/TRA–7 and Junction Box J–207/MRC–2.

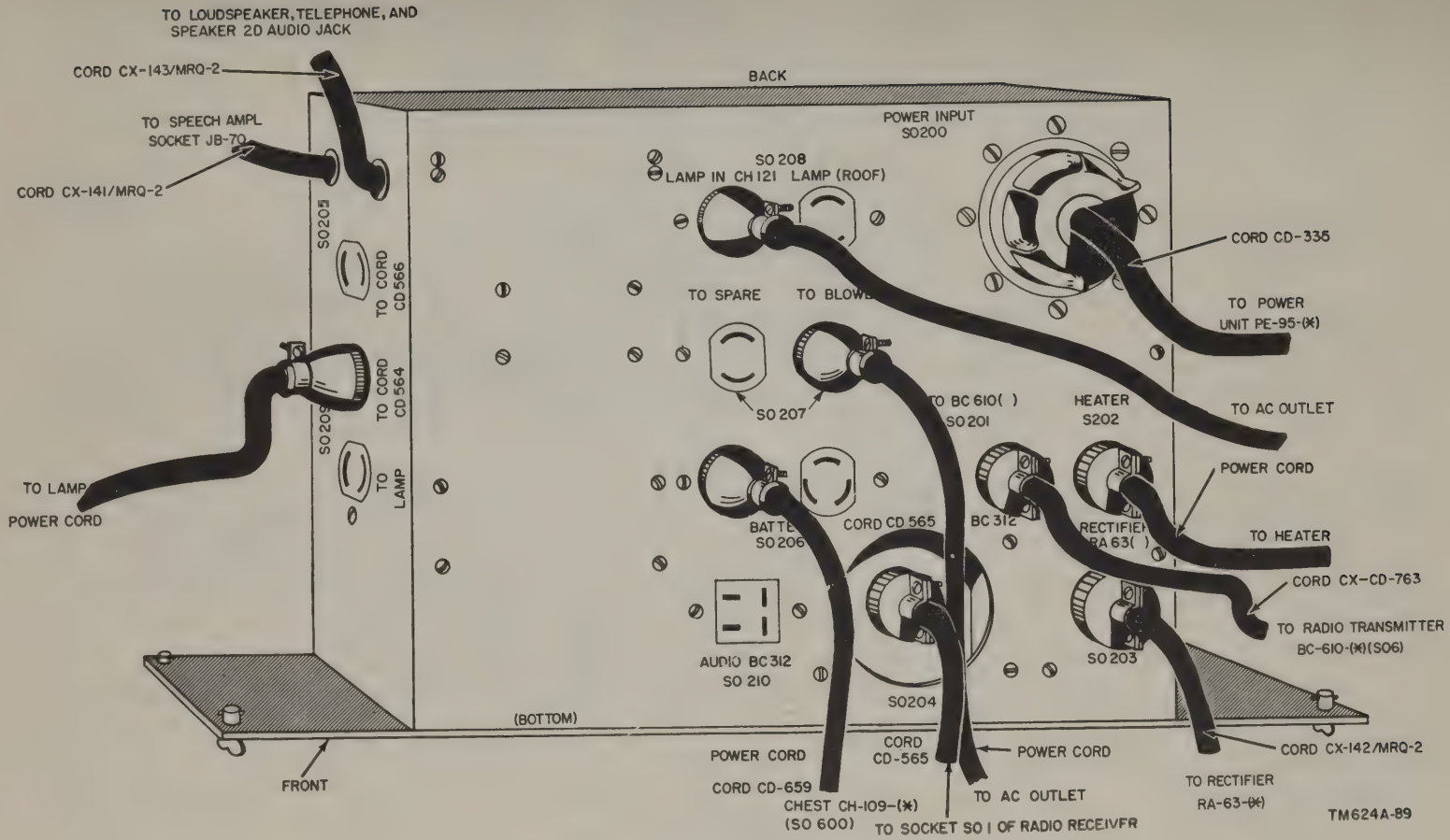


Figure 57. Connections to Junction Box JB–70–A.

g. Connect Microphone T–50 to the speech amplifier connector labeled DYNAMIC MIC. 2 with Cord CD–318–( ).

h. Connect the heater and blower to the 110-volt a-c power receptacles as they are needed.

i. Connect the SIG. ANT. connector of Radio Receiver BC–312 to Mast Base MP–48 or Mast Base AB–15/GR with Wire W–128 or equal.

Note. This connection is not made when the receiver is to be used for monitoring purposes.

j. If a whip or long wire antenna is to be used for transmitting, connect Mast Base MP–47–A to the connector on the rear of the antenna tuning unit with Wire W–128 or equal.

k. With the braid straps provided, ground all the equipment in the shelter.

l. Connect the bench bus ground terminal to the shelter ground strap provided.

m. With #7 AWG braid cord, connect the transmitting shelter ground terminal to Ground Rod GP–26 (modified) driven into the earth close to the shelter ground terminal.

n. Connect the ANT. and GND. terminals of Frequency Meter BC–221–( ) to Pickup Antenna AT–137/MRC–2. Connect the outer braid to the GND. terminal. The pickup end is clamped to the shelter wall near the r-f output terminals of the transmitter.

o. Check all cord connections in the transmitting shelter against figure 54.

20. Receiving Shelter Connections
(fig. 58)

a. Connect one of the receiving antenna feeder lines, RF Cable Assembly CG–557/U in Radio Set AN/MRC–2B or Cord CG–338/MRC–2 in Radio Sets AN/MRC–2 and –2A, to the SIG. ANT. jack of Radio Receiver Assembly OA–65(*)/MRC–2 (Channel B) using the coaxial adapter. Connect the other receiving antenna feeder line to the SIG. ANT. jack of Radio Receiver Assembly OA–65(*)/MRC–2 (Channel A) using the coaxial adapter.

b. Connect i-f output jack J107 of the Channel A receiver to jack J101, in the rear of the dual diversity converter, with one Cord CG–406/TRA–7. Connect i-f output jack J107 of the Channel B receiver to jack J102, in the rear of the dual diversity converter, with the other Cord CG-406/TRA–7.

c. Connect jack J103 in the rear of the dual diversity converter to the connector labeled BLUE on the operating table with Cord CX–953/TRA– (blue) (fig. 59).

d. Connect jack J404 in the rear of the dua diversity converter to the connector labeled RE on the operating table with Cord CX–952/TRA– (red) (fig. 59).

e. Insert the plug end of Cord CD–1251, con nected to Telephone EE–8–( ), into the EE– jack of the operating table (fig. 59). Connect th other end of this cord to the line terminals o Telephone EE–8–( ).

f. Connect socket SO 1 of the Channel A receiver to jack J402, in the rear of the dua diversity converter, with one Cord CX–955/TRA– (fig. 58). Connect socket SO 1 of the Channel B receiver to jack J403, in the rear of the dua diversity converter, with the other Cord CX–955 TRA–7 (fig. 58).

g. Insert plug P1 of the cord TO REC. A or Control Box C–345(*)/MRC–2 into the SPEAKER 2ND AUDIO jack of the Channel A receiver. Insert plug P2 of the cord TO REC. B on Control Box C–345(*)/MRC–2 into the SPEAKER 2ND AUDIO jack of the Channel B receiver.

h. Connect the SPEAKER jack above TO REC. A on Control Box C–345(*)/MRC–2 to the phone jack of Loudspeaker LS–3 by means of Cord CD–135–A. To monitor the Channel B receiver, connect the SPEAKER jack above TO REC. B to the phone jack of Loudspeaker LS–3 by means of Cord CD–135–A.

i. Connect Headset HS–30–( ) to Control Box C–345(*)/MRC–2 by inserting the plug at the end of Cord CD–605 into the PHONES jack above TO REC. A. The Channel B receiver may be heard in the headset by inserting the plug from Cord CD–605 into the PHONES jack above TO REC. B.

j. Connect the dual diversity converter to the a-c outlet by inserting the red plug of Cord CX–954/TRA–7 into jack J104 in the rear of the converter. Insert the three-prong plug at the other end into the a-c outlet.

k. Connect power to the two receivers by inserting the power cords into the a-c outlets.

l. Insert the red shell plug of the monitoring teletypewriter into the RED jack on the operating table (fig. 60). Insert the black shell plug of the monitoring teletypewriter into the BLACK jack on the operating table (fig. 60). Plug the power cord into an a-c outlet.

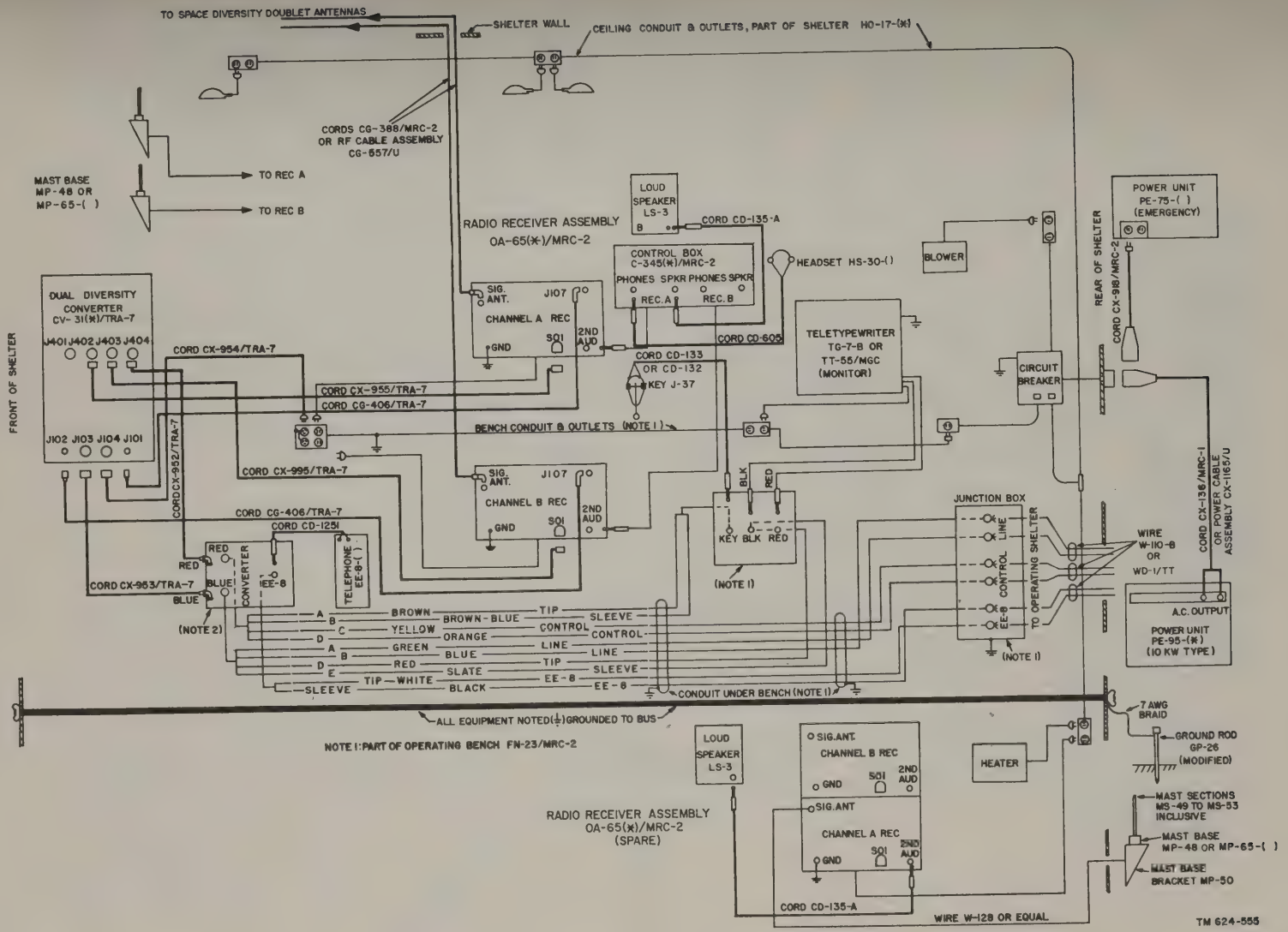


Figure 58. Receiving shelter wiring and cording diagram.

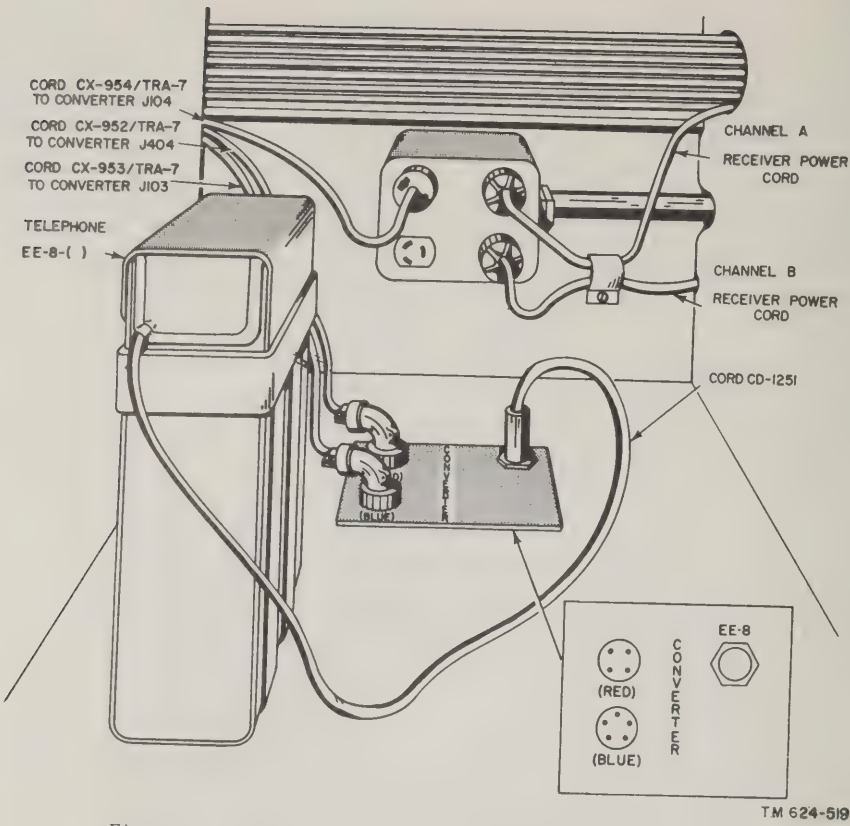


Figure 59. Connections to converter jack panel in the receiving shelter.

m. Insert the plug at the end of Cord CD–132 or CD–133 into the KEY jack on the operating table. The other end of the cord is connected to Key J–37 (fig. 60).

n. With the braid straps provided, ground all equipment to Operating Table FN–23/MRC–2. Connect operating table bus ground terminal to the shelter ground strap provided (fig. 58).

o. Plug the power cord attached to the Channel A receiver of the spare Radio Receiver Assembly OA–65/MRC–2 to the a-c receptacle nearest the receiver (fig. 58).

p. Connect the spare Loudspeaker LS–3 to the SPEAKER 2ND AUDIO jack of the Channel A receiver by means of Cord CD–135–A.

q. Connect the ALT. SIG. ANT. connector of the spare radio receiver to Mast Base MP–48 o MP–65–( ) with Wire W–128 or equal.

r. Connect Power Unit PE–95–(*) to the a-c input circuit of the main circuit breaker of the shelter with Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U as shown in figure 58. Power Unit PE–75–( ) may be substituted for Power Unit PE–95–(*) by connecting Cord CX–918/MRC–2 between the AC receptacle and the feedthrough receptacle on the shelter wall.

s. Ground the receiving shelter by driving Ground Rod GP–26 (modified) into the earth close to the shelter ground terminal and connect the ground terminal to the ground rod with #7 AWG braid cord (fig. 58).

t. Complete all lamp, heater, and blower connections to the a-c receptacles as required (fig. 58).

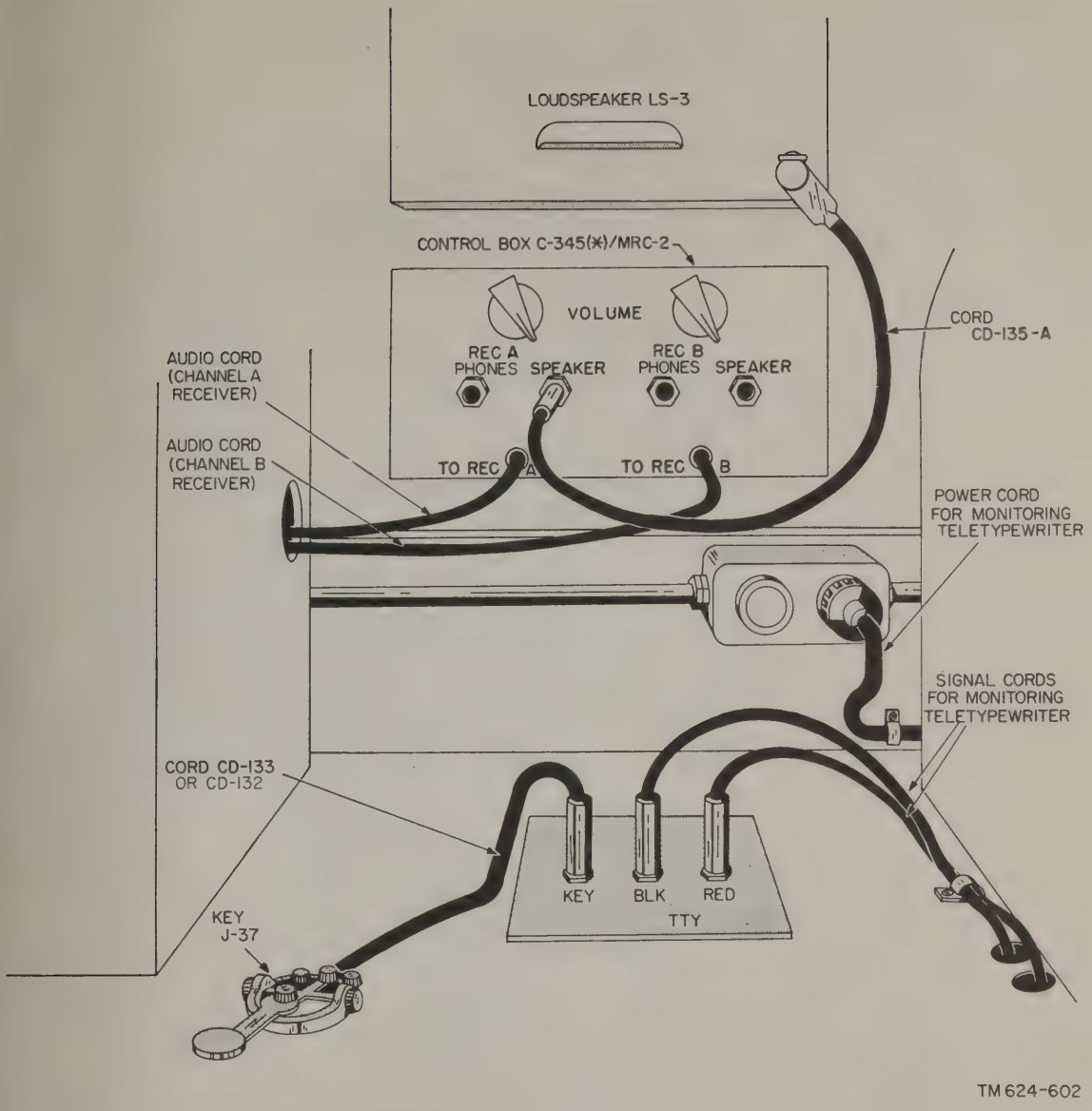


Figure 60. Connections to teletypewriter jack panel in receiving shelter.

21. Operating Shelter Connections

(fig. 61)

a. Connect J101 in the rear of Control Unit C–292(*)/TRA–7 to the BLACK connector on the operating table with Cord CX–957/TRA–7 (fig. 62).

b. Connect J102 in the rear of Control Unit C–292(*)/TRA–7 to the GREEN connector on the operating table with Cord CX–958/TRA–7 (fig. 62).

c. Connect J103 in the rear of Control Unit C–292(*)/TRA–7 to the YELLOW connector on the operating table with Cord CX–956/TRA–7 (fig. 62).

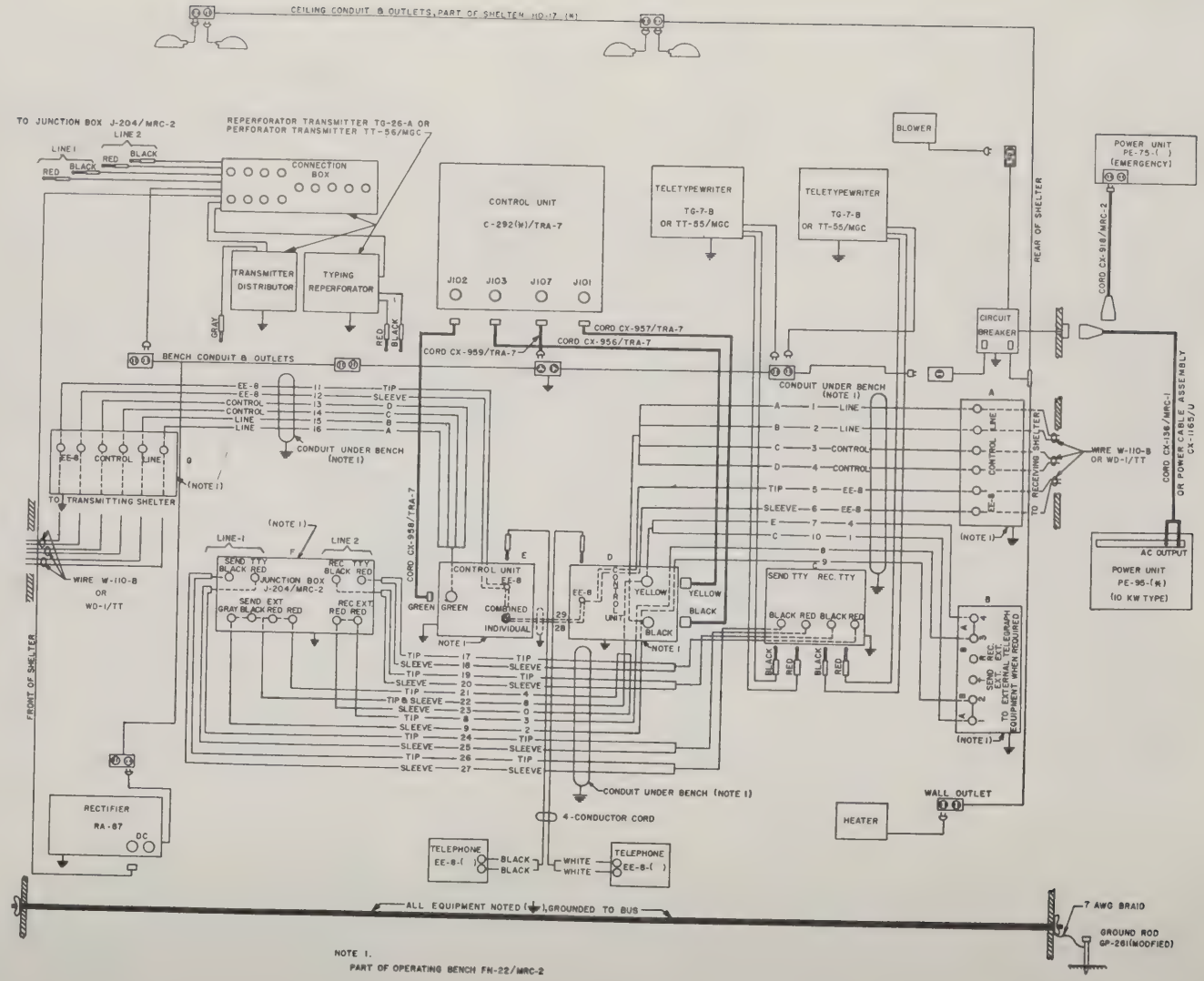


Figure 61. Operating shelter wiring and cording diagram.

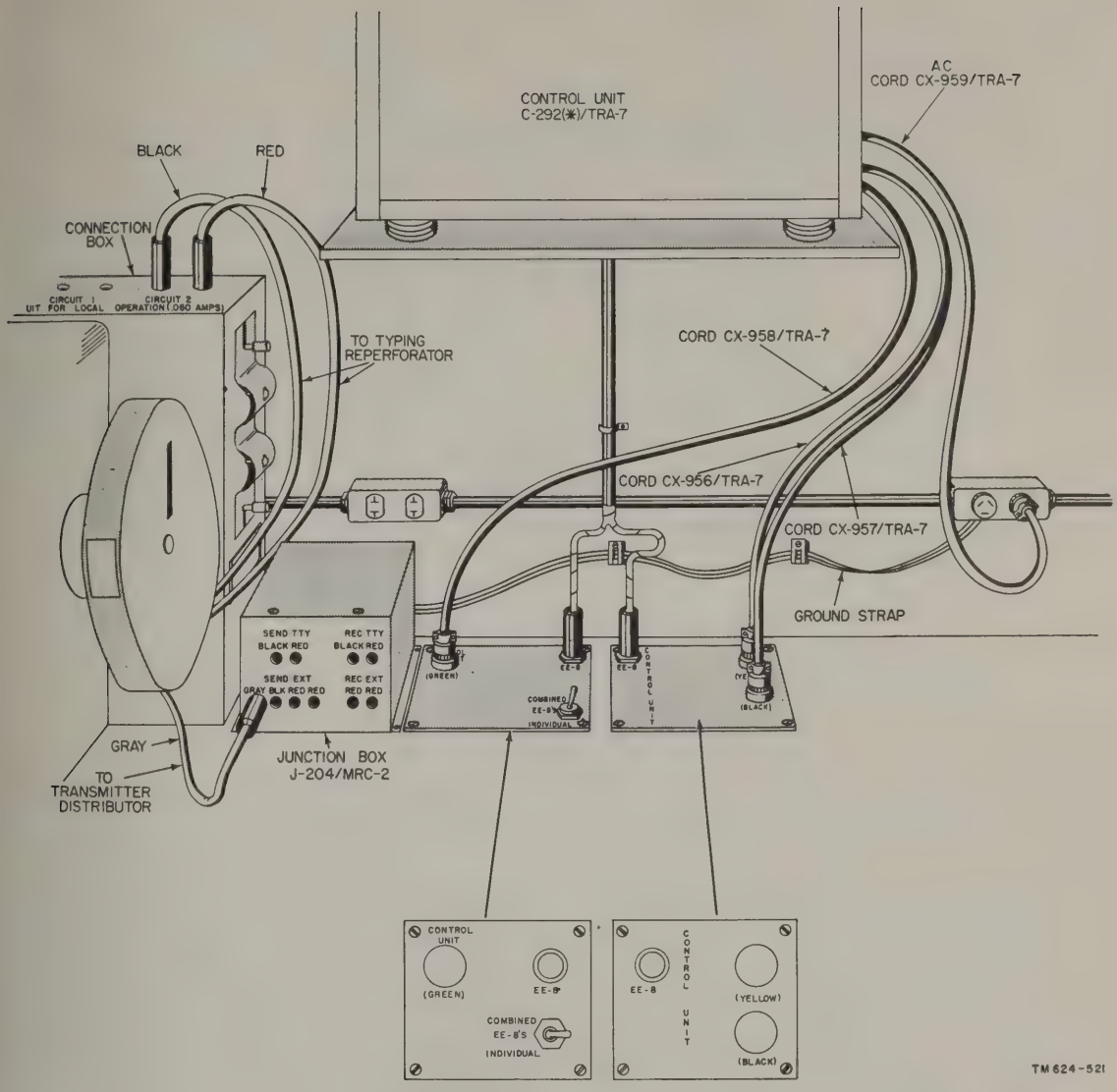


Figure 62. Connections to operating table jack panel in operating shelter.

d. Connect J107 in the rear of Control Unit C–292(*)/TRA–7 to the a-c receptacle with Cord CX–959/TRA–7 (fig. 62).

e. Insert one plug from the four-conductor cable into the EE–8 jack on the operating table and insert the other plug from the four-conductor cable into the other EE–8 jack on the operating table (fig. 62).

f. Insert the gray shell plug attached to the transmitter-distributor into the GRAY jack of Junction Box J–204/MRC–2. Insert the red and black shell plugs attached to the typing reperforator into two of the connection box jacks in circuit 1 as shown in figure 62.

g. Insert the plug of the a-c motor cord attached to the connection box into an a-c outlet. Insert the d-c cord attached to the connection box into one of the d-c outlets of Rectifier RA–87.

h. Insert the plug of the a-c cord attached to Rectifier RA–87 into an a-c outlet.

i. Connect the sending and receiving teletypewriters as follows (fig. 63):

(1) Insert the red shell plug of the receiving TT into the REC. TTY RED jack on the

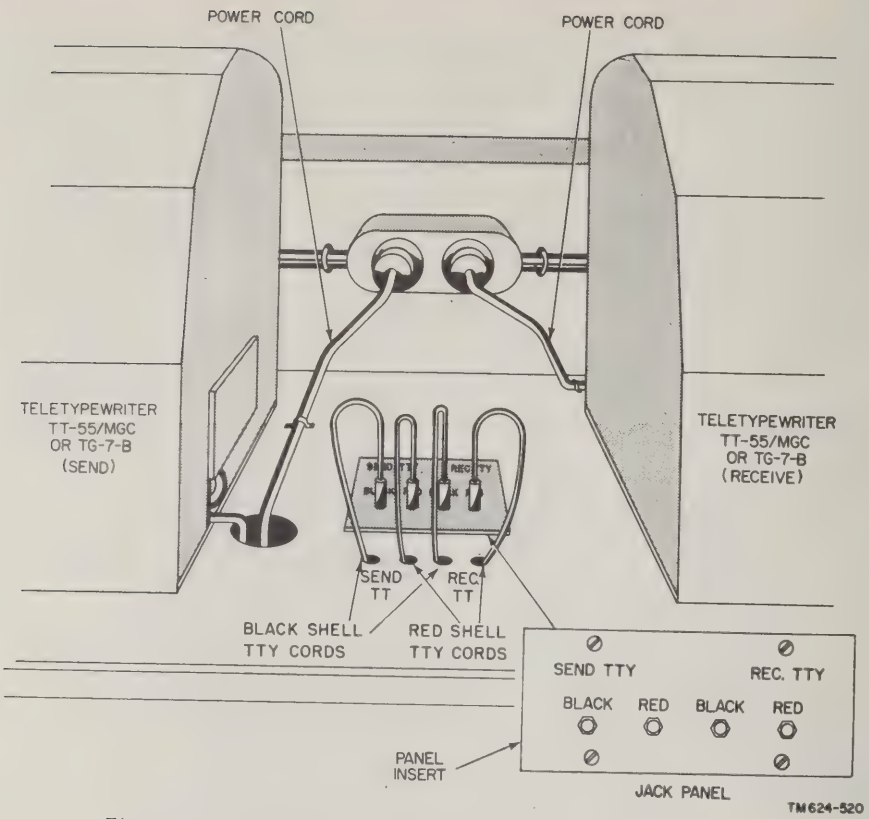


Figure 63. Teletypewriter connections to jack panel in operating shelter.

operating table and the black shell plug of the receiving TT into the REC. TTY BLACK jack.

(2) Insert the red shell plug of the sending teletypewriter into the SEND TTY RED jack and the black shell plug of the sending teletypewriter into the SEND TTY BLACK jack.

(3) Insert the plugs of the a-c power cords into the a-c outlets.

j. Connect strap wires A between posts 1 and 2 and between 3 and 4 on the terminal board marked TO EXTERNAL TELEGRAPH EQUIPMENT.

k. Connect the ground straps provided on the under side of Operating Table FN–22/MRC–2 to the nearest mounting bolt on the following equipments:

(1) Perforator-Transmitter TT–55/MGC or Reperforator-Transmitter TG–26–A.

(2) Typing reperforator.

(3) Transmitter-distributor.

(4) Connection box.

(5) Teletypewriters TT–55/MGC or TG–7–B

l. Connect the operating table ground termina to the shelter ground strap (fig. 61).

m. Ground the operating shelter by driving Ground Rod GP–26 (modified) into the earth close to the shelter grounding terminal and connect the terminal to the ground rod with #7 AWG braid shown in figure 61.

n. Connect Power Unit PE–95–(*) to the a-c input circuit of the main circuit breaker of the shelter with Cord CX–136/MRC–1 or CX–1165/U as shown in figure 61.

o. Complete all lamp, heater, and blower connections as required.

22. Construction of Doublet Transmitting Antenna for Radio Sets AN/MRC–2(*)

a. The necessary wire, insulators, connectors, and coaxial cable are provided to construct a doublet transmitting antenna (fig. 64). The antenna is made up of sections which can be connected by jumpers, allowing preselection of var-

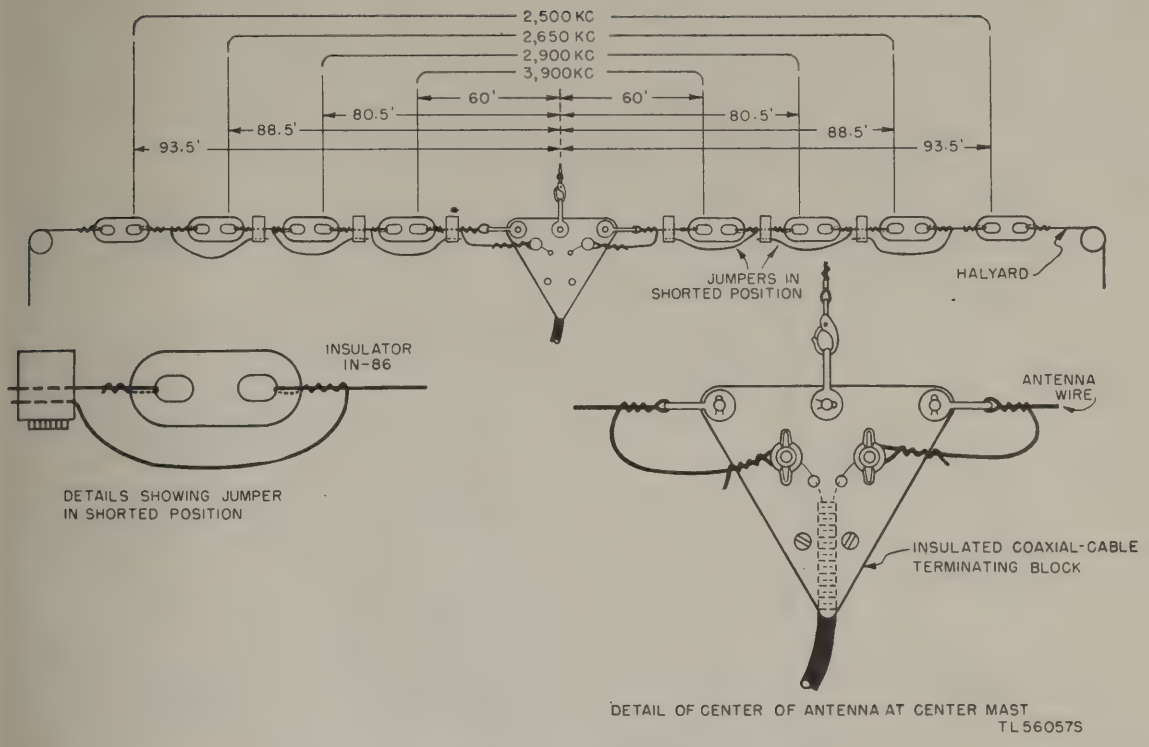


Figure 64. Construction of doublet transmitting antenna.

ious lengths for operating on different frequencies. Before erecting the antenna, compute the lengths desired for the various antenna sections.

b. A half-wave doublet is designed to operate at the fundamental of the transmitted frequency, or on any odd harmonic of the fundamental. Figure 65 is a graph of frequency plotted against antenna length for the fundamental, third, fifth, and seventh harmonics. Normally, the length selected is the length that permits the antenna to operate at its fundamental wavelength. If operation of the antenna at any of its harmonics is desired, the effective change in the radiation pattern must be considered The radiation pattern will be broadside only when the antenna is used at its fundamental wavelength.

c. Select the proper lengths for the operating frequencies to be used when transmitting (fig. 65).

Example: If operation is desired on frequencies of 2,500, 2,650, 2,900, and 3,900 kc, refer to the graph (fig. 65), which 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 case of 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; make sure that the distance from the center of the terminating block to the end fastened to the insulator is exactly 60 feet as shown in figure 64. Construct the other half of the half-wave antenna in a similar fashion using the remaining terminal on the terminating block as a starting point.

f. Select the next shortest length of antenna desired which, in this case, is 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 a sufficient length of free wire which can be used for a jumper connection. Follow the procedure outlined in *e* above

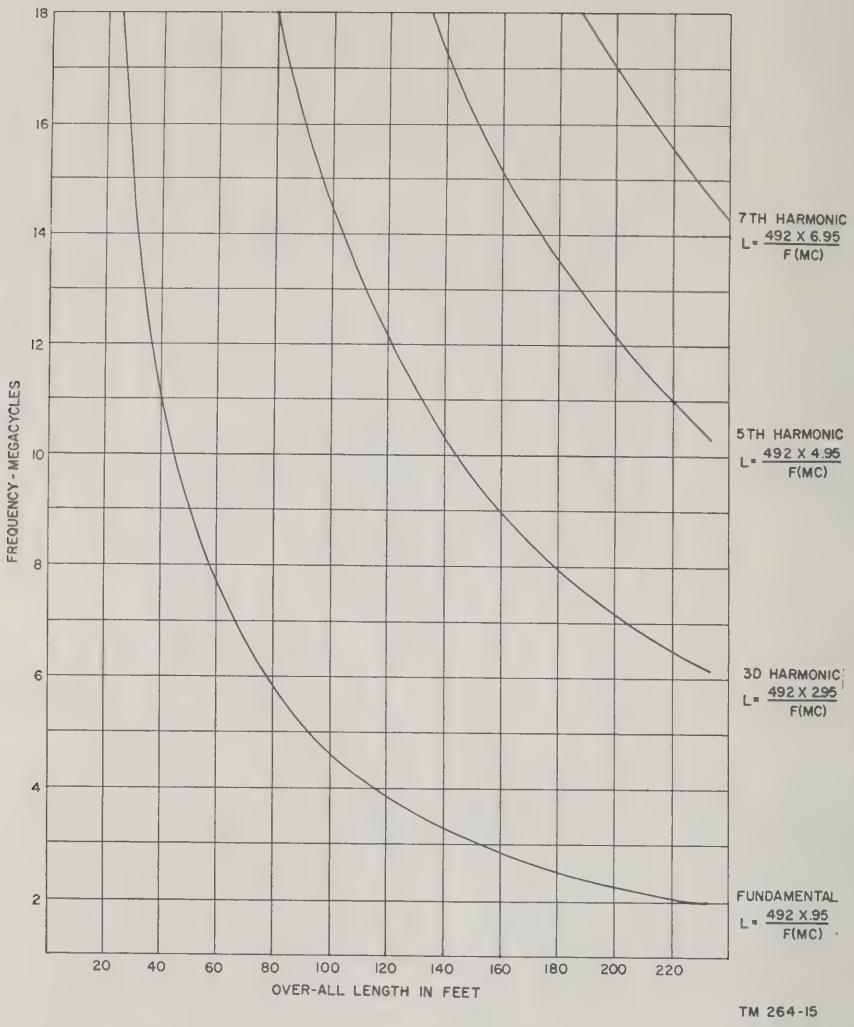


Figure 65. Frequency versus antenna length chart.

to arrive at the proper length for a quarter-wave for 2,900 kc; $\frac{161}{2}$=80.5 feet. Run out a sufficient length of 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 antenn already formed. Each antenna length is calcu lated from the center of the terminating block t the end of the antenna being constructed.

h. After the various lengths have been deter mined and constructed, connect the correc jumpers in place as shown in figure 64. Eac antenna selected will operate on the fundamenta and odd harmonics of the frequency to which it i cut. In the example given in the subparagraph

above, the antenna will be the correct length for the following frequencies:

Fundamental (kc)	Third harmonic (kc)	Fifth harmonic (kc)
2,500	7, 500	12, 500
2,650	7, 950	13, 250
2,900	8, 700	14, 500
3,900	11, 700	19, 500

Note. Refer to figure 65 to calculate harmonics versus length of antenna wire.

23. Construction of Rhombic Transmitting Antenna for Radio Sets AN/MRC–2(*) (fig. 66)

a. General. Antenna Kit MX–852/MRC–2 is a component 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 6 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.

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

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

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

[1] Feet.

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

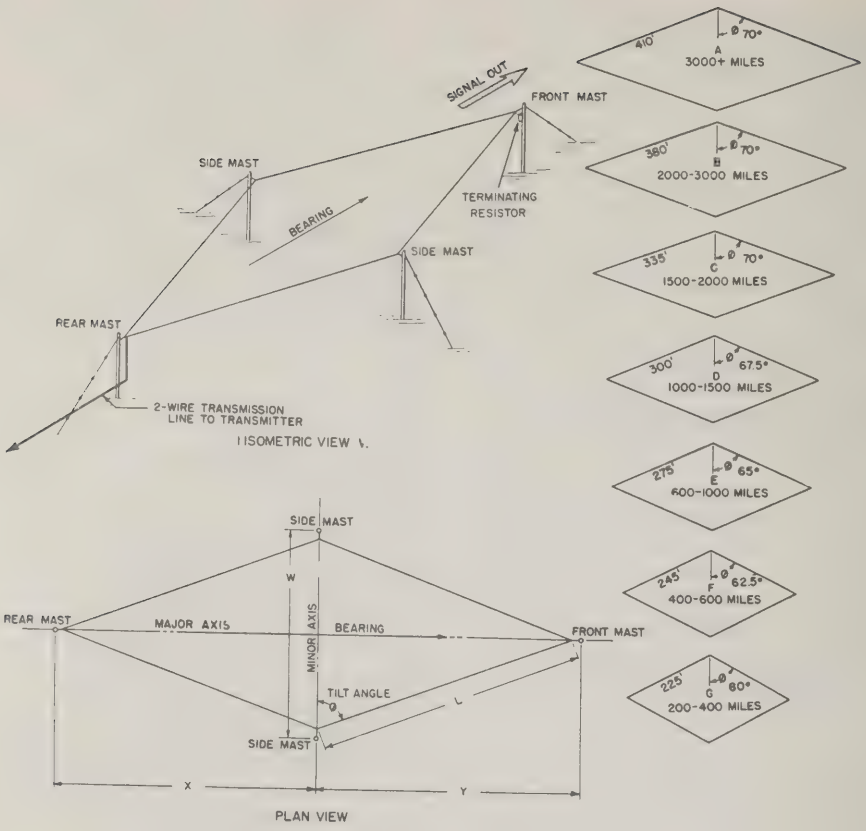
Description	Quantity
Fuse clip	24
Plastic panel for mounting the resistors (12 in. x 12 in. x 3/16 in.)	1
Hexagonal nut	12
Machine screws, 10–32 x ½ in. long	12
Fixed, noninductive resistor, 250 ohms, 86 watts	12
Terminals	12
Wire, #10 AWG bare copper	[1] 2
Lockwashers for No. 10 screws	12

[1] Feet.

Note. Additional items necessary for the erection of the rhombic antenna are supplied with the doublet transmitting 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 66. These antennas are designed for operation in the range of 6 to 18 mc at the frequencies which are 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 suited for transmitting signals over long distances when the optimum working frequency is 10 mc or higher. For information on radio wave propagation and the choice of operating frequencies, refer to TM 11–499 and the TB 11–499-series.

d. Antenna Orientation. After the location of the antenna has been determined, the antenna must be oriented 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, therefore, must 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



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

TM624-517

Figure 66. Rhombic antenna design.

11–477, TM 11–499, and the TB 11–499-series to determine the great circle distance bearings and locations of transmitter control points.

e. Locating Antenna Masts. In order to construct a rhombic antenna, stakes are driven 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. 66). 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 mast on the minor axis of the antenna. Figure 66 gives mast mast-to-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 67.) Determine the mast locations with an accuracy of ±1 foot.

f. Layout of Antenna.

(1) Starting at the rear mast (fig. 66), measure along the major axis of the antenna a distance equal to twice the side length (1) of the antenna plus 1 foot. Drive a stake to mark this disdistance. Lay out two lengths of #16 AWG copper-weld 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 wire at the stake.

(2) Place a single transmitting antenna insulator on one wire. Slide the insulator down the antenna wire to a point next to its side mast (fig. 67). Similarly, slide another transmitting antenna insulator on the other wire.

(3) Fasten one insulator to each end of the antenna wire near the front stake by sliding 6 inches of the antenna wire through one end of the insulator, bringing it around and wrapping it around the antenna four or five times (fig. 66). Cut off the excess wire.

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

g. Assembly and Installation of Resistor Board (fig. 67).

(1) Attach the 20 fuse clips on the plastic terminal board; use the 10–32 by ½-inch long machine screws, hexagonal nuts, and washers provided.

(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.

(4) Support the resistor terminal board mechanically by threading a picee 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. 67).

24. Construction of the Transmission Line for the Rhombic Antenna

(fig. 67)

The transmission line consists of two #16 AWG copper weld wires spaced apart by the steatite spreader insulators. It is constructed as follows:

a. Cut two pieces of #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 #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 67 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 minimum height of approximately 7 feet above the ground can be maintained.

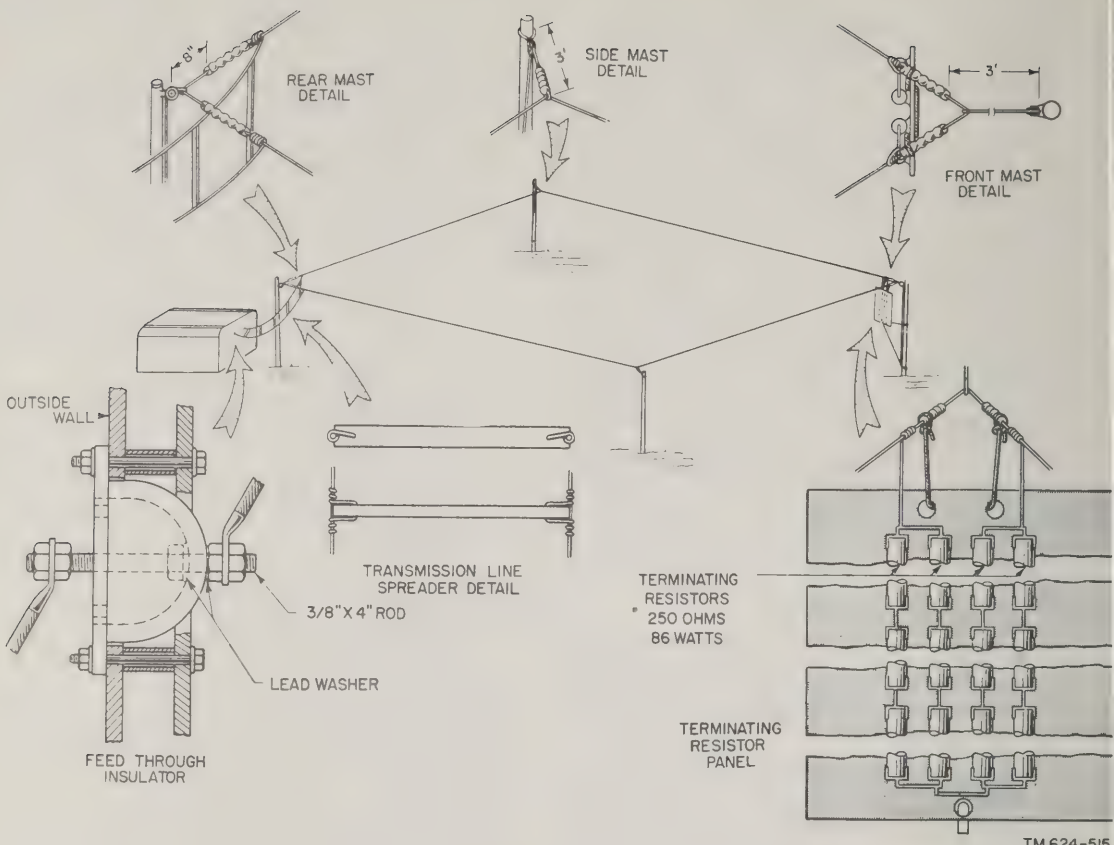


Figure 67. Rhombic antenna constructions details.

25. Erection of Transmitting Antennas for Radio Sets AN/MRC–2(*)

The transmitting antennas used with Radio Sets AN/MRC–2(*) are supported approximately 50 feet high by antenna masts. Four of these masts are supplied with each radio set. Normally, three antenna masts are used to support a half-wave doublet. However, on the higher frequencies, two are sufficient. Four antenna masts are required to support the rhombic antenna. The antenna masts supplied with Radio Set AN/MRC–2(*) are constructed from Antenna Supports AB–38(*)/CR. Radio Set AN/MRC–2 is supplied with Antenna Support AB–38/CR, Radio Set AN/MRC–2A is supplied with Antenna Support AB–38A/CR, and Radio Set AN/MRC–2B is supplied with Antenna Support AB–38B/CR. For details on the assembly of these antenna supports, refer to TM 11–2620 and TM 11–2620A.

a. Half-Wave Doublet. Place the antenna proper in the desired location. Erect two antenna supports 15 to 20 feet farther apart than the maximum length of the antenna. Erect an antenna support midway between the two end supports and offset the support 3 feet from the line of sight between the end supports. This is necessary to allow the doublet antenna to clear the center mast (fig. 68). Be sure to orient the mast head 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. Since transmission line Cord CG–145/MRC–1 is 100 feet in length, the center mast should not be located 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/wire up the end masts and the coaxial

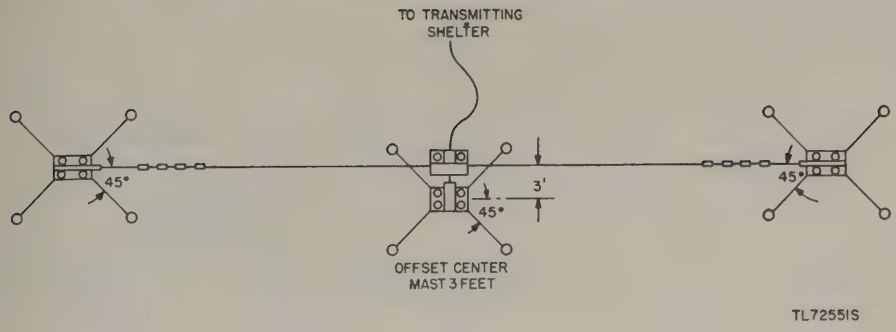


Figure 68. Top view of erected transmitting antenna.

terminating block up the center mast. Connect the free end of Cord CG–145/MRC–1 to the r-f output terminals on Amplifier AM–141(*)/MRC.

b. Rhombic. After the rhombic antenna has been constructed (par. 24), erect the four antenna supports. Before raising the antenna into position, proceed as follows:

(1) Feed one end of a piece of #16 AWG copper weld wire through the unused hole of the insulator attached to the ends of the antenna wire and wrap it around the wire five or six times. Tie the free ends of the two wires to the halyard at the rear antenna support.

(2) Attach two pieces of #16 AWG copper weld wire to the insulators at the other ends of the antenna wire near the front antenna support. Securely tie the free ends to the halyard.

(3) Attach a piece of #16 AWG copper weld wire to the insulators on the antenna wire near the two side stakes. Securely tie each free end to the halyard of the two side antenna supports.

(4) Tie the free end of the halyard rope at the front antenna support to the hole in the bottom of the resistor panel to keep the assembly from swinging free.

(5) Attach the free end of the transmission line to the two feedthrough studs of the insulator bowls at the end of the transmitting shelter. Connect the feedthrough studs inside the shelter to the two r-f output terminals on Amplifier AM–141(*)/MRC using Wire W–128 or equal. Remove the grounding strap connected to one of the output terminals of the amplifier.

26. Construction of Receiving Antennas for Radio Sets AN/MRC–2(*)

Radio Sets AN/MRC–2(*) use two half-wave doublet receiving antennas. These antennas are spaced 3 wavelengths or 1,000 feet, maximum, apart for satisfactory space diversity reception. The antennas are positioned broadside to the source of signals as shown in figure 41.

a. Radio Set AN/MRC–2. The doublet receiving antenna used with Radio Set AN/MRC–2 is constructed of wire and insulators in the same manner as is the doublet transmitting antenna (par. 22).

b. Radio Sets AN/MRC–2A and –2B.

(1) The doublet receiving antennas used with Radio Sets AN/MRC–2A and –2B are constructed with two Reel Assemblies RL–122/GRA–4 (fig. 69).

(2) Determine from the chart (fig. 65) the antenna length necessary for the chosen frequency. Connect the free end of the antenna wire on the reel to the coaxial terminating block. Unreel enough wire for one-half the length determined from the chart. Lock the antenna wire at the reel by tightening the wingnut.

(3) Follow the procedure outlined above for the other half of the antenna, using another reel as indicated in (2) above.

27. Assembly and Erection of Receiving Antenna Supports for Radio Set AN/MRC–2

(figs. 70 and 71)

a. After the site for the antenna has been determined and the antenna has been constructed (par. 26*a*), stretch the antenna wire out along the ground. Lay out the positions for three Mast

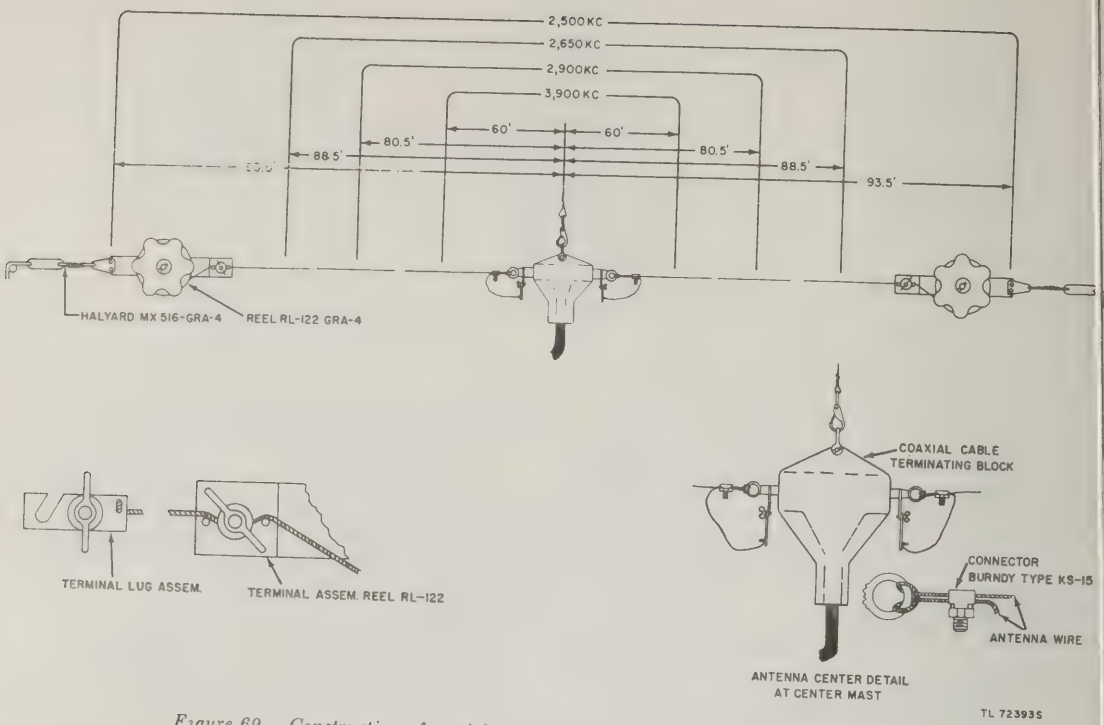


Figure 69. Construction of receiving antenna with Reel Assembly RL–122/GRA–4.

Bases MP–19. The position of the mast bases is determined by the position of the coaxial cable terminating block and the insulators at the ends of the antenna. Stake Mast Base MP–19 to the ground with two Stakes GP–2.

b. With a radius of 20 feet from the mast base, drive in four Stakes GP–2, 90° from one another and at an angle of 45° with the axis of the antenna wire.

c. Assemble the seven Mast Sections MS–44–A with one Guy Plate MP–20 at the top of the mast, another at the junction of the fourth and fifth sections, and the remaining guy plate at the junction of the first and second sections. Slip the bottom mast section over the mast base (fig. 70).

d. To one hole in Guy Plate MP–20 at the top of the mast, attach the two ends of Guy GY–22–A and the block of Guy GY–24–A (halyard) with the snap hooks. To the hole in the opposite end of the top guy plate, attach the two ends of the remaining Guy GY–22–A. Place one of the rings with block attached (not the center ring) over the corresponding Stake GP–2.

e. To Guy Plate MP–20, at the junction of the fourth and fifth sections near the center of the mast, attach one end of each of the four Guys GY–41 using two snap hooks in each of the two holes. Since these guys are not used in raising the mast, temporarily tie the loose ends near the bottom of the mast to avoid tangling when the mast is raised.

f. Guy GY–24–A is used as a halyard to raise and lower the antenna wire. Be sure that this guy will be on the antenna side of the mast after erection. Secure both ends of this guy to a point near the bottom of the mast to keep it out of the way while the mast is being raised and also to prevent either end from accidentally getting out of reach.

g. The mast now can be raised easily. One man grasps the center ring of Guy GY–22–A and walks toward the base of the mast. Another man assists in the erection by lifting the mast from the ground in a manner similar to that used in raising a ladder. At the same time, a man guides the bottom of the mast into Mast Base MP–19 until the mast is halfway erect, then quickly grasps the center ring of the remaining Guy GY–22–A and makes the necessary adjustment on the length of the guy when the mast is erect. When the mast has been brought into a vertical position,

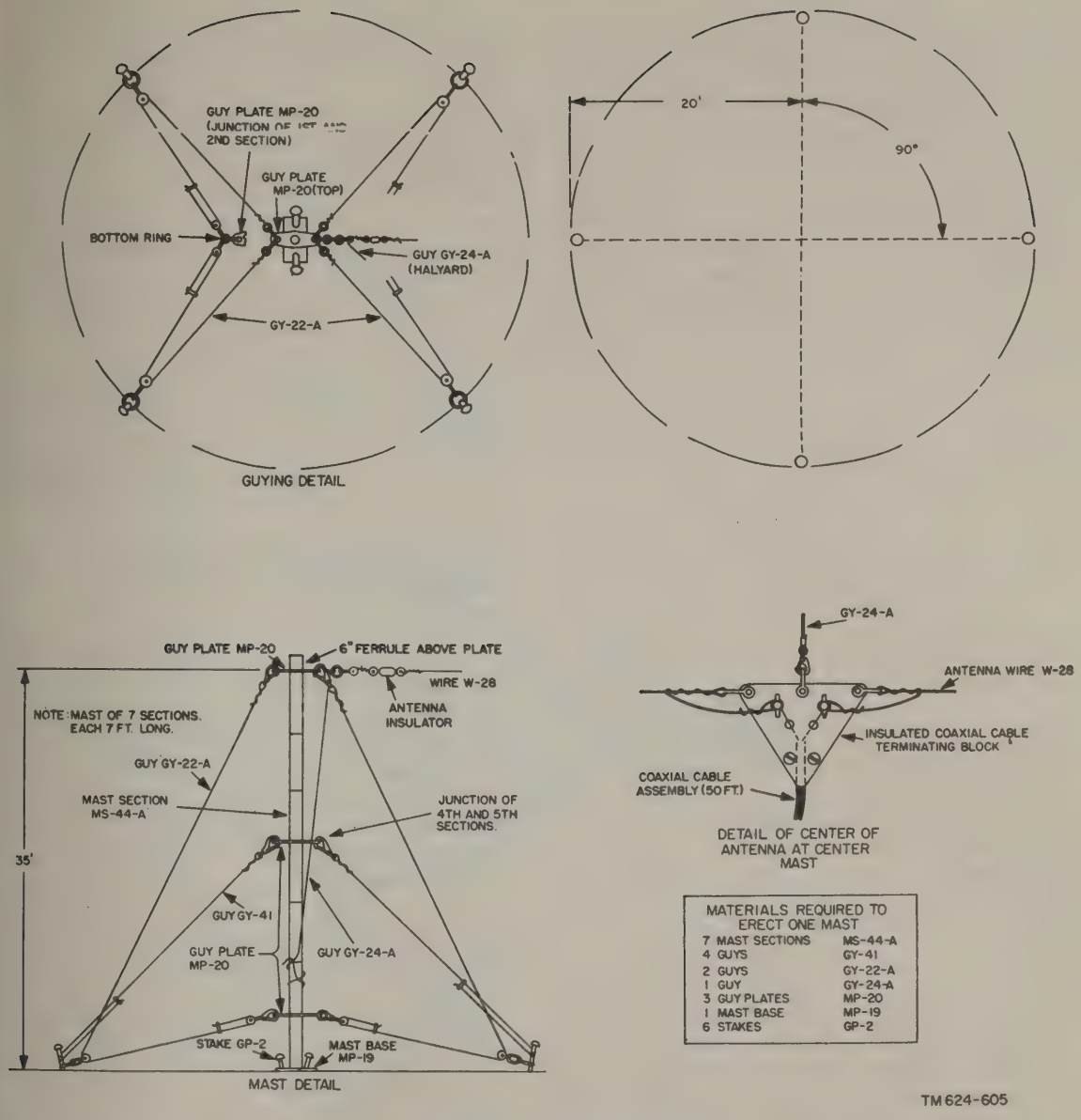


Figure 70. Radio Set AN/MRC–2, assembly of receiving antenna mast.

adjust both Guys GY–22–A until the mast is plumb.

h. Untie the loose ends of the four Guys GY–41, attach them to their respective stakes, and tighten them firmly to prevent any tendency of the mast to bow.

i. After the masts are erected (fig. 71), the blocks will not be needed until the mast is to be lowered. Lift off the rings and attached blocks that are secured to the stakes one at a time, and loop the guy rope two or three times around the guy stake. This is done to prevent the antenna mast from bowing or bending.

j. Erect the other two masts in the same manner.

k. Attach one end of each half of the antenna

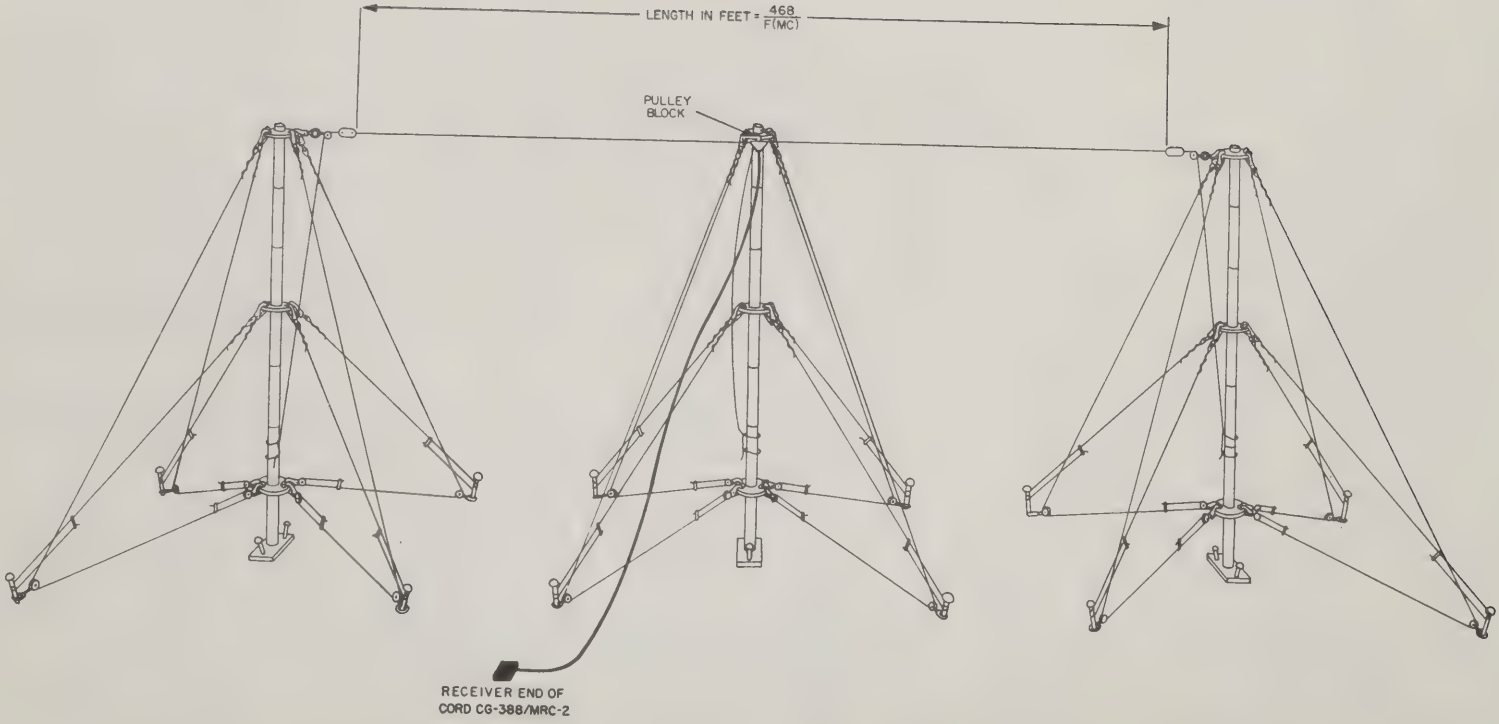


Figure 71. Radio Set AN/MRC-2, receiving antenna erected.

wire to the coaxial cable terminating block and attach one end of the halyard to the terminating block.

l. Attach the halyards of the two end masts to the antenna insulators at the end of the antenna wire. Raise the antenna to the top of the mast and secure the halyard to the bottom of the mast.

m. Erect the mast supports for the other receiving antenna as described in *a* through *i*, *k*, and *l* above.

n. Feed the free end of Cord CG–388/MRC–2 from one antenna through the fair-lead in the receiving shelter and connect it to the SIG. ANT. jack of the Channel A receiver (fig. 58). Feed the free end of Cord CG–388/MRC–2 from the other antenna through the fair-lead in the receiving shelter and connect it to the SIG. ANT. jack of the Channel B receiver (fig. 58).

28. Assembly and erection of Receiving Antenna Supports for Radio Set AN/MRC–2A

(figs. 72 and 73)

After the site for the antenna has been determined and the antenna constructed (par. 26*b*), stretch the wire out along the ground. Lay out the positions for three Mast Bases MP–19. The positions of the mast bases are determined by the position of the coaxial cable terminating block and Reel Assemblies RL–122/GRA–4 at the ends of the antenna. Stake each mast base to the ground with two Stakes GP–2.

a. Assembling Mast Sections. Lay the mast sections out in a line with the female end of the sections toward Mast Base MP–19. Slide the section nearest the mast base onto it. Fit another section on the first section and then place Guy Plate MX–378/U over the second section. Assemble an additional two sections and fit another guy plate to the last section. Slide on another three sections and place a guy plate on top of the last section. To make the mast a total of 40 feet high, add the spare mast section to the bottom of the mast.

b. Driving Stakes. Slip Guy Fastener MX–379/U over each Stake GP–2 and drive the stakes into the ground (fig. 73). The back stake is driven first as close to the junction of the fifth and sixth sections as possible. Using the distance from the back stake to Mast Base MP–19 as a reference and a guy rope to measure with, position the other three stakes so that each is at a 90° angle with respect to the adjoining stake; use Mast Base MP–19 as a pivot point. If the ground is soft, wooden stakes are used instead of metal Stakes GP–2 and guy fasteners are not used. The guy ropes are looped over the stakes.

c. Fastening Guys and Halyards. All guys are color-coded at one end. Guys MX–383/GRA–4 fastened to the top guy plate are colored red; Guys MX–381/GRA–4 fastened to the center guy plates are white and Guys MX–382/GRA–4 fastened to the bottom guy plates are blue.

(1) Fasten the guy ropes to their respective guy plates with the snap hooks; use the four holes spaced 90° apart on the guy plate.

(2) Carry the free ends of the three back guys to a side stake to determine their correct lengths. Fasten them permanently to the back stake.

(3) Connect both sets of side guys to their respective side stakes and remove slack from them. Do not tighten them enough to bend the mast.

(4) Tie the three front guys together and stretch them along the mast toward the front stake.

(5) With the snap hook provided, fasten Halyard MX–516/GRA–4 pulley to the top guy plate on the center mast (fig. 73). Slip the halyard rope through the pulley and tie the free ends of the rope to keep it from running through the pulley during erection of the antenna mast. Fasten the insulated coaxial cable terminating block to the halyard.

d. Assembling End Masts. Assemble the two end masts by repeating the procedure described in *a*, *b*, and *c* above. Fasten the halyard pulleys to the top guy plate of the two end masts. Thread the rope halyards, fastened to the ends of the antenna wire, through their respective pulleys.

e. Raising Center Mast. Two men are required to raise the masts. One man takes a position near Mast Base MP–19 to hold the front guys and the halyard. The other man takes a position near the top end of the mast.

(1) The man holding the guys pulls steadily on them, keeping slightly more tension on the top guy so that the mast bows slightly while it is being raised. Simultaneously, the man at the other end of the mast raises the end up and walks toward Mast Base MP–19, raising the mast as he walks.

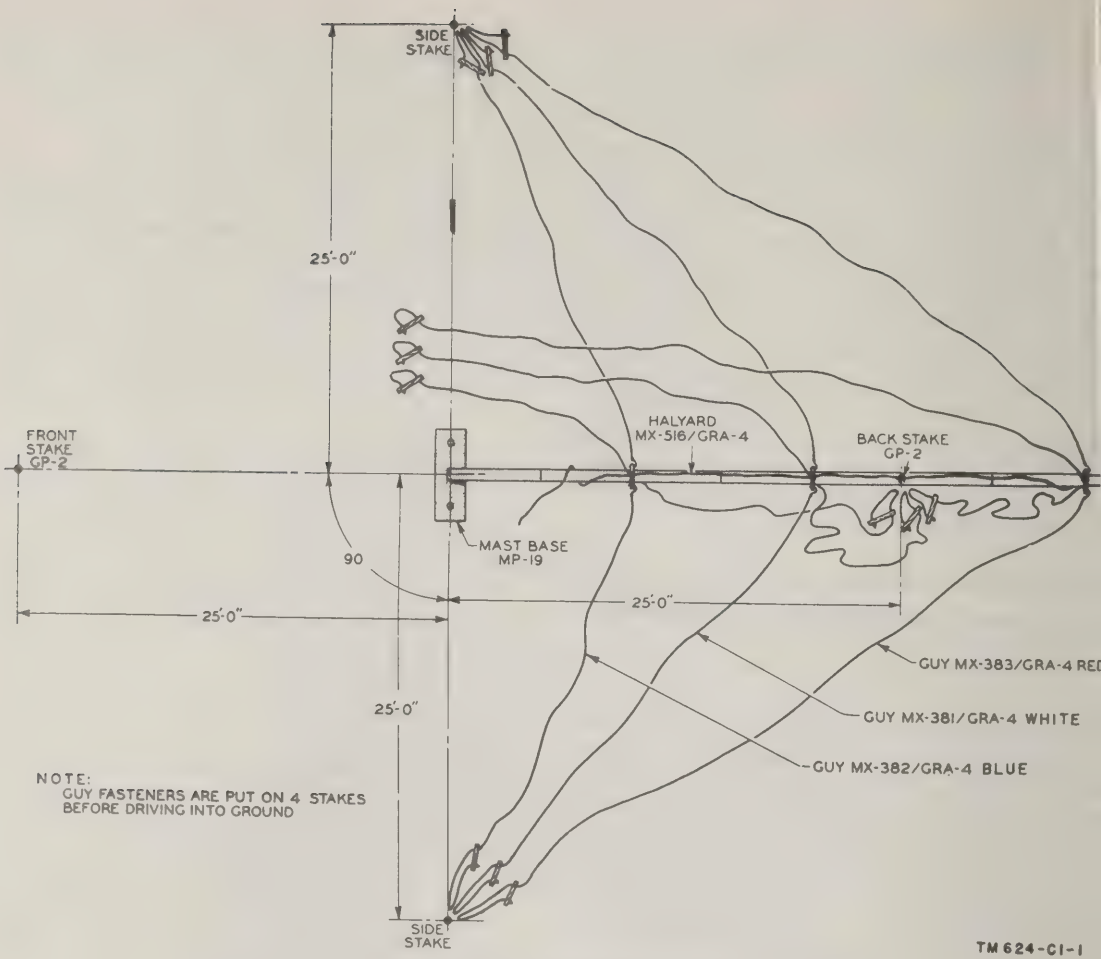


Figure 72. Radio Set AN/MRC–2A, assembly of receiving antenna support.

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

(3) The rest of the guys are given final adjustment so that the mast is perfectly vertical (fig. 73). If one guy is taken up, the opposite one must be loosened slightly so that the mast will not bow.

f. Raising End Masts. Raise the two end masts, repeating the procedure described in *e* above. Pull the antenna into position with 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.

g. Connecting Antenna. Feed the free end of coaxial cable (Cord CG–388/MRC–2) through the holes provided in the receiving shelter wall. Connect the free end of the coaxial cable to the SIG. ANT. connector of one of the operating receivers (fig. 58).

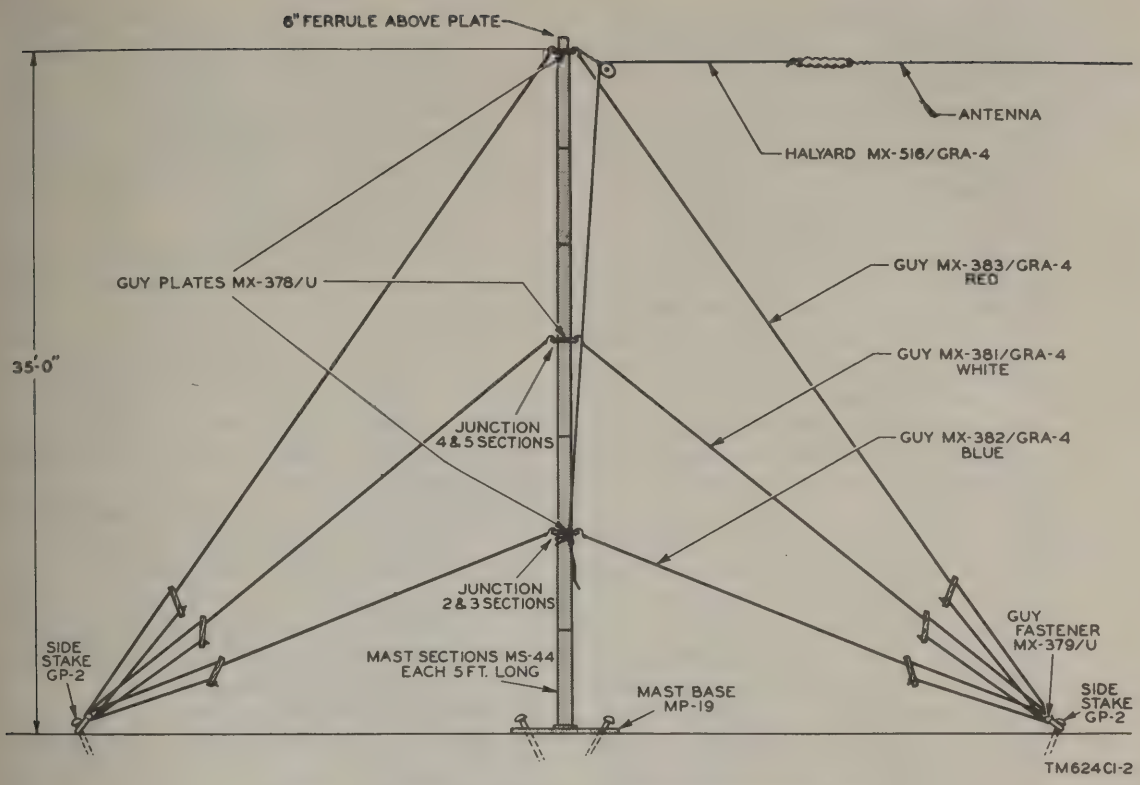


Figure 73. Radio Set AN/MRC–2A, receiving antenna erected.

29. Assembly and Erection of Receiving Antenna Masts AB–155A/U for Radio Set AN/MRC–2B

(figs. 74 and 75)

After the site for the receiving antennas has been determined and the antenna has been constructed (par. 26*b*), stretch the wire out along the ground. Lay out the positions for the three masts. The position of the mast bases is determined by the position of the coaxial cable terminating block and two Reel Assemblies RL–122/GRA–4 at the ends of the antenna. If the location is on soft or sandy ground, level off the spot and place one of the end plates of Carrying Device MX–387/GRA–4 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.

a. Assembling Mast Sections and Positioning Stakes.

(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. Successively fit two more sections on the first section and then place Guy Plate MX–378/U over the third section. Add two more sections and then another guy plate; then 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 driving it 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). Use a guy rope to measure the distance between the back stake and the mast base. Use this measurement to locate the position of 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.

b. Fastening Guys and Halyards.

(1) The next step requires four each Guys MX–381/GRA–4, MX–382/GRA–4, and MX–383/GRA–4. These guys 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 top 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.

(2) 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 mast toward the front stake.

(3) Remove Halyard MX–516/GRA–4 from the carrying device and fasten it with the snap fastener to the unused hole in the top guy plate. Slip the halyard rope through the pulley and tie the free end of the rope to the mast to prevent the rope from running out of the pulley during the erection of the mast (fig. 74).

(4) Assemble the additional masts by repeating the operations outlined in (1) through (3) above.

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

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

c. Raising Center Mast.

(1) Two men are required to raise the masts. One man takes a position near Mast Base AB–154/U to hold 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 steadil on them, keeping slightly more tensio on the top guy so that the mast bow slightly while it is being raised. Simu taneously, the man at the other end c the mast raises the end up and walk toward Mast Base AB–154/U, raisin the mast as he walks.

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

(4) The rest of the guys are given final ad justment so that the mast is perfectly vertical (fig. 75). If one guy is taken up, the opposite one must be loosened slightly so that the mast will not bow

d. Raising End Masts.

(1) Raise the two end masts, repeating the procedure described in *b* above.

(2) 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.

e. Connecting r-f Cable Assembly.

(1) Unreel RF Cable Assembly CG–557/U attached to one antenna and feed the free end through the receiving shelter wall. Connect this end to the SIG. ANT. jack of the Channel A receiver of Radio Receiver Assembly OA–65(*)/MRC–2.

(2) Unreel RF Cable Assembly CG–557/U attached to the other antenna and feed the free end through the receiving shelter wall. Connect this end to the SIG. ANT. jack of the Channel B receiver of Radio Receiver Assembly OA–65(*)/MRC–2.

30. Interconnections Between Shelters

(figs. 54, 58, and 61)

Three pairs of field Wire W–110–B, or equal, interconnect the operating and the transmitting shelters. Three pairs of field Wire W–110–B, or equal, interconnect the operating and the receiving shelters. The function of one pair of wires is for telephone communication between shelters by means of Telephone EE–8–( ), and this pair is terminated at the EE–8 binding posts on the shelter junction boxes. The function of a second pair of wires is to provide for control between

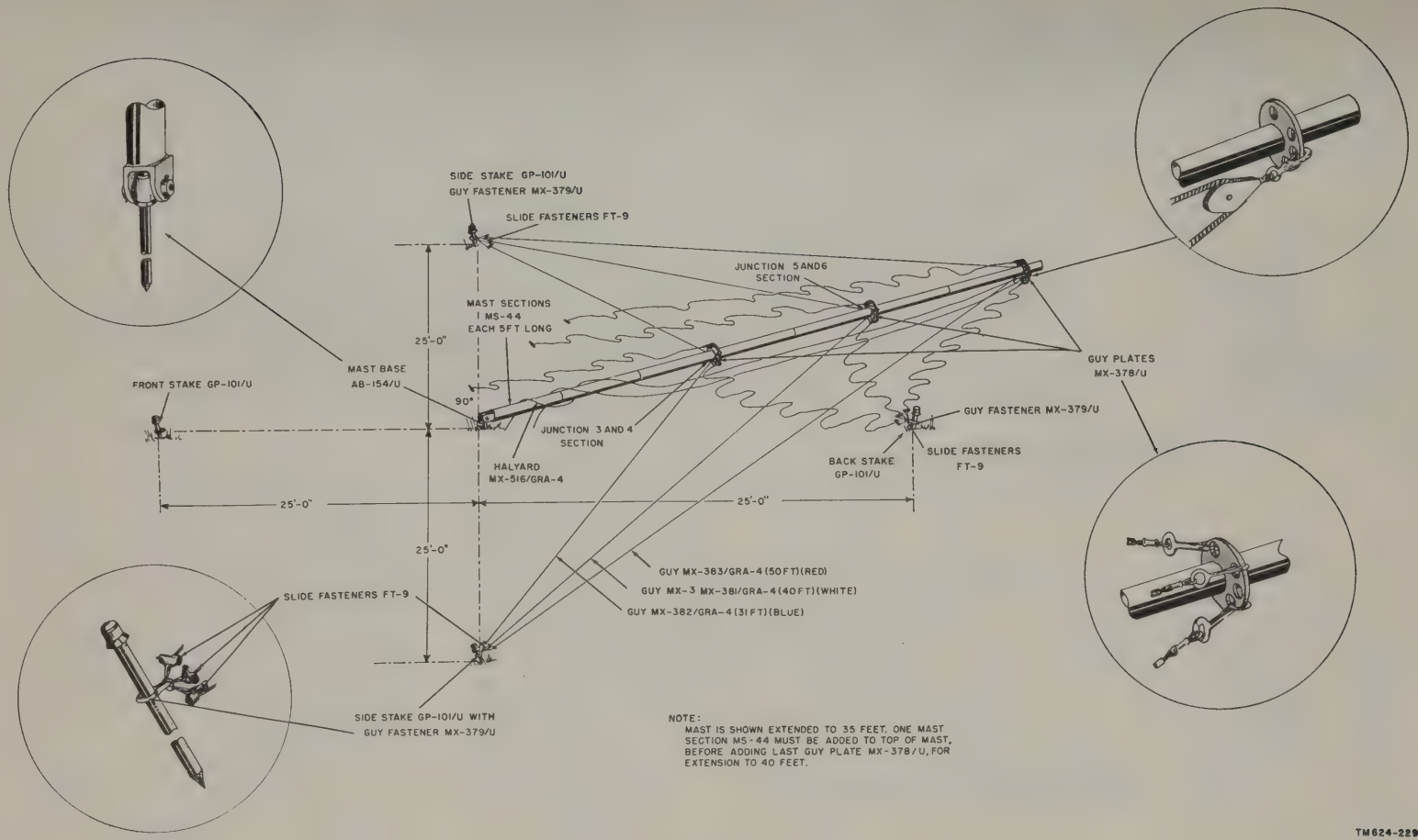


Figure 74. Radio Set AN/MRC–2B, assembly of receiving antenna.

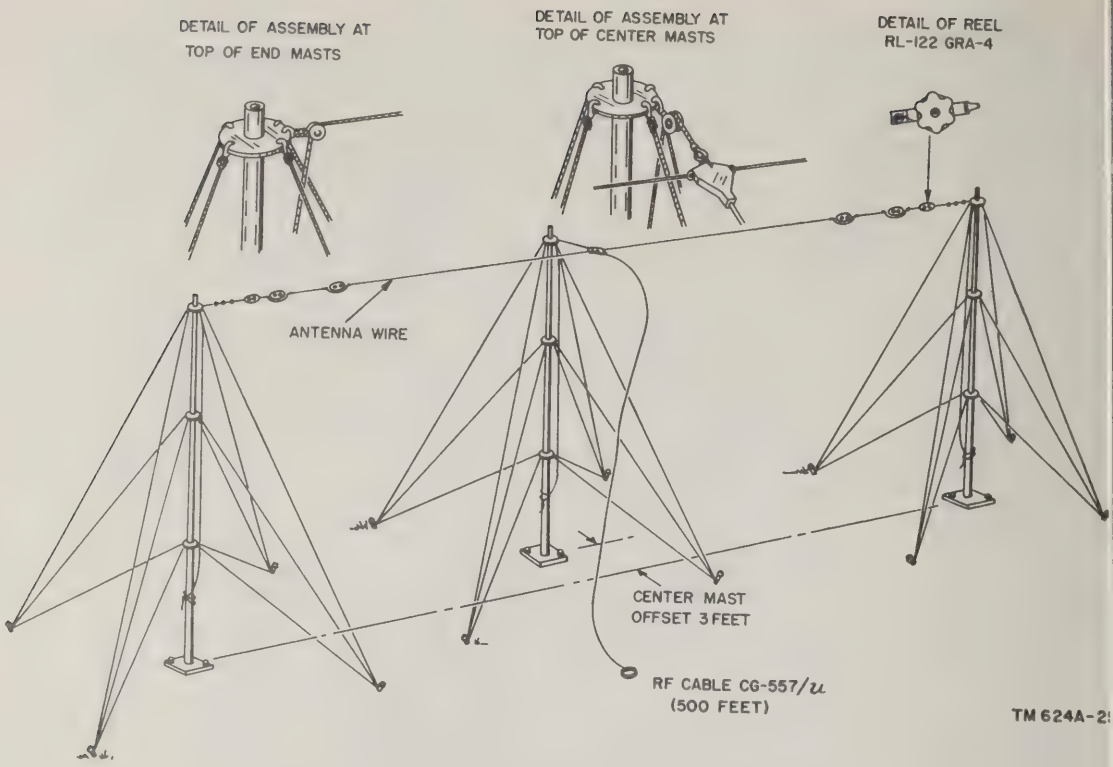


Figure 75. Radio Set AN/MRC–2B, receiving antenna erected.

shelters. This pair is terminated at the CONTROL binding posts on the shelter junction boxes. The function of the third pair of wires is to carry teletypewriter signals between shelters. This pair terminates at the LINE binding posts of the shelter junction boxes. Make the following connections between shelters, using field Wire W–110–B or equivalent:

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

a. 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 wingnut 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.

b. Transmitting Shelter. Access to the EE–8, LINE, and CONTROL binding post terminals on Junction Box J–199/MRC–2 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 Junction Box J–199/MRC–2.

c. Operating Shelter. The EE–8, LINE, and CONTROL binding posts terminals labeled TO RECEIVING SHELTER on the junction box are made accessible by removing the section of the operating table nearest the rear doors. A wingnut beneath the top section holds it in place.

The EE–8, LINE, and CONTROL binding posts on the junction box labeled 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.

31. 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. After the wires are laid, be sure to provide sufficient slack before they are cut. 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 the ends of the wire pairs about 1 inch. 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–( )

(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–( ).

(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–( ) until the removal of a lead interrupts the telephone contact. Tie a knot in this lead and remove the other lead of this pair from terminal L2 of Telephone EE–8–( ). 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–( ) and connect them to the LINE binding posts. Connect the two leads from one of the remaining two pairs of wire to terminals L1 and L2 of Telephone EE–8–( ).

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

(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–( ) while maintaining telephone contact. One of the two leads will interrupt the telephone contact. Tie two knots in 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–( ) 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.

32. Mounting Canopy CW–153/U

Remove Canopy CW–153/U stowed in each of the three shelters. These are mounted above the rear door 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
OPERATING INSTRUCTIONS

Section I. MODES OF OPERATION

33. Full-Duplex

The simultaneous reception and transmission of RTT 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.

34. Half-Duplex

The reception and transmission of RTT signals, 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.

35. One-Way Reversible

One-way reversible operation is similar to half-duplex. RTT signals are transmitted and received, 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 the 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.

36. Dual Diversity Reception

To minimize the effects of selective fading one location, two antennas and two receivers a used. These antennas are spaced approximate 3 wavelengths or a maximum of 1,000 feet apa The output of each receiver is applied to t separate input circuits in the dual diversity co verter. In some locations, it is possible to u one or the other receiver alone.

37. Emergency Transmission

The following modes of operation are availab to the operator when RTT communication is n practical or cannot be achieved:

a. Emergency c-w transmission from the tran mitting shelter.

b. Emergency c-w transmission from the r ceiving shelter.

c. Emergency manual FS transmission fro the receiving shelter.

d. Emergency voice operation.

38. RTT Relay Operation

If the distance between two stations is too gre to provide satisfactory teletypewriter operatio Radio Set AN/MRC–2(*) can be located betwee the two stations and can act as a relay. Und these conditions, the received teletypewriter si nals are retransmitted to the other station witho operating the teletypewriter equipment in th operating shelter of the relay station. Howeve the monitoring teletypewriter in the receivin shelter will print page copy of the receive message.

39. Power Unit PE–95–(*) Controls

(fig. 76)

The following table lists the power unit controls and indicates their functions:

Control	Function
AC VOLTS meter	Indicates output voltage of the a-c generator.
AC AMPERES meter	Indicates the output current of the a-c generator.
FUEL GAGE indicator	Indicates the amount of gasoline in the supply tank.
BATTERY CHARGE RATE meter.	Indicates the rate of charge or discharge of the battery.
OIL PRESSURE gage	Indicates the pressure of the oil being applied to the bearings.
WATER TEMPERATURE gage.	Indicates the temperature of the engine.
RUNNING TIME METER.	Indicates, in hours, the time the engine has been running.
FREQUENCY METER	Indicates the frequency, in cps, of the generated alternating current.
CIRCUIT BREAKER ON-OFF switch.	In the ON position, connects the output of the generator to the load.
	In the OFF position, disconnects the output of the generator from the load.
MANUAL START-REMOTE START switch.	In the MANUAL START position, the engine is hand cranked until started.
	In the REMOTE START position, connects battery current to the exciter and the automatic choke through the START switch.
START-STOP button	Closing the START switch connects battery current to the automatic choke and to the d-c exciter through the solenoid. The exciter cranks the engine. Closing the STOP switch energizes the stop relay which grounds the engine ignition and the engine stops.
TROUBLE LAMP outlet.	Supplies a connection to the 120-volt a-c source supplied by the generator.
Indicating lamp	Lights when the CIRCUIT BREAKER is in the ON position.

40. Radio Transmitter BC–610–(*) Controls

(figs. 77, 78, and 79)

a. Front Panel Controls (fig. 78). The following table lists the transmitter controls and indicates their functions:

Control	Function
P. A. PLATE TUNING control (C12).	Varies the capacitance in the p-a (power amplifier) plate circuit. Used to tune the p-a plate tank circuit to resonance.
P. A. PLATE meter (M2).	Measures the current in the p-a plate circuit.
EXCITATION METER (M1).	Indicates the current in the circuits controlled by the EXCITATION METER SWITCH.
FILAMENT VOLTAGE meter (M3).	Indicates the voltage supplied to the filaments of p-a tube V16.
EXCITATION METER SWITCH (SW8).	Connects the EXCITATION METER to the following circuits:
	In position P. A. GRID X10, connects to the p-a grid circuit.
	In position INT. AMP. PLATE X20, connects to the intermediate amplifier plate circuit.
	In position INT. AMP. GRID X1, connects to the intermediate p-a grid circuit.
	In position DOUB. PLATE X10, connects to the buffer-doubler plate circuit.
	Note. EXCITATION METER SWITCH on Radio Transmitter BC-610-E does not show multiplication factor. EXCITATION METER M1 has separate scale for each position of EXCITATION METER SWITCH.
BAND SWITCH (SW11):	Selects one of three tuning unit circuits which becomes a part of the circuits for tubes V8, V9, V10, and V11.
C. W.-PHONE switch (SW7).	Controls the plate voltage supplied to h-v (high-voltage) rectifier tubes V6 and V7 and the operation of relay RY3.
	In the C. W. position, maximum voltage is supplied to the plates.

40. Radio Transmitter C–610–(*) Controls—Continued

Control	Function
C. W.-PHONE switch (SW7)—Continued	In the PHONE position, the voltage supplied to the plates is reduced. Relay RY3 is energized.
OVERLOAD RESET switch (SW12).	Opening this normally closed switch resets the overload relay after an overload current has energized relay RY5.
FILAMENT POWER switch (SW1).	In the on (up) position, a-c power is supplied to the filaments of all the tubes in the transmitter and to the bias power supply. A-c power is also supplied to the power transformer in the speech amplifier. A green jeweled lamp is lighted.
EXCITER PLATE POWER switch (SW3).	In the EXCITER PLATE POWER position, the cathode of r-f oscillator tube V8 is grounded. A-c power is supplied to the plate transformer for exciter rectifier tube V12 which supplies plate and screen voltages for tubes V8, V9, V10, and V11. This position is used when tuning the oscillator, buffer-doubler, and intermediate p-a stages.
	In the NORMAL position, a-c power is removed from the plate transformer and the circuit from ground to the cathode of tube V8 is opened.
HIGH VOLTAGE PROTECT switch (SW4).	In the HIGH VOLTAGE PROTECT position, the a-c power supplied to the primary of transformer T6 is reduced, thus reducing the rectified secondary voltage supplied to the p-a circuit. This position is used when tuning the p-a plate circuit.
	In the NORMAL position, normal a-c power is supplied to transformer T6. This position is used in normal operation.
PLATE POWER switch (SW6).	In the PLATE POWER position, controls the a-c power supplied to one side of the coils of relays RY1 and RY4 and energizes the transmitter. This switch is used in an emergency or when repairing the transmitter. A red jeweled lamp lights. ***Caution:*** Do not key t transmitter with this swit in the PLATE POWER po tion because the receiver di abling relays are not operate
FILAMENT VOLTAGE control (R18).	Varies the voltage supplied the filaments of all the tub in the transmitter except t bias rectifier and a-f driv tubes.
MODULATOR BIAS control (R12).	Varies the bias voltage su plied to the grids of modu lator tubes V3 and V4 whe the C. W.-PHONE switc is in the PHONE positio
FUSES FS1 and FS2	Protect all the circuits in th transmitter and the powe transformer in the speec amplifier.
FUSE FS3	Protects transformer T6.
FUSE FS4	Protects transformers T2, T3 T4, and T5.
FUSE FS5	Protects transformers T1 an T101 in the speech amplifier

b: Transmitter Tuning Unit Controls (fig. 79) The tuning unit controls are located below the right-hand door in the top of the transmitter. The following table lists the transmitter tuning unit controls and indicates their functions:

Control	Function
M. O.-XTAL switch (SW15).	Selects the circuit in the tuning unit to be used.
	In the M. O. position, transmission is controlled by a master oscillator.
	In the XTAL position, transmission is controlled by a crystal or FS exciter.
M. O. control	Varies the frequency of the master oscillator. The calibrated dial allows presetting to values obtained in the tuning chart.
DOUB. control	Tunes the buffer-doubler plate tank circuit.
INT. AMP. control	Tunes the intermediate p-a plate tank circuit.
Crystal socket	Receptacle for Crystal Holder FT–171–B or the connector at the end of Cord CG–389/U from the FS exciter.

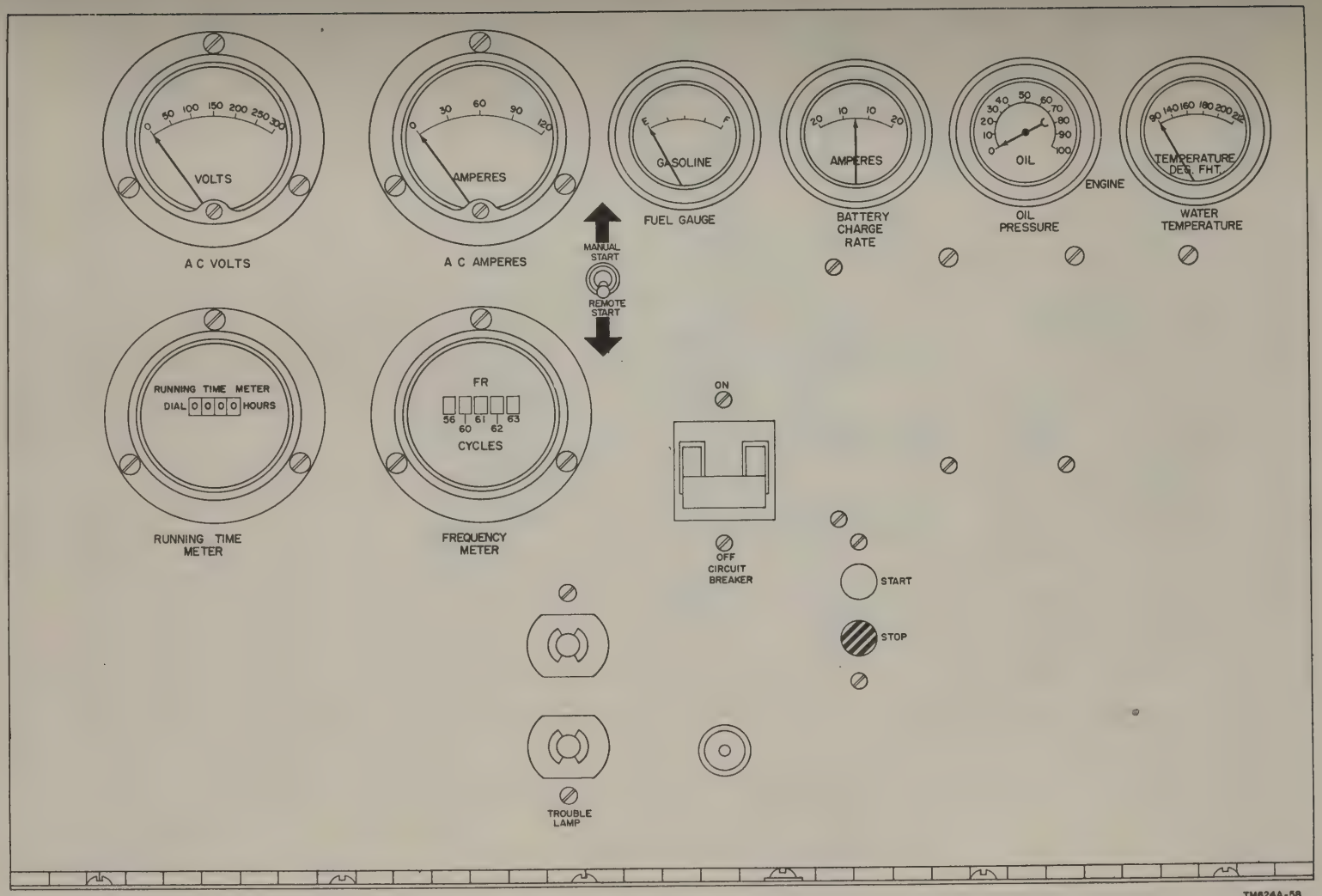


Figure 76. Power Unit PE–95–(*) controls.

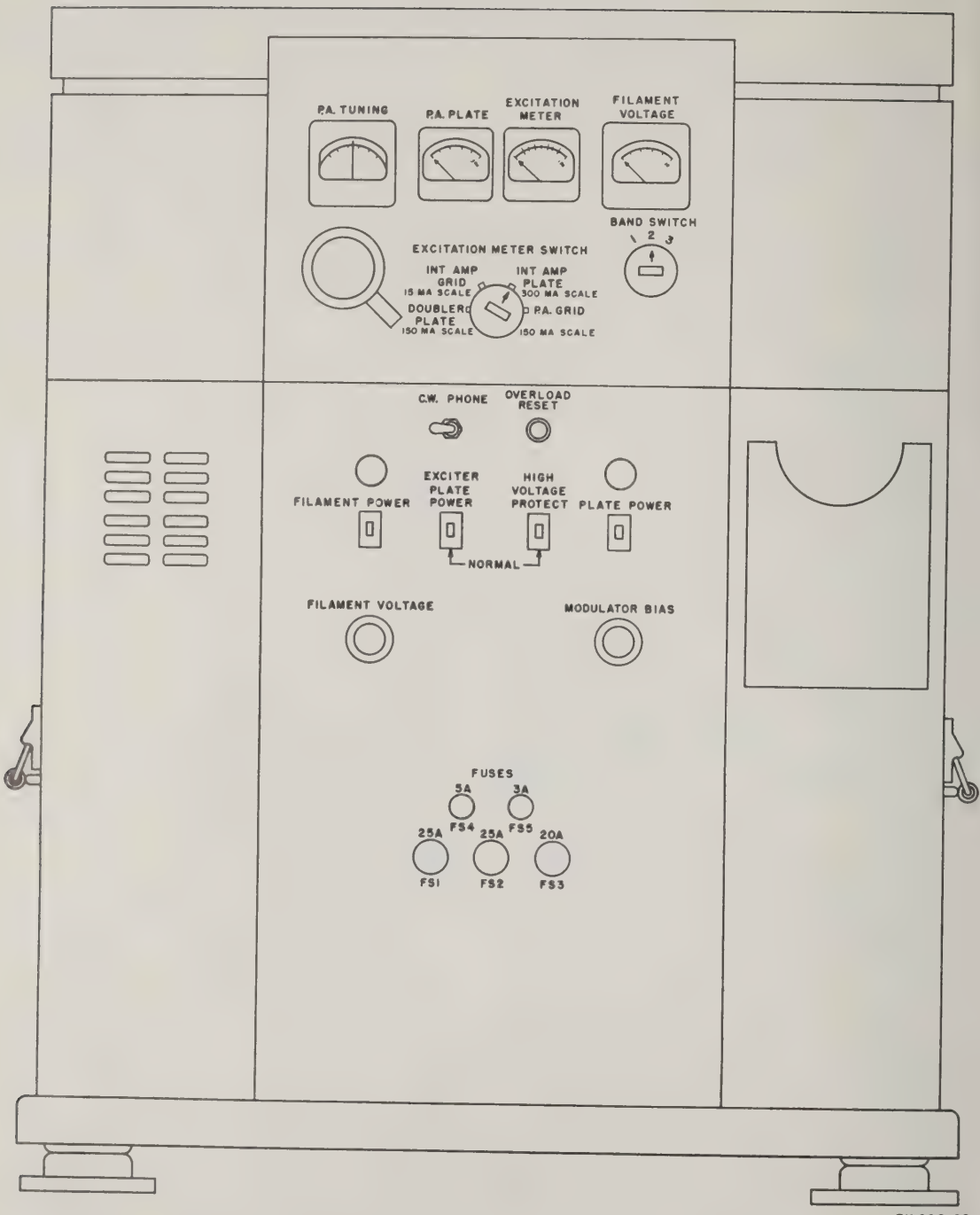


Figure 77. Radio Transmitter BC–610–E, location of front panel controls.

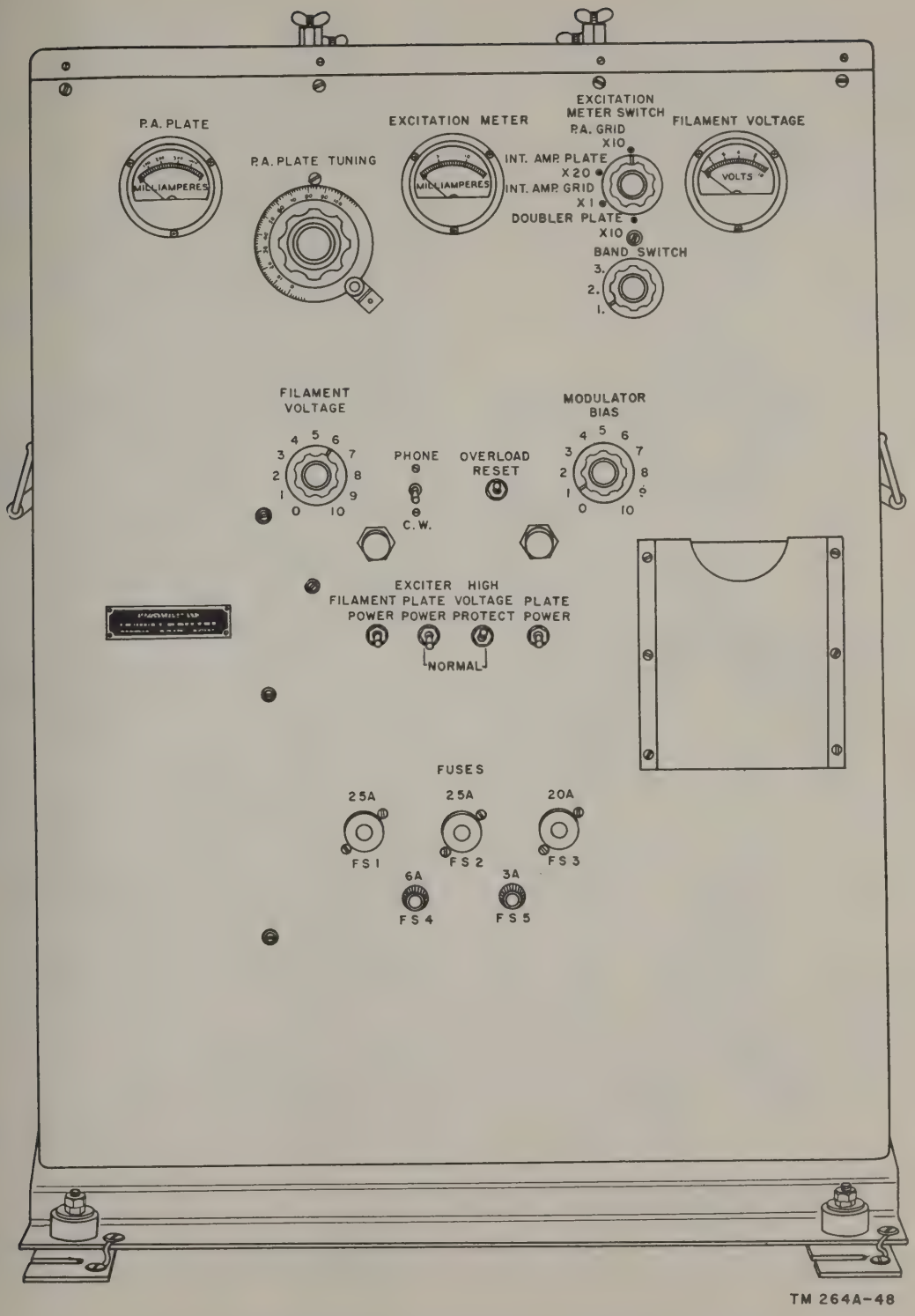


Figure 78. Radio Transmitter BC-610-H and -I, location of front panel controls.

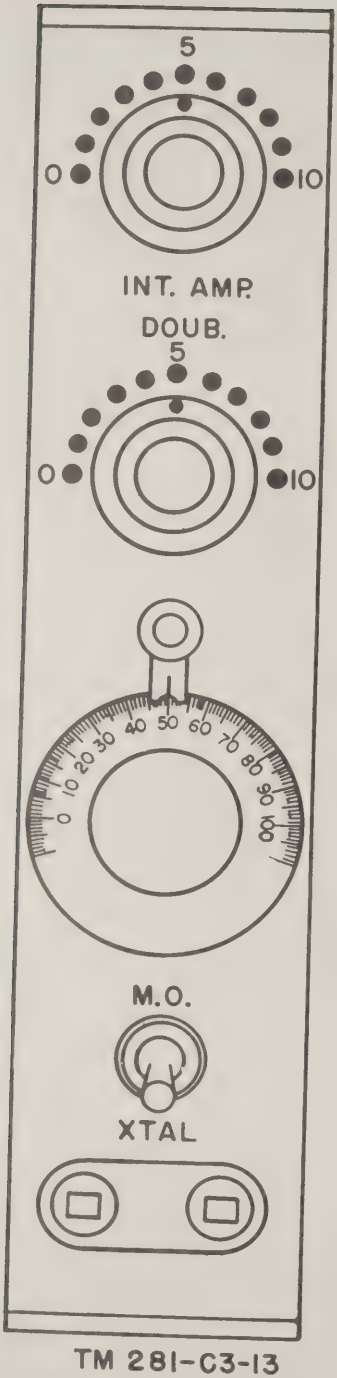


Figure 79. Transmitter Tuning Unit Controls.

41. Antenna Tuning Unit BC-939-(*) Cont
(fig. 80)

The following table lists the antenna tun unit controls and indicates their functions:

Control	Function
COUPLING INCREASE control (L5).	Varies the inductive reacta of the link coil for optim plate load resistance.
FREQUENCY 10MC-INCREASE-2 MC control (L6).	Changes inductance of the (low-frequency) loading by varying the tap posit on this coil (for whip tenna).
FREQUENCY 18MC-INCREASE-10 MC control (L44).	Changes inductance of (high-frequency) loading L4 by varying the tap this coil (for whip antenn
ANTENNA CURRENT meter (M4).	Measures the r-f antenna c rent. Maximum current dicates proper match antenna to the transmitt
2-10 M-C-LONG WIRE-10-18 M-C switch (SW9).	A three-position antenna ran switch. In 2-10 M-C position, allo matching of whip antenn in the 2- to 10-mc range, the transmitter. In the LONG WIRE positio a long-wire antenna may matched for any transmitt frequency. In the 10-18 M-C positio allows matching the tran mitter, in the 10- to 18-m range, to a whip antenna.

42. Amplifier AM-141 (*)/MRC Controls
(fig. 81)

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

Control	Function
CIRCUIT BREAKER ON-OFF switch (K5).	ON-OFF switch for entir amplifier. In the ON position, an abnor mally high current break the circuit to one terminal o a-c input jack J2.
Filament indicator lamp (E5).	Green jeweled lamp light when CIRCUIT BREAKER switch is in the ON position.
PLATE POWER indicator lamp (E6).	Red jeweled lamp lights when PLATE POWER switch is in the on (up) position.

Control	Function
PLATE POWER switch (S1).	In the PLATE POWER position, a-c power is supplied to the plate voltage transformer for tubes V5 and V6 after a time interval has elapsed.
NORMAL-TUNE UP switch (S2).	In the NORMAL position, a-c power is connected directly to the plate voltage transformer and maximum power is supplied to rectifier tubes V5 and V6. In the TUNE UP position, a-c power is supplied to the plate transformer through a resistor, reducing the power supplied to tubes V5 and V6. This position is used during the tuning procedures.
OVERLOAD RESET switch (S15).	Closing this normally open switch energizes the coil of relay K3 after an abnormally high plate current opens the contacts.
INCREASE FILAMENT control.	Varies the voltage supplied to the filaments of tubes V1, V2, V3, V4, V5, and V6.
FILAMENT VOLTAGE meter (M2).	Indicates the voltage supplied to the filaments of tubes V1 and V2.
INCREASE EXCITATION control.	Varies the plate voltage supplied to the r-f p-a stage in the transmitter. Consequently, the grid excitation voltage supplied to tubes V1 and V2 in the amplifier also is varied.
GRID TUNING control (C2).	Varies the frequency response of the grid circuit to match the excitation frequency from the transmitter.
GRID CURRENT meter (M1).	Indicates the current drawn by the grids of tubes V1 and V2.
PLATE TUNING control (C11).	Tunes the plate tank circuit.
PLATE CURRENT meter (M3).	Indicates the current drawn by the plate circuit of tubes V1 and V2.
NEUT. SWITCH (S14). This switch is located inside the plate coil compartment.	In the ON position, removes a-c power from the high-pressure blower and the plate transformer for tubes V5 and V6. This position is used when neutralizing the pa. In the OFF position, a-c power is reconnected to the high-pressure blower and the plate transformer for V5 and V6.
BAND SWITCH (S17).	In position 1, one section of each dual section of capacitor C11 is connected in parallel with each half of the plate tank coil. In position 2, both sections of each dual section of capacitor C11 are connected in series with each half of the plate tank coil. In position 3, both sections of each dual section of capacitors C11 are connected in parallel with each half of the plate tank coil.
Switch S16. This switch is located inside of the plate coil compartment and is actuated by the door in some models.	When the door is open, the choke side of capacitor C13 is connected to the chassis (ground) and the capacitor is discharged.
Amplifier AM–141A/MRC and AN–141B/MRC.	Closing the door breaks the circuit to ground.
EXCITATION INPUT jack (J4).	Provides a connection for the r-f input.
BC–610 jack (J3) located in the rear of the amplifier.	Provides a connection for controlling the a-c power in the transmitter.
A-c output jack (J2) located in the rear of the amplifier.	Provides a connection for the a-c power supplied to the amplifier.
BLOWER jack (J1)	Provides a connection for supplying a-c power to high-pressure blower B3.
R-f output terminals located on the top of amplifier.	Provide a connection for the transmission line to the transmitting antenna.
FUSE 8 AMPS SPARE	Filament fuse F1 protects the filament transformer from overloads.
FUSE 8 AMPS SPARE	Excitation fuse F2 protects the EXCITATION INCREASE transformer from overloads.
Interlock switches (S5 through S13).	Open the 115-volt a-c line when doors are opened or panels are removed.

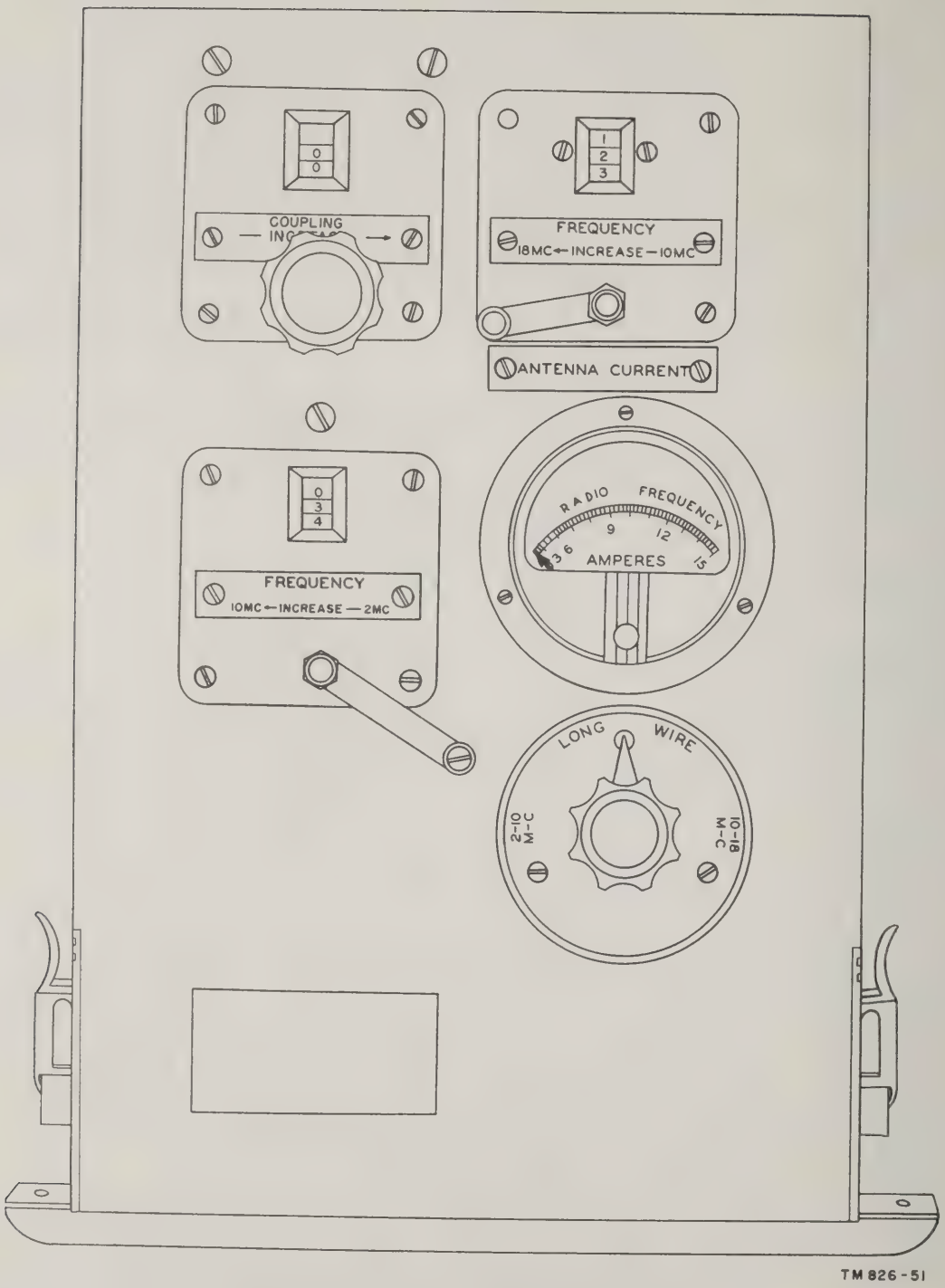


Figure 80. Antenna Tuning Unit BC-939-(*) controls.

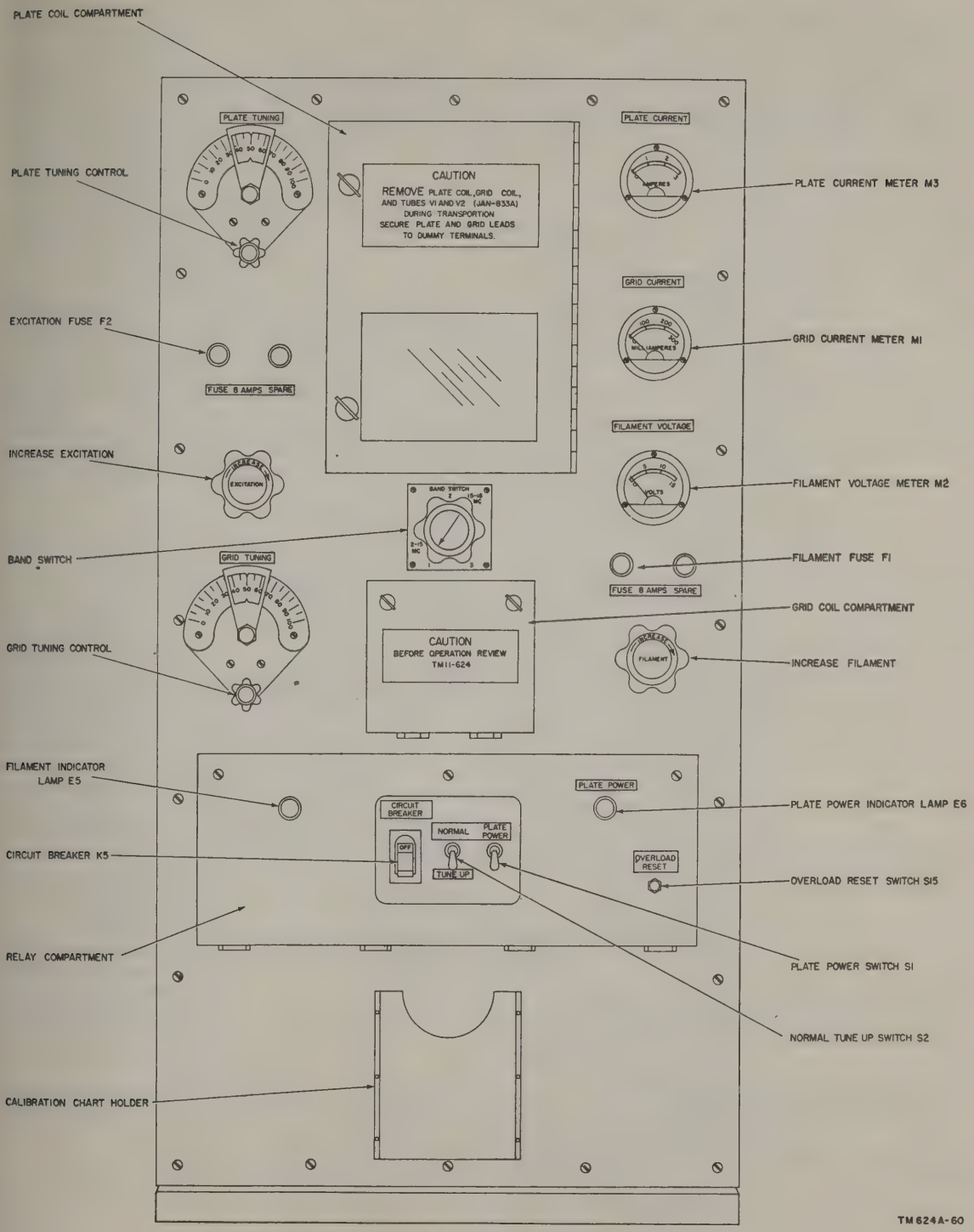


Figure 81. Amplifier AM-141(*)/MRC controls.

43. Frequency Shift Exciter O–39 (*)/TRA–7 Controls

(fig. 82)

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

Control	Function
OSCILLATOR TUNING control (C102).	Varies the frequency generated by tube V101 in the range of 2 to 3.5 mc or 3.5 to 6 mc depending on the position of switches S101 and S102.
BUFFER TUNING control (C110).	Varies the frequency over the range of 2 to 3.5 mc or 3.5 to 6 mc.
OSCILLATOR RANGE switches (S101 and S102).	In the 2–3.5 MC position, connects the circuit elements into the circuit to vary the frequency of the r-f oscillator from 2 to 3.5 mc.
	In the 3.5–6 MC position, connects the circuit to vary the frequency of the r-f oscillator from 3.5 to 6 mc.
SHIFT control (C111)	Varies the frequency generated by oscillator tube V101 when a space signal is transmitted.
TEST key (S104)	In the MARK position, the transmitter transmits a mark signal.
	In the SPACE position, the transmitter transmits a space signal.
	In the NORM position, the transmitter signal is controlled by the signals developed in the control unit.
TEST OSC 850 ~ –OFF switch (S106).	In the 850 ~ position, the 850-cycle tone is connected to the monitoring circuit.
	In the OFF position, the B+ voltage is disconnected from the 850-cycle oscillator tube, V107.
VOLUME 850 ~ TEST control (R132).	Varies the amplitude of the 850-cycle tone.
OVEN ON switch (S108)	In the ON position, connects a-c power to the thermostatically controlled oven.
OVEN indicating lamp (I 102).	Lamp lights when the thermal switch is closed if the OVEN switch is in the ON position.
AC SUPPLY ON switch (S105).	In the ON position, connects a-c power from jack J103 to the power transformer and oven heaters.
AC SUPPLY indicating lamp (I 102).	Lights when the AC SUPPL switch is in the ON positio
RF OUTPUT NORMAL-ADJ connectors.	In the NORMAL (J101) po tion, a connection for fixed-impedance r-f outp from coil L104.
	In the ADJ (J102) position, connection for various ou put impedances determin by switch S103.
850~TEST indicator tube (V110).	Indicates by the smalle shadow angle when the ze beat is obtained between t 850-cycle oscillator and t 850-cycle note supplied the FREQUENCY METE IN connector.
BUFFER INDICATOR lamp (I 101).	Indicates by maximum bri liance the proper position the BUFFER TUNING co trol.
Fuses F101 and F102	Protect power transform T101 and the oven heate against damage caused b overloads.
SEND AND CONTROL connector (J107).	Provides a means for connec ing RTT signals from th control unit and control lin for energizing relay K101.
LOCAL CW CONTROL connector (J106).	Provides a means for connec ing the control line whic operates relay RY200 i Junction Box JB–70–A an for connecting the c-w keyin line which operates rela K101.
FREQUENCY METER IN connector (J105).	Provides a means for connec ing the output of the fre quency meter.
GRD binding post	Provides a means for connect ing the shelter ground to th exciter chassis.
PHONES 850~TEST jack (J104).	Provides a means for monitor ing the beat note resultin from beating the frequenc supplied to connector J10 and the 850-cycle frequenc generated by the 850-cycl oscillator.
AC SUPPLY connector (J103).	Provides a means for connect ing the a-c power source t the exciter.

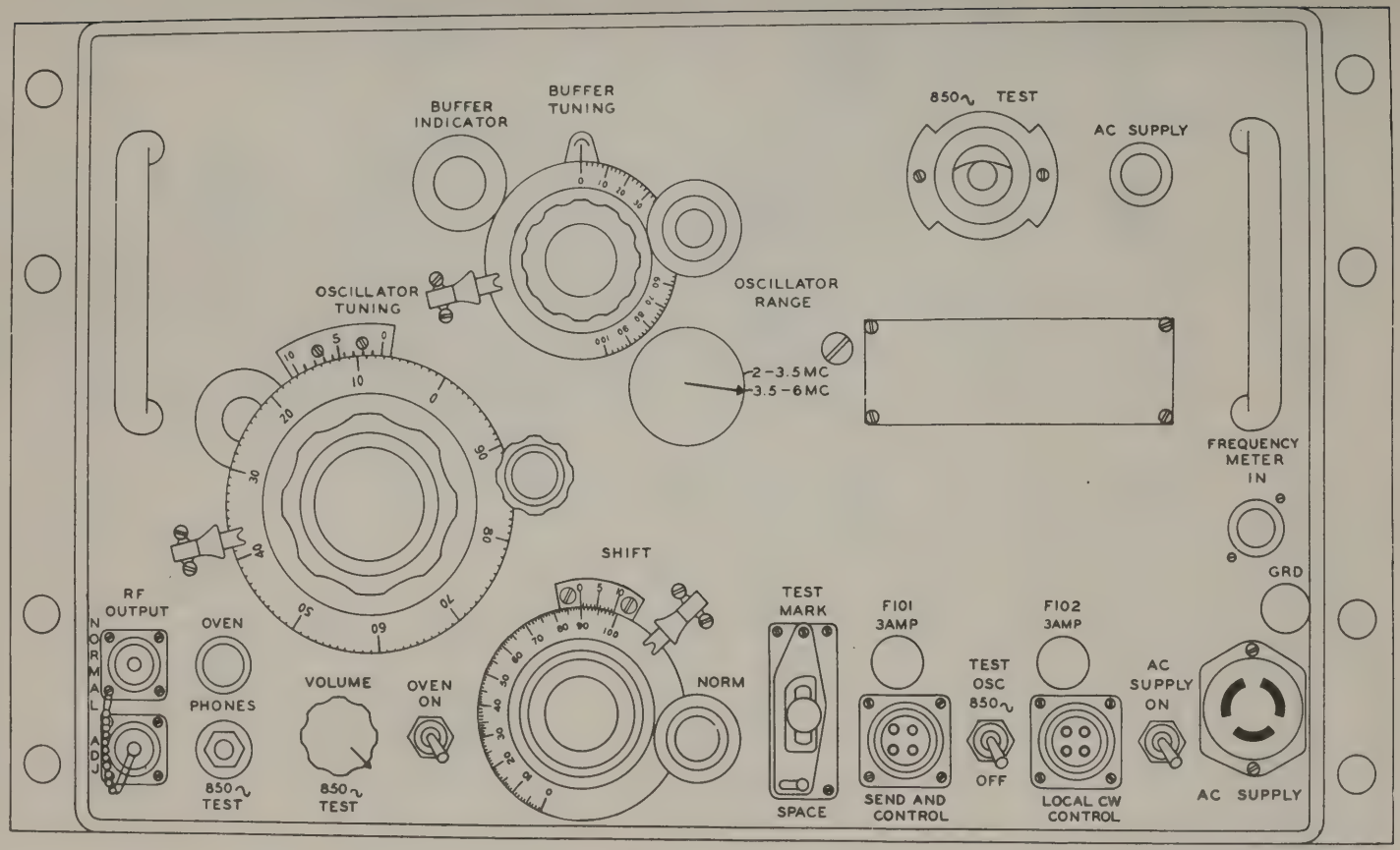


Figure 82. Frequency Shift Exciter O-39(*)/TRA-7 Controls.

44. Speech Amplifier BC–614–(*) Controls
(fig. 83)

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

Control	Function
CARBON MIC. 1 jack (J102).	Provides a means of grounding the coil of relay RY200 in Junction Box JB–70–A or connecting a carbon microphone to the amplifier.
CARBON MIC. 1 control (R123).	Varies the gain of the speech amplifier by controlling the input level of the carbon microphone.
DYNAMIC MIC. 2 socket (SO 101).	Provides a means of connecting a dynamic microphone to the speech amplifier.
DYNAMIC MIC. 2 control (R111).	Varies the gain of the speech amplifier by controlling the input level of a dynamic microphone to the speech amplifier input circuit.
TO BC–610 socket (SO 103).	Provides a means for connecting eight circuits to the transmitter.
TO JB–70 socket (SO 102).	Provides a means for connecting eight circuits to Junction Box JB–70–A.
KEY Jack (J101)_____	Provides a means for connecting a telegraph key in serie with the cathode of tub V8, in the transmitter, an ground.
LIMITER CONTROL (R134) (located behind a plate on the front panel).	Varies the excitation voltag fed to the grid of modulatio limiter tube V105 from th grid of tube V104 which i turn controls the bias volt age supplied to the grid c tube V102.
MODULATOR PLATE meter (M101).	Indicates the plate curren drawn by modulator tube V3 and V4 (in the trans mitter).
Pilot lamp (LM101)_____	Indicates by lighting a re jeweled lamp when a-c powe is supplied to the speech amplifier.
SIDETONE VOLUME control (R137). This screw-driver adjustment is located at the rear of the chassis.	Varies the amplitude of the sidetone signal.

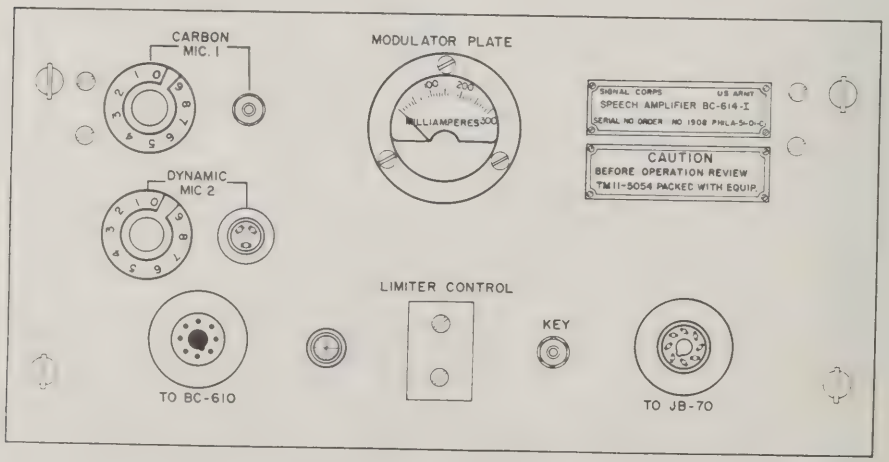


Figure 83. Speech Amplifier BC–614–(*) Controls.

45. Junction Box JB–70–A Controls
(figs. 84 and 57)

a. Front Panel Controls (fig. 84). The following table lists the front panel controls of the junction box and indicates their functions:

Control	Function
BATTERY SOURCE PE–95–AUX. switch (SW207).	In the PE–95 position, connects +12 volts dc from Power Unit PE–95–(*) to the +12-volt circuits. In the AUX position, connects +12 volts dc from the battery in Chest CH–109–(*) to the +12-volt d-c circuits.
REMOTE TELEPHONE binding posts.	A means of connection to a remote telephone.
RECEIVER DISABLING switches (SW200 and SW201).	In the BC–312–ON position, connects 12 volts dc to terminal 2 of socket SO 204 through two contacts of relay RY200. Disables Radio Receiver BC–312–(*). In the BC–312–OFF position, disconnects +12 volts dc from terminal 2 of socket SO 204. In the BC–342–ON position, connects +12 volts dc to terminal 2 of socket SO 205 through two terminals of relay RY200. In the BC–342–OFF position, disconnects +12 volts dc from terminal 2 of socket SO 205.
TRANS. ON-TRANS. OFF-REC. TO EE–8 switch (SW203).	In the TRANS ON position, one set of contacts connects terminals 2 and 1 of terminal strip TS200 together. Connecting these terminals operates relays RY1 and RY4 in the transmitter. One set of contacts connects L2 of the telephone in the transmitting shelter to terminals 2 and 4 of the REMOTE CONTROL EE–8 switch SW202C. One set of contacts connects the tip of KEY jacks J200 and J201 to one side of the coil of relay RY200 and to terminal 7 of terminal strip TS200. In the TRANS OFF position, the three sets of contacts are open.
TRANS ON-TRANS. OFF-REC. TO EE–8 switch (SW203).—Con.	In the REC. TO EE–8 position, connects line terminal L2 of the telephone to the common terminal of section A of switch SW202.
REMOTE CONTROL EE–8 switch (SW202). (For switch section, see fig. 177.)	In the TELEGRAPH POSITION, section A connects the a-f output of the receiver to the telephone, when switch SW203 is in the REC. TO EE–8 position. Section B connects one side of the coil of relay RY200 to the ungrounded REMOTE TELEPHONE binding post through switch SW203 in the TRANS. ON position. This permits keying of relay RY200 with a telegraph key in a remote location. Section C grounds the telephone input to the speech amplifier. In the TO BC–312 TELEPHONE position, section A connects the telephones through switch SW203 in the REC. TO EE–8 position to terminal 2 of socket SO 210. Section B grounds one end of the coil of relay RY200 through switch SW203 in the TRANS. ON position. Section C connects the telephones, through switch SW203 in the TRANS. ON position, to the telephone input to the speech amplifier. In the TO BC–342 TELEPHONE position, section A connects the telephones, through switch SW203 in the REC. TO EE–8 position, to the receiver output from the PHONES jack. Section B, same as for TO BC–312, section B. Section C, same as for TO BC–312, section C. In the NORMAL position, section A, no circuit is involved. Section B, no circuit is involved. Section C, grounds the telephone input to the speech amplifier.

45. Junction Box JB–70–A Controls—Con.

Control	Function
START-STOP switch (SW206).	In the START position, closes the relay in Power Unit PE–95–(*), which starts the engine. In the STOP position, stops the engine.
CIRCUIT BREAKER PUSH TO RESET switch (CB200).	Pushing this button, after an overload current has opened the a-c circuit, closes this circuit again.
C. W. SIDETONE switch (SW205).	In the TO BC–312 position, section A connects the sidetone signal developed in the speech amplifier to the two HEADSETS jacks J202 and J203. Section B grounds the cathodes of the sidetone oscillator in the speech amplifier when relay RY200 is operated. In the TO BC–342 position, section A connects the sidetone signal developed in the speech amplifier to the two HEADSETS jacks J204 and J205. Section B, same as TO BC–312, section B. In the OFF position, section A disconnects the sidetone signal. Section B disconnects ground from the cathodes of the sidetone oscillator tube.
RECEIVER OUTPUT switch (SW204).	In the NORMAL positi connects the audio sig output of the receiver to t loudspeaker and also co nects terminals 1 and 2 the AUDIO BC–312 sock (SO 210) together. In the TRANSPOSED po tion, connects the audio si nal output of the receiver terminal 1 of the AUDI BC–312 socket (SO 210) ar also connects terminal 2 AUDIO BC–312 socket (S 210 to the loudspeaker.)
KEY jacks (J200 and J201).	Provides a connection for telegraph key. Pressing th key of a telegraph key insert ed in either jack grounds on side of the coil of relay RY200 when switch SW20 is in the TRANS. ON posi tion.
HEADSETS jacks (J202 and J203).	Provides a connection to headset for receiving th sidetone signal from th speech amplifier when switch SW202 is in the TO BC–31 position.
HEADSETS jacks (J204 and J205).	Provides a connection to headset for receiving th sidetone signal from the speech amplifier when switch SW202 is in the TO BC–342 position.

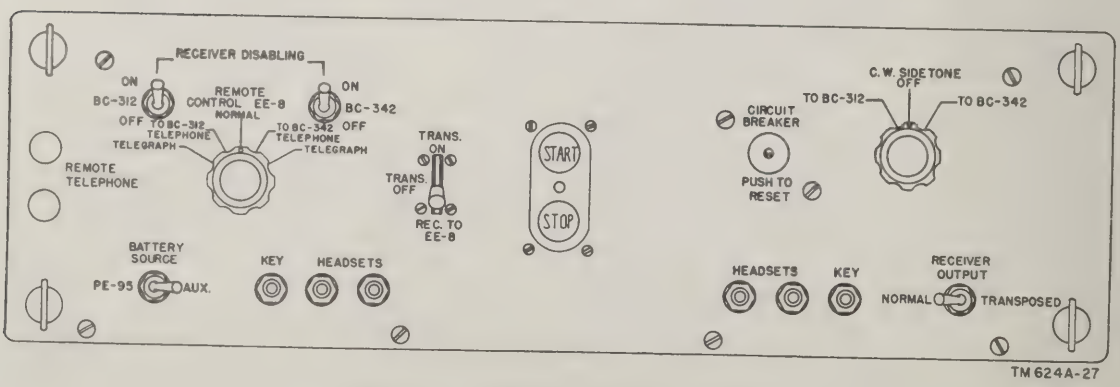


Figure 84. Junction Box JB–70–A Controls.

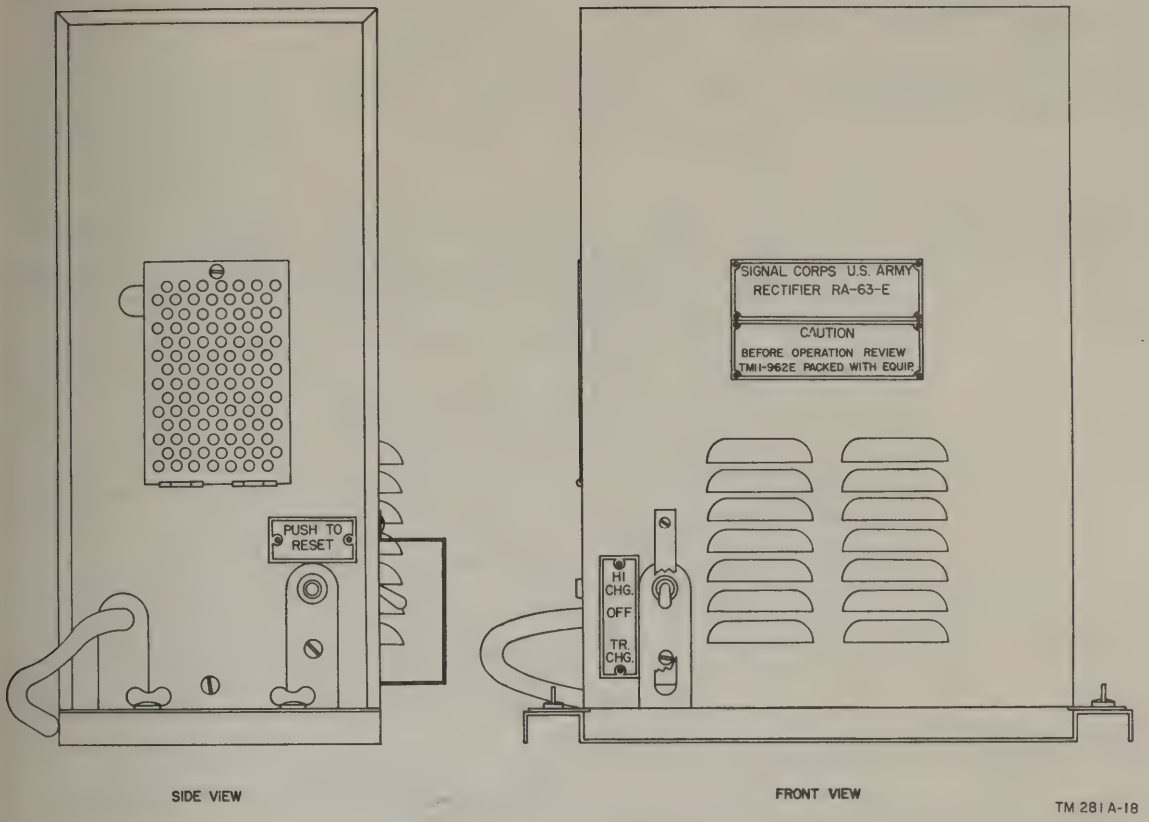


Figure 85. Rectifier RA–63–(*) controls.

b. Chassis Mounted Connectors (fig. 57). The following table lists the connectors located on the junction box chassis and indicates their functions:

Control	Function
POWER INPUT socket (SO 200).	Provides a connection for the ground circuit from the start and stop relays and the a-c and d-c power sources in Power Unit PE–95–(*).
TO BC–610–( ) socket (SO 201).	Provides a connection for a-c power to the transmitter.
HEATER socket (SO 202).	Provides a connection for the a-c power to the heater.
Rectifier RA–63–( ) (SO 203).	Provides a connection for a-c power to Rectifier RA–63–(*) and d-c power from the rectifier.
Cord CD–565 TO BC–312 socket (SO 204).	Provides a connection for the d-c power to the disabling relay and dynamotor in Radio Receiver BC–312–( ).
TO CORD CD–566 socket (SO 205).	Provides an outlet for 12 volts direct current.
BATTERY socket (SO 206).	Provides a connection for the 12-volt d-c source from the batteries in Chest CH–109–(*).
TO BLOWER socket (SO 207).	Provides a connection for the a-c source to the outlet box which supplies power to the heater and a lamp.
IN CH 121 LAMP (ROOF) sockets (SO 208).	Provides a connection for the a-c source to the outlet box which supplies power to the blower and a lamp.
TO LAMP socket (SO 209).	Provides a connection for a-c power to a lamp.
AUDIO BC 312 socket (SO 210).	Provides a means for connecting to a receiver and a loudspeaker.

46. Rectifier RA–63–(*) Controls

(fig. 85)

The following table lists the rectifier controls and indicates their functions:

Control	Function
HI CHG.-OFF-TR. CHG. switch (SW500).	In the HI CHG. position, connects a lower number of turns of wire to the primary of the transformer, increasing the d-c output of the rectifier. In the TR. CHG. position, connects a higher number of turns of wire to the primary of the transformer, decreasing the current output of the rectifier. In the OFF position, disconnects the a-c voltage from the transformer.
Circuit breaker PUSH TO RESET switch (CB500).	Closes the a-c circuit to the transformer after an overload current has opened the circuit.

47. Frequency Meter BC–221–( ) Controls

(fig. 86)

The following table lists the frequency meter controls and indicates their functions:

Control	Function
OFF - WARMUP - CRYSTAL - OPERATE - MODULATE - CHECK switch.	In the OFF position, opens input power circuits. In the WARMUP position, provides filament power to the tubes. In the CRYSTAL position, provides frequencies of 1,000 kc and harmonic frequencies of 1,000 kc. In the OPERATE position, the frequency meter provides frequencies or receives frequencies within the range of 125 to 20,000 kc. In the MODULATE position, modulates, by 375 cycles, the frequencies within the range of the frequency meter. In the CHECK position, provides means for calibrating the variable-frequency oscillator.
PHONES jacks	Provides a means for connecting two headsets. One headset must be plugged into a PHONES jack for the meter to operate.
GAIN control	Varies the output signal to the PHONES jacks.
FREQ. BAND HIGH-LOW switch.	Selects the range of frequency of the variable-frequency oscillator.
DIAL UNITS dial	Indicates the frequency for the variable-frequency oscillator in units and tenths.
DIAL HUNDREDS scale	Indicates in hundreds the reading of the DIAL UNITS setting.
CORRECTOR control	Provides small changes in capacity to accurately calibrate the meter.
ANT. post	Provides a means of connection for the pick-up antenna.
GND. post	Provides a ground connection for the meter.
ON-OFF switch (rectifier).	In the ON position, connects rectifier unit of the frequency meter to a-c power source.

48. Junction Box J–207/MRC–2 Controls

(fig. 56)

The following table lists the connectors on the junction box and indicates their functions:

Control	Function
DISABLING jack (J2)	Provides a connection for Cord CD–607 or CD–1019. When Cord CD–607 or CD–1019 is removed from this jack, the transmitter is disabled.
EE–8 jack (J3)	Provides a connection for Cord CD–1251. Connects this jack with the telephone and Junction Box JB–70–A.
KEY jack (J4)	Provides a connection to a telegraph key for c-w keying the transmitter.
F. S. EXCITER	BLUE plug P1 provides a connection to Cord CX–961/TRA–7 which connects to the SEND AND CONTROL connector in the exciter. RED plug P2 provides a connection to Cord CX–961/TRA–7 which connects to the LOCAL CW CONTROL connector in the exciter.

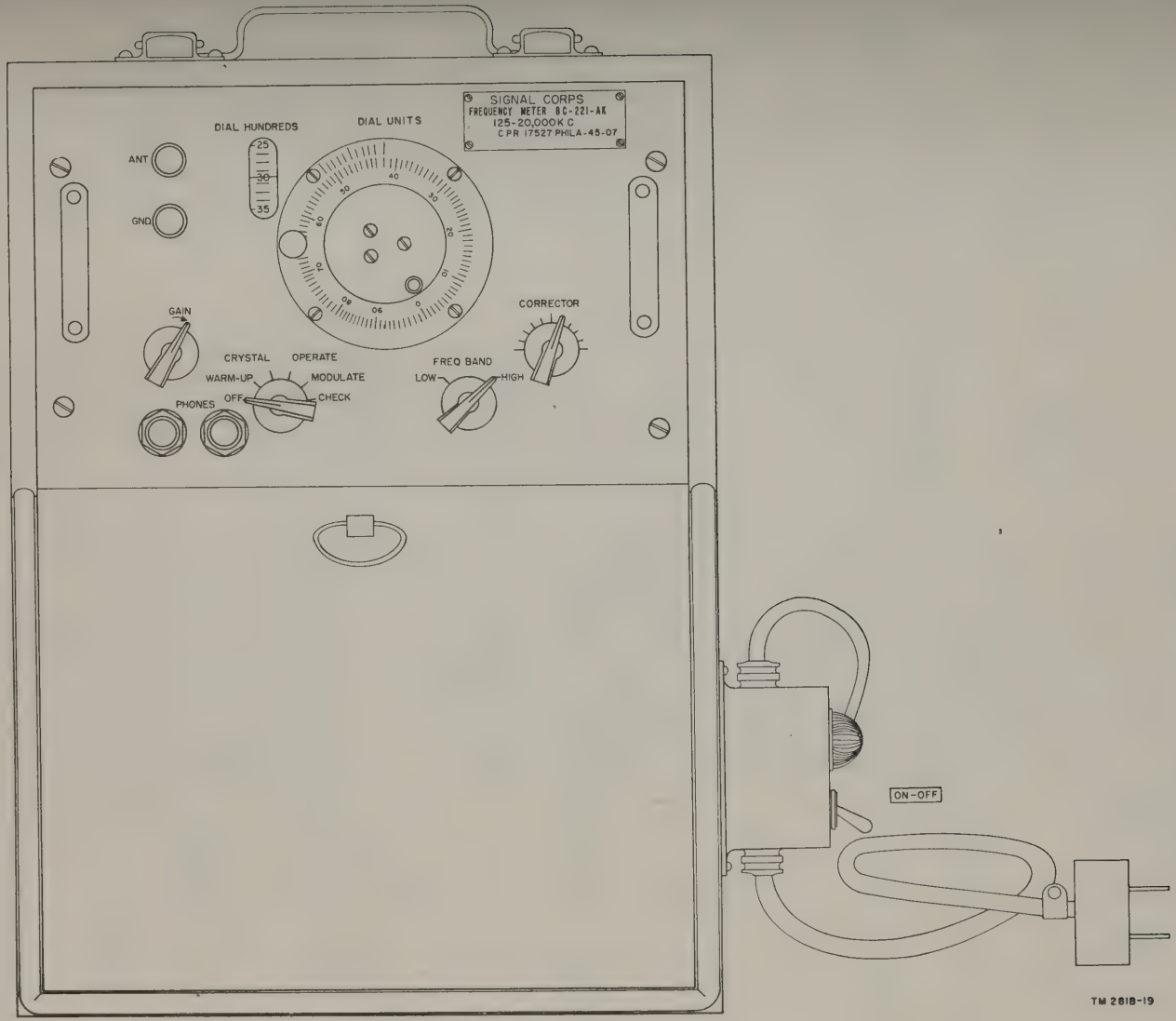


Figure 86. Frequency Meter BC–221–AK Controls.

49. Radio Receiver Assembly OA–65A/MRC–2 Controls (fig. 87)

The following table lists the controls of the Channel A or Channel B receiver and Radio Receiver BC–312–( ) and indicates their functions:

Control	Function
SIG. ANT. jack	Provides a means for connecting an r-f signal to the input circuit.
ALT. SIG. ANT	Provides a means for connecting an r-f signal to the input signal.
ALINE INPUT control (C26).	Varies the capacitance of the input circuit. Controls the matching of the antenna to the input circuit.
BAND CHANGE switch (SW5).	Selects one of six ranges of frequencies between 1.5 and 18 mc depending on the position of the switch. This switch also operates a masking plate over the FREQUENCY dial which exposes the scale of the band selected.
FREQUENCY dial	Exposes the scale containing the band of frequencies indicated by the BAND CHANGE switch and a scale calibrated from 0 to 45.
Dial lamps (located behind the KILOCYCLES window).	Illuminate the FREQUENCY dial for easier reading.
CRYSTAL PHASING OUT control (C51).	Varies the selectivity of the receiver.
DIAL LIGHT control (on some models of BC–312–( )).	Varies the brilliance of the dial lamp.
Note. DIAL LIGHT is CRYSTAL PHASING in all models of BC–342–( ) and some models of BC–312–( ).	
FAST TUNING control (C7, C16, C46, and C67).	Rapidly varies the frequency of the input circuit. Tunes the input circuit to resonance with the received frequency.
VERNIER control (C7, C16, C46, and C67).	Slowly varies the frequency of the input circuit. Tunes the input circuit to resonance with the received frequency.
OFF-M. V. C.-A. V. C. switch (SW12).	In the OFF position, the source of the power for the receiver is removed. In the M. V. C. position, permits manual controlling of the receiver sensitivity in conjunction with the VOL. control. In the A. V. C. position, permits automatic control of the receiver sensitivity.
VOL. control (R34, R35)	Varies the sensitivity of receiver with SW12 in M. V. C. position. Va the a-f gain with sw SW12 in the A. V. position.
C. W.-O. S. C. switch (SW11).	In the ON position, conn B+ to the plate of the C. O. S. C. tube V9. In the OFF position, remo B+ from the plate of C. O. S. C. tube V9.
C. W.-O. S. C. ADJUST control (C84).	Adjusts the frequency of C.-W. oscillator.
REC.-SEND switch (SW1).	In the REC. position, op the circuit from terminal of socket SO 1 and the of KEY jack J5 to one si of the coil for relay RL1. In the SEND position, clos the circuit from terminal of socket SO 1 and the tip KEY jack J5 to one side the coil for relay RL1.
FUSES LAMPS	Protects the two pilot lam from overloads.
FUSE BYN. FIL	Protects the filament circu from overloads.
KEY jack (J5)	Provides a connection for telegraph key. Closing th key grounds one side of th coil of relay RL1.
MICRO jack (J4)	Provides a means for connec ing a microphone. Depres ing the microphone switc grounds the circuit cor nected to terminal E socket SO 1.
SPEAKER 2ND AUDIO jack (J3).	Provides a means of connectin the audio output from trans former T2 to a permanen magnet-type speaker.
PHONES 2ND AUDIO jacks (J1 and J2).	Provides a means of connect ing the audio output fron transformer T2 to a headset
Socket (SO 1)	Provides a means for connect ing the 12-volt d-c circuit fo disabling the relay and i Radio Receiver BC–312–( ) provides a 12-volt d-c source for the dynamotor.
I-f output jack (J107) (located below the upper right-hand LOCK nut).	Provides a means for connect ing the frequency shifted i- output from the receivers to the converter.
Lamp (LM1) located in back of the front panel.	Protects the receiver input circuit from r-f radiations of nearby transmitters.

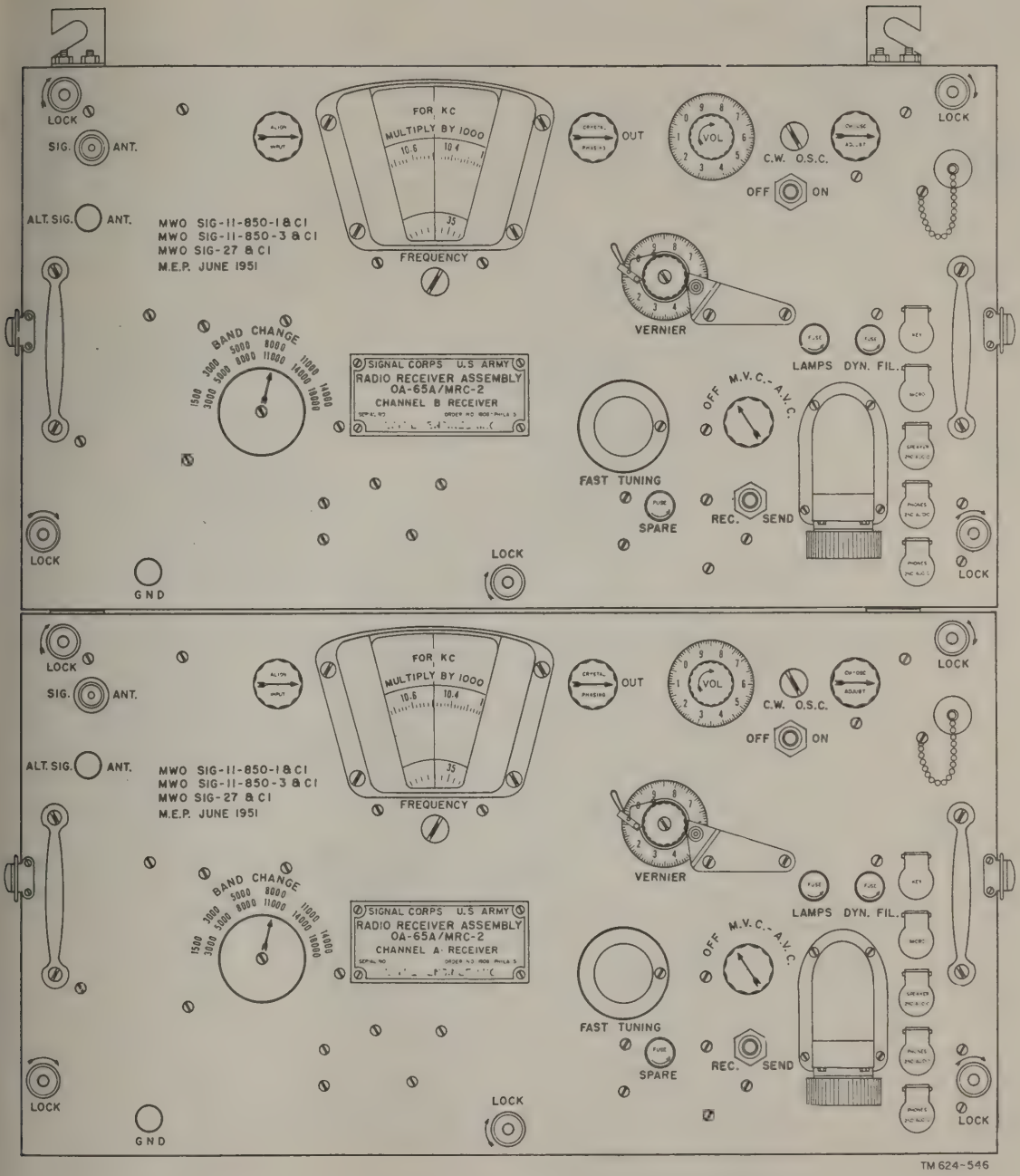


Figure 87. Radio Receiver Assembly OA–65A/MRC–2 Controls.

50. Dual Diversity Converter CV-31(*)/TRA-7 Controls

(figs. 88 through 91)

a. Front Panel Controls (fig. 88). The following table lists the front panel controls of the dual diversity converter and indicates their functions:

Control	Function
AC SUPPLY ON switch (S303).	In the ON position, connects a-c power to the primary of the filament transformer and white jeweled lamp (I 301) lights indicating that a-c power is supplied to the primary of the filament transformer.
PLATE ON switch (S304).	In the ON position, connects a-c power to the primary of the plate voltage transformer and red jeweled lamp (I 302) lights indicating that a-c power is supplied to the primary of the plate transformer.
OUTPUT switch (S102).	In the NORMAL REVERSE position, reverses the polarity of the mark and space signals. In the MARK position, causes the converter to produce a constant mark signal. In the SPACE position, causes the converter to produce a constant space signal.
Meter A (M101)	Measures the discriminator current produced from signals received from Channel A receiver.
Meter B (M102)	Measures current or voltage depending on the position of METER B switch.
METER B switch (S105).	In the INPUT position, indicates the voltage supplied to the mark-hold circuit. In the CHAN B position, indicates the output current of the discriminator circuit for channel B. In the CHAN A+B position, indicates the combined current output of the discriminators from channel A and channel B signals.
METER B switch (S105).	In the POLAR position, indicates the current flow in the polar loop circuit. In the NEUTRAL position indicates the current flow in the neutral loop circuit. In the COMP AMP position indicates the feedback voltage from the drift compensator circuit. In the +275 V position, indicates the voltage of the +275-volt source. In the REG +150V position indicates the voltage of the regulated +150-volt source. In the REG −150V position indicates the voltage of the regulated −150-volt source. In the −150V position, indicates the voltage of the −150 volt source. In the −400V position, indicates the voltage of the −400-volt source.
CHANNEL A FINE TUNING control (C102).	Provides for fine adjustment of the local oscillator associated with tube V101. Used to adjust the channel A output of tube V101 to 50 kc.
CHANNEL B FINE TUNING control (C104).	Provides for fine adjustment of the local oscillator associated with tube V102. Used to adjust the channel B output of tube V102 to 29.3 kc.
CHANNEL A OPERATE-DISABLED in CV-31D/TRA-7 or CHANNEL A DISABLING in CV-31C/TRA-7 switch (S107).	Removes B+ voltage from the screen grid of tube V101 and permits adjusting the channel B input without interference from the channel A input.
CHANNEL B OPERATE-DISABLED in CV-31D/TRA-7 or CHANNEL B DISABLING in CV-31C/TRA-7 switch (S108).	Removes B+ voltage from the screen grid of tube V102 and permits adjusting the channel A input without interference from the channel B input.
PHONES KEYED TONE jack (J105).	Provides a connection to a headset for monitoring the tone produced in the tone oscillator by a mark signal.

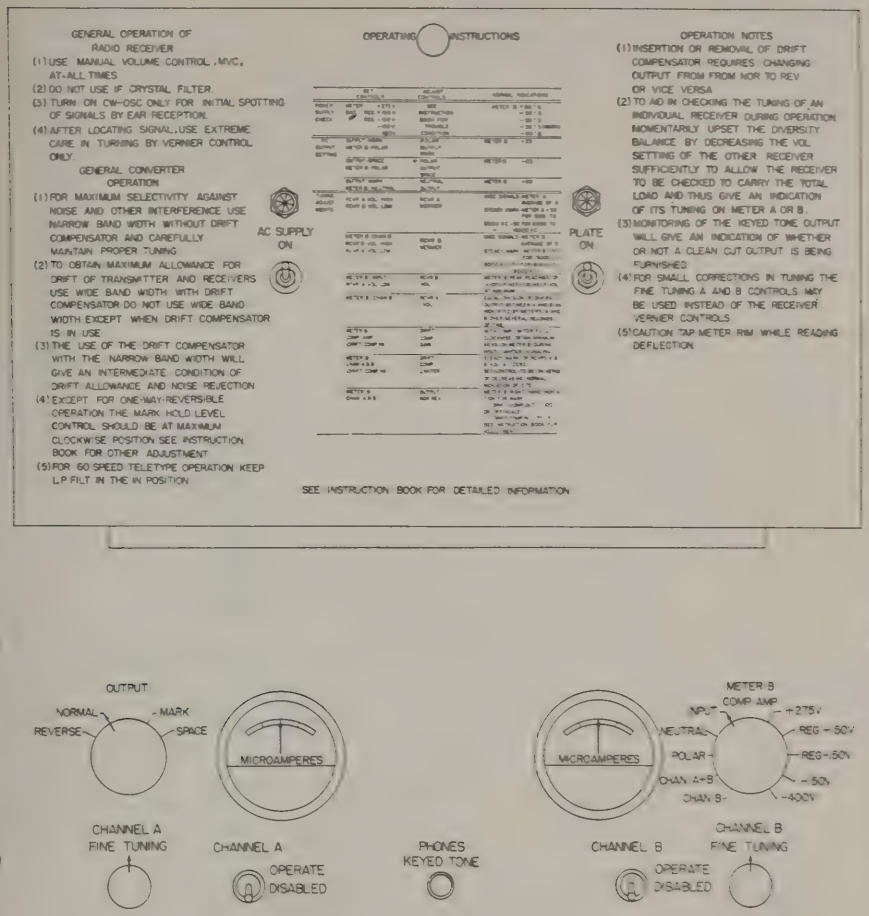


Figure 88. Dual Diversity Converter CV-31D/TRA-7, front panel controls.

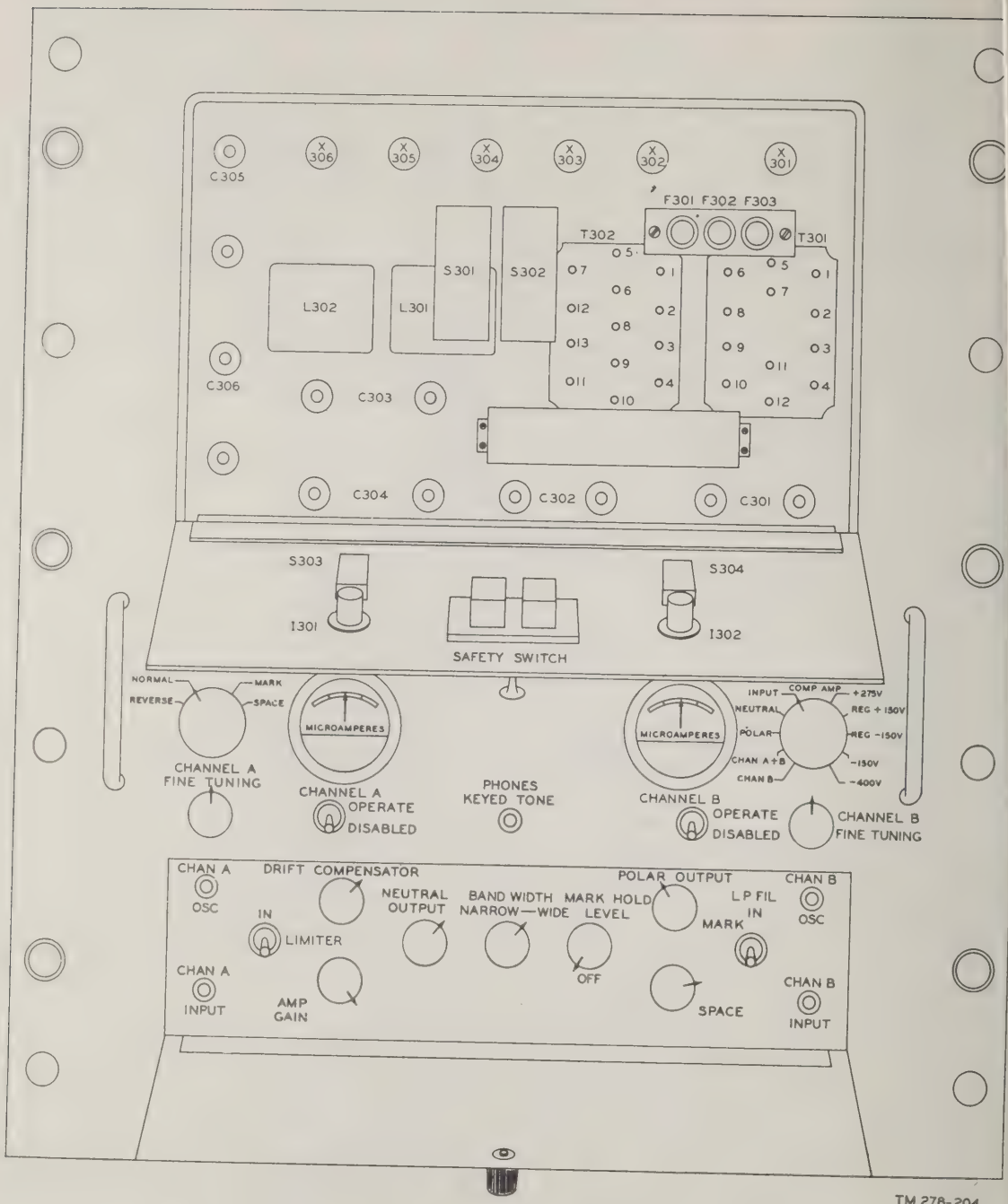


Figure 89. Dual Diversity Converter CV-31D/TRA-7, controls behind hinged panels.

b. Controls Behind Hinged Panels (fig. 89). The following table lists the controls located behind the hinged panel and indicates their functions:

Control	Function
DRIFT COMPENSATOR switch (S104).	In the IN position, connects the drift compensator circuit to the output of the discriminators. This circuit compensates for drift in the frequency of the received signals.
LIMITER control (R152).	Varies the bias on limiter tube V112 and is effective only when switch S104 is set to the IN position.
AMP GAIN control (R207).	Varies the amplitude of the signal fed to the drift compensator tube V104 from the discriminators when switch S104 is set to the IN position.
NEUTRAL OUTPUT control (R182).	Varies the magnitude of the current flowing in the neutral loop circuit.
BAND WIDTH switch (S101).	In the NARROW position, connects a 1,500-cycle bandpass filter in the output of the channels A and B converters.
	In the WIDE position, connects a 3,000-cycle bandpass filter into the output of the channels A and B converters.
MARK HOLD LEVEL OFF control (R109) and switch (S106) (switch S106 not used in CV–31/TRA–7).	Varies the amplitude of the voltage from the output of tube V103 to the input of tube V105 and is adjusted to nullify the carrier-control mark-hold feature when a signal is being received. Switch S106, in the OFF position, disables mark-hold level tube V105.
POLAR OUTPUT SPACE control (R174).	Varies the magnitude of the polar space current flowing in the loop circuit.
POLAR OUTPUT MARK control (R171).	Varies the magnitude of the polar mark current flowing in the loop circuit.
LP FIL IN switch (S103).	Connects two capacitors in the output circuit of the discriminators for low signal speeds.
CHAN A INPUT control (C101).*	Varies the frequency of the channel A input circuit.
CHAN B INPUT control (C103).*	Varies the frequency of the channel B input circuit.
CHAN A OSC control (C105).*	Coarsely varies the frequency of the local oscillator associated with tube V101.
CHAN B OSC control (C106).*	Coarsely varies the frequency of the local oscillator associated with tube V102.

*The controls are located on the chassis in Dual Diversity Converters CV–31/TRA–7, CV–31A/TRA–7, and CV–31B/TRA–7.

c. Chassis Mounted Controls (fig. 90). The following table lists the chassis mounted controls in Dual Diversity Converters CV–31/TRA–7, CV–31A/TRA–7, and CV–31B/TRA–7 and indicates their functions:

Control	Function
COMP AMP control (R145).	Varies the magnitude of the feedback voltage to the drift compensator circuit.
BIAS A control (R155).	Varies the bias voltage supplied to the grid of driver amplifier tube V113 and is used to equalize the amplitude of the mark and space signal voltage output.
BIAS B control (R160).	Varies the bias voltage supplied to d-c amplifier tube V114 when the drift compensator is used.
COMP BAL control (R194).	Varies the plate voltage of the d-c amplifier and is used to produce equal voltage for the mark and space signals.
Channel A input (C101).	Varies the frequency of the channel A input circuit.
Channel B input (C103).	Varies the frequency of the channel B input circuit.
Channel A oscillator (C105).	Coarsely varies the frequency of the local oscillator associated with tube V101.
Channel B oscillator (C106).	Coarsely varies the frequency of the local oscillator associated with tube V102.

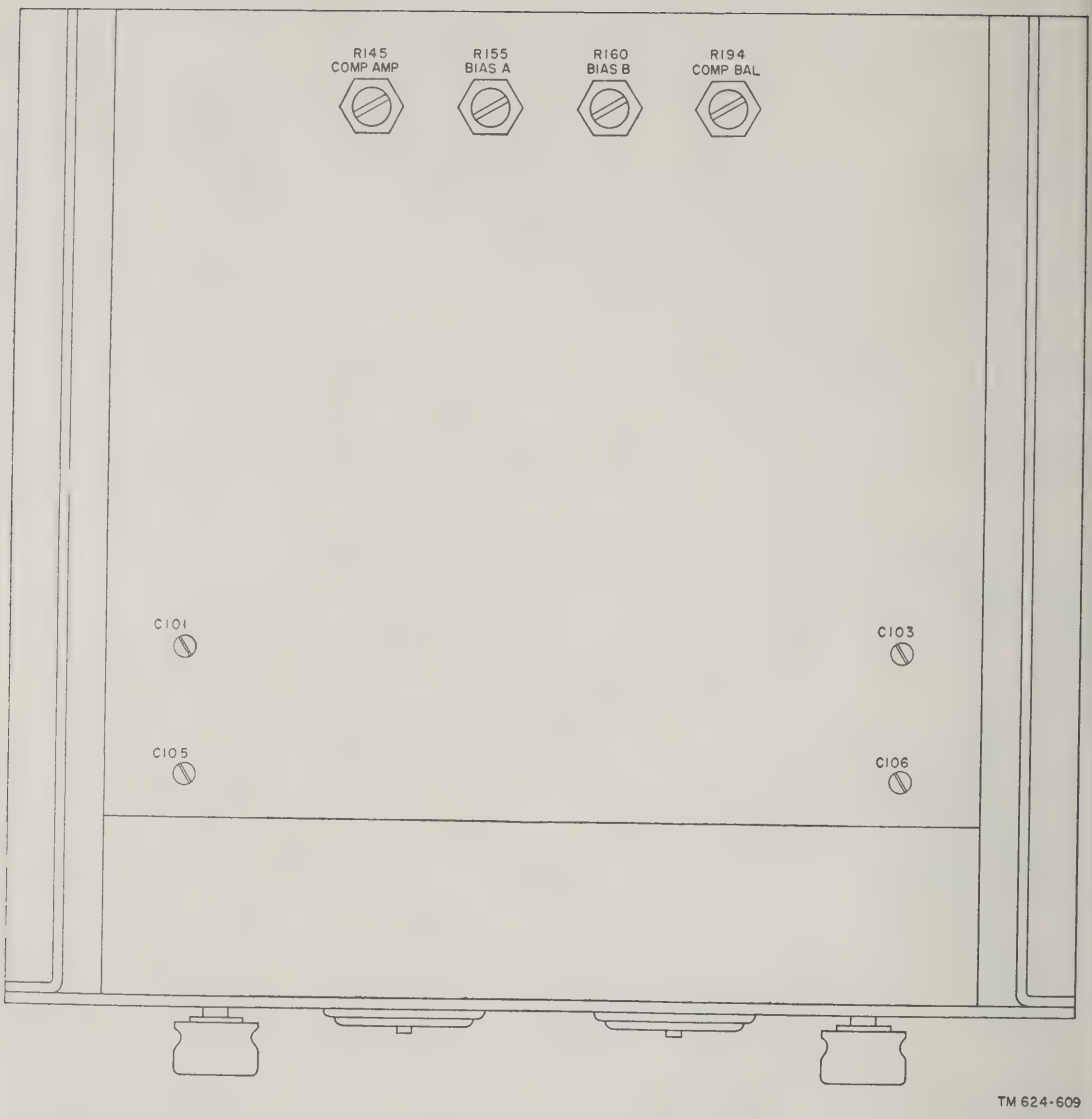


Figure 90. Dual Diversity Converter CV–31/TRA–7, chassis mounted controls.

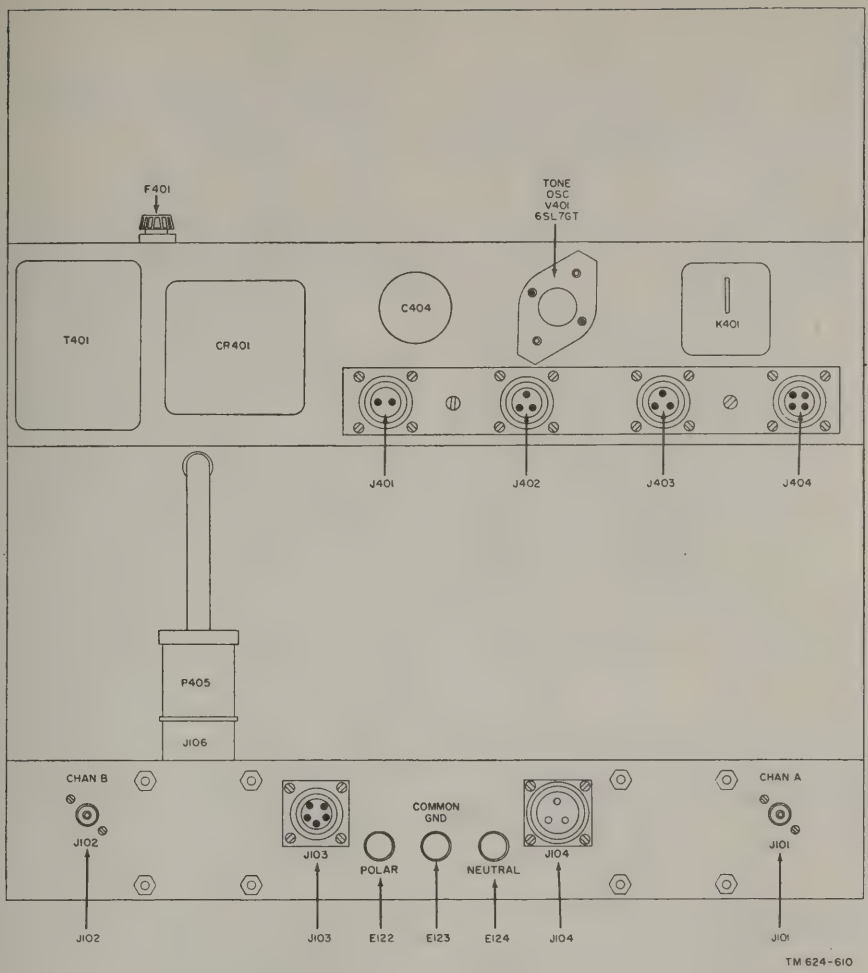


Figure 91. Dual Diversity Converter CV–31(*)/TRA–7, chassis mounted connectors.

d. Chassis Mounted Connectors (fig. 91). The following table lists the connectors mounted on the chassis and indicates their functions:

Control	Function
CHAN A input connector (J101).	Provides a connection for the Channel A receiver i-f output to the converter channel A input circuit.
CHAN B input connector (J102).	Provides a connection for the Channel B receiver i-f output to the converter channel B input circuit.
Signal output connector (J103).	Provides an output connection for the polar and neutral mark and space currents to the control unit.
A-c power input connector (J104).	Provides a connection for the a-c power source to the rectifier power supply.
Socket (J106)	Provides a connection for various circuits between the tone oscillator and the dual diversity converter.
External receiver disabling connector (J401).	Provides a connection for using an external voltage to disable the receivers.
Receiver disabling connector (J402).	Provides a connection to the disabling relay in the Channel A receiver.
Receiver disabling connector (J403).	Provides a connection to the disabling relay in the Channel B receiver.

Control	Function
Control circuit connector (J404).	Provides a connection to a KEY jack on Operating Table FN–23/MRC–2 and to the control line in the control unit.
Plug P405	Connects to Socket J106 on the dual diversity converter chassis.
Fuse (F401)	Protects power transformer T401 in the tone oscillator from damage caused by overloads.
Binding posts E122 and E123.	Connect to pin B of connector J103 and ground, respectively, and provide connections for land line polar loop circuits.
Binding posts E124 and E123.	Connect to pin D of connector J103 and ground, respectively, and provide connections to land line neutral loop circuits.

e. Rectifier Power Unit PP–193(*)/TRA–7 (fig. 89). The following table lists the controls located behind the large hinged door on the front panel and indicates their functions:

Control	Function
Fuses F301 and F302	Protect the power transformer T101 from damage caused by overloads.
Fuse F303	Fuse F303 is a spare and is not connected to a circuit.
Interlock switches (S301 and S302).	Provide protection against electric shock when the hinged panel door is opened.

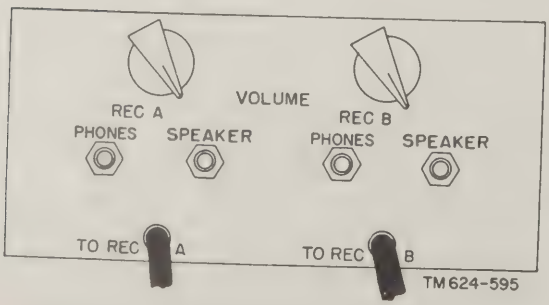


Figure 92. Control Box C–345(*)/MRC–2, controls.

51. Control Box C–345(*)/MRC–2 Controls (fig. 92)

The following table lists the controls and indicates their functions:

Control	Function
PHONES jack (J1)	Provides a connection to headset for audio signa from Channel A receiver.
PHONES jack (J2)	Provides a connection to headset for audio signa from Channel B receiver.
SPEAKER jack (J3)	Provides a connection to th loudspeaker for audio signal from Channel A receiver.
SPEAKER jack (J4)	Provides a connection to th loudspeaker for audio signal from Channel B receiver.
VOLUME controls (R1 and R2).	REC A varies the amplitud of the audio signals fron Channel A receiver sup plied to the PHONES and SPEAKER jacks.
	REC B varies the amplitud of the audio signals from Channel B receiver sup plied to the PHONES and SPEAKER jacks.
Cords with plug (P1)	TO REC A connects the audio signals from Channel A receiver.
Cords with plug (P2)	TO REC B connects the audio signals from Channel B receiver.

52. Control Unit C–292(*)/TRA–7 Controls (figs. 93 and 94)

a. Front Panel Controls (fig. 93). The following table lists the front panel controls of the control unit and indicates their functions:

Control	Function
AC SUPPLY ON switch (S108).	Connects a-c power to the control unit power transformer through the interlock switches.
AC SUPPLY white jeweled lamp (I 102).	Lights when the a-c power is connected to the control unit.
RECEIVING TEST switches (SPACE (S101), MARK (S103)).	In the SPACE position, artificially produces a space signal condition in the receiving circuit.
	In the MARK position, artificially produces a mark signal condition in the receiving circuit.

Control	Function
SERVICE switch (S102)	In the ONE WAY position, sets up circuits for operating on a one-way reversible basis. In the HALF DX position, sets up circuits for operation on a half-duplex basis. In the FULL DX position, sets up circuits for operation on a full-duplex basis.
METER switch (S105) and meter (M101).	In the REC LINE CURRENT position, indicates the magnitude of the current in the polar loop circuit from the converter. In the REC EXT CURRENT position, indicates the magnitude of the current through receive extension driving tube V104 during FULL DX operation. In the SEND EXT CURRENT position, indicates the magnitude of the neutral loop extension current. In the SEND LINE CURRENT position, indicates the magnitude of the polar output current to the FS exciter. In the −150 VOLT SUPPLY position, indicates the voltage of the −150-volt source. In the +300 VOLT SUPPLY position, indicates the voltage of the +300-volt source. In the −300 VOLT SUPPLY position, indicates the voltage of the −300-volt source. In the BALANCE position used with BALANCE ADJ control to equalize the effect on tube V101 of a mark and space signal.
OPERATION switch (S104).	In the NORMAL position, connects the circuit used for RTT operation. In the EMERG FS position, connects the circuits used for hand FS keying the transmitter and for retransmitting received RTT signals. In the EMERG CW position, connects the circuits used for c-w keying the transmitter from the receiving shelter.
EXTENSION CURRENT control (R110).	Varies the receiving loop current (REC EXT CURRENT meter reading) during full-duplex operation. Varies the sending loop current (SEND EXT CURRENT meter reading) during half-duplex or one-way reversible operation.
SENDING LINE CURRENT controls (SPACE (R143) MARK (R146)).	In the SPACE position, varies the space current in the polar loop circuit to the exciter. In the MARK position, varies the mark current in the polar loop circuit to the exciter.
TRANSMITTER ON switches (S109 and S110).	In the ON position, operates relay K101 in the FS exciter which conditions the exciter for operation during normal operation. During one-way reversible service, the disabling relay of the receivers is disabled and a negative voltage is applied to the grid of tube V101 which causes a mark signal to be produced constantly by tube V104.
TRANSMITTER green jeweled lamp (I 101).	Indicates by lighting when the TRANSMITTER switch is in the ON position.
FUSES (F102 and F103)	Protect the primary of the power transformer from damage caused by overloads.

b. Chassis Mounted Controls (fig. 94). The following table lists the controls and indicates their functions:

Control	Function
BALANCE ADJ control (R126).	Varies the bias voltage supplied to the grid of mark space switching tube V101. Adjusted to equalize the amplitude of the output of tube V101.
−150V ADJ control (R181).	Varies the output voltage of the −150-volt source.
+300V ADJ control (R172).	Varies the output voltage of the +300-volt source.

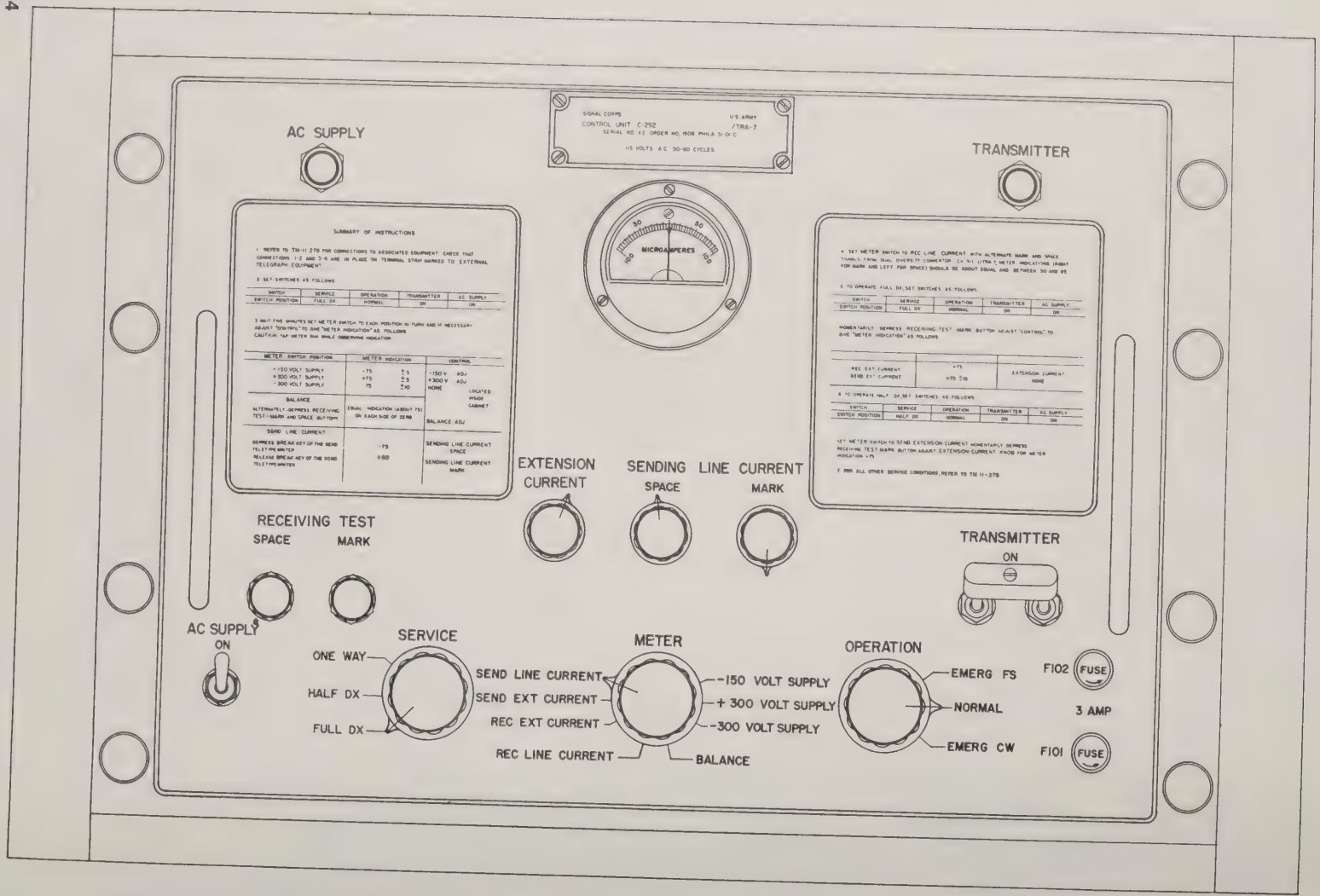


Figure 93. Control Unit C-292 (*)/TRA-7, front panel controls.

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c. Chassis Mounted Connectors (fig. 94). The following table lists the controls and indicates their functions:

Control	Function
Input jack (J101)	Provides a connection for polar loop circuit from the dual diversity converter.
Output jack (J102)	Provides a connection for polar loop and control circuit to the FS exciter.
Extension jack (J103)	Provides a connection for neutral loops circuits to the teletypewriter equipments.
Power input jack (J107)	Provides a connection for the 115-volt power source.
Power selector switch	Connects the power source to the drive motors of the typing reperforator and transmitter-distributor. In the AC, 25–40 CYCLES position, the motors will operate when connected to a 115-volt, 25- to 40-cycle a-c power source. In the DC position, the motors will operate when connected to a 115-volt, d-c power source. In the AC 50–60 CYCLE position, the motors will operate when connected to a 115-volt 50- to 60-cycle a-c power source.
CIRCUITS FOR LOCAL OPERATION (.060 AMPS) CIRCUIT 1 and CIRCUIT 2 jacks.	Provides a 60-ma series connection to teletypewriter equipment.

53. Perforator-Transmitter TT–56/MGC or Reperforator-Transmitter TG–26–A Controls

(figs. 95 and 96)

a. Connection Box Controls (fig. 95). The following table lists the controls and indicates their functions:

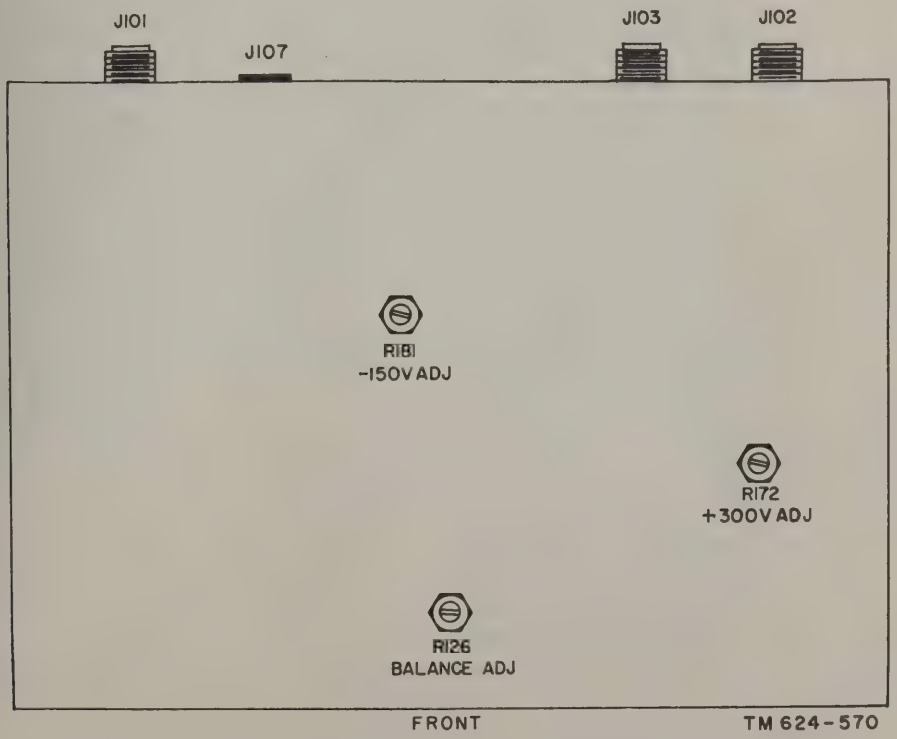


Figure 94. Control unit C–292(*)/TRA–7 chassis mounted controls and connectors.

53. Perforator-Transmitter TT-56/MGC or Reperforator-Transmitter TG-26-A Controls—Continued

Control	Function
LINE 1 jacks	In the REC. (RED ONLY) position, provides two series connections to LINE 1 REC. plug.
	In the SEND (BLK OR GRAY) position, provides two series connections to LINE 1 SEND plug.
LINE 2 jacks	In the REC. (RED ONLY) position, provides two series connections to LINE 2 REC. plug.
	In the SEND (BLK OR GRAY) position, provides two series connections to LINE 2 SEND plug.
LINE 1 cord and plug	In the REC. position, provides a connection to teletypewriter equipment plugged into LINE 1 REC. (RED ONLY) jacks.
	In the SEND position, provides a connection to teletypewriter equipment plugged into LINE 1 SEND (BLK OR GRAY) jacks.
LINE 2 cord and plug	In the REC. position, provides a connection to teletypewriters equipment plugged into LINE 2 REC. (RED ONLY) jacks.
	In the SEND position, provides a connection to teletypewriter equipment plugged into LINE 2 SEND (BLK OR GRAY) jacks.
D. C. cord	Provides a connection to a 12-volt d-c power source.
MOTOR cord	Provides a connection to the power source for the drive motors.
EARTH CONNECTION.	Provides a connection to ground.
FUSE BOX	1⅘ AMP fuse protects the drive motor of the typing reperforator from damage caused by overloads.
	1⅘ AMP fuse protects the drive motor of the transmitter-distributor from damage caused by overloads.

b. Typing Reperforator Controls (fig. 96). T following table lists the controls and indicat their functions:

Control	Function
POWER switch	In the on (up) position, co nects power from the conne tion box to the drive motc In the off (down) positio disconnects power from tl connection box to the dri motor.
LINE BREAK KEY	When the key is depressed, tl signal circuit is open an the machine runs open. I the normal position, th signal line is closed and th machine runs closed.
Red jeweled lamp	Indicates by lighting up tha the carriage should be re turned to starting position

c. Transmitter-Distributor Controls (fig. 96). The following table lists the controls and indicates their functions:

Control	Function
MOTOR ON-MOTOR OFF switch.	In the MOTOR ON position, connects a-c power to the drive motor.
	In the MOTOR OFF position, disconnects a-c 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 will stop automatically if tape becomes tangled or if all the slack is taken up in the tape.

54. Teletypewriter TG–7–B or TT–55/MGC Controls

(fig. 97)

The following table lists the controls and indicates their functions:

Control	Function
Motor ON-OFF switch	In the ON position, connects the connection box power source to the drive motor. In the OFF position, disconnects the power to the drive motor.
SEND-REC-BREAK	In the SEND position, permits the sending contacts to operate when a key on the keyboard is pressed. In the REC. position, permits reception of signals by the receiving solenoid and translation to printed characters. In the BREAK position, opens the signal line circuit, causing the machine to run open.

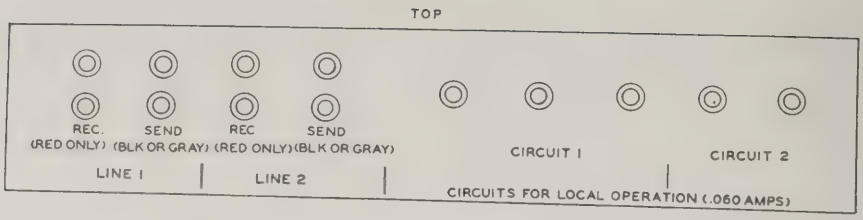
55. Rectifier RA–87 Controls

(fig. 98)

The following table lists the controls and indicates their functions:

Control	Function
Power ON-OFF switch	In the ON position, connects a-c power to the power transformer. In the OFF position, disconnects a-c power to the power transformer.
PRINTER MOTORS outlets.	Provides three connections to the 115-volt a-c supply.
TURN CAPS TO LOCK	Provides two connections to the 115-volt d-c supply.
Primary taps*	Provides connection to the primary of the power transformer for various input voltages as indicated by the number beside the tap.
RECT TAPS*	Provides for increasing the voltage supplied to the rectifier.
Fuse*	5-ampere fuse protects the power transformer against damage caused by overloads.

* Located behind the hinged panel.



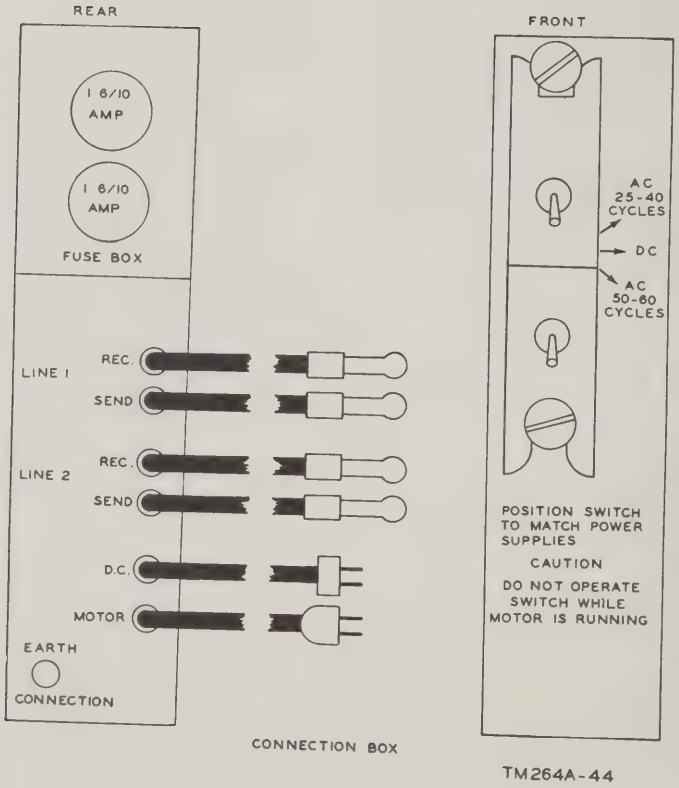


Figure 95. Connection Box Controls.

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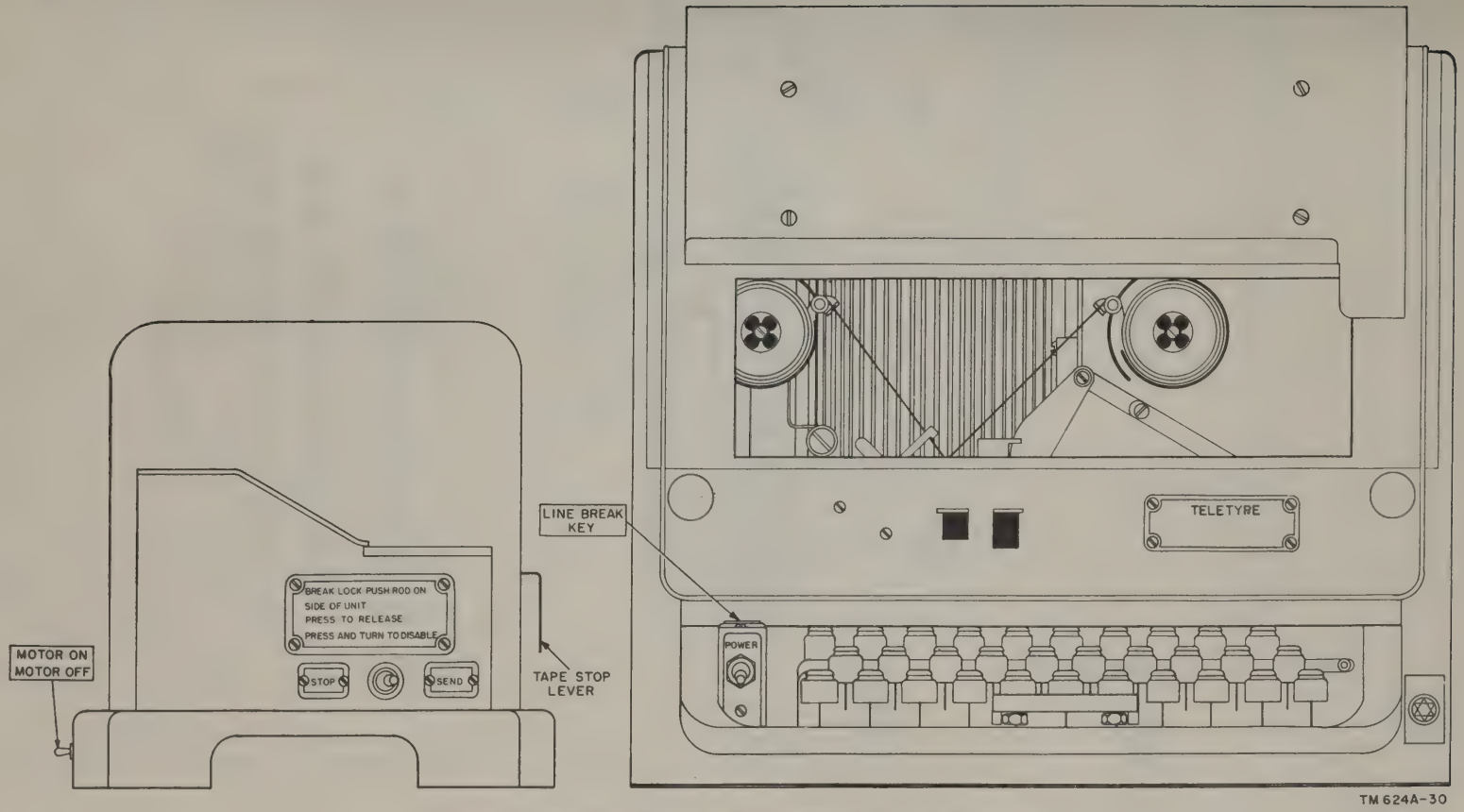
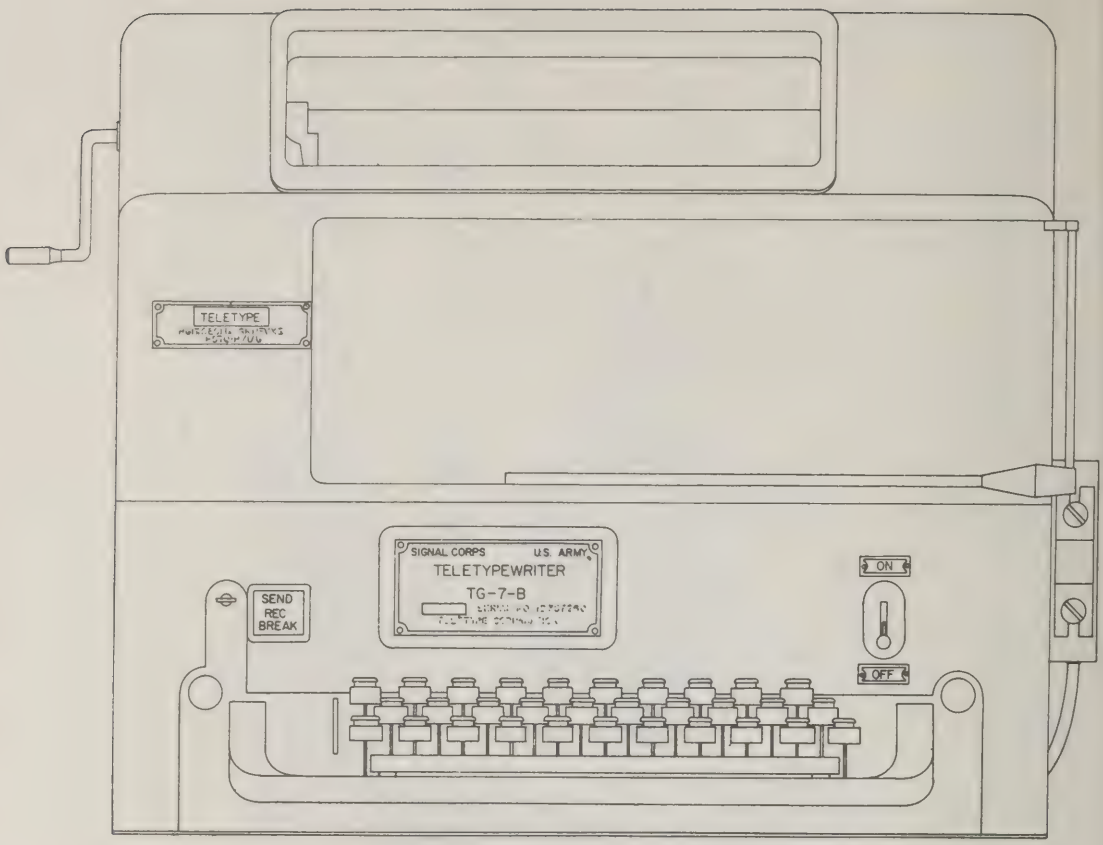
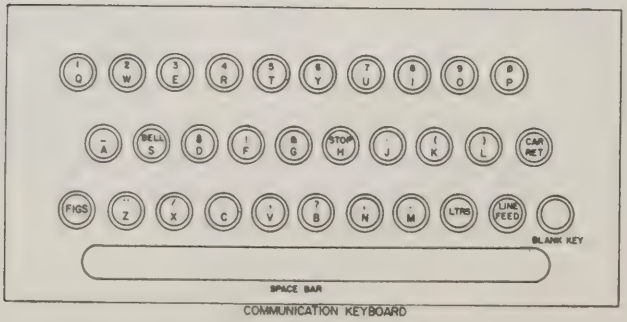


Figure 96. Typing-Reperforator and Transmitter-Distributor, controls.





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Figure 97. Teletypewriter TG–7–B Controls.

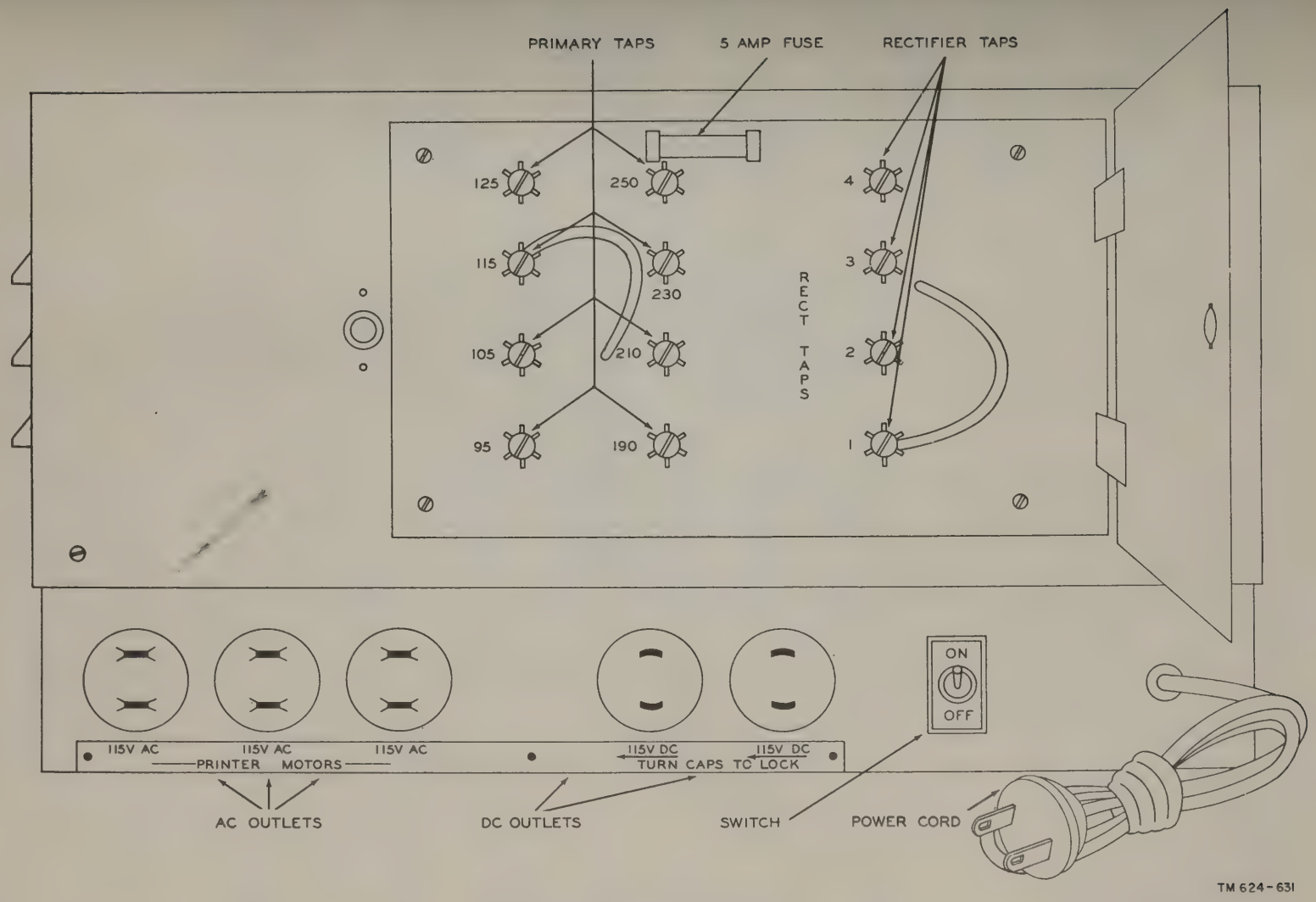


Figure 98. Rectifier RA–87 controls.

56. Operating Table FN–23/MRC–2 Controls
(figs. 62 and 63)

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

Control	Function
REC. TTY jacks (J22 and J21).	RED jack provides a connection to the receiving solenoid of the receive teletypewriter by means of the red shell plug and cord.
	BLK jack provides a connection to the sending contacts of the receiving teletypewriter by means of the black shell plug and cord.
SEND TTY jacks (J20 and J19).	RED jack provides a connection to the receiving solenoid of the send teletypewriter by means of the red shell plug and cord.
	BLK jack provides a connection to the sending contacts of the send teletypewriter by means of the black shell plug and cord.
(YELLOW) connector (P1).	Provides a connection for neutral signals to jack J103 in the control unit by means of Cord CX–956/TRA–7.
(BLACK) connector (J17).	Provides a connection for polar and control signals to jack J101 in the control unit by means of Cord CX–957/TRA–7.
(GREEN) connector (J14).	Provides a connection for polar and control signals to jack J102 in the control unit by means of Cord CX–958/TRA–7.
Telephone jacks (J13 and J16).	EE–8 jack provides a connection to one telephone in the operating shelter.
	EE–8 jack provides a connection to the other telephone in the operating shelter.
EE–8's COMBINED-INDIVIDUAL switch (S1).	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.

57. Junction Box J–204/MRC–2 Controls
(fig. 62)

Control	Function
SEND TTY jacks (J2 and J3).	BLK jack provides a connection for patching neutral signals originated by the sending teletypewriter to the control unit.
	RED jack provides a connection patching neutral signal originated by either teletypewriter to the send teletypewriter.
REC. TTY jacks (J4 and J5).	BLK 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 (J6, J7, J8, and J9).	GRAY jack provides a connection to the control unit sending circuit for signals originated in the transmitter-distributor.
	BLK jack provides a connection to the control unit sending circuit for signals originated by the send teletypewriter, the receive teletypewriter or the typing-reperforator.
	The 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 (J10 and J11).	The 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 ADJUSTMENTS AT TRANSMITTING SHELTER

58. General

With the equipment properly installed and cabled in the three shelters, the radio set is ready for the initial adjustments. This section covers the initial adjustment of the transmitting equipment. Paragraphs 67 through 76 cover the initial adjustment of the receiving equipment and the operating equipment, respectively. The initial adjustment procedures in paragraphs 58 through 76 may be performed simultaneously at the three shelters and the final adjustments for operation of Radio Set AN/MRC–2(*) may be coordinated as described in paragraphs 77 through 85.

59. Control Settings

Before starting Power Unit PE–95–(*), make sure that all switches in the transmitting shelter are in the OFF position so that high voltages will not be applied to circuits accidentally. Application of voltage before warm-up and tune-up of the set will lead to break-down of components. The controls listed below should be operated to the positions indicated.

Component	Control	Position
Junction Box JB–70–A	BATTERY SOURCE switch	AUX.
	REMOTE CONTROL EE–8 switch	NORMAL.
	RECEIVER DISABLING switches	OFF.
	TRANS. ON-TRANS. OFF-REC. to EE–8 switch	TRANS. OFF.
	C. W. SIDETONE switch	OFF.
	RECEIVER OUTPUT switch	NORMAL.
Frequency Shift Exciter O–39(*)/ TRA–7.	AC SUPPLY ON switch	OFF (down).
	OVEN ON switch	OFF (down).
	TEST OSC. switch	OFF.
	TEST switch	NORMAL.
Frequency Meter BC–221–( )	OFF-WARM-UP-CRYSTAL-OPERATE-MODULATE-CHECK switch.	OFF.
Rectifier RA–133–(*)	Power switch	OFF.
Radio Transmitter BC–610–(*)	FILAMENT POWER switch	OFF (down).
	EXCITER PLATE POWER switch	NORMAL.
	HIGH VOLTAGE PROTECT switch	NORMAL.
	PLATE POWER switch	OFF (down).
	C. W.-PHONE switch	C. W.
	EXCITATION METER SWITCH	INT. AMP. GRID.
	FILAMENT VOLTAGE control	Full counterclockwise position.
Amplifier AM–141(*)/ MRC	CIRCUIT BREAKER ON-OFF switch	OFF.
	NORMAL-TUNEUP switch	TUNEUP.
	PLATE POWER switch	OFF (down).
	NEUT. SWITCH	OFF.
	INCREASE EXCITATION control	Full counterclockwise position.
	INCREASE FILAMENT control	Full counterclockwise position.
Rectifier RA–63–(*)	Power switch	OFF.
Radio Receiver BC–312–( )	OFF-M. V. C.-A. V. C. switch	OFF.
	REC.-SEND switch	SEND.

60. Starting Procedure at Transmitting Shelter

a. Power Source. After determining that the connections to Power Unit PE–95–(*) have been made properly, set the CIRCUIT BREAKER of the power unit to the ON position, and the MANUAL START–REMOTE START switch to REMOTE START position. Press the START switch on Junction Box JB–70–A. 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 Unit PE–95–(*), see TM 11–904.

b. Frequency Shift Exciter O–39(*)/TRA–7. Throw the OVEN ON and AC SUPPLY ON switches on the front panel to their ON positions at least 1 hour before beginning the initial adjustments and operations. The OVEN indicating and AC SUPPLY indicating 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 noted. When a readjustment of the transmitted frequency is made, the receiving station should be notified to avoid interruption of service.

c. Radio Transmitter BC–610–(*). Set the FILAMENT POWER switch 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 should always be allowed a warm-up period of not less than 1 minute before plate power is applied. In cold weather operation, a warm-up period from 5 to 10 minutes is required. The period of time necessary depends on the ambient temperature of the shelter.

Note. If Radio Transmitter BC–610–E is being operated for the first time, the mercury-vapor rectifier tubes require a warm-up period from one-half hour at normal temperatures to longer periods at low temperatures.

d. Amplifier AM–141(*)/MRC. Set the CIRCUIT BREAKER ON-OFF switch to the ON position and rotate the INCREASE FILAMENT control in a clockwise direction until an indication of 10 volts is noted on FILAMENT VOLTAGE meter. After approximately 1 minute, time-delay relay K1 in Amplifier AM–141/MRC (synchronous motor time-delay relay K1 in Amplifiers AM–141A/MRC and AM–141B/MRC) and thermal switch S4 (depending on the ambient temperature) should close, causing the high-pressure blower on the rear of the amplifier to operate. The blower will not operate if any of the door interlo switches are open.

Note 1. Switch S4 is not used in Amplifier AM–141 MRC, procured under Order No. 19624–Phila–50, or Amplifier AM–141B/MRC.

Note 2. The ventilator at the rear of the shelter abo the power amplifier should be opened at this time. T warm air may be exhausted inside or outside the shelte depending on the operator's preference. When the equi ment is shut down, this ventilator must be closed.

Note 3. During the warm-up period, disable the pla and bias power supplies in Amplifier AM–141(*)/MRC b opening the grid coil access door.

e. Rectifier Power Unit RA–133–(*). Set th power switch to ON.

f. Frequency Meter BC–221–(K). Plug a head set into the PHONES jack. Turn the OFF WARM-UP-CRYSTAL-OPERATE-MODULATE-CHECK switch to the WARM-UP positio and the GAIN control to its approximate midpoint position. The frequency meter should be allowed a warm-up period of not less than 10 minutes before using.

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

g. Rectifier RA–63–(*). Set the HI CHG.-OFF-TR. CHG. switch to the TR. CHG. position.

61. Initial Adjustment of FS Exciter

The amount of frequency shift in the FS exciter depends on the assigned frequency of the transmitter, as shown in the table below. The exciter frequency is dependent upon the multiplying factor of the radio transmitter. After the frequency has been assigned, determine the frequency range required for the FS exciter and the required frequency shift from the table below. Note from this table that the frequency shift from MARK to SPACE signals changes from 850 to 425 cycles when the frequency of the exciter is one-half of the transmitter frequency, and to 212.5 cycles when the exciter frequency is one-fourth of the transmitter frequency. The frequency shift of the transmitter output 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 switches to the frequency range as determined from the calibration chart furnished with the exciter unit.

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

c. Set the VOLUME 850 ~ TEST control to approximately the midpoint position.

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

e. Operate the TEST key to NORM. position.

62. Adjustment of the Radio Transmitter

With the FS exciter tuned to the operating frequency or to a submultiple of the assigned operating frequency as described in paragraph 61, adjust the radio transmitter as follows:

a. Radio Transmitter Initial Adjustment.

(1) Select the transmitter tuning unit covering the desired frequency range from Chest CH–88–(*) (wall). Lift the right-hand cover door at the top of the transmitter and firmly insert the tuning unit into the appropriate channel (marked 1, 2, or 3). Locate the transmitter tuning unit so that the switch marked M. O.-XTAL faces the front panel of the transmitter. The table below indicates the frequency range covered by each tuning unit.

Note. Install tuning units in descending order of frequency range from left to right.

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

(2) Set the BAND SWITCH on the transmitter to correspond with the channel number into which the tuning unit was plugged. Insert the plug end of Cord CG–389/U (from the FS exciter) into the XTAL socket of the proper tuning unit. The M.O.-XTAL switch should be set to the XTAL position.

(3) Select a coil unit which covers the assigned frequency and plug it into the position under the left-hand door in the top of the transmitter. Adjust the rotatable link half-way between minimum and maximum coupling. The following table indicates the frequency range covered by each coil unit.

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)
C–387–D*	2.0 to 2.5.
C–387–D	2.5 to 3.5.
C–388–C	3.5 to 4.5.
C–389–C	4.5 to 5.7.
C–390–C	5.7 to 8.0.
C–447–B	8.0 to 11.0.
C–448–B	11.0 to 14.0.
C–449–B	14.0 to 18.0.

*Coil Unit C–387–D is used with vacuum Capacitor CA–423.

(4) Set the following controls in accordance with tuning charts furnished with the transmitter.

(*a*) DOUB. control (on tuning unit).

(*b*) INT. AMP. control (on tuning unit).

(*c*) P. A. PLATE TUNING control.

(5) Set the GRID TUNING and the PLATE TUNING controls of the power amplifier to the approximate settings as obtained from the p-a calibration chart. Set the BAND SWITCH to the correct position as indicated by the chart.

b. Radio Transmitter Temporary Operating Adjustments. The transmitter now will have to be alined temporarily to the assigned operating frequency. This is necessary so that a portion of the r-f output of the transmitter can be picked up by Pick-Up Antenna AT–137/MRC–2 and fed to the frequency meter for proper adjustment of mark and space output frequencies.

(1) Operate the TEST key on the FS exciter to the MARK position and adjust the DOUB. control on the transmitter for maximum indication on the EXCITATION METER (1 to 8 ma with EX-

CITATION METER SWITCH at INT. AMP. GRID position).

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

(3) Rotate the INCREASE EXCITATION control on Amplifier AM–141(*)/MRC about one-half turn in a clockwise position.

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 control on the transmitter for resonant dip on the P. A. PLATE meter (minimum current). If there is no indication of plate current, check to see that the doors in the top of the transmitter are closed tightly. Push the OVERLOAD RESET switch.

63. Adjustment of Frequency Meter BC–221–( )

When presetting the frequency meter to the desired transmitter output frequency, be very careful while performing the operations given below since 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. Check to see that the a-c power cord plug from the frequency meter power supply is inserted into an a-c outlet.

b. Set the operation switch to the CHECK position.

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

d. 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.

e. 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.

f. Connect the headset to PHONES 850 ~ TEST jack on the exciter unit, then adjust 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.

g. 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.

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

64. Final Adjustments of FS Exciter

a. Adjust the OSCILLATOR TUNING dial on the exciter front panel to obtain a zero beat in the headphones. Tune for the zero beat of the strongest signal heard. If a great change in the oscillator dial setting is required, retune the BUFFER TUNING control at the same time.

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

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

d. Throw the TEST key to the SPACE position and the TEST OSC switch to 850 ~ position. With the above-mentioned switches in their respective positions, it is possible to adjust accurately the output frequency of the transmitter on space signals to obtain an 850-cycle shift from the mark frequency. When the SHIFT control on the exciter unit is adjusted properly, a zero beat will be obtained in the headset. This zero beat is the combination of an audio tone of 850 cycles (the difference frequency between transmitter and frequency meter signals) beating with the 850-cycle signal from the 850-cycle oscillator in the FS exciter.

e. Adjust the SHIFT control to obtain a zero beat indicating that both signals are 850-cycle

ones. Check the 850 ~ TEST indicator tube for zero-beat indication. If the SHIFT control is moved more than a few divisions, an erroneous frequency shift may result.

f. Since any change of the SHIFT control will affect the oscillator frequency, it will be necessary to readjust the OSCILLATOR TUNING control. Throw the TEST OSC switch to OFF and the TEST key to the MARK position. Readjust the OSCILLATOR TUNING control as outlined in *e* above. To prevent a frequency change when the dial lock is tightened, the final adjustment should be made 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 control as in *d* above.

65. Preliminary Adjustment of Amplifier AM–141(*)/MRC

a. Select the proper plate and grid coils for the amplifier from Case CY–521/MRC–2. The tables below indicate the frequency range of each grid and plate coil.

(1) The frequency range of each grid and plate coil for Amplifier AM–141/MRC is as follows:

Frequency (mc)	Grid coil	Frequency (mc)	Plate coil
2.0 to 3.6*	C387–B	2.0 to 2.95	1684–1
3.7 to 5.0	C388–A	2.68 to 4.1	1685–1
5.1 to 6.3	C389–A	3.68 to 5.7	1686–1
6.4 to 8.0	C390–A	4.95 to 7.6	1687
8.1 to 10.8	C447–A	6.45 to 10.0	1688
10.9 to 13.8	C448	8.7 to 13.0	1689
14.0 to 18.0	C449	13.0 to 18.0	1909

*Use plug-in Capacitor CA–423 for frequencies between 2,000 and 2,240 kc.

(2) The frequency range of each grid and plate coil for Amplifiers AM–141A/MRC and AM–141B/MRC is as follows:

Frequency (mc)	Grid coil	Frequency (mc)	Plate coil	BAND SWITCH position
2.0 to 2.3*	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

*Use plug-in Capacitor CA–423.

Warning: Before attempting to place the grid and plate coils in the power amplifier, make sure that the PLATE POWER switch of the transmitter is set to the off (down) position. Should the transmitter switch in the operating shelter be in the TRANSMITTER ON position, the transmitting shelter operator can remove the control from the operating shelter by temporarily removing the disabling cord plugged into the DISABLING jack of Junction Box J–207/MRC–2.

b. Open the grid and plate coil compartment doors (figs. 8 and 9) in the front panel of the amplifier and firmly insert the coils in place.

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

c. The PLATE POWER switch should never be closed until the transmitter and the grid circuit of the amplifier have been tuned to the assigned frequency.

66. Final Adjustments of Transmitter and Amplifier

Before making any final adjustments to the amplifier, the operator must make sure that the transmitter is adjusted properly. Refer to paragraph 62.

a. Set the TEST key on the exciter unit to the MARK position.

b. Adjust the GRID TUNING control on the amplifier for a maximum indication of current on the GRID CURRENT meter. If necessary, rotate the INCREASE EXCITATION 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 INCREASE EXCITATION 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 (up) position (NORMAL-TUNEUP switch in TUNEUP position). If necessary, momentarily push the OVERLOAD RESET switch.

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, 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 (down), and disable the plate power to the transmitter by temporarily removing the disabling cord plugged into the DISABLING jack on Junction Box J–207/MRC–2. Open the plate compartment door and, using the neutralizing rod, readjust the 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.

Caution: 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 while observing the same precautions as given in *h* above. Again check the meter reading. Readjust if necessary.

j. Throw the NORMAL-TUNEUP 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 to 1.0 ampere). Readjust the 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; be careful to observe all previous precautions noted above.

k. Readjust the FILAMENT INCREASE control to 10 volts.

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

m. Communicate with the operating shelter and have the operator at this point throw the TRANSMITTER switch (on the control unit) to the TRANSMITTER ON position. This should cause normal functioning of the FS exciter, transmitter, and amplifier. With the TRANSMITTER switch at the OPERATING shelter thrown to TRANSMITTER ON, a continuous mark signal should be produced 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 of Radio Transmitter BC–610–(*) and to paragraph 181 for neutralizing Amplifier AM–141(*)/MRC.

Section IV. INITIAL ADJUSTMENTS AT RECEIVING SHELTER

67. Control Settings

Before starting Power Unit PE–95–(*), check to see that the controls of the components in the receiving shelter are in the positions indicated by the following table:

Component	Control	Position
Power circuit breaker		Set to OFF.
Light circuit breaker		Set to OFF.
Radio Receiver Assembly OA–65(*)/MRC–2.	OFF-M. V. C.-A. V. C. switch	Set to OFF.
	REC.-SEND switch	Set to SEND.
	BAND CHANGE switch	Set to correct band.
	C. W.-O. S. C. switch	Set to OFF.
	FAST TUNING control	Set at approximate frequency assigned.
	CRYSTAL PHASING OUT control	Turn to OUT.
Teletypewriter TG–7–B or TT–55/MGC.	ON-OFF motor switch	Set to OFF.
	AC SUPPLY switch	Set to off (down).
Dual Diversity Converter CV–31(*)/TRA–7.	PLATE power switch	Set to off (down).
	OUTPUT switch	Set to NORMAL.
	METER B switch	Turn to COMP AMP.
	DRIFT COMPRESSOR switch	Set to out (down).

68. Receiving Shelter Starting Procedure

a. Power Unit PE–95–(*).

(1) Set the CIRCUIT BREAKER ON-OFF switch to OFF.

(2) Set the MANUAL START-REMOTE START switch to REMOTE START position.

(3) Press the START-STOP button on the control panel to start power unit.

(4) Set the CIRCUIT BREAKER ON-OFF switch to ON.

(5) Set the power and light circuit breakers (in the shelter) to ON.

(6) Make whatever adjustments are necessary at the power unit to deliver 115 to 120 volts at the shelter.

b. Emergency Power Unit PE–75–( ). After determining that the connections to Power Unit PE–75–( ) are made properly, start the power unit in accordance with the instructions given in TM 11–900. Adjust the output voltage for 115 to 120 volts at the receiving shelter.

c. Dual Diversity Converter CV–31(*)/TRA–7.

(1) Open the upper hinged cover on the dual diversity converter and check the input connections on transformers T301 and T302. For operation on 115 volts alternating current, connect the input to terminals 1 and 3 of both transformers. The upper hinged door is provided with two interlock switches. Close the upper hinged door securely.

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

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

(4) Turn the METER B switch to the following switch positions and observe the meter indications. The values given below are for an a-c input voltage of 115 volts.

Switch position	Meter reading (v)
+275V	+47 to +65.
REG +150V	+20 to +40.
REG −150V	−20 to −40.
−150V	−20 to −40.
−400V	−65 to −95.

Note. The + sign indicates a deflection to the right of 0, and the − sign indicates a deflection to the left of 0.

d. Radio Receiver Assembly OA–65(*)/MRC–2. Turn on the dual diversity channels A and B

receivers and the spare channel A receiver by operating the OFF-M. V. C.-A. V. C. switches to their M. V. C. positions. Allow a warm-up period of at least 20 minutes.

69. Converter Output Circuit Adjustments

a. Set the OUTPUT switch on the converter to the MARK position, the DRIFT COMPENSATOR switch off (down), and the METER B switch to the NEUTRAL position.

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

c. If carrier-control mark-hold feature is not desired when using Dual Diversity Converter CV–31/TRA–7, remove tube V105 from its socket. For the other models, rotate the MARK HOLD LEVEL control to its extreme counterclockwise position by operating switch S106.

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 switch to ON, and check to see that the teletypewriter runs open when the OUTPUT switch is on SPACE, and holds when the OUTPUT switch is set to the MARK position.

g. Leave the OUTPUT switch in the MARK position. Turn the BAND WIDTH switch to NARROW unless the drift compensator is used.

70. Channel A Receiver and Channel A Adjustment

a. The following adjustments will provide the receiving shelter operator with a check of his equipment prior to the time contact is scheduled with the distant station or whenever the scheduled operating frequency is changed. If time does not permit these checks, proceed directly to paragraphs 77 through 85.

Note. H-f oscillator radiation from the spare Channel A receiver may be used as a reliable signal source for the alinement of Radio Receiver Assembly OA–65(*)/MRC–2 output with the input circuit of Dual Diversity Converter CV–31(*)/TRA–7. Alinement also may be achieved by using Frequency Meter BC–221–( ) or a steady r-f carrier, at the assigned frequency, as a signal source.

b. If the spare receiver is to be used as a signal source, connect one end of a length of wire to the ALT. SIG. ANT. binding post of spare Chann A receiver and loosely couple the other end to th same binding posts on the operating receiver This is accomplished by winding the insulate wire around the posts.

c. Insert the plug from the loudspeaker cor into the SPEAKER jack above REC. A on Cor trol Box C–345(*)/MRC–2.

d. Turn the BAND CHANGE switches of bot the operating receivers and the spare diversit receiver to the band positions covering the sched uled frequency. Set the FREQUENCY dial o the operating receivers to the assigned frequency and the FREQUENCY dial of spare Channel A receiver to a setting 470 kc higher or lower than the assigned frequency, depending on the receiver band used (470 kc lower within the range of 1.5 to 8.0 mc, 470 kc higher within the range of 8.0 mc to 18.0 mc).

e. Turn the CRYSTAL PHASING controls of all receivers to their OUT positions. Set the VOL. control of Channel A receiver at maximum (clockwise) position and the C. W.-O. S. C. switch to the ON position. When using Dual Diversity Converter CV–31C/TRA–7, CV–31A/TRA–7, or CV–31B/TRA–7, set the VOL. controls of Channel B receiver and the spare receiver to the minimum position (counterclockwise) and their C. W.-O. S. C. switches to the OFF positions. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL B DISABLING switch to the down position and when using Dual Diversity Converter CV–31D/TRA–7, set the CHANNEL B DISABLING switch to DISABLED.

f. Turn the METER B switch on the converter unit to the INPUT position and slowly tune the spare receiver back and forth across the assigned frequency +470 kc, until a beat note is heard in the loudspeaker.

g. Turn the C. W.-O. S. C. switch of Channel A receiver to the OFF position.

h. Peak the meter B reading at 50 or higher by adjusting the VERNIER control and rotating ALIGN INPUT control of Channel A receiver.

i. Set the CHANNEL A, FINE TUNING control of the converter unit to the straight up position.

j. Adjust the VERNIER control of Channel A receiver very carefully until the needle on meter A rests on zero after first going off scale. (The input level shown on meter B with METER B switch at the INPUT position should remain high.) The

zero reading indicates the exact center of the converter unit discriminator circuit output.

71. Channel B Receiver and Channel B Adjustment

a. Make certain Channel B receiver is tuned to the same frequency as Channel A receiver.

b. Reduce the volume of Channel A receiver to a minimum (in Dual Diversity Converter CV–31/TRA–7, CV–31A/TRA–7, or CV–31B/TRA–7) or set the CHANNEL A DISABLING switch to the down position in Dual Diversity Converter CV–31C/TRA–7 or set the CHANNEL A disabling switch to DISABLED in Dual Diversity Converter CV–31D/TRA–7. Increase the volume on the Channel B receiver until meter B, with METER B switch in the INPUT position on the converter, reads 50 or higher.

c. Turn METER B switch to the CHAN B position and adjust the CHANNEL B FINE TUNING control until Meter B reads zero.

Note. Channel B receiver may be monitored by the loudspeaker or a headset if the cord marked TO REC B on Control Box C–345(*)/MRC–2 is connected to the SPEAKER 2D AUDIO jack of the receiver and a cord is connected between the SPEAKER jack above TO REC B and the jack on Loudspeaker LS–3.

d. Set the OUTPUT switch to the NORMAL position and place the BAND WIDTH switch to the NARROW position.

e. Set the DRIFT COMPENSATOR switch to the off position and throw the LP FIL IN switch to IN. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL A DISABLING switch to the up position or when using CV–31D/TRA–7, set the CHANNEL A disabling switch to OPERATE.

f. Check to see that meter A 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. With the meter deflected to the left, the teletypewriter should hold, and with the meter deflected to the right, the teletypewriter should run open.

g. If the OUTPUT switch is turned to the REVERSE position, the readings of meter A should reverse and the operation of the teletypewriter will be reversed; that is, when the CHANNEL A FINE TUNING control is turned so that the meter deflects to the right, the teletypewriter should hold, and when the meter deflects to the left, the teletypewriter should run open.

h. Set the OUTPUT switch to the NORMAL position.

i. Connect a pair of headphones to the PHONES KEYED TONE jack on the converter unit front panel and note that the tone oscillator is heard, when the CHANNEL A FINE TUNING control is turned to the left, until meter A reads −50. No tone should be heard, when the CHANNEL A FINE TUNING control is turned to the right, until meter A reads +50.

72. Adjustment of the Drift Compensator Circuit

The drift compensator feature on the converter is used only if the i-f output signals from the diversity receivers are unstable because of drift of either the h-f oscillator in the Channel A receiver or the signal being received. The compensator should be used only if the frequency drift is serious. Do not use the drift compensator feature if weak r-f 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 VERNIER controls on the receivers or the CHANNEL A FINE TUNING and CHANNEL B FINE TUNING controls on the converter as necessary to keep the meters centered around zero.

a. Tune in a strong r-f carrier signal.

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

c. Adjust the Channel A receiver VERNIER control very carefully until meter A indicates the exact center of the discriminator output (par. 70).

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

e. Set the BAND WIDTH switch to the WIDE position and the LP FIL switch to 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. Set 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 indications do not stay on the space side (left) after the CHANNEL A FINE TUNING control is moved quickly to one side or the other, turn the AMP GAIN control about one-half turn counterclockwise and repeat the foregoing check.

i. Check to see that the mark and space indications on meter B are approximately +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.

73. Preliminary Adjustment While Receiving Test Tape

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

a. Adjustment Without Drift Compensation.

(1) Set Radio Receiver Assembly OA–65(*)/MRC–2 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 SPACE position and check to see that the teletypewriter runs open. Return the OUTPUT switch to MARK position.

(4) Set the VOL. control on Channel A receiver for a maximum gain. Set the VOL. control on Channel B receiver to minimum gain when using Dual Diversity Converter CV–31/TRA–7, CV–31A/TRA–7, or CV–31B/TRA–7. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL A DISABLING switch to the down position or when using Dual Diversity Converter CV–31D/TRA–7, set the CHANNEL disabling switch to DISABLED.

(5) Check on both receivers to see that t receiver power switch is on M. V. C that the C. W.-O. S. C. switch is OF and that the CRYSTAL PHASING co trol is turned fully clockwise to the OU position. Adjust the ALINE INPU control of Channel A receiver to obtai maximum signal or maximum noise a indicated on meter B.

(6) Tune in the remote or distant station o Channel A receiver. Use the c-w oscilla tor of the receiver, if necessary, to locat the station. Then turn the C. W.-O. S. C switch to the OFF position and leave i off for all subsequent operations.

(7) Adjust the VERNIER control of Channe A receiver until the miscellaneous kicks on meter A center around zero, and the indications on meter B, with METER B switch at INPUT, is a maximum.

(8) Realine the ALINE INPUT control so that a maximum input level is indicated on meter B.

(9) Place the DRIFT COMPENSATOR switch in the converter to the down position and the BAND WIDTH switch to NARROW.

(10) Set the OUTPUT switch to NORMAL or REVERSE, depending on the frequency band being used on the receiver (refer to the chart on the front of the converter unit). The three h-f bands of Radio Receiver Assembly OA–65(*)/MRC–2 have the oscillator frequency 470 kc below the frequency of the incoming carrier, while the three l-f bands have the oscillator frequency 470 kc above the incoming r-f carrier. Therefore, it will be necessary to set the OUTPUT switch at NORMAL or REVERSE, depending on which band of the receiver is used and whether the drift compensator is in or out. The correct switch position may be obtained from the following table providing 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 then the frequency of the space signal, the transmitter keying lines at the distant station must be reversed.

Band	Frequency range (kc)	OUTPUT switch position		Meter A deflection
		DRIFT COMPENSATOR switch OFF	DRIFT COMPENSATOR switch ON	
A	1,500–3,000	REVERSE	NORMAL	Right.
B	3,000–5,000	REVERSE	NORMAL	Right.
C	5,000–8,000	REVERSE	NORMAL	Right.
D	8,000–11,000	NORMAL	REVERSE	Left.
E	11,000–14,000	NORMAL	REVERSE	Left.
F	14,000–18,000	NORMAL	REVERSE	Left.

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

(12) Increase the Channel B receiver gain. Reduce the Channel A receiver gain to zero when using Dual Diversity Converters CV–31/TRA–7, CV–31A/TRA–7, and CV–31B/TRA–7. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL A DISABLING switch to the down position. When using Dual Diversity Converter CV–31D/TRA–7, set the CHANNEL A disabling switch to DISABLED. Adjust ALINE INPUT control to obtain a maximum indication on meter B.

b. Adjustment With Drift Compensation. After the adjustments mentioned 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 and the BAND WIDTH switch to WIDE.

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

(3) Adjust the Channel A receiver VERNIER control so that the meter A indications center at zero.

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

(5) Turn the AMP GAIN control 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 control at the point where the kicks are a minimum and the meter needle is essentially steady at zero.

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

(6) Set the DRIFT COMPENSATOR switch to out (down) and the BAND WIDTH switch to NARROW.

(7) Set 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.

(8) Obtain a steady carrier and reset the CHANNEL A FINE TUNING control to straight up. Adjust the Channel A receiver VERNIER control so that meter A reads zero (the center of the discriminator output). See whether 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).

Section V. INITIAL ADJUSTMENTS AT OPERATING SHELTER

74. Control Settings

Before starting Power Unit PE–95–(*), check to see that the controls of the components in operating shelter are in the positions noted below.

Components	Control	Position
Power circuit breaker		Set at OFF.
Lights circuit breaker		Set at OFF.
Teletypewriter TG–7–B or TT–55/MGC (receiving).	Motor ON-OFF switch	Set at OFF.
Teletypewriter TG–7–B or TT–55/MGC (sending).	Motor ON–OFF switch	Set at OFF.
Reperforator-Transmitter TG–26–A or Perforator-Transmitter TT–56/MGC.	Typing reperforator switch	Set at OFF.
	Transmitter-distributor MOTOR ON-MOTOR OFF switch.	Set at MOTOR OFF.
Rectifier RA–87	SEND-STOP switch	Set at STOP.
Control Unit C–292 (*)/TRA–7	Power ON-OFF switch	Set at OFF.
	AC-SUPPLY ON switch	Set at off (down).
	TRANSMITTER ON switch	Set at off (down).

75. Operating Shelter Starting Procedure

a. Power Unit PE–95–(*).

(1) Set the CIRCUIT BREAKER ON-OFF switch to OFF.

(2) Set the MANUAL START-REMOTE START switch to REMOTE START position.

(3) Press the START button on the control panel to start power unit.

(4) Set the CIRCUIT BREAKER ON-OFF switch to ON.

(5) Set the power and light circuit breakers (in the shelter) to ON.

(6) Make whatever adjustments that are necessary at the power unit to deliver 115 to 120 volts at the shelter.

b. Emergency Power Unit PE–75–( ). After determining that the connections to Power Unit PE–75–( ) are properly made, start the power unit in accordance with the instructions given in TM 11–900. Adjust the output voltage for 115 to 120 volts at the operating shelter.

c. Initial Setting of Controls on Control Unit C–292 (*)/TRA–7.

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

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

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

d. Turning on Power. Throw the AC SUPPLY ON switch on the control unit to the ON position. The white jeweled AC SUPPLY indicator lam should light.

e. Voltage Check.

(1) With the METER switch in the −15 VOLT SUPPLY position, the mete should indicate −75±5 to the left o the center position. If the reading i not within these limits, raise the to cover on the control unit and adjust th slotted shaft control labeled −150V ADJ to obtain the correct meter reading

(2) Turn the METER switch to the +30(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.

(3) Turn the METER switch to the −300 VOLT SUPPLY position. The meter should indicate −75±8 to the left of the center position. No adjustment of this supply is provided.

76. Control Unit Initial Adjustment

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

b. Momentarily depress the RECEIVING TEST MARK switch on the front panel of the

control unit. Adjust the EXTENSION CURRENT control until the meter indicates +75 to the right of zero.

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

d. Turn the METER switch to BALANCE position. Alternately depress the RECEIVING TEST SPACE and the RECEIVING TEST MARK switches. The meter should indicate equally 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 control with a screw driver until the meter deflections are equal.

e. Turn the METER switch to the SEND LINE CURRENT position.

f. Adjust the SENDING LINE CURRENT MARK control until the panel meter indicates +60 to the right of zero.

g. Set the sending teletypewriter ON-OFF switch to the ON position.

h. Depress the SEND-REC-BREAK key on the sending teletypewriter to BREAK position.

i. Adjust the SENDING LINE CURRENT SPACE control until the panel meter indicates −75 to the left of zero.

j. Release the teletypewriter SEND-REC-BREAK key.

Section VI. FINAL ADJUSTMENTS AND OPERATIONAL TESTS

77. 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. The following paragraphs outline the procedure to be followed when coordinating the operation of the transmitting, receiving, and operating shelters.

78. Final Adjustments of Transmitting Shelter

a. Communicate with the operating shelter and have the operator set the TRANSMITTER switch of the control unit to TRANSMITTER ON. Set the TEST key of the exciter to the NORM position. Set the TEST OSC switch at OFF position and readjust the OSCILLATOR TUNING control until a zero beat is heard in the headphones. (Do not retune the BUFFER TUNING control at this time.)

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

c. Operate the TEST OSC switch to OFF.

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

e. Repeat the procedures in *b*, *c*, and *d* above until proper conditions are obtained.

79. Final Adjustments at Receiving Shelter

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

a. Use Telephone EE–8–( ) to communicate with the operating shelter and check to make sure that the operator is ready to receive polar d-c 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 the Channel A input of the converter in accordance with instructions given in paragraph 70.

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

e. Request the operating shelter to send a mark signal (transmitter-distributor STOP-SEND switch at STOP position).

f. Check neutral d-c loops at the converter as follows:

(1) Set the OUTPUT switch to MARK position.
(2) Set the METER B switch to NEUTRAL.
(3) Adjust the NEUTRAL OUTPUT control until meter B indicates 60 to the right of zero.

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g. Check the polar d-c loop at the converter 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) Set the OUTPUT switch to SPACE.
(4) Adjust the POLAR OUTPUT SPACE control until meter B indicates 25 to the left of zero.
(5) Set the OUTPUT switch to either 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. Reduce the volume of the Channel A receiver to zero when using Dual Diversity Converter CV–31/TRA–7, CV–31A/TRA–7, or CV–31B/TRA–7. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL A DISABLING switch to the down position. When using Dual Diversity Converter CV–31D/TRA–7, set the CHANNEL A disabling switch to DISABLED. Increase the volume of Channel B receiver to maximum. Use Channel B receiver to check to see that the copy can be received on the monitoring teletypewriter and also at the operating shelter.

80. Tuning to Distant Transmitter Frequency

Upon proper orders, tune the receivers to the distant transmitter frequency.

a. Turn on the bfo (beat-frequency oscillator) of the Channel A receiver. Reduce the volume of Channel B receiver to a minimum when using Dual Diversity Converter CV–31/TRA–7, CV–31A/TRA–7, or CV–31B/TRA–7. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL B DISABLING switch to the down position. When using Dual Diversity Converter CV–31D/TRA–7, set the CHANNEL B disabling switch to DISABLED.

b. Tune in the desired station by ear; locate the signal at the center of the i-f pass band.

c. Turn off the bfo of Channel A receiver.

d. Reduce the volume of Channel A receiver if the input is more than 100 on meter B.

e. Slowly retune Channel A receiver while observing meter A of the converter. The significance of the meter deflections with respect to receivers having an h-f oscillator set above the carrier or set below the carrier is as follows:

Frequency of h-f oscillator	Meter deflection for a mark signal
Above carrier	To the right.
Below carrier	To the left.

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

g. If the distant station transmits a steady mark, tune Channel A receiver until the meter deflection is approximately 50 (for a frequency shift of 850 cycles).

h. Decrease the volume of the Channel A receiver when using Dual Diversity Converter CV–31/TRA–7, CV–31A/TRA–7, or CV–31B/TRA–7. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL A DISABLING switch to the down position. When using Dual Diversity Converter CV–31D/TRA–7, set the CHANNEL A disabling switch to DISABLED. Increase the volume of Channel B receiver.

i. Turn METER B switch to INPUT.

j. Adjust the ALINE INPUT control for a maximum input as indicated by meter B.

k. Adjust the volume of Channel B receiver until meter B indicates about 100 to the right of zero.

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

m. When using Dual Diversity Converter CV–31C/TRA–7, set the CHANNEL A DISABLING switch to the down position. When using the Dual Diversity Converter CV–31D/TRA–7, set the CHANNEL A disabling switch to OPERATE. Adjust the volume of Channel A receiver until its output as indicated by meter A is equal to that of Channel B receiver in *l* above. Carefully observe meters A and B since the meter deflections reveal the diversity effect of 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 frequently the mark signals are received over channel A and the space signals over channel B, or vice versa (meter needles operate in opposite directions). If the distant transmitter is sending signals, adjust the volume of Channel A receiver to make the maximum swings of meter A and meter B equal.

n. Check to see that each meter averages near zero when signals are received over a considerable time.

81. Tuning Check During Normal Transmission

a. During Period While Steady Mark Is Transmitted.

(1) Observe when a steady marking condition prevails that meters A and B on the dual diversity converter alternately deflect to full mark positions (aprx. ±50).

(2) If meter A fails to reach a full mark, make sure that the tuning is correct by reducing the volume of Channel B receiver and adjust VERNIER tuning control of Channel A receiver so that meter A reads ±50. Again increase the volume of Channel B receiver until meters A and B on the dual diversity converter alternately deflect to full mark positions.

b. During Period When Miscellaneous Teletype Signals Are Transmitted.

(1) When receiving miscellaneous teletypewriter signals, the indicating pointer 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) Adjusting the VERNIER control of the Channel A receiver in the proper direction will simultaneously correct this condition.

Note. Be sure that the dial setting of the Channel B receiver is the same as the Channel A receiver.

82. Adjustment of Converter Output Control Circuit

a. Drift-Compensator Feature Disconnected.

(1) The drift-compensator feature need not be used if the i-f 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 r-f 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 in position CHAN A+B.

(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 Feature Connected.

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

(2) Turn the OUTPUT switch to a position which is opposite to that 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 deflection 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 on meter B. A more definite setting of the AMP GAIN knob may be found if the LIMITER knob is first turned fully clockwise.

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

(6) Make certain 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.

83. Carrier-Control Mark-Hold Feature

The carrier-control mark-hold feature is provided to maintain a steady marking condition automatically if the transmitting station shuts down, or the carrier frequency disappears for any reason. It is used when operating on a one-way reversible basis. If the mark-hold feature is not required when using Dual Diversity Converter CV–31/TRA–7, remove tube V105 from its socket to allow converter operation at lower input levels. If the mark-hold-level feature is not required when using Dual Diversity Converters CV–31A/TRA–7, CV–31B/TRA–7, CV–31C/TRA–7 or CV–31D/TRA–7, disable the circuit by rotating the MARK HOLD LEVEL OFF control to its full counterclockwise position, thereby operating switch S106. When the mark-hold feature is used, the following adjustments are made:

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

b. With the power at the distant transmitter off or with both receivers detuned from the signal, make certain that a steady marking signal is connected to one of the associated d-c 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 level prevails. In this case, slowly turn the MARK HOLD LEVEL knob counterclockwise until a steady marking signal is produced.

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

d. Check the setting of the MARK HOLD LEVEL control periodically since it is important to provide a setting which is as far clockwise as possible so that it does not interfere when receiving weak or fading r-f signals, and which also is 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 because of variable noise levels and different volume control adjustments of the associated receivers.

84. Monitoring Received Signals

a. Monitor the discriminator output from the converter at all times except when the noise level is high on meter A or meter B (with METER B switch at CHAN B). Adjust the receiver VERNIER control or the FINE TUNING control on the converter to keep the output balanced around zero. In case of high noise level, monitor the keyed tones.

Note. Keep the DRIFT COMPENSATOR switch down if the preceding adjustments are not required more than once an hour after allowing about a 2-hour warm-up period. Use the drift compensator feature only if adjustments are frequently necessary even after a 2-hour warm-up period. Do not use the drift compensator feature on weak signal reception.

b. Continually monitor the input level on meter B of the converter (METER B switch at INPUT).

(1) The level should be above 15 even on extreme fades, preferably full scale at all times. If peaks of 100 cannot be obtained, increase the receiver volume to a maximum.

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

(3) Keep the ALIGN INPUT control on Channel A and Channel B recievers at the position which gives a maximum input on meter B (METER B switch at INPUT).

(4) Keep the C. W.-O. S. C. switch on Channel A and Channel B receivers at OFF except when using the loudspeaker or phone to listen for signals from a distant station. The C. W.-O. S. C. switch in the ON position may at times cause errors in the received copy.

(5) Keep the CRYSTAL PHASING-OUT control on the radio receivers fully clockwise at all times.

(6) Keep the OFF-M. V. C.-A. V. C. switch on the receivers at M. V. C. at all times.

85. Final Adjustments at Operating Shelter

a. Receiving Test Signals From Receiving Shelter.

(1) Communicate with the operator at the receiving shelter and have the operator turn the OUTPUT knob 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 on the junction box marked TO RECEIVING SHELTER.

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

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

(5) If the meter indications in (2) and (4) above are not approximately the same, have the operator at the receiving shelter check and readjust the polar output current and, at the same time, observe the panel meter of the dual diversity converter unit.

b. Sending Test Local.

(1) When the TRANSMITTER switch is set to ON, the green TRANSMITTER indicator lamp should light. Communicate with the transmitting shelter and notify the operator that the TRANSMITTER switch is going to be turned on.

(2) Turn the METER switch to the SEND LINE CURRENT position and adjust the SENDING LINE CURRENT MARK control until the panel 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 SEND-REC-BREAK key on the sending teletypewriter to the BREAK position.

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

Section VII. OPERATION UNDER USUAL CONDITIONS

86. Teletypewriter Operation

The sending teletypewriter, typing-reperforator, or the transmitter-distributor, when operated, keys Control Unit C–292(*)/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 FS of the transmitter. RTT signals are received by Radio Receiver Assembly OA–65(*)/MRC–2 and, after amplification and conversion, are transferred to Dual Diversity Converter CV–31(*)/TRA–7. 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 by means of 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. If jacks in Junction Box J–204/MRC–2 are insufficient, the cords and jacks on the jack box of the typing reperforator marked LINE 1 and LINE 2 (fig. 95) may be used.

g. Junction Box J–204/MRC–2 provides a means for many patching arrangements. Five patching arrangement illustrations are shown in figures 99 through 103 and are described in paragraphs 86, 87, and 88. These illustrations are representative of the patching arrangements possible using Junction Box J–204/MRC–2. Other arrangements are left to the discretion of the operator.

87. Dual Diversity, Full-Duplex Operation

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

(1) From the operating shelter, communicate with the operator in the transmitting shelter and have the operator adjust the transmitting shelter components to the assigned frequency (pars. 59 through 66, and 78).

(2) From the operating shelter, communicate with the operator in the receiving shelter and have the operator adjust the receiving shelter components to the frequency of the distant station (pars. 68 through 71. and 79).

(3) At the operating shelter, adjust the operating components as indicated in paragraphs 74, 75, 76, and 85.

(4) At the operating shelter, make the following connections on Junction Box J–204/MRC–2 (fig. 99):

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

(5) At the operating shelter, set the EE–8 combined-individual switch of the jack panel to COMBINED.

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

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

(6) 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 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 and the SEND-REC-BREAK key to REC.

(*e*) Set the METER switch on the control unit to SEND LINE CURRENT. Adjust the SENDING LINE CUR-

RENT MARK control for an indication of 60 to the right of zero on the meter. Depress the SEND-REC-BREAK key and adjust the SENDING LINE CURRENT SPACE control for an indication of 75 to the left of zero on the meter.

(*f*) Set the MOTOR switch on the send (left) teletypewriter to ON and the SEND-REC-BREAK key to SEND.

(*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 monitored in the receiving shelter.

(7) To reverse the sending and receiving teletypewriters, make the following connections in place of those indicated in *a*(4) (*a*), (*b*), and (*c*) above (fig. 100):

(*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 BLK jack and the SEND EXT. BLACK jack.

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

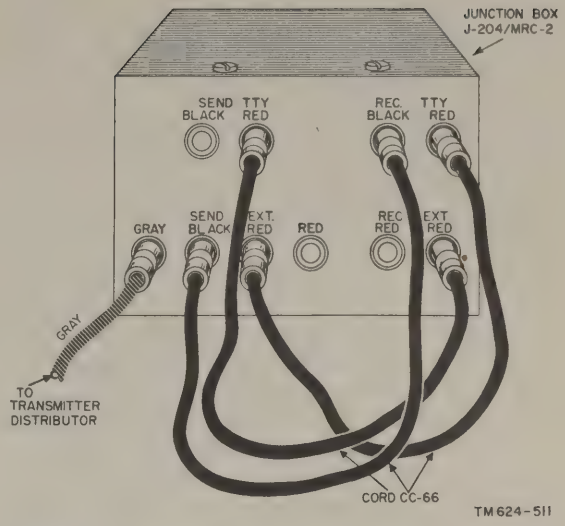


Figure 100. Reversed teletypewriter patching arrangement.

(8) To receive on both teletypewriters and transmit from the send teletypewriter, make the following connections in place of those indicated in *a*(4)(*a*), (*b*), and (*c*) above (fig. 101):

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

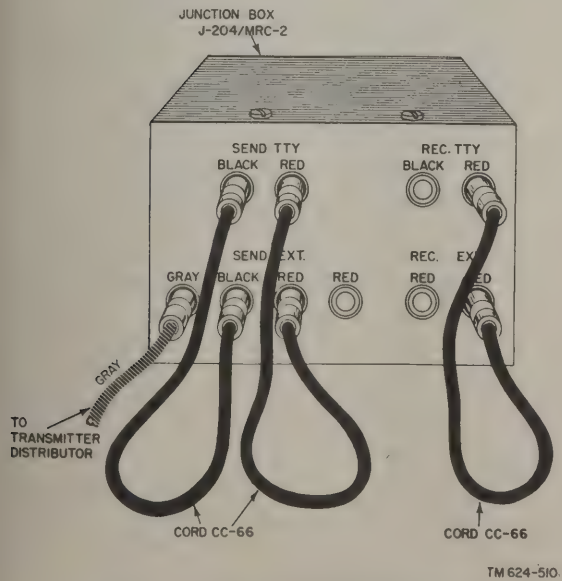


Figure 99. Normal patching arrangement.

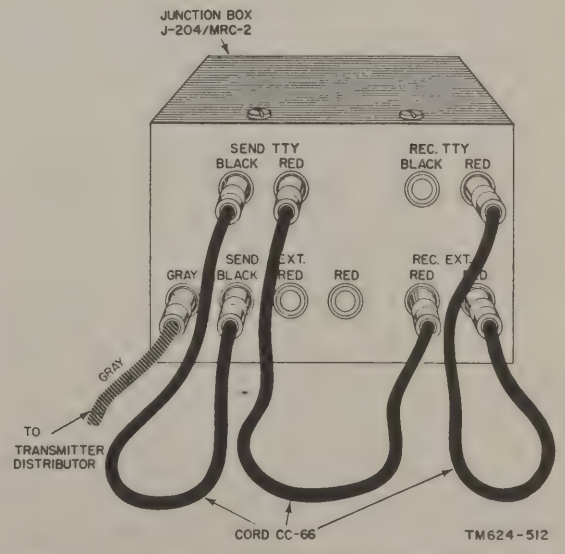


Figure 101. Receive on both teletypewriters, transmit on send teletypewriter.

(*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 REC. EXT. RED jack.

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

(1) Proceed as directed in *a*(1), (2), and (3) above.

(2) At the operating shelter, make the following connections to Junction Box J–204/MRC–2 (fig. 102):

(*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 the SEND TTY BLK jack and the SEND EXT. BLK jack.

(3) Proceed as directed in *a*(5)(*a*) and (*b*) above.

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

(*a*) Proceed as directed in *a*(6)(*a*) through (*c*) above.

(*b*) Set the power switch on the typing-reperforator to ON and the power 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 receive teletypewriter as page copy. The message also will be monitored at the receiving shelter.

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

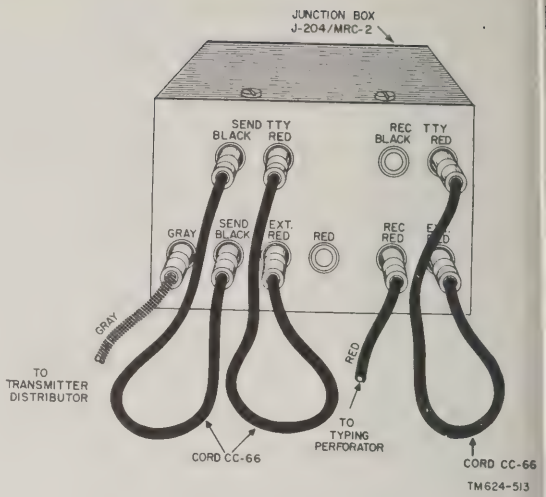


Figure 102. Normal and receive on typing reperforator patching arrangement.

(1) Proceed as directed in *a*(1), (2), and (3) above.

(2) At the operating shelter, make the following connections to Junction Box J–204/MRC–2 (fig. 103):

(*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. BLK jack.

(3) Proceed as directed in *a*(5)(*a*) and (*b*) above.

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

(*a*) Proceed as directed in *a*(6)(*a*), (*b*), (*c*), (*e*), and *b*(4)(*b*) above.

(*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 and monitored at the receiving shelter.

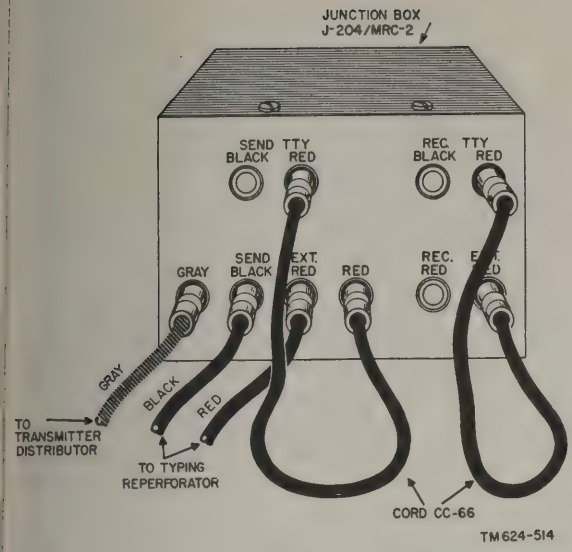


Figure 103. Normal and cut tape on typing reperforator patching arrangement.

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

(1) Proceed as directed in *a*(1), (2), and (3) above.

(2) At the operating shelter, make the following connections to Junction Box J–204/MRC–2 (fig. 100):

(*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.

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

(*a*) Proceed as directed in *a* (6)(*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.

(*d*) Feed the prepared tape through the tight tape switch into the transmitter-distributor. Set the STOP-SEND switch to SEND. 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, and monitored at the receiving shelter.

88. Dual Diversity, Half-Duplex Operation

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

(1) From the operating shelter, communicate with the transmitting shelter operator to adjust the transmitting shelter components to the assigned frequency (pars. 59 through 67, and 78). Have the operator communicate with the distant station operator to operate on half duplex at a certain time.

(2) From the operating shelter, communicate with the receiving shelter operator to adjust the receiving shelter components to the frequency of the distant station (pars. 68 through 71, and 79).

(3) At the operating shelter, adjust the operating components as indicated in paragraphs 74, 75, 76, and 85.

(4) 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 (fig. 101).

(*b*) Patch Cord CC–66 between the SEND TTY BLK jack and the SEND EXT. BLK jack (fig. 101).

(*c*) Patch Cord CC–66 between the REC. TTY RED jack and the SEND EXT. RED jack (fig. 100).

(5) 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.

(6) 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 control for an indication of 75 to the right of zero 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 zero. Depress the SEND-REC-BREAK key of the send teletypewriter and adjust the SENDING LINE CURRENT SPACE control for an indication of 75 to the left of zero on the meter.

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

(*f*) At the predetermined time, set the SEND-REC-BREAK key to SEND and 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 and monitored at the receiving shelter. 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 SEND-REC-BREAK key of the teletypewriter.

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

(1) Proceed as directed in *a*(1), (2), and (3) above.

(2) 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 (fig. 103).

(*b*) Patch Cord CC–66 between REC. TTY BLK jack and SEND EXT. BLK jack (fig. 100).

(*c*) Patch Cord CC–66 between REC. TTY RED jack and REC. EXT. RED jack (fig. 101).

(3) Proceed as directed in *a*(5) (*a*) and (*b*) above.

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

(*a*) Proceed as directed in *a*(6)(*a*) through (*e*) above.

(*b*) At the predetermined time, set the SEND-REC-BREAK key to SEND and 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 as page copy.

(*c*) The message from the distant station will be received on the receive teletypewriter as page copy and monitored at the receiving shelter. 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 SEND-REC-BREAK key of the teletypewriter in use.

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

(1) Proceed as directed in *a*(1), (2), and (3) above.

(2) 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 (fig. 103).

(*b*) Insert the black plug of the typing reperforator into the SEND EXT. BLK jack (fig. 103).

(*c*) Insert the red plug of the typing reperforator into the REC. EXT. RED jack (fig. 102).

(3) Proceed as directed in *a*(5)(*a*) and (*b*) above.

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

(*a*) Proceed as directed in *a*(6)(*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 SEND-REC-BREAK key to SEND and type out the message on the keyboard of the typing reperforator. Observe the end of the line signal lamp to prevent the receiving page teletypewriter from typing beyond the edge of the paper. 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 as page copy.

(*d*) The message from the distant station will be received on the typing reperforator as perforated and printed tape and will be monitored at the receiving shelter.

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

89. Dual Diversity, One-Way Reversible Operation

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

(1) From the operating shelter, communicate with the transmitting shelter operator to adjust the transmitting shelter components for operation on the assigned frequency (pars. 59 through 66, and 78). Have the operator communicate with the distant station operator to operate on one-way reversible basis at a certain time.

(2) From the operating shelter, communicate with the receiving shelter operator to adjust the receiving shelter components to the assigned frequency (pars. 68 through 71, and 79). Adjust the mark-hold level feature as indicated in paragraph 83.

(3) At the operating shelter, adjust the operating components as indicated in paragraphs 74, 75, 76, and 85.

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

(*a*) Patch Cord CC–66 between the SEND TTY BLK jack and the SEND EXT. BLK jack (fig. 101).

(*b*) Patch Cord CC–66 between the SEND TTY RED jack and the REC. EXT. RED jack (fig. 100).

(*c*) Patch Cord CC–66 between the REC. TTY RED jack and the SEND EXT. RED jack (fig. 100).

(5) 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 one-way reversible basis.

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

(6) Performs 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 control for an indication of 75 to the right of zero 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 zero. Depress the SEND-REC-BREAK key of the send teletypewriter and adjust the SENDING LINE CURRENT SPACE control for an indication of 75 to the left of zero on the meter.

(*e*) Set the power switches of the send teletypewriter and the receive teletype writer to ON.

(*f*) At the predetermined time, set the TRANSMITTER switch on the control unit to TRANSMITTER 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 (down). The receiver 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 and monitored at the receiving shelter.

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

(1) Proceed as directed in *a*(1), (2), and (3) above.

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

(*a*) Patch Cord CC–66 between REC. TTY BLK jack and SEND EXT. BLK jack (fig. 100).

(*b*) Patch Cord CC–66 between REC. TTY RED jack and REC. EXT. RED jack (fig. 101).

(*c*) Patch Cord CC–66 between SEND TTY RED jack and SEND EXT. RED jack (fig. 102).

(3) Proceed as directed in *a*(5)(*a*) and (*b*) above.

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

(*a*) Proceed as directed in *a*(6)(*a*) through (*e*) above.

(*b*) At the predetermined time, set the TRANSMITTER switch on the control unit to TRANSMITTER 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 (down). The send teletypewriter will monitor the message sent to the distant station as page copy.

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

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

(1) Proceed as directed in *a*(1), (2), and (3) above.

(2) 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 (fig. 103).

(*b*) Insert the black shell plug of the typing reperforator into the SEND EXT. BLK jack (fig. 103).

(*c*) Insert the red shell plug of the typing reperforator into the REC. EXT. RED jack (fig. 102).

(3) Proceed as directed in *a*(5)(*a*) and (*b*) above.

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

(*a*) Proceed as directed in *a*(6)(*a*) through (*d*) above.

(*b*) Set the power switch of the typing reperforator to ON the motor switch of the send teletypewriter to ON. Set the SEND-REC-BREAK key to SEND.

(*c*) At the predetermined time, set the TRANSMITTER switch on the control unit to TRANSMITTER ON. Type out the message on the keyboard of the typing reperforator. Set the TRANSMITTER switch to off (down). Observe the end of line light to prevent the receive teletypewriter 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. The message will also be monitored at the receiving shelter.

90. Typing-Reperforator Operation With Connection Box

The connection box d-c power cord provides current for two test circuits (fig. 95), one 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 (fig. 95).

(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 (fig. 95):

(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 (fig. 95):

(1) Insert the red and black plugs of page teletypewriter in 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 (fig. 95):

(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 (fig. 95):

(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 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 (fig. 95):

(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 line 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 (fig. 95):

(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 upon copy desired, in the remaining jacks of local circuit 1.

91. RTT Relay Operation

a. Adjust the transmitting shelter components to the assigned frequency as indicated in paragraphs 59 through 66, and 78.

b. Adjust the receiving shelter components to the assigned frequency as indicated in paragraphs 68 through 71, and 79.

c. Adjust the operating shelter components as indicated in paragraphs 74, 75, 76 and 85.

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.

92. Operation With External Teletypewriter Equipment

a. General. When Radio Set AN/MRC–2(*) is operated as a semipermanent installation, it may be desired to remove the teletypewriters from the operating shelter and operate them from a communication center. The following subparagraphs give the necessary instructions for connecting the d-c extension circuits of the control unit in the operating shelter, to remotely located teletypewriters.

b. Adjustments and Connections at Operating Shelter.

(1) Make the control unit initial adjustments as specified in paragraph 76.

(2) Remove all plugs from the SEND and REC extension jack panel located between the sending and receiving teletypewriters (fig. 63).

(3) Remove strap wires (A) from binding posts 1 and 2, and binding posts 3 and 4 on the junction box marked to EXTERNAL TELEGRAPH EQUIPMENT (fig. 61).

(4) Connect strap wires (B) between binding posts 2 and T, and between binding posts 3 and R.

c. Full-Duplex Operation Using Line Units BE–77–( ) (fig. 104).

(1) On the control unit, set the SERVICE switch to FULL DX and the operation switch to NORMAL.

(2) Connect Wire W–110–B, or equal, to binding post T and ground bus on the TO EXTERNAL TELEGRAPH EQUIPMENT junction box on the operating table.

(3) Connect the opposite ends of Wire W–110–B, or equal, to the LINE and GND terminals on the send Line Unit BE–77–( ).

(4) Connect the d-c cord from the line unit to a d-c outlet on Rectifier RA–87.

(5) Connect the red and black plugs attached to the signal cords of the send teletypewriter into the RED and BLK jacks on the line unit.

(6) Operate the switches on the sending line unit to RELAY IN CIRCUIT and DISTANT CURRENT SUPPLY. Adjust the LINE RHEOSTAT for reading of 60 ma.

(7) Connect Wire W–110–B, or equal, to the binding post marked R and the ground bus wingnuts on the TO EXTERNAL TELEGRAPH EQUIPMENT junction box on the operating table.

(8) Connect the opposite end of Wire W–110–B, or equal, to the LINE and GND terminals on the receive Line Unit BE–77–( ).

(9) Connect the d-c cord from the line unit into a d-c outlet on Rectifier RA–87.

(10) Connect the red and black plugs attached to the signal cords of the receive teletypewriter to the RED and BLK jacks on the line unit.

(11) Connect a ground to the GND binding post of the line unit.

(12) Operate the switches in the receiving line unit to RELAY IN CIRCUIT and DISTANT CURRENT SUPPLY. Turn the LINE RHEOSTAT to the OUT position.

(13) In the operating shelter, turn the METER switch on the control unit to REC EXT CURRENT and adjust the EXTENSION CURRENT control for a meter indication of 75 to the right of zero (mark).

(14) Adjust the line unit bias with *repeat space* signals sent from the remote location at the other end of the radio link.

d. One-Way (Half-Duplex) Operation Using Line Unit BE–77–( ) (fig. 105).

(1) Make the adjustments and connections indicated in *b*(1) through (4) above.

(2) On the control unit, set the SERVICE switch to HALF DX and the OPERATION switch to NORMAL.

(3) Connect Wire W–110–B, or equal, to binding posts marked T and the ground bus wingnut on the TO EXTERNAL TELEGRAPH EQUIPMENT junction box on the operating table.

(4) Connect the opposite ends of Wire W–110–B, or equal, to the terminals marked LINE and GND on Line Unit BE–77–( ).

(5) Connect the d-c cord of the line unit to a d-c outlet on Rectifier RA–87.

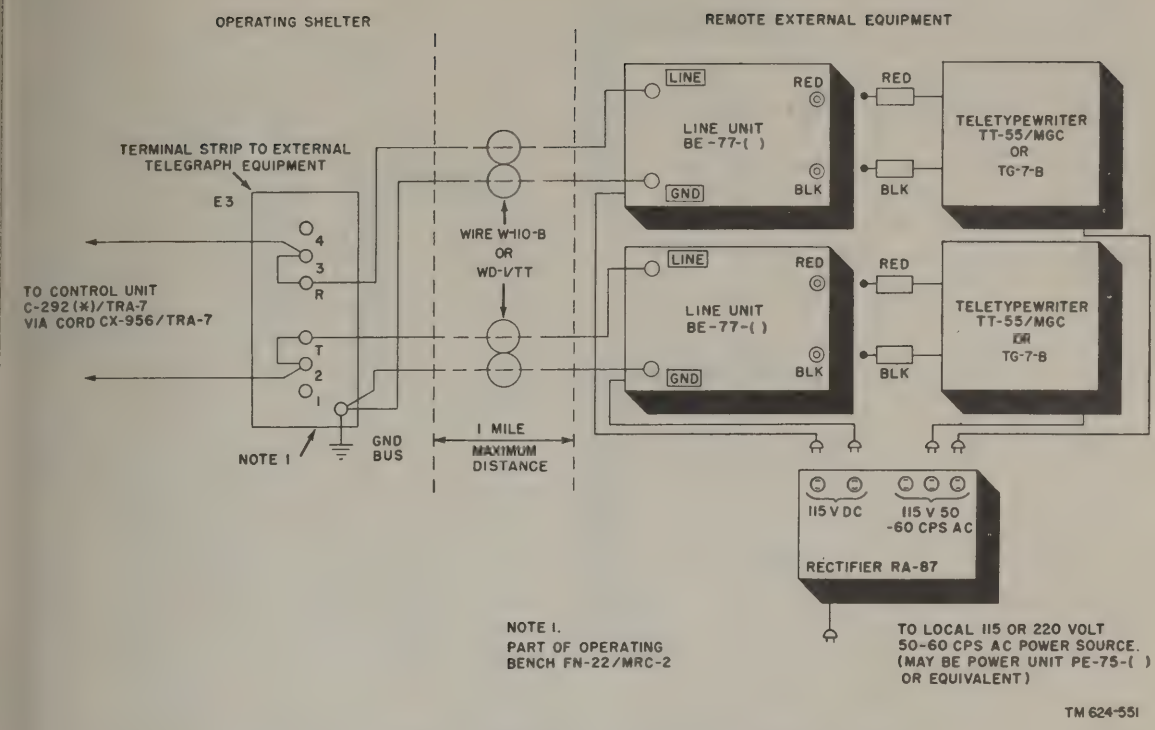


Figure 104. Remote teletypewriter connections for full-duplex operation.

(6) Connect the red and black plugs attached to the signal cords of the teletypewriter into the RED and BLK jacks on the line unit.

(7) Connect a ground to the GND binding post of the line unit.

(8) Operate the switches in the line unit to RELAY IN CIRCUIT and DISTANT CURRENT SUPPLY. Turn the LINE RHEOSTAT to the OUT position.

(9) In the operating shelter, turn the METER switch to SEND EXT CURRENT and adjust the EXTENSION CURRENT control for a meter indication of 75 to the right of zero.

(10) Adjust the line unit bias with repeat space signals sent from the external location at the other end of the radio link.

e. Repeater TG–30 (Terminal), One-Way (Half-Duplex) Operation.

(1) Make the adjustments and connections as indicated in *b*(1) through (4) above.

(2) On the control unit, set the SERVICE switch to HALF DX and the OPERATION switch to NORMAL.

(3) Connect binding post T and ground bus in the operating shelter to the LOCAL 1 binding post on Repeater TG–30.

(4) Operate the LOCAL switch on the repeater to position 2.

(5) Set the METER switch on the control unit to SEND EXT CURRENT and adjust the EXTENSION CURRENT control for a meter indication of 75 to the right of zero.

f. Telegraph Terminal CF–2–( ) or CF–6–( ), Full-Duplex Operation.

(1) Make the adjustment and connections as indicated in *b*(1) through (4) above.

(2) On the control unit, set the SERVICE switch to FULL DX and the OPERATION switch to NORMAL.

(3) Set the LOOP control of the telegraph terminal channel to be used to FULL DX-NEUTRAL TO NEG. BAT.

(4) Connect binding post T and ground bus in the operating shelter to the RL and GR binding posts on the telegraph terminal equipment.

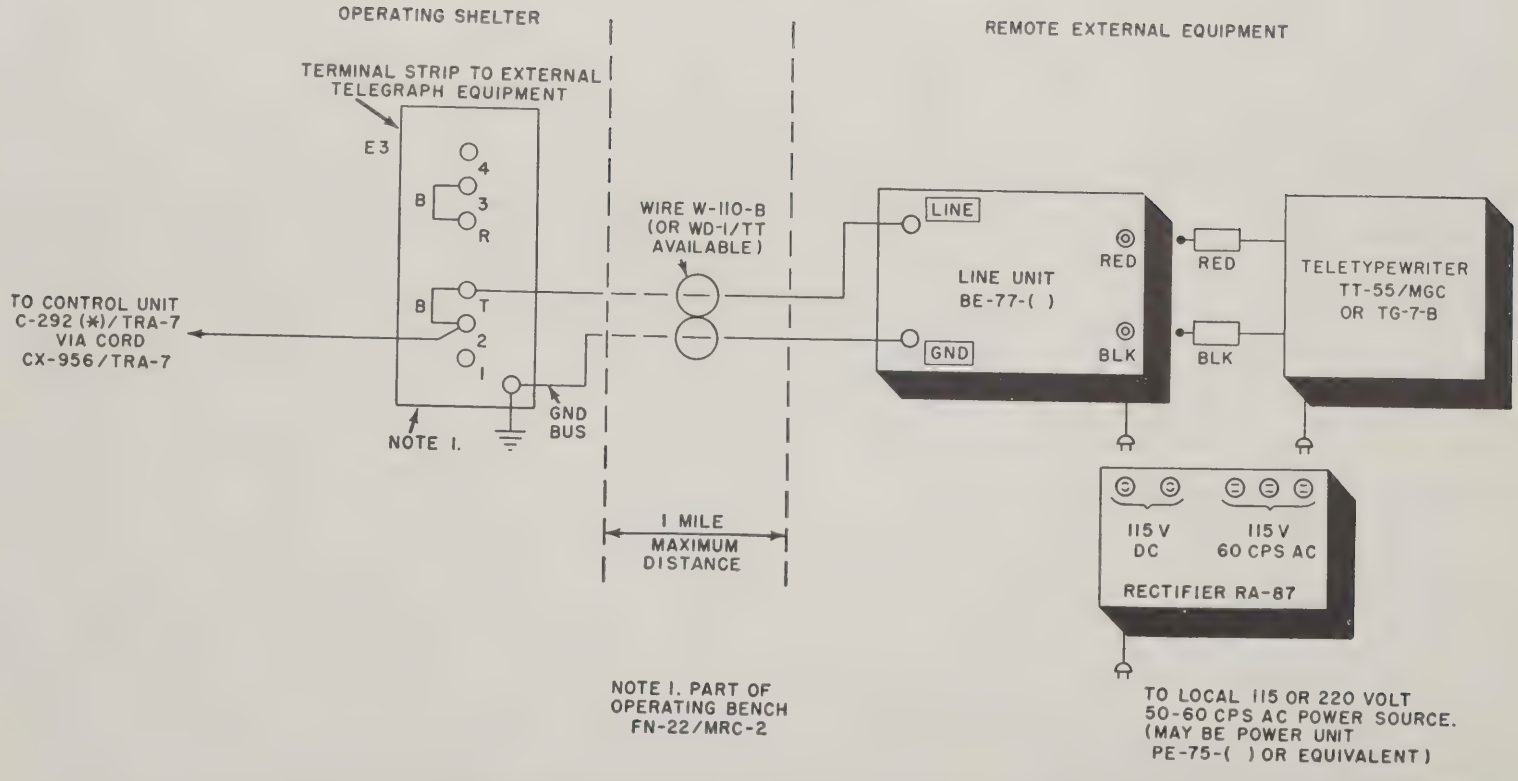


Figure 105. Remote teletypewriter connections for half-duplex operation.

(5) Connect binding post R in the operating shelter to the SL binding post on the telegraph terminal equipment.

(6) Adjust the RL RES and SL RES knobs on the telegraph terminal equipment for meter readings of 60.

(7) Adjust the telegraph terminal equipment for zero send bias while receiving signals from the operating shelter at the other end of the radio link.

g. Telegraph Terminal CF–2–( ) or CF–6–( ), Half-Duplex Operation.

(1) Make the adjustments and connections as indicated in *b*(1) through (4) above.

(2) On the control unit, set the SERVICE switch to HALF DX and the OPERATION switch to NORMAL.

(3) Turn the LOOP control on the telegraph terminal channel to be used to HALF DX-NEUTRAL TO NEG. BAT.

(4) Connect binding post T and ground bus in the operating shelter to the SL and GR binding posts on the telegraph terminal equipment.

(5) Adjust the SL RES knob on the telegraph terminal equipment for a meter reading of 60.

(6) Adjust the telegraph terminal equipment for zero send bias while receiving repeat space signals from the operating shelter at the other end of the radio link.

93. Emergency Operation

a. Emergency C-W Transmission From Transmitting Shelter.

(1) Insert the plug on Key J–37 cord into the KEY jack of Junction Box J–207/MRC–2.

(2) Set the TEST key on the exciter unit to the MARK position.

(3) Set the TRANS. ON-TRANS. OFF switch of Junction Box JB–70–A 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 the amplifier.

(5) Release the key, and the buffer indicator lamp will become dim.

(6) The transmitted c-w signal can be monitored with the receiver.

(*a*) Set the RECEIVER DISABLING switch (BC–312) on Junction Box JB–70–A to the ON position.

(*b*) Set the OFF-STANDBY-ON switch of the receiver to the ON position.

Note. Even though the disabling relay is operated, there is enough signal pick-up to permit monitoring the transmitter.

(*c*) Tune the receiver to the transmitter frequency.

(*d*) Set the BFO switch to the ON position and adjust the BFO PITCH control to produce a suitable pitch.

(*e*) Set the AUDIO GAIN control to the desired volume.

b. Emergency C-W Transmission 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 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 TRANS. ON-TRANS. OFF switch of Junction Box JB–70–A 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 obtained.

(5) The transmitted c-w signal can be monitored with the spare radio receiver assembly.

c. Emergency Manual FS Transmission From Receiving Shelter.

(1) At the receiving shelter, communicate with the operator at the operating shelter 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 0.

d. Emergency Voice Operation.

(1) Disconnect Cord CG–65/MRC–1 at the transmitter r-f output terminals.

(2) Disconnect the antenna lead in Cord CG–145/MRC–1 at the r-f output terminals of the amplifier.

(3) Connect the antenna lead in Cord CG–145/MRC–1, to the output terminals of the transmitter.

(4) Remove the plug at the end of disabling Cord CD–1019 or CD–607 from the CARBON MIC. 1 jack of the speech amplifier.

(5) Set the RECEIVER DISABLING switch (BC–312) to the ON position.

(6) Set the transmitter control switch on Junction Box JB–70–A to the TRANS. OFF position.

(7) Set the PLATE POWER switch on the transmitter to the off (down).

(8) Set the C. W.-PHONE switch to the PHONE position.

(9) Set the MODULATION BIAS control full counterclockwise.

(10) Set the TEST key on the exciter to the MARK position.

(11) Insert the plug from the cord attached to Microphone T–17–( ) into the CARBON MIC. 1 jack on the speech amplifier.

(12) Press the microphone button and check the P. A. PLATE meter on the transmitter to see that it indicates approximately 250 ma.

(13) Press the button on the microphone an adjust the MODULATOR BIAS cor trol on the transmitter until the MODU LATOR PLATE meter on the speec amplifier indicates 40 ma. Speak int the microphone and adjust the CARBO MIC. 1 control on the speech amplifie for an indication of approximately 20 ma on voice peaks.

(14) Microphone T–45 may be used in plac of the carbon microphone by insertin the plug attached to the cord in th CARBON MIC. 1 jack.

(15) Microphone T–50, a dynamic microphone, may be used to modulate th transmitter carrier by inserting the plug attached to this microphone into the DYNAMIC MIC. 2 socket on the speech amplifier.

Note. Antenna Tuning Unit BC–939–(*) may be used in conjunction with a whip antenna for emergency voice operation.

94. 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 ON switch, on the control unit, to the off (down) position.

(2) Turn off all a-c supply switches on the components in the shelter.

(3) Press the STOP switch on the power unit.

b. Transmitting Shelter.

(1) Turn off all a-c supply switches on the components in the shelter.

(2) Press the STOP switch on Junction Box JB–70–A.

c. Receiving Shelter.

(1) Turn off all a-c supply switches on the components in the shelter.

(2) Press the STOP switch on the power unit.

Section VIII. OPERATION UNDER UNUSUAL CONDITIONS

95. General

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 paragraphs 96 through 98, instructions are given on procedures for minimizing the effect of these unusual operating conditions.

96. 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 the 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. Mercury vapor tubes require more time to warm up than other vacuum tubes. Before turning on the plate voltage, turn on the filaments and let the tubes heat until they feel warm to the touch. This may take from 10 to 15 minutes, depending on the temperature of the surrounding air. If the tube is not warm when the plate voltage is turned on, the surge of high voltage may ruin the tube.

d. Be careful to prevent cold air from coming into contact with heated tubes when the shelter door is opened. A sudden draft of cold air often is sufficient to shatter the glass envelope of a heated tube.

e. Do not attempt to operate teletypewriters when they are cold because the typing mechanism is inoperable at low temperatures. Allow adequate warm-up time before using them.

f. Heavy coatings of frost will gather on mouth-type microphones in extreme cold weather when the microphones are used in the open air or in a cold room. Frost will form from the breath in the small holes of the cap and will affect transmitter modulation. Rubber diaphragms have been designed to protect some types of microphone; use them when available. Have a spare microphone ready, if possible, in case the one in use fails to function properly.

g. The equipment will sweat until it is brought up to operating temperature after exposure to the cold. This condition also arises when the equipment is used after exposure during a cold night. When the equipment has reached room temperature, dry it thoroughly.

97 Operation in Tropical Climates

a. When operating 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, place electric light bulbs under the equipment. Dry the equipment thoroughly before operating it.

b. Tape all cable connectors with rubber tape to prevent shorts and leakage caused by moisture.

98. Operation in Desert Climates

a. Conditions similar to those encountered in tropical climates often prevail in desert areas. Use the same measures to insure proper operation of the equipment.

b. 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 radio equipment, such as motors and power units. The ideal preventive precaution is to house the equipment in a dustproof shelter. Since, however, such a building is seldom available and would require air conditioning, the next best precaution is to make the shelters in which the equipment is located as dustproof as possible with available materials. Hang wet sacking over windows and doors.

c. Take care to keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (ch. 4). Pay particular attention to the condition of 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.

d. Make periodic checks of antennas to prevent damage during the sudden wind squalls which occur in desert areas.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. ORGANIZATIONAL TOOLS AND EQUIPMENT

99. Tools and Equipment Supplied with Radio Set AN/MRC–2(*)

References to the tools and equipment in each of the shelters composing Radio Set AN/MRC–2(*) are listed below.

a. Transmitting Shelter. The table of components (par. 6*a*) lists the tools and equipment supplied for the transmitting shelter.

b. Receiving Shelter. The table of components (par. 6*b*) lists the tools and equipment supplied for the receiving shelter.

c. Operating Shelters. The table of components (par. 6*c*) lists the tools and equipment supplied for the operating shelter.

100. Special Tools for Radio Set AN/MRC–2(*)

a. General. The tools that are furnished with Radio Set AN/MRC–2(*) should be adequate for organizational maintenance of the equipment. A neutralizing indicator is included to aid in neutralizing the power amplifier and a T wrench is provided to aid in removing the radio transmitter from the shelter deck. Additional tools, if required, often can be improvised. For example, a safety shorting stick and several jumper wires may be constructed.

b. Construction of Shorting Stick.

(1) To construct a safety shorting stock (fig. 106), secure a dry piece of wood or some other material which is a good electrical insulator. It should be approximately 36 inches long and about 1 inch square. Fasten a piece of copper or brass rod (or thin tubing) to one end of the stick so that the rod extends approximately 10 inches beyond the end of the stick. The free end of the rod should be bent in the form of a small hook. Solder a piece of heavy flexible hook-up wire about 18 inches long to the metal rod at the point where it is fastened to the stick. Attach a heavy clip to the free end of the wire.

(2) The jumper wires are made from heavy flexible wire, about 18 inches long, with

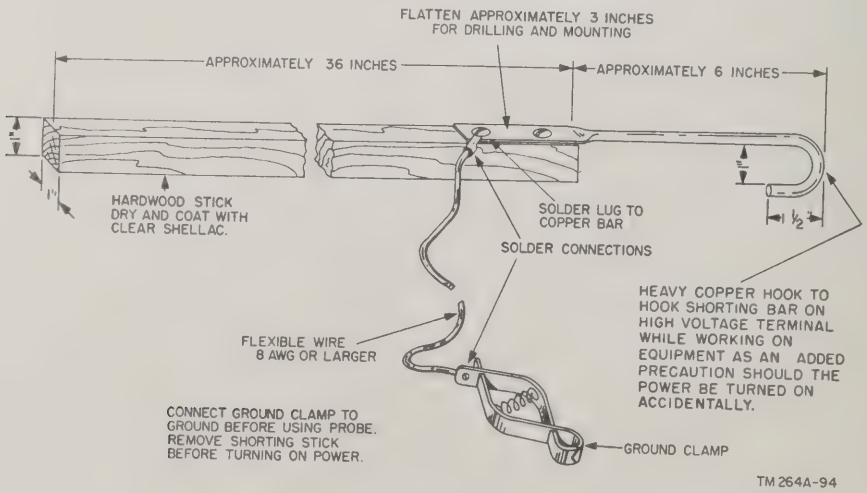


Figure 106. Construction of shorting stick.

heavy clips attached to each end. These are intended for use as shorting links across h-v (high-voltage) capacitors in components that are being repaired or cleaned.

c. Neutralizing Indicator.

(1) This tool consists of a loop of insulated wire and an incandescent lamp. If the loop is placed near a circuit containing r-f currents, the loop will pick up sufficient energy to light the lamp.

(2) A neutralizing tool is included for adjustment of 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 grip the plates of the neutralizing capacitors so that they may be turned.

Section II. PREVENTIVE MAINTENANCE SERVICES

101. 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 break-downs and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from troubleshooting and repair since its object is to prevent certain troubles from occurring. See AR 750–5.

102. General Preventive Maintenance Techniques

a. Use No. 0000 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 dry with a dry cloth.

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

c. If available, dry compressed air may be used at a line pressure not exceeding 60 pounds per square inch 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.

103. Use of Preventive Maintenance Forms

a. The decision as to which items on DA Forms 11–238, 11–239, 11–262, and 11–263 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. Circled items in figures 107 through 110 are partially or totally applicable to Radio Set AN/MRC–2(*). References in the ITEM block refer to paragraphs in the test which contain additional maintenance information.

104. Performing Exterior Preventive Maintenance

Caution: Tighten screws, bolts, and nuts carefully. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

a. Radio Equipment (fig. 107).

(1) Check the completeness and satisfactory condition of the transmitting, receiving, teletypewriter, and control equipment. The components are listed in the table in paragraph 6.

(2) Check suitability of location and installation for normal operation (par. 15) (fig. 40).

(3) Clean dirt and moisture from antenna mast bases, microphones, headsets, keys, jacks, plugs, equipment cases and panels, and antenna and transmission line insulators (par. 102).

(4) Inspect for satisfactory seating and good electrical contact all tubes, pilot lamps, crystals, fuses, connectors, plug-in coils, and resistors (figs. 43 through 53).

(5) Inspect controls on all units and components for binding, scraping, excessive looseness, and misalinement. Make certain that each control exhibits positive action (figs. 76 through 98).

OPERATOR FIRST ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE | 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, carrying cases, wire and cable, microphones, tubes, spare parts, technical manuals and accessories*). PAR 104a (1)							
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR 104a (2)							
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, CHESTSETS, KEYS, JACKS, PLUGS, TELEPHONES, CARRYING BAGS, COMPONENT PANELS. PAR 104a (3)							
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, CRYSTALS, FUSES, CONNECTORS, VIBRATORS, PLUG-IN COILS AND RESISTORS. PAR 104a (4)							
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR 104a (5)							
6	CHECK FOR NORMAL OPERATION. PAR 104a (6)							

WEEKLY

NO.	ITEM	CONDITION	NO.	ITEM	CONDITION
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, RACK MOUNTS, SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, WAVE GUIDES, AND CABLE CONNECTIONS. PAR 104a (7)		13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES. PAR 104a (13)	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR 104a (8)		14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES. PAR 104a (14)	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR 104a (9)		15	INSPECT METERS FOR DAMAGED GLASS AND CASES. PAR 104a (15)	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS. PAR 104a (10)		16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING. PAR 104a (16)	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING. PAR 104a (11)		17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION. PAR 104a (17)	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWERSTATS, RELAYS, SELSYNS, MOTORS, BLOWERS, CAPACITORS, GENERATORS, AND PILOT LIGHT ASSEMBLIES. PAR 104a (12)		18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE. PAR 104a (18)	
19	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR 104a (19)				

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

Figure 107. 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 | EQUIPMENT SERIAL NO.

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; (1) Defect corrected.
NOTE: Strike out items not applicable.

NO.	ITEM	CONDITION
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT (*receiver, transmitter, carrying cases, wire and cable, microphones, tubes, spare parts, technical manuals and accessories*). PAR. 104a(1)	
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 104a(2)	
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, CHESTSETS, KEYS, JACKS, PLUGS, TELEPHONES, CARRYING BAGS, COMPONENT PANELS. PAR. 104a(3)	
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, CRYSTALS, FUSES, CONNECTORS, VIBRATORS, PLUG-IN COILS AND RESISTORS. PAR. 104a(4)	
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR. 104a(5)	
6	CHECK FOR NORMAL OPERATION. PAR. 104a(6)	
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, RACK MOUNTS, SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, WAVE GUIDES, AND CABLE CONNECTIONS. PAR. 104a(7)	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR. 104a(8)	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR. 104a(9)	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS. PAR. 104a(10)	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING. PAR. 104a(11)	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWERSTATS, RELAYS, SELSYNS, MOTORS, BLOWERS, CAPACITORS, GENERATORS, AND PILOT LIGHT ASSEMBLIES. PAR. 104a(12)	
13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES. PAR 104a(13)	
14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES. PAR. 104a(14)	
15	INSPECT METERS FOR DAMAGED GLASS AND CASES. PAR. 104a(15)	
16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING. PAR. 104a(16)	
17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION. PAR. 104a(17)	
18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE.	

NO.	ITEM	CONDITION
19	ELECTRON TUBES - INSPECT FOR LOOSE ENVELOPES, CAP CONNECTORS, CRACKED SOCKETS: INSUFFICIENT SOCKET SPRING TENSION; CLEAN DUST AND DIRT CAREFULLY; CHECK EMISSION OF RECEIVER TYPE TUBES. PAR. 105a(1)	
20	INSPECT FILM CUT-OUTS FOR LOOSE PARTS, DIRT, MISALIGNMENT AND CORROSION.	
21	INSPECT FIXED CAPACITORS FOR LEAKS, BULGES, AND DISCOLORATION. PAR. 105a(2)	
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. 105a(3)	
23	INSPECT VARIABLE CAPACITORS FOR DIRT, MOISTURE, MISALIGNMENT OF PLATES, AND LOOSE MOUNTINGS. PAR. 105a(4)	
24	INSPECT RESISTORS, BUSHINGS, AND INSULATORS, FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE. PAR. 105a(5)	
25	INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR CORROSION, DIRT AND LOOSE CONTACTS. PAR. 105a(6)	
26	CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES, AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE. PAR. 105a(7)	
27	INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS. PAR. 105a(8)	
28	CHECK SETTINGS OF ADJUSTABLE RELAYS. PAR. 105a(9)	
29	LUBRICATE EQUIPMENT IN ACCORDANCE WITH APPLICABLE DEPARTMENT OF THE ARMY LUBRICATION ORDER. PAR. 105a(10)	
30	INSPECT GENERATORS, AMPLIDYNES, DYNAMOTORS, FOR BRUSH WEAR, SPRING TENSION, ARCING, AND FITTING OF COMMUTATOR. PAR. 105a(11)	
31	CLEAN AND TIGHTEN CONNECTIONS AND MOUNTINGS FOR TRANSFORMERS CHOKES, POTENTIOMETERS, AND RHEOSTATS. PAR. 105a(12)	
32	INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS FOR OVERHEATING AND OIL-LEAKAGE. PAR. 105a(13)	
33	BEFORE SHIPPING OR STORING - REMOVE BATTERIES. PAR. 105a(14)	
34	INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS.	
35	INSPECT BATTERIES FOR SHORTS AND DEAD CELLS. PAR 105a(15)	
36	INSPECT FOR LEAKING WATERPROOF GASKETS, WORN OR LOOSE PARTS. PAR. 105a(16)	
37	MOISTURE AND FUNGIPROOF. PAR. 105a(17)	
38	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 105a(18)	

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

TM 624-582

Figure 108. DA Form 11–239.

OPERATOR FIRST ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
TELETYPE CENTRAL OFFICE SET

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE	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	INSPECT SET FOR PRESENCE OF ALL COMPONENTS, ACCESSORIES AND RUNNING SPARE PARTS. PAR 104b(1)							
2	TIGHTEN TO A SNUG FIT - ALL LOOSE EXTERIOR BOLTS, SCREWS, FASTENINGS, SUPPORTS, BRACKETS, EXTERIOR APPARATUS MOUNTING SCREWS. PAR 104b(2)							
3	CLEAN OUTSIDE SURFACES OF ALL COMPONENTS OF DIRT, GREASE, GRIME, RUST, DUST. PAR 104b(3)							
4	INSPECT ALL VISIBLE CORDS, CABLES AND WIRING FOR CORRECT POSITIONS, SECURELY FASTENED TERMINALS, BROKEN CONDUCTORS, DAMAGED INSULATION, MILDEW, FUNGUS, KINKS, STRAINS, SHARP BENDS. PAR 104b(4)							
5	CLEAN ALL VISIBLE CORDS, CABLES, TERMINALS, BINDING POSTS, ELECTRICAL CONNECTORS OF DIRT, DUST, GREASE, GRIME, CORROSION. PAR 104b(5)							
6	TIGHTEN ALL VISIBLE ELECTRICAL CONNECTIONS FOR SNUG FIT AND GOOD CONTACT. PAR 104b(6)							
7	CLEAN PLUGS OF TARNISH, GREASE, DUST, GRIME, OIL. PAR 104b(7)							
8	CLEAN ALL LINE CIRCUITS FOR SATISFACTORY OPERATION. PAR 104b(8)							
9	CHECK NIGHT ALARM FOR OPERATIONS.							

WEEKLY

NO.	ITEM	CONDITION	NO.	ITEM	CONDITION
10	INSPECT OUTER SURFACES OF ALL COMPONENTS FOR RUST, CHIPPED PAINT, CRACKS, BROKEN GLASS. PAR 104b(9)		13	INSPECT ALL MARKINGS AND DESIGNATION STRIPS FOR LEGIBILITY. PAR 104b(12)	
11	INSPECT ALL VISIBLE ELECTRICAL CONNECTIONS, TERMINALS AND BINDING POSTS FOR PROPER CONTACT, FIRMNESS OF SEATING, BENT BINDING POSTS, RUST, CORROSION, CRACKED TERMINAL BLOCKS. PAR 104b(10)		14	INSPECT PLUGS FOR CHIPS, CRACKS, TARNISH, ROUGHNESS, SNUG FIT AND GOOD CONTACT. PAR 104b(13)	
12	CHECK GROUND ROD FOR TIGHT CONNECTIONS, FRACTURES, BENDS, RUST, FIRMLY EMBEDDED. PAR 104b(11)		15	CHECK THE MECHANICAL ACTION OF EACH KEY AND SWITCH FOR FREEDOM OF MOVEMENT, POSITIVE ACTION, SPRING TENSION, BROKEN, MISSING OR ILLEGIBLE KEY TOPS. PAR 104b(14)	
16	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR 104b(15)				

DA FORM 1 MAY 51 11-262 REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

Figure 109. DA Form 11–262.

SECOND AND THIRD ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
TELETYPE CENTRAL OFFICE SET

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE | 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	NO.	ITEM	CONDITION
1	INSPECT SET FOR PRESENCE OF ALL COMPONENTS, ACCESSORIES AND RUNNING SPARE PARTS. PAR. 104b(1)		22	ADJUST KEY AND SWITCH CONTACTS WHERE NECESSARY. PAR. 105b(6)	
2	TIGHTEN TO A SNUG FIT - ALL LOOSE EXTERIOR BOLTS, SCREWS, FASTENINGS, SUPPORTS, BRACKETS, EXTERIOR APPARATUS MOUNTING SCREWS. PAR. 104b(2)		23	CLEAN THE TYPING UNIT VERY CAREFULLY OF GREASE, DUST, DIRT, OIL. *(Care should be exercised to prevent dirt from getting into the bearings).* PAR. 105b(7)	
3	CLEAN OUTSIDE SURFACES OF ALL COMPONENTS OF DIRT, GREASE, GRIME, RUST, DUST. PAR. 104b(3)		24	INSPECT THE TYPING UNIT FRAME CASTING FOR CRACKS OR OTHER DAMAGE. PAR. 105b(8)	
4	INSPECT ALL VISIBLE CORDS, CABLES AND WIRING FOR CORRECT POSITIONS, SECURELY FASTENED TERMINALS, BROKEN CONDUCTORS, DAMAGED INSULATION, MILDEW, FUNGUS, KINKS, STRAINS, SHARP BENDS. PAR. 104b(4)		25	CHECK THE TYPING UNIT FOR LOOSE OR MISSING SCREWS, FREE MOVEMENT OF ALL MOVING PARTS, BENT, BROKEN, DISTORTED OR WORN SHAFTS, GEARS, SPRINGS, BEARINGS, CAMS, CLUTCHES. PAR. 105(9)	
5	CLEAN ALL VISIBLE CORDS, CABLES, TERMINALS, BINDING POSTS, ELECTRICAL CONNECTORS OF DIRT, DUST, GREASE, GRIME, CORROSION. PAR. 104b(5)		26	ADJUST ANY ASSEMBLIES ON THE TYPING UNIT WHICH REQUIRE ADJUSTMENT. PAR. 105(10)	
6	TIGHTEN ALL VISIBLE ELECTRICAL CONNECTIONS FOR SNUG FIT AND GOOD CONTACT. PAR 104b(6)		27	CLEAN THE TYPE-BAR CARRIAGE OF DIRT, GREASE, EXCESS LUBRICANT. PAR. 105b(11)	
7	CLEAN PLUGS OF TARNISH, GREASE, DUST, GRIME, OIL. PAR. 104b(7)		28	INSPECT THE TYPE-BAR CARRIAGE FRAME FOR CRACKS OR OTHER DAMAGE. PAR. 105b(12)	
8	CLEAN ALL LINE CIRCUITS FOR SATISFACTORY OPERATION. PAR. 104b(8)		29	CHECK THE TYPE-BAR CARRIAGE FOR MISSING MOUNTING SCREWS, BOLTS, LOOSE PARTS, SIGNS OF EXCESSIVE WEAR, MISSING, BROKEN, OR DISTORTED SPRINGS. PAR. 105b(13)	
9	CHECK NIGHT ALARM FOR OPERATION.		30	INSPECT EACH BELL CRANK, CODE-BAR AND TYPE-BAR TO DETERMINE THAT ALL PARTS MOVE FREELY AND ARE NOT BENT OR BROKEN. PAR. 105b(14)	
10	INSPECT OUTER SURFACES OF ALL COMPONENTS FOR RUST, CHIPPED PAINT, CRACKS, BROKEN GLASS. PAR. 104b(9)		31	INSPECT EACH TYPE-BAR FOR MISSING OR DAMAGED PALLETS. PAR. 105b(15)	
11	INSPECT ALL VISIBLE ELECTRICAL CONNECTIONS, TERMINALS AND BINDING POSTS FOR PROPER CONTACT, FIRMNESS OF SEATING, BENT BINDING POSTS, RUST, CORROSION, CRACKED TERMINAL BLOCKS. PAR. 104b(10)		32	INSPECT GEARS, SHAFTS, BEARINGS OF TYPE-BAR CARRIAGE FOR SIGNS OF EXCESSIVE WEAR, LOOSE PARTS, DAMAGE. PAR. 105b(16)	
12	CHECK GROUND ROD FOR TIGHT CONNECTIONS, FRACTURES, BENDS, RUST, FIRMLY EMBEDDED. PAR. 104b(11)		33	ADJUST ANY UNITS ON THE TYPE-BAR CARRIAGE THAT REQUIRE ADJUSTMENT. PAR. 105b(17)	
13	INSPECT ALL MARKINGS AND DESIGNATION STRIPS FOR LEGIBILITY. PAR. 104b(12)		34	CLEAN OIL, GREASE, DUST, DIRT, FROM KEYBOARD, KEY-TOPS, KEY LEVERS, AND AROUND THE TRANSMITTING MECHANISM. PAR. 105b(18)	
14	INSPECT PLUGS FOR CHIPS, CRACKS, TARNISH, ROUGHNESS, SNUG FIT AND GOOD CONTACT. PAR. 104b(13)		35	INSPECT THE KEYBOARD FOR LOOSE, BROKEN, OR MISSING MOUNTING SCREWS, BROKEN, MISSING OR DISTORTED SPRINGS. INSPECT FOR SIGNS OF WEAR OR BINDING ON SHAFTS, GEARS, CLUTCHES, PAWLS, LATCHES AND CAMS. PAR. 105b(19)	
15	CHECK THE MECHANICAL ACTION OF EACH KEY AND SWITCH FOR FREEDOM OF MOVEMENT, POSITIVE ACTION, SPRING TENSION, BROKEN, MISSING OR ILLEGIBLE KEY TOPS. PAR. 104b(14)		36	INSPECT THE KEYBOARD CASTING FOR CRACKS OR OTHER DAMAGE. PAR. 105b(20)	
16	CLEAN INTERIOR APPARATUS, WHERE ACCESSIBLE THROUGH PANELS OR DOORS, OF DIRT, DUST, GREASE, GRIME AND OIL. PAR 105b(1)		37	TIGHTEN ANY LOOSE ASSEMBLIES AND ADJUST ANY UNITS IN NEED OF ADJUSTMENT. PAR. 105b(21)	
17	TIGHTEN LOOSE SCREWS AND FASTENINGS USED TO MOUNT INTERIOR APPARATUS.		38	INSPECT THE TELETYPEWRITER MOTOR AND BASE FOR CRACKS AND OTHER DAMAGE, SIGNS OF OVERHEATING, LOOSE OR MISSING MOUNTING SCREWS, AND BRUSH WEAR. PAR. 105b(22)	
18	INSPECT INTERIOR WIRING AND CABLING FOR FRAYED OR DAMAGED INSULATION, LOOSE TERMINALS, BROKEN CONDUCTORS. PAR. 105b(2)		39	CLEAN THE TELETYPEWRITER MOTOR AND BASE, AND GOVERNOR ASSEMBLY OF DIRT, GREASE, FOREIGN MATTER. PAR. 105b(23)	
19	SOLDER ANY LOOSE OR BROKEN SOLDER CONNECTIONS. PAR. 105b(3)		40	INSPECT INTERIOR ELECTRICAL CONNECTIONS FOR TIGHTNESS, MOISTURE, OIL, GREASE, FUNGUS. PAR. 105b(24)	
20	INSPECT KEYS AND SWITCHES FOR PITTING, DIRT, GREASE, CORROSION. PAR. 105b(4)		41	INSPECT MOISTURE AND FUNGUS PROOFING FOR GENERAL CONDITION. PAR. 105b(25)	
21	ADJUST SPRING TENSION ON CONTACT SPRING WHERE NECESSARY. PAR. 105b(5)		42	OPERATE THE SET AND CHECK FOR SMOOTHNESS OF OPERATION, CLEAR PRINTING, SIGNS OF WEAR, EVIDENCES OF MOTOR OR RECTIFIER OVERHEATING. PAR. 105b(26)	
43	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 105b(27)				

DA FORM 1 MAY 51 11-263 REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

TM 624-545

Figure 110. DA Form 11-263.

(6) Check each component for normal operation (par. 121).
(7) Clean and tighten all panel screws, rack mounts, shock mounts, whip antenna connections, coaxial transmission lines, and cable connections (par. 102).
(8) Inspect for rust, corrosion, and moisture in all cases, mountings, antennas, mast bases, mast sections, and all exposed metal surfaces (par. 116).
(9) Inspect for cuts, breaks, kinks, and fraying all cords, cable assemblies, shelter wiring, shelter interconnecting lines, and antenna guys (par. 118).
(10) Inspect all antennas for eccentricities, corrosion, damaged insulators; check all mast sections for tightness of fit (par. 22 through 29).
(11) Inspect canvas items, leather, and cabling for mildew, tears, and fraying (par. 118).
(12) Inspect for looseness all switches, knobs, jacks, connectors, transformers, equipment mounts, relays, motors, blowers, capacitors, and pilot lamp assemblies (figs. 43 through 53, and 76 through 98).
(13) Inspect storage batteries in shelters, power units, and vehicles for dirt, loose terminals, electrolyte level, specific gravity, and damaged or corroded cables (par. 118).
(14) Clean blower air filters, nameplates, dial and meter windows, and pilot lamp jewels (par. 102).
(15) Inspect meters for damaged glass and cases (figs. 76 through 98).
(16) Inspect shelters and covers of the power units for adequacy of weatherproofing (par. 115).
(17) Check the guy wires of the doublet antennas and rhombic antenna masts for looseness and proper tension (figs. 71, 72, and 75).
(18) Check terminal box covers for cracks, dirt, and grease.
(19) In any case where deficiencies are noted and not immediately corrected, indicate on the form the action taken to initiate correction.

b. Teletypewriter Equipment (fig. 109).
(1) Inspect for presence of all components, accessories, and running spares (par. 6).
(2) Tighten all loose screws, bolts, and nu replace any that are missing.
(3) Remove oil, grease, and other stubbo dirt from all surfaces with a clean clo moistened in solvent (SD); then wi them with a dry cloth (par. 102).
(4) Inspect cords, cables, and wiring f correct position, securely fastened te minals, broken conductors, damag insulation, mildew, fungus, kinks, an bends (figs. 60 and 63).
(5) Clean cords, cables, terminals, and bin ing posts, SEND, REC, and BATTER connections of dirt, dust, grime, an corrosion (par. 102).
(6) Tighten all visible electrical connection for snug fit and good contact.
(7) Clean tarnish, grease, dust, grime, an oil from plugs.
(8) Check all line circuits for satisfactor operation (par. 121).
(9) Inspect outer surfaces of all component for rust, chipped paint, cracks, an broken glass (figs. 30 and 32).
(10) Inspect all visible electrical connections terminals, and binding posts for proper contact, firmness of seating, bent binding posts, rust, corrosion, and cracked terminal blocks.
(11) Check ground rod for tight connection, corrosion, and embedded firmness.
(12) Inspect all markings and designation strips for legibility.
(13) Inspect plugs for chips, cracks, tarnish, roughness, snug fit, and good contact.
(14) Check the mechanical action of each key and switch for freedom of movement, positive action, spring tension, and broken, missing, or illegible key tops (figs. 96 and 97).
(15) If deficiencies noted are not corrected during inspection, indicate action taken for correction.

105. Performing Interior Preventive Maintenance

Caution: Disconnect all power before performing the following operations. Upon completion, reconnect power and check for satisfactory operation.

a. Radio Equipment (fig. 108).
(1) Inspect electron tubes for loose envelopes, loose cap connectors, cracked sockets,

and insufficient socket spring tension; clean off dust and dirt carefully; check emission of receiver-type tubes (pars. 118 and 119).

(2) Inspect fixed capacitors for leaks, bulges, and discoloration (par. 118).

(3) 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. 150, 151, and 152).

(4) Inspect variable capacitors for dirt, moisture, misalinement of plates, and loose mountings (par. 118).

(5) Inspect resistors, bushings, and insulators for cracks, chipping, blistering, discoloration, and moisture (par. 118).

(6) Inspect terminals of large fixed capacitors and resistors for corrosion, dirt, and loose contacts (par. 118).

(7) Clean and tighten switches, terminal blocks, blowers, relay cases, and interiors of chassis and cabinets not readily accessible (par. 102).

(8) Inspect all terminal blocks for loose connections, cracks, and breaks (par. 118).

(9) Check settings of adjustable relays (par. 181).

(10) Lubricate equipment in accordance with applicable Department of the Army lubrication order (par. 106).

(11) Inspect motors for brush wear, spring tension, arcing, and fitting of commutator (par. 177).

(12) Clean and tighten connections and mountings for transformers, chokes, potentiometers, and rheostats (see applicable technical manual).

(13) Inspect transformers, chokes, potentiometers, and rheostats for overheating and oil leakage (see applicable technical manuals).

(14) Before shipping or storing, remove batteries from telephones, shelters, and power units.

(15) Inspect batteries for shorts and dead cells.

(16) Inspect for leaking waterproof gaskets, and worn or loose parts.

(17) Moistureproof and fungiproof when necessary (par. 115*b*).

(18) In any case where deficiencies are noted and not immediately corrected, indicate on the form the action taken to initiate correction.

b. Teletypewriter Equipment (fig. 110).

(1) Clean interior apparatus, where accessible, of dirt, dust, grease, grime, and oil (par. 102).

(2) Inspect interior wiring and cabling for frayed or damaged insulation, loose terminals, and broken conductors (par. 118).

(3) Solder any loose or broken solder connections.

(4) Inspect keys and switches for pitting, dirt, grease, and corrosion (refer to applicable technical manual).

(5) Adjust spring tension on contact spring where necessary (TM 11–352).

(6) Inspect key and switch contacts where necessary.

(7) Clean grease, dust, dirt, and oil from typing unit (par. 102).

(8) Inspect typing unit frame casting for cracks or other damage.

(9) Check the typing unit for loose or missing screws, free movement of all moving parts, bent, broken, distorted, or worn shafts, gears, springs, bearings, cams, and clutches (TM 11–352).

(10) Adjust any assemblies on the typing unit which require adjustment (TM 11–352).

(11) Clean dirt, grease, and excess lubrication from the type bar carriage.

(12) Inspect the type bar carriage frame for cracks or other damage.

(13) Check the type bar carriage for missing mounting screws, bolts, loose parts, signs of excessive wear and missing, broken, or distorted springs (refer to applicable technical manual).

(14) Inspect each bell crank, code bar, and type bar to determine that all parts move freely and are not bent or broken.

(15) Inspect each type bar for missing or damaged pallets.

(16) Inspect gears, shafts, and bearings of type bar carriage for signs of excessive wear, loose parts, and damages.

(17) Adjust any units on the type bar carriage that require adjustment.

(18) Clean oil, grease, dust, and dirt from keyboard, key taps, key levers, and around the transmitting mechanism (par. 102).

(19) Inspect the keyboard for loose, broken, or missing mounting screws and broken, missing, or distorted springs. Inspect for signs of wear or binding on shafts, gears, clutches, panels, latches, or cams.

(20) Inspect the keyboard casting for cracks or other damage.

(21) Tighten and adjust assemblies when necessary.

(22) Inspect the teletypewriter equipment motor bases for damage, signs of overheating, loose mounting screws, and brush wear.

(23) Clean foreign matter from the teletype writer equipment motor, base, an governor.

(24) Inspect interior electrical connection for tightness, moisture, oil, grease, an fungus (par. 102).

(25) Inspect moistureproofing and fungi proofing for general condition (par. 115)

(26) Operate the set and check for smoot operation, clear printing, signs of wear and evidences of motor or rectifier over heating (par. 121).

(27) If deficiencies noted are not correcte during inspection, indicate the actio taken for correction.

Section III. LUBRICATION

106. Approved Lubricants

The following table lists the lubricating materials necessary in servicing Radio Set AN/MRC–2(*):

Symbols	Standard nomenclature
OE–10	Oil, Engine, Heavy Duty.
PL–Special	Oil, Lubricating, Preservative, Special.
GL	Grease, Aircraft and Instruments.
WB	Grease, General Purpose.
SD	Solvent, Dry Cleaning.

107. Amplifier AM–141(*)/MRC

a. General. The intervals at which the amplifier is to be lubricated are based on average 8-hour-day operation, under normal conditions. For operation under climatic conditions in which extreme temperatures are encountered, the lubricants listed should be used in place of those specified.

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 parts are clean and free of dust or dirt. Lubricate sparingly. Wipe off excess lubricant.

b. Lubrication. Every 3 months, clean and lubricate the following parts:

(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 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.

(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, B2.* Apply 4 to 6 drops of oil (OE–10) to the blower motor through the oil tubes attached to each motor.

(5) *High pressure blower motor B3.*

(*a*) The high pressure blower motor requires lubrication annually, or more frequently, depending upon operating conditions. Complete lubrication requires disassembly. Refer to paragraph 178 for disassembly information.

(*b*) Clean the bearings with solvent (SD). Dry the bearings thoroughly before lubricating them. Knead grease (WB) into the space between the inner and outer races. Wipe off excess grease and reassemble the motor immediately to prevent contamination by dirt or dust.

Note. Some motors are equipped with sealed bearings which are prelubricated for the life of the bearings. Do not attempt to disassemble or lubricate motors of this type. If the motor fails due to lack of lubricant, replace the motor.

108. Radio Receiver Assembly OA–65(*)/MRC–2

a. It is necessary only to cover the tuning gear train teeth cam edges with a light grease (GL).

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

c. Remove old grease with a lint-free cloth moistened with carbon tetrachloride or solvent (SD).

d. Wipe the equipment with a dry cloth and apply lubricant.

e. Refer to TM 11–850 for additional information.

109. Control Unit C–292(*)/TRA–7

The lubrication of the control unit is relatively simple. Clean the shafts and areas adjacent to the switch shaft bearings. Apply 1 or 2 drops of oil (PL-Special) to the bearings. Wipe off excess oil.

110. Frequency Shift Exciter O–39(*)/TRA–7

Lubricate the shafts of the vernier drives and the edges of the vernier drive friction disks with grease (GL). These vernier drives are associated with the OSCILLATOR TUNING, BUFFER TUNING, and SHIFT capacitors which are component parts of Frequency Shift Exciter O–39(*)/TRA–7.

111. Dual Diversity Converter CV–31(*)/TRA–7

Every 3 months, or more often if necessary, remove all switch and control knobs and apply 1 or 2 drops of oil (PL-Special) on exposed shaft bearings. Lubricate all door hinges, fasteners, and slides with 1 or 2 drops of oil (PL-Special). Wipe off excess oil.

Caution: Do not allow oil to run into the electrical contacts of switches and relays, since a film of oil may cause serious damage or poor contact.

112. Teletypewriter TT–55/MGC (Teletypewriter TG–7–B)

The only lubricants and preservatives recommended for use on Teletypewriter TT–55/MGC (Teletypewriter TG–7–B) are:

a. Oil, General Purpose, Low Temperature, Lubricating AN–0–6a.

b. Grease, Aircraft and Instruments (GL), US A Spec. 2–134.

c. Ten percent solution of Alox 937 in Oil, General Purpose, Low Temperature, Lubricating, AN–0–6a.

Note. Do not use substitutes except in emergencies.

d. A lubrication schedule, and complete detailed lubrication instructions can be found in TM 11–352.

113. Radio Transmitter BC–610–(*)

Refer to TM 11–826 for lubrication information.

114. Power Unit PE–95–(*)

Refer to TM 11–904 for lubricating information.

Section IV. WEATHERPROOFING

115. 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 fungi-proofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained in TB SIG 13 and TB SIG 72.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66 and TB SIG 219.

d. Desert Maintenance. Special precautions are 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 TB SIG 69 and pay strict attention to all lubri tion orders when operating equipment under co ditions of extreme cold or heat. Refer to par graphs 106 through 114 for detailed instructio

116. Rustproofing and Painting

a. When the finish on the case has been bad scarred or damaged, rust and corrosion can b prevented by touching up bared surfaces. U No. 00 or No. 000 sandpaper to clean the surfa down to bare metal; obtain a bright, smoot finish.

Caution: Do not use steel wool. Minute pa ticles frequently enter the cases and cause harmfu internal shorting or grounding of circuits.

b. When a touch-up job is necessary, appl paint with a small brush. Remove rust from th case by cleaning corroded metal with solvent (SD) In severe cases it may be necessary to use solven (SD) to soften the rust and to use sandpaper t complete the preparation for painting. Paint used will be authorized and consistent with exist- ing regulations.

Section V. TROUBLESHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

117. 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 in determining such trouble as burned-out tubes, fuses, and circuit elements.

b. The following paragraphs in this section will help to determine which component is at fault. After localizing the fault to a component, the defective stage or item can be determined.

118. 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.

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 permitted by the tactical situation.

119. System Sectionalization of Trouble to 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 checklist (par. 121) for normal operating indications.

c. If the components of any particular shelter do not function, 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

cking elsewhere to determine the source of the uble.

. If the signal is present in one component (as icated by a correct meter reading), but there is o indication of a signal in the component which fows it, the trouble may be a defective con- tor or a disconnected cord.

Note. The order in which one component follows the er is shown on the complete block diagram (fig. 118).

f. If the teletypewriter equipment does not erate properly, the trouble is probably in the letypewriter equipment cords, plugs, or jacks, d in the setting of switches in Control Unit 292(*)/TRA–7.

g. To find the source of excessive noise, remove te antenna lead-in from the operating receiver. noise becomes less pronounced or stops, the uble is either in the antenna, or is from a urce external to the shelter. If noise persists, y one receiver at a time. If the noise continues ith either receiver, the trouble is in one of the mponents.

h. Use the procedures outlined above to isolate e trouble to a particular unit.

i. If these checks are not productive, use the uipment performance checklist (par. 121).

20. Troubleshooting by Using Equipment Performance Checklist

a. General. The equipment performance check- st (par. 121) 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.

121. Equipment Performance Checklist

a. Transmitting Shelter.

	Unit	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	Power Unit PE–95–(*)	Fuel tank	Check fuel gage	Full	Add fuel.
		Fuel valve	Check position	Open in local position	Set in local supply position.
		Lubrication oil supply	Check bayonet gage	Full	Add oil.
		Air cleaner	Check oil reservoir	Oil up to bead on cleaner	Add oil.
		Radiator	Check water level	About 2 inches below top of filter neck.	Add water.
		Crankcase breather	Check oil level	Filled to indicated level	Add oil.
		CIRCUIT BREAKER ON-OFF switch.	Check to see that it is in the ON position.	In ON position when remote start-stop operation from Junction Box JB–70–A is required.	Place in ON position.
		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.
	Junction Box JB–70–A	TRANS. ON-TRANS. OFF REC. TO EE–8 switch.	Set at TRANS. OFF position.		
		C. W.-SIDETONE switch	Set at OFF position		
		BATTERY SOURCE switch	Set at AUX		
		REMOTE CONTROL EE–8 switch.	Set at NORMAL position		
		RECEIVER DISABLING switches.	Set BC–312 and BC–342 switches at OFF.		
		RECEIVER OUTPUT switch	Set to NORMAL		
	Rectifier RA–63–(*)	Main control switch	Set to TR. CHG		
	Frequency Shift Exciter O–39(*)/TRA–7.	AC SUPPLY switch	Set at OFF		
		OVEN switch	Set at OFF (down)		
		TEST OSC	Set at OFF		
		OSCILLATOR RANGE switch.	Set in accordance with calibration chart.		
		OSCILLATOR TUNING control.	Set in accordance with calibration chart.		
		SHIFT control	Set in accordance with calibration chart.		
	Radio Receiver BC–312–( ).	SEND-REC switch	Set at SEND position		
		BAND CHANGE switch	Set to correct band		
		FAST TUNING control	Set to approximate frequency required.		
		CW-OSC switch	Set to ON and c-w reception		

Frequency Meter BC–221–( ).	Operation switch	Set at OFF position	
	Rectifier switch	Set at OFF position	
Radio Transmitter BC–610–(*).	FILAMENT POWER switch	Set at OFF (down)	
	FILAMENT VOLTAGE control.	Set at full counterclockwise position.	
	HIGH VOLTAGE PROTECT switch.	Set at OFF (normal)	
	PLATE POWER switch	Set at OFF (down)	
	C. W.-PHONE switch	Set at C. W. position	
	EXCITATION METER SWITCH.	Set at INT. AMP. GRID	
	BAND SWITCH	Set to channel corresponding to desired tuning unit.	
	Tuning unit	Check selection of proper tuning unit.	
	Coil unit	Check selection of proper coil unit for frequency desired.	
	M. O.-XTAL switch of tuning unit.	Set at XTAL	
	DOUB. knob	Set in accordance with calibration chart.	
	INT. AMP control	Set in accordance with calibration chart.	
	PLATE TUNING dial	Set in accordance with calibration chart.	
Amplifier AM–141(*)/MRC.	CIRCUIT BREAKER switch	Set to OFF position	
	NORMAL-TUNEUP switch	Set to TUNEUP position	
	PLATE POWER switch	Set to OFF (down) position	
	NEUT. SWITCH	Set to OFF position	
	INCREASE EXCITATION control.	Set to full counterclockwise position.	
	INCREASE FILAMENT control.	Set to full counterclockwise position.	
	GRID TUNING dial	Set in accordance with calibration chart.	
	PLATE TUNING dial	Set in accordance with calibration chart.	
	BAND SWITCH	Set to correct position as given by calibration chart.	

121. Equipment Performance Checklist—Continued

a. Transmitting Shelter—Continued

	Unit	Item	Action or condition	Normal indications	Corrective measures
S T A R T	Power Unit PE–95–(*)	CIRCUIT BREAKER ON-OFF switch (Main power switch if commercial source is used).	Set at ON		
	Junction Box JB–70–A	START-STOP button	Push START button	Power unit starts. Normal line voltage (117 volts) indicated on A. C. LINE VOLTAGE METER on power unit panel. Shelter lights go on.	Check cords CO–335, CD–652, CO–316. Check for discharged battery in power unit. Check circuit breaker Check PE–95–(*) circuit breaker. Use hand crank.
	Radio Receiver BC–312–( ).	OFF–M. V. C.-A. V. C. switch.	Turn to M. V. C. position for c-w operation.	Dial lamp lights Dynamotor starts.	Refer to TM 11–904. Refer to TM 11–850.
		Rectifier switch	Turn to ON	Pilot lamp lights	
	Frequency Meter BC–221–( ).	Operation switch	Turn to CHECK position	Beat notes should be heard in headset (connected to PHONES jack on frequency meter).	Check a-c cord and fuse. Check a-c cord plug. Check to see that phone plug is fully inserted.
		GAIN control	Set to midposition		
		Tuning dial	Rotate back and forth several turns.		
	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. Check fuses on front panel; replace if necessary.
		OSCILLATOR RANGE switch.	Set in accordance with calibration chart.		Refer to paragraph 61 or to TM 11–257.
	Radio Transmitter BC–610–(*).	FILAMENT POWER switch	Set switch to ON. Wait 1 minute for filaments to reach operating temperature.	Green pilot lamp and PLATE TUNING dial on transmitter light.	If both lamps are out, check FUSES FS1, 2, 4 and Cord CD–763, replace fuses if necessary. Replace lamps.
		FILAMENT VOLTAGE control.	Turn partially clockwise	FILAMENT VOLTAGE meter reads 5 to 5.3 volts.	Adjust FILAMENT VOLTAGE control.

	Amplifier AM–141–(*)/MRC.	CIRCUIT BREAKER switch	Set CIRCUIT BREAKER to ON position.	CUIT BREAKER glows.	Check Cord CX–135/MRC–1, Cord CX–137/MRC–1, and Cord CX–136/MRC–1.
		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. Check power cords listed in step above.
EQUIPMENT PERFORMANCE	Frequency Shift Exciter 0–39(*)/TRA–7.	BUFFER TUNING control	All dials and controls set in accordance with charts.	BUFFER INDICATOR lamp glows with maximum brilliancy when BUFFER TUNING dial is turned to resonance.	Refer to paragraph 61 or to TM 11–257.
			TEST key set at MARK or SPACE.		Replace tube V101, V102, or V104.
			BUFFER TUNING dial rotated in either direction.		Replace buffer indicator lamp
		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 paragraph 61 or TM 11–257.
		Headset	With plug inserted into PHONES 850 ~ TEST jack, VOLUME 850 ~ TEST control set to midposition, and TEST OSC switch set to 850 ~ (on) position.	850-cycle tone heard in headset.	Refer to paragraph 61 or TM 11–257.
		VOLUME 850 ~ TEST control.	Rotate in either direction	Level of 850-cycle tone will vary.	Refer to paragraph 61 or TM 11–257.
		OSCILLATOR TUNING control.	TEST OSC switch in OFF position. TEST key in MARK position.	Zero beat obtained in phones when exciter oscillator is turned to operating frequency.	Refer to paragraph 61 or TM 11–257.
			Frequency meter set to assigned frequency. Transmitter alined to exciter frequency.		Check settings and readjust controls.
			Rotate OSCILLATOR TUNING dial in either direction.		Replace tube V107, V108, V109, or V104.

121. Equipment Performance Checklist—Continued

a. Transmitting Shelter—Continued

	Unit	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	Frequency Shift Exciter 0–39(*)/TRA–7—Con.	SHIFT dial	TEST OSC switch in ON position. TEST key in SPACE position. Rotate SHIFT dial very slightly in either direction. Transmitter alined to exciter frequency.	A second audio tone heard with 850-cycle tone. Second tone varies in frequency as SHIFT dial is adjusted, and zero beat is obtained when properly adjusted. This point also is indicated on 850-TEST indicator tube by minimum flutter.	Refer to paragraph 61 or TM 11–257. Replace tube V103. Replace tube V110.
	Radio Transmitter BC–610–(*).	EXCITATION METER	TEST key on exciter unit set to MARK. EXCITATION METER SWITCH set to: DOUB. PLATE x 10. INT. AMP. GRID x 1. INT. AMP PLATE x 20 P. A. GRID x 10.	EXCITATION METER reads: 25 to 45 ma, 1 to 8 ma, 125 to 175 ma, 60 to 100 ma.	If the meter does not indicate in any position, check the following: The installation and tuning of the tuning unit. The setting of the BAND SWITCH. The position of the M. O.-XTAL switch on the tuning unit. If the meter readings are improper, retune the transmitter; replace V8, V9, V10, or V11 if necessary.
		P. A. PLATE meter	TEST key on exciter set to MARK	200 to 300 ma	Check tuning of P. A. PLATE TUNING control. Check adjustment of GRID TUNING control on the power amplifier. Check plate coil and the position of the link. Check INCREASE EXCITATION control on power amplifier. Operate the OVERLOAD RESET. Check FUSES FS1, FS2, and FS3. Check all interlock switches Replace V6, V7, or V16, if necessary.

Amplifier AM-141-(*)/MRC.	GRID CURRENT meter--	TEST key on exciter unit set to MARK.	170 to 200 ma	TUNING control. Check adjustment of PLATE TUNING control on transmitter. Check adjustment of INCREASE EXCITATION control on power amplifier. Replace V1, V2, V3, or V4.
	PLATE POWER switch----	Set at ON position----------	PLATE POWER indicator lamp should light.	Push OVERLOAD RESET switch button. Throw CIRCUIT BREAKER to OFF position and check PLATE POWER indicator lamp. See that all equipment doors are closed.
	PLATE CURRENT meter---	TEST key on exciter in MARK position. NORMAL-TUNEUP switch in TUNEUP position. NORMAL-TUNEUP switch in NORMAL position.	---------- Meter reads 300 to 325 ma--- Meter reads 900 to 1,000 ma--	Replace V1 or V2. Push OVERLOAD RESET switch button. Check adjustment of PLATE TUNING control. Check adjustment of antenna coupling coil. Check antenna installation and length. Replace tubes V1, V2, V5 or V6, if necessary. Check neutralization.

121. Equipment Performance Checklist—Continued

a. Transmitting Shelter—Continued

	Unit	Item	Action or condition	Normal indications	Corrective measures
STOP		PLATE POWER switch	Set at OFF position	PLATE POWER indicator lamp goes out.	
		NORMAL-TUNEUP switch	Set to TUNE UP position (down).		
		CIRCUIT BREAKER switch	Set at OFF position	Bias and filament supply shut off. Blowers stop operating. Transmitter PLATE POWER indicator lamp goes out.	
	Radio Transmitter BC 610 (*).	FILAMENT POWER switch	Set to OFF position	White light goes out and filament power shuts off.	
	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.	BUFFER INDICATOR lamp goes out.	
		AC SUPPLY and OVEN switches.	Set at OFF (down) position	OVEN and dial lamps go out	
		Rectifier switch	Set to OFF position	Pilot lamp goes out	
	Frequency Meter BC 221–( ).	Operation switch	Set to OFF position		
	Radio Receiver BC–312 ( ).	OFF-M. V. C.-A. V. C. switch	Turn to OFF position	Pilot lamps go out.	
	Junction Box JB–70–A.	STOP button	Press STOP button	All power goes off	

b. Receiving Shelter.

	Unit	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	Power Unit PE–95–(*)	Fuel tank	Check fuel gage	Full	Add fuel.
		Fuel valve	Check position	Open in local position	Set in *local* supply position.
		Lubrication oil supply	Check bayonet gage	Full	Add oil.
		Air cleaner	Check oil reservoir	Oil up to bead on cleaner	Add oil.
		Radiator	Check water level	About 2 below top of filler neck.	Add water.
		Crankcase breather	Check oil level	Filled to indicated level	Add oil.
		CIRCUIT BREAKER ON-OFF switch.	Check to see that it is in the OFF position.	In OFF position	Place in OFF position.
		MANUAL START-REMOTE START switch.	Check to see that it is in REMOTE START position.	In REMOTE START position.	Place in correct position for starting method used.
	Shelter HO–17–(*)	Power circuit breaker	Set to OFF position		
		Lights circuit breaker	Set to OFF position		
	Radio Receiver Assembly OA–65(*)/MRC–2, Channel A and Channel B receivers.	OFF-M. V. C.-A. V. C. switch.	Turn to OFF position		
		REC.-SEND switch	Set to REC. position		
		BAND CHANGE switch	Set to correct band		
		C. W.-O. S. C. switch	Set to OFF position		
		FAST TUNING control	Tune to approximate frequency to be used.		
		CRYSTAL PHASING knob	Turn to OUT position		
	Teletypewriter TG–7–B or TT–55/MGC.	ON-OFF motor switch	Set to OFF position		
	Dual Diversity Converter CV–31(*)/TRA–7.	AC SUPPLY switch	Set in OFF (down) position		
		PLATE ON switch	Set in OFF (down) position		
		OUTPUT switch	Set to NORMAL position		
		METER B switch	Turn to COMP AMP position.		
		DRIFT COMPENSATOR switch.	Place in OUT (down) position		

121. Equipment Performance Checklist—Continued

b. Receiving Shelter—Continued

	Unit	Item	Action or condition	Normal indications	Corrective measures
START	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 MANUAL START position. Refer to TM 11–904. Check circuit breaker.
		CIRCUIT BREAKER ON-OFF switch (main power switch if commercial source is used).	Set to ON position	Normal line voltage (117 volts) indicated on AC VOLTS meter on power unit panel.	Refer to TM 11–904.
		Power Unit PE–75–( ) (for emergency use only).			
		Starting rope	Pull rope	Power unit starts	Refer to TM 11–900.
	Shelter HO–17–(*)	Power circuit breaker	Set to ON position		
		Light circuit breaker	Set to ON position	Shelter power lamps go on	Check Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U from PE–95–(*). Check Cord CX–918/MRC–2 from PE–75–( ), if used.
	Radio Receiver Assembly OA–65(*)/MRC–2, Channel A and Channel B receivers.	OFF-M. V. C.-A. V. C. switch	Turn to M. V. C. position	Dial lamps light	Check fuses on front panel. Check power cord and plugs. Replace dial lamps.
		VOL. controls	Turn clockwise	Increased signal or noise is heard (speaker plugged into TO REC A or TO REC B jack on control box).	See TM 11–850.
	Dual Diversity Converter CV–31(*)/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.
		PLATE ON switch	Throw to ON position	Red-capped pilot lamp should light.	Check power Cord CX–954/TRA–7, fuses and lamp. Replace fuses F301, F302.
	Teletypewriter TG–7–B or TT–55/MGC.	Motor ON-OFF switch	Set to ON position	Motor starts	Check power cord.

Radio Receiver Assembly OA–65(*)/MRC–2, Channel A and Channel B receivers.	ALIGN INPUT control	Rotate	Maximum noise peaks or signal can be obtained.	Check antenna.
	VERNIER control	Adjust	Use for fine adjustment of receiver tuning.	
	CW-OSC ADJUST control	Rotate control in either direction (c-w operation only).	Beat note can be heard to pass through zero beat.	Return signal using VERNIER control.
	Headset or loudspeaker	Set operating normally. Plug inserted into TO REC A or TO REC B jack at control box.	Signal is heard	Check plug and cable connections. Tune receiver.
Dual Diversity Converter CV–31(*)/TRA–7.	−400-volt supply	METER B switch in −400V position.	Meter B indicates between 65 and 95 to the left.	Replace tube V303 if necessary.
	−150-volt supply	METER B switch in −150V position.	Meter B indicates between 20 and 40 to the left.	Replace tube V302 if necessary.
	Regulated −150-volt supply	METER B switch in REG −150V position.	Meter B indicates between 20 and 40 to the left.	Replace tube V303 if necessary.
	Regulated +150-volt supply	METER B switch in REG +150V position.	Meter B indicates between 20 and 40 to the left.	Replace tube V301 if necessary.
	+275-volt supply	METER B switch in +275V position.	Meter B indicates between 50 and 70 to the right.	Replace tube V301 if necessary.
	Input signal	METER B switch in INPUT position.	Peak indication on meter B of 100 to the right.	Increase receiver volume if required; replace V101, V103 if necessary.
	Neutral loop current	METER B switch in NEUTRAL position.	Meter B indicates +60 (0.060 amp) for mark signals, 0 for space signals.	Adjust NEUTRAL OUTPUT control. Check V117, V118.
	Polar loop current	METER B switch in POLAR position.	Meter B indicates +25 (0.025 amp) for mark signals, −25 for space signals.	Adjust POLAR OUTPUT, MARK, and SPACE controls. Check V115, V116.
	Channel A+B signal	METER B switch in CHAN A+B position.	Drift compensator out; meter B indicates +100 (mark) and −100 (space). Drift compensator in; meter B indicates +70 (mark) and −70 (space).	Adjust DRIFT COMPENSATOR LIMITER control. Replace tube V111.
	Output of channel B discriminator.	METER B switch in CHAN B position, receiver A volume reduced.	Meter B indicates ±50 for steady mark signal, averages 0 for miscellaneous signals.	Check tuning of CHANNEL B FINE TUNING control and tuning of receiver B. (Frequency shift of transmitter may not be 850 cycles.) Check V102, V103, V110; replace if necessary.

121. Equipment Performance Checklist—Continued

b. Receiving Shelter.—Continued

	Unit	Item	Action or condition	Normal indication	Corrective measures
EQUIPMENT PERFORMANCE	Dual Diversity Converter CV-31(*)/TRA-7- Con.	Output of channel A discriminator.	Receiver B volume reduced	Meter A indicates ±50 for a steady mark signal, averages 0 for miscellaneous teletypewriter signals.	Check tuning of CHANNEL A FINE TUNING control and tuning of receiver A. (Frequency shift of transmitter may not be 850 cycles.)
		Diversity output of channel A and B discriminators.	METER B switch in CHAN B position.	Reading on meter A will exceed reading of meter B about 50 percent of the time when steady mark signal is received; sum of meter A and B readings will be approximately 50.	Check V109. Check tube V103, V109.
		Drift compensator circuit	METER B switch in COMP AMP position, LIMITER control in full clockwise position.	Minimum kicks on meter B while receiving signals.	Adjust AMP GAIN control for minimum meter kicks. Check tube V112.
		Mark condition	Converter OUTPUT switch at MARK position.	Teletypewriter runs closed	Refer to TM 11-352.
		Space condition	Converter OUTPUT switch at SPACE position.	Teletypewriter runs open	Refer to TM 11-352.
STOP	Dual Diversity Converter CV-31(*)/TRA-7.	PLATE ON switch	Throw to off (down) position	Red-capped pilot lamp goes out.	
		AC SUPPLY switch	Throw to off (down) position	White-capped pilot lamp goes out.	
	Radio Receiver Assembly OA-65(*)/MRC-2 (Channel A and Chan- B receivers).	OFF-M. V. C.-A. V. C. switch	Turn to OFF position	Dial lamp goes out	
	Teletypewriter TG-7-B or TT-55/MGC.	Motor ON-OFF switch	Set to OFF position	Motor stops	
	Shelter HO-17-(*)	Power and light circuit breakers.	Set to OFF position	Power and lights go off	
	Power Unit PE-95-(*)	START-STOP button	Press STOP button firmly until engine stops.	Engine stops. AC VOLTS meter indicates 0.	
		CIRCUIT BREAKER ON-OFF switch.	Set to OFF position		
	Power Unit PE-75-( ) (if used).	STOP button	Press STOP button firmly until engine stops.	Engine stops	

c. Operating Shelter.

	Unit	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	Power Unit PE–95–(*)	Fuel tank	Check fuel gage	Full	Add fuel.
		Fuel valve	Check position	Open in local position	Set in *local supply* position.
		Lubrication oil supply	Check bayonet gage	Full	Add oil.
		Air cleaner	Check oil reservoir	Oil up to bead on cleaner	Add oil.
		Radiator	Check water level	About two below top of filler neck.	Add water.
		Crankcase breather	Check oil level	Filled to indicated level	Add oil.
		CIRCUIT BREAKER ON-OFF switch.	Check to see that it is in the OFF position.	OFF position	Place in OFF position.
		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.
	Shelter HO–17–(*)	Power circuit breaker	Set to OFF position		
		Lights circuit breaker	Set to OFF position		
	Teletypewriter TG–7–B (receiving) or TT–55/MGC.	Motor ON-OFF switch	Set to OFF position		
	Teletypewriter TG–7–B (sending) or TT–55/MGC.	Motor ON-OFF switch	Set to OFF position		
	Reperforator-Transmitter TG–26–A or Perforator-Transmitter TT–56/MGC.	Typing reperforator POWER switch.	Set to the OFF (down) position.		
		Transmitter-distributor MOTOR ON-MOTOR OFF switch.	Set to MOTOR OFF position		
		Transmitter-distributor STOP-SEND switch.	Set to STOP position		
	Rectifier RA–87–(*)	ON-OFF switch	Set to OFF position		
	Control Unit C–292(*)/TRA–7.	AC SUPPLY switch	Set to OFF (down) position		
		TRANSMITTER switch	Set to OFF (down) position		

121. Equipment Performance Checklist—Continued

c. Operating Shelter.—Continued

	Unit	Item	Action or condition	Normal indications	Corrective measures
START	Power Unit PE–95–(*)	START-STOP button	Push START button	Power unit starts, normal line voltage, 117 volts indicated on AC VOLTS meter on power unit panel.	Check for discharged battery in power unit. Set MANUAL START-REMOTE START switch to REMOTE START. Substitute Power Unit PE–75–( ). Refer to TM 11–904.
		CIRCUIT BREAKER ON-OFF switch (main power switch if commercial source is used).	Set at ON position	AC AMPERES meter on power unit panel indicates 0.	Check circuit breaker. Check Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U.
	Power Unit PE–75–( ) (for emergency use only).	Starting rope	Pull rope	Power unit starts	Refer to TM 11–900.
	Shelter HO–17–(*)	Power circuit breaker switch	Set to ON position	Equipment starts when turned on.	Check Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U from PE–95–(*).
		Light circuit breaker switch	Set to ON position	Lamps go on	Check circuit breakers.
	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 a-c outlet to bench. Check bench connector and outlet. Check Cord CX–959/TRA–7. Refer to TM 11–262.

Control Unit C–292(*)/ TRA–7.	—150-volt supply	METER switch in —150 VOLT SUPPLY position.	Meter indicates 75 ±5 to the left of zero.	on top of chassis. Check tube V117.
	+300-volt supply	METER switch in +300 VOLT SUPPLY position.	Meter indicates 75 ±5 to the right of zero.	Adjust +300 ADJ control on top of chassis. Check tubes V114, V108, V111.
	—300-volt supply	METER switch in —300 VOLT SUPPLY position.	Meter indicates 75 ±10 to the left of zero.	Check tubes V116, V110.
	Send extension current	METER switch in SEND EXT CURRENT position. BREAK key on send teletypewriter, depress for space, release for mark.	Meter indicates 0 Meter indicates 75 (60 ma) to the right of zero.	Check Cord CX–956/TRA–7. Check SEND EXT jumper. Check SEND EXT jacks. Check patch cords. Check plugs on send teletypewriter.
	Receive extension current	METER switch in REC EXT CURRENT position. Press RECEIVING TEST SPACE button on control unit. Press RECEIVING TEST MARK button on control unit.	--- Meter indicates 0 Meter indicates 75 (60 ma) to the right of zero for full-duplex operation; 0 for half-duplex or one-way reversible.	--- Adjust EXTENSION CURRENT control. Check Cord CX–956/TRA–7. Check REC EXT jumper. Check patch cords. Check plugs on receiving teletypewriter.
	Balance circuit	METER switch in BALANCE position, alternately depress RECEIVING TEST, MARK, SPACE buttons on control unit.	Equal indications (approximately 75) each side of zero (MARK to the right; SPACE to the left).	Adjust BALANCE ADJ control on top of chassis for equal deflections.
	Receiving line	METER switch in REC LINE CURRENT position; have alternate mark and space signals sent from the receiving shelter.	Meter reading of 75 (25 ma) ±10 to the right of zero for mark signals, and 75 (25 ma) ±10 to the left of zero 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 to receiving shelter. Check Cord CX–957/TRA–7. Reverse LINE wires to receiving shelter.

121. Equipment Performance Checklist—Continued

c. Operating Shelter—Continued

	Unit	Item	Action or condition	Normal indications	Corrective measures
EQUIPMENT PERFORMANCE	Control Unit C–292(*)/TRA–7—Continued	TRANSMITTER remote 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 the NORM position).
		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 set TEST key of exciter to the NORM position; check frequency shift.	Meter reads 75 (25 ma) to the left of zero. Meter reads 60 (20 ma) to the right of zero. Shift should be 850 cycles	Refer to TM 11–262. Check LINE going to transmitting shelter. Check Cord CX–958/TRA–7. Adjust SENDING LINE CURRENT, SPACE, and MARK controls. Adjust SENDING LINE CURRENT, SPACE, and MARK controls. Have transmitter shelter operator adjust shift.
			Compare mark signals from operating shelter with the test mark signal at transmitting shelter.	The same note should be heard in the headset.	Reverse LINE going to transmitting shelter.
	Sending Teletypewriters TG–7–B or TT–55/MGC.	Send teletypewriter motor ON-OFF switch.	Set to ON position. METER switch in SEND LINE CURRENT position.	Motor runs; machine holds. Control unit meter indicates 60 to the right of zero.	Check teletypewriter power selector switch 50- to 60-cycle position. Check a-c cord. Check jacks (SEND EXT). Check patch cords.
		BREAK key	Depress BREAK key momentarily.	Control unit meter indicates 75 to left of zero. Teletypewriter runs open.	
		Space bar	Hold space bar down momentarily.	Carriage travels to right, stops when space bar is released.	
		Manual carriage return lock bar.	Press carriage return bar	Carriage returns to left side of teletypewriter.	
		Test message	ON-OFF (send-stop) switch in ON position (send test message).	Teletypewriter types; same test message should appear on page copy.	Refer to TM 11–352.

	Motor ON-OFF switch			50–60 cycles.
Receiving Teletypewriters TG–7–B or TT–55/MGC.				Check a-c cord.
	RECEIVING TEST MARK key on control unit.	Momentarily depress MARK key on control unit.	Teletypewriter runs closed	Check patch cords. Check jacks, plugs, on receive teletypewriter.
	RECEIVING TEST SPACE key on control unit.	Momentarily depress SPACE key on control unit.	Teletypewriter runs open	Refer to TM 11–352.
	Manual carriage return lock bar.	Press carriage return lock bar.	Carriage returns to left side of teletypewriter.	Refer to TM 11–352.
Rectifier RA–87	Power ON-OFF switch	Set to ON position		Check power selector switch (50–60 cycles) position.
Reperforator-Transmitter TG–26–A or Perforator-Transmitter TT–56/MGC.	POWER switch on typing reperforator.	Set to UP (on) position	Motor operates; machine runs closed.	Check motor (jack box) a-c cord. See TM 11–2223. Check Rectifier RA–87. Check d-c cord (connection box). Check red and black plugs of reperforator.
	LINE BREAK KEY	Press	Machine runs open	
		Release	Machine runs closed	
	Space bar	Hold down momentarily (10 seconds).	Machine runs open	
		Release	Signal lamp indicates end of line.	Press LINE FEED and CAR RET keys.
	CAR RET key	Press	Lamp goes out	Check lamp. Press LINE FEED and CAR RET keys.
	Test message	Type test message	Tape should be printed and perforated correctly.	Refer to TM 11–2223 and TM 11–2201.
	MOTOR ON-MOTOR OFF switch (on transmitter-distributor).	Set to MOTOR ON position	Motor on transmitter-distributor runs.	
	STOP-END switch	Set to SEND position	Reperforator runs closed	
	Tape stop lever	Place tape stop lever in down position.	Tape feeds	
		Raise lever	Tape stops	
	Test tape	Run tape	Reperforator prints	Refer to TM 11–2223 and TM 11–2201.

121. Equipment Performance Checklist—Continued

c. Operating Shelter—Continued

	Unit	Item	Action or condition	Normal indications	Corrective measures
EQUIP. PERFORMANCE	Final test	Test message	Have operator at transmitting shelter place all switches in position for transmitting FS signals. Send test message by prearrangement with distant station. Have operator at receiving shelter tune receivers to distant station. Have distant station send a test message.	Test message sent from the operating shelter should be printed on the send teletypewriter in the operating shelter and on the receiving teletypewriter at the distant station. Test message from distant station should be printed on monitor teletypewriter in receiving shelter and on receiving teletypewriter in operating shelter as well as on sending teletypewriter at distant station. The test messages should be identical.	
STOP	Teletypewriters TG–7–B or TT–55/MGC.	Motor ON-OFF switch (both teletypewriters).	Set to OFF position	Motor stops	See TM 11–2352.
	Reperforator-Transmitter TG–26–A or Perforator-Transmitter TT–56/MGC.	Typing reperforator POWER switch.	Set to OFF position	Motor stops	See TM 11–2223.
		STOP-SEND switch	Set at STOP position	Tape stops	See TM 11–2222.
		MOTOR ON-MOTOR OFF switch.	Set to MOTOR OFF position	Motor stops	
	Rectifier RA–87	Power ON-OFF switch	Set to OFF position		Refer to TM 11–957.
	Control Unit C–292(*)/TRA–7.	TRANSMITTER switch	Set to DOWN (off) position	Green TRANSMITTER indicator lamp should go out. Transmitter and FS exciter plate power in transmitting shelter go off.	
		AC SUPPLY switch	Set to DOWN (off) position	AC SUPPLY indicator lamp should go out.	
	Shelter HO–17–(*)	Power circuit breaker and lights circuit breaker.	Throw to OFF position	Power and lights in shelter should go off.	
	Power Unit PE–95–(*)	CIRCUIT BREAKER ON-OFF switch.	Set at OFF position		
		START-STOP button	Press STOP button firmly until engine stops.	Engine stops; AC VOLTS meter reads 0.	
	Power Unit PE–75–( )	STOP button	Press STOP button firmly until engine stops.	Engine stops	

CHAPTER 5
THEORY

Section I. GENERAL

122. Introduction

The theory of Radio Set AN/MRC–2(*) is discussed in this chapter in order to give the operators of the radio set a concept of the equipments operating as a system, rather than of a number of separate components functioning individually. The subject is treated as follows:

a. Section II. The overall system theory is detailed in this section, using diagrams showing the application of teletypewriter circuits to r-f circuits, and the system block diagram (fig. 118) to show the signal circuits of both the transmitting and receiving channels of the radio set. Details of power distribution and the main interunit control circuits are detailed by theory and functional diagrams showing their path between shelters.

b. Section III. Brief component theory is presented in this section concerning the components which have their theory and maintenance information detailed in individual technical manuals. Complete schematic diagrams of the components described will be found in the back of this manual.

c. Section IV. Detailed theory of Amplifier AM–141(*)/MRC is given in this section. Differences in models of the amplifiers are given for the information of field maintenance personnel. Amplifier power and control circuits are discussed separately in this section.

d. Section V. General antenna theory is reviewed, with emphasis given to systems applicable to Radio Set AN/MRC–2(*).

123. References

The theory of the components listed below is covered in the indicated technical manuals.

Radio Receiver Assembly OA–65(*)/MRC–2	TM 11–850
Dual Diversity Converter CV–31(*)/TRA–7	TM 11–261
Teletypewriter TG–7–B or TT–55/MGC	TM 11–352
Telephone EE–8–( )	TM 11–333
Power Unit PE–95–(*)	TM 11–904
Control Unit C–292(*)/TRA–7	TM 11–262
Reperforator Transmitter TG–26–A or	TM 11–2201
Perforator Transmitter TT–56/MGC	TM 11–2222
Frequency Shift Exciter O–39(*)/TRA–7	TM 11–257
Antenna Tuning Unit BC–939–(*)	TM 11–826
Radio Transmitters BC–610–E, –F, G, H	TM 11–826
Frequency Meter BC–221–( )	TM 11–300
Speech Amplifier BC–614–(*)	TM 11–5054
Junction Box JB–70–A	TM 11–281
Radio Receiver BC–312–( )	TM 11–850
Line Unit BE–77–( )	TM 11–359

Section II. SYSTEM THEORY

124. General

Radio Set AN/MRC–2(*) consists of an assembly of equipments in three shelters operating as a system and employing both wire and radio equipments. The following paragraphs of this section are a general discussion of basic teletypewriter theory as applied to radioteletype circuits, and the distribution of teletypewriter and r-f signals along with a-c, d-c, and control voltages throughout the radio set to enable the set to function as a system.

125. Basic Teletypewriter Circuits and Signals

a. Neutral Circuits. The teletypewriter equipments in the radio set which require neutral circuits for their operation are Teletypewriters

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TT–55/MGC (modified Teletypewriter TG–7–B), and Perforator-Transmitter TT–56/MGC (modified Reperforator-Transmitter TG–26–A). The latter consists of a typing-reperforator with keyboard, a transmitter-distributor, and a connection box for patching circuits. Neutral circuits are teletypewriter or telegraph circuits employing a line or loop current (in Signal Corps teletypewriter circuits this current is normally 60 ma) flow when the circuit is closed, and no flow of current when an open circuit exists. In other words, there is a circuit make-and-break for the transmission of signal intelligence. The sending contacts of the TD (transmitter-distributor) and the keyboard contacts of the teletypewriters are connected in series with the selector magnet windings of the receiving teletypewriter equipments (when in the same loop) and the source of loop or line current. Therefore, manual typing on the keyboards or the use of a perforated tape in the TD will open and close the contacts, interrupting the flow of loop current, and actuate the armature of the receiving teletypewriter selector magnets. Figure 111 (neutral) illustrates a basic teletypewriter neutral circuit, showing the sending contacts, the selector magnet windings, and the source of loop current series-connected in the loop.

b. Polar Circuits. The equipments in the radio set which require or produce polar d-c signals for operation of the system are Control Unit C–292(*)/TRA–7, Frequency Shift Exciter O–39(*)/TRA–7, and Dual Diversity Converter CV–31(*)/TRA–7. The control unit accepts neutral signals from the teletypewriter equipments and converts them to polar signals for the input of the FS exciter which is designed to accept only polar-type d-c impulses. The dual-diversity converter supplies polar signals to the control unit where they are converted into neutral d-c impulses for the operation of the teletypewriter components. The selector magnets in the teletypewriter components can accept only neutral signals. The dual-diversity converter also supplies neutral signals for the operation of a monitor teletypewriter, connected directly to the neutral output of the converter. Polar signal circuits differ from neutral circuits in that they employ loop current flow in one direction for one signaling condition, and a reverse flow for another signaling condition (figs. 111 and 112). This change of polarity of loop current corresponds exactly to the current-on current-off signals of the neutral circuit. The magnitude of the current flow in one direction equals that of the current flow in the opposite direction. Polar circuits are used when long interconnecting lines are required, such as between widely spaced shelters of Radio Set AN/MRC–2(*). Neutral circuits, on the other hand, are used for short-haul circuits, such as the local loops within the shelter, and for short extension circuits to external teletypewriter equipment operated directly by the radio set.

c. Teletypewriter Signals.

(1) *Mark and space signals.* Teletypewriter signals often are referred to as *mark* and *space* impulses. A *mark* impulse in a neutral teletypewriter wire loop is always a condition of current flow; conversely, the *space* impulse in the loop is a condition of no current flow, or an open circuit condition. A *mark* impulse in a polar teletypewriter wire loop is current flow of one polarity (or direction), and a *space* impulse is current flow of the opposite polarity (or direction). The assignment of polarity to a mark or space signal can be arbitrary, but usually is determined by the equipments involved. A reversal of polarity in a polar circuit must be compensated by a polarity reversal at the opposite end of the line. In any radioteletypewriter circuit, the mark carrier frequency is always higher than the space carrier frequency, the standard frequency separation being set at 850 cps (cycles per second). At radioteletypewriter terminals the changes from mark to space during signaling are converted from changes in rf to changes in d-c signals, either neutral or polar, according to requirements.

(2) *The teletypewriter code* (fig. 113). In order that intelligence can be transmitted and interpreted over a neutral or polar telegraph or teletypewriter circuit, the make-and-break of the circuit or the reversal of current flow in the circuit must take place according to a prearranged code which involves both timing and spacing characteristics. In the ordinary Morse code of telegraphy, the timing factor is controlled by both the duration of the signal impulses and the spaces between them. This dot-dash system usually is interpreted by the ear in manual operation, and also by inking the dots and dashes

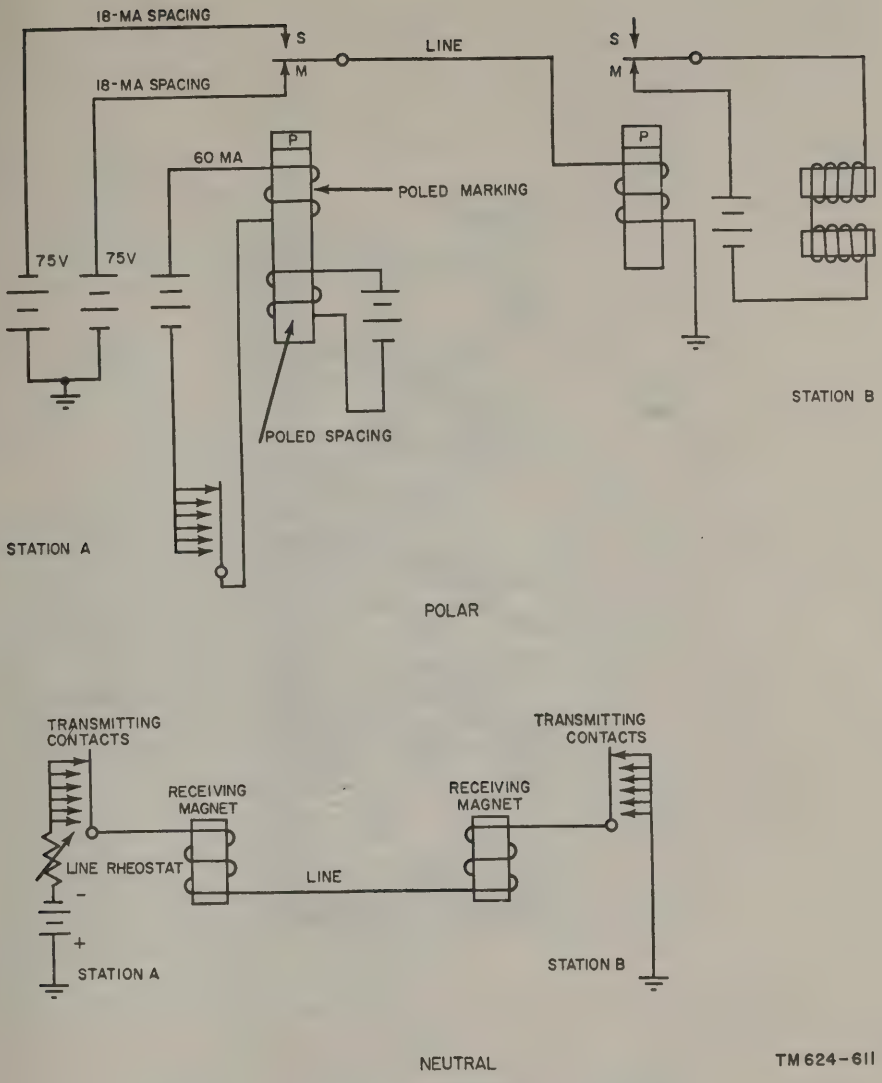


Figure 111. Basic Teletypewriter, polar and neutral circuits.

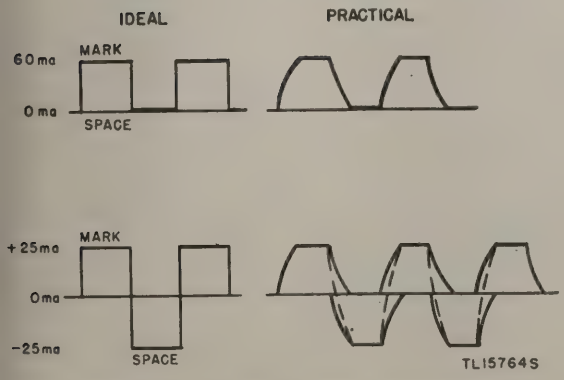


Figure 112. Neutral and polar waveshapes.

(short and long pulses) on a moving tape when high-speed circuits are used. Since such a system is impracticable for teletypewriter functioning, the standard 5-unit teletypewriter code was devised. Figure 113 illustrates this code and its corresponding letters, numerals, and symbols. In the 5-unit code system, the perforations in the tape correspond to *mark* signals, while *space* signals correspond to positions where no perforations occur (with the exception of the small feed-holes at the center of the tape). As the perforated tape (chadless) (fig. 114)

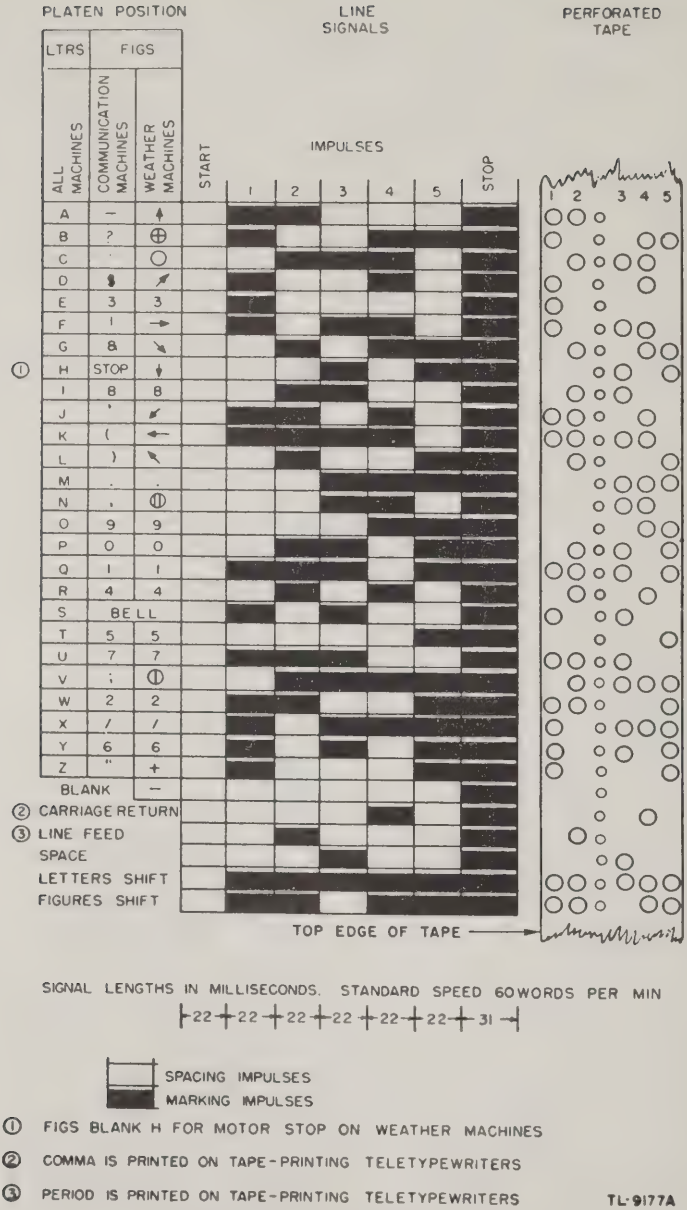


Figure 113. Teletypewriter code.

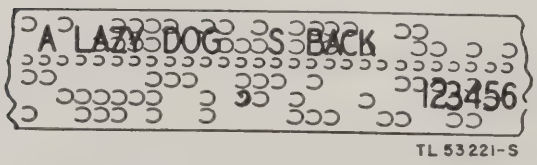


Figure 114. Chadless tape.

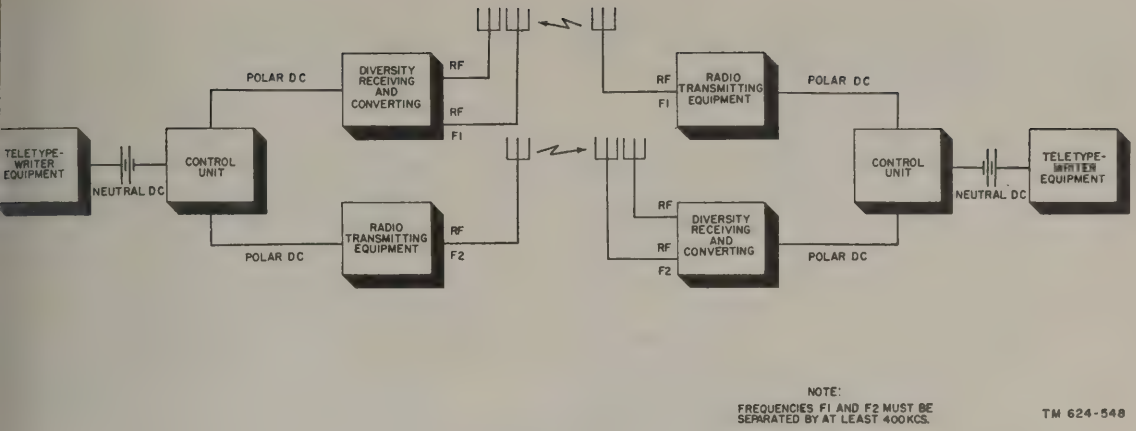


Figure 115. Simplified radioteletype system, block diagram.

passes through the tape transmitting mechanism (TD), five fingers operating as a group of contacts either are allowed to rise or are prevented from rising, depending on whether a perforation exists or not. When a combination of fingers rise through perforations representing a certain character, corresponding contacts are closed and the others remain open, and a rotating timing arm translates the positions of the contacts, with respect to a time interval, into a sequence of impulses. These impulses are the mark and space signals of the character being transmitted. Of the seven impulses transmitted, five are actual character impulses; the remaining two are the start impulse for preparing the receiving equipment and circuit for the character impulses, and the stop impulse for stopping the cycle of the character impulses in synchronism with the other equipments in the circuit. During transmission of the continuous tape, all impulses are 22 ms (milliseconds) in length, with the exception of the stop impulse, which is 31 ms in length. When the transmission cycle is completed, and the circuit is idle, the equipment rests on the stop impulse, holding all equipments in the loop on *mark*, and the circuit then *runs closed*. The start and stop impulses are not perforated in the tape, but are initiated automatically by the transmitting teletypewriter equipment. In Radio Set AN/MRC–2(*), tape is perforated by the typing-reperforator, and transmission of the prepared tape is accomplished by the TD. Both units are part of Reperforator-Transmitter TG–26–A or Perforator-Transmitter TT–56/MGC.

126. Basic Radioteletype Theory

a. Radioteletype System. A radioteletype system consists of the following major components:

(1) Teletypewriter equipments for manual or automatic transmission and reception.
(2) Patching and control circuits.
(3) R-f transmission equipment (radio transmitter).
(4) R-f reception equipment (radio receivers).
(5) Radioteletype converters for dual-diversity combining of signals and for changing r-f signals into d-c telegraph impulses.

b. Basic Radioteletype Theory. Figure 115 illustrates a fundamental radioteletype system such as is used in Radio Set AN/MRC–2(*) and other mobile and point-to-point Signal Corps radio sets. Referring to the block diagram, note that signals initiated by the transmitting teletypewriter equipment pass to a patching and control section, which directs the d-c signals to the input circuits of the r-f transmitting equipment. In the input stages of the r-f transmitting equipment, the teletypewriter d-c signals are converted to mark and space (par. 125*c*) frequency-shifted r-f signals; the latter stages of the r-f section greatly amplify these r-f signals and couple them to the transmitting antenna. Frequency-shifted r-f signals picked up by the receiving antennas are detected and amplified by the radio receivers and then are converted by the combining unit to polar d-c signals. These

d-c impulses are directed by the control and patching circuits to the teletypewriter receiving mechaisms for the preparation of a perforated tape or a page copy of the incoming messages.

c. Half-Duplex Radioteletype System.

(1) The basic requirement for any half-duplex circuit, either radioteletype or land-line, is that traffic must move in but one direction at a time, and the receiving station must have 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 radio transmission must be separated from the frequency of 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 set up, since different frequencies are used for transmitting and receiving. However, the patching arrangement of the teletypewriters and the circuit control is such that it is possible for the receiving station to utilize one machine for both page copy reception and transmission and, by pressing the SEND-REC-BREAK key of the teletypewriter, the operator can interrupt the flow of traffic from the transmitting station. For half-duplex operation, it is necessary that the SERVICE switch on the control unit at both ends of the circuit be set to HALF DX. When this is done, the plate of the receive extension driving tube V104 then 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 EXTENSION CURRENT control R110. 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 SEND-REC-BREAK key of the teletypewriter, transmitting a space signal to the distant terminal. Reception of the space signal cuts tube V104 off, interrupts current through the sending teletypewriter selector magnet and prevents the sending teletypewriter from printing transmitted copy. Figure 116 shows a simplified diagram of the teletypewriter equipments patched for half-duplex operation.

d. Full-Duplex Radioteletype System.

(1) Full-duplex radioteletype circuits permit the simultaneous transmission and reception of traffic. For full-duplex operation of Radio Set AN/MRC–2(*), the following conditions must be met:

(*a*) The frequency of radio transmission must be separated from the frequency of radio reception by at least 400 kc.

(*b*) The SERVICE switch on the control unit is set to FULL DX.

(2) In the radio set 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 117 illustrates a functional diagram of the teletypewriter equipments connected for full-duplex operation.

e. One-Way Reversible Radioteletype System. One-way reversible operation is essentially the same as half-duplex operation (fig. 116) with the exception 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 for ONE WAY. With the preceding conditions satisfied, and when the TRANSMITTER switch of the control unit is ON, keying circuits are closed, which operates a relay in the tone oscillator of the receiving dual-diversity con-

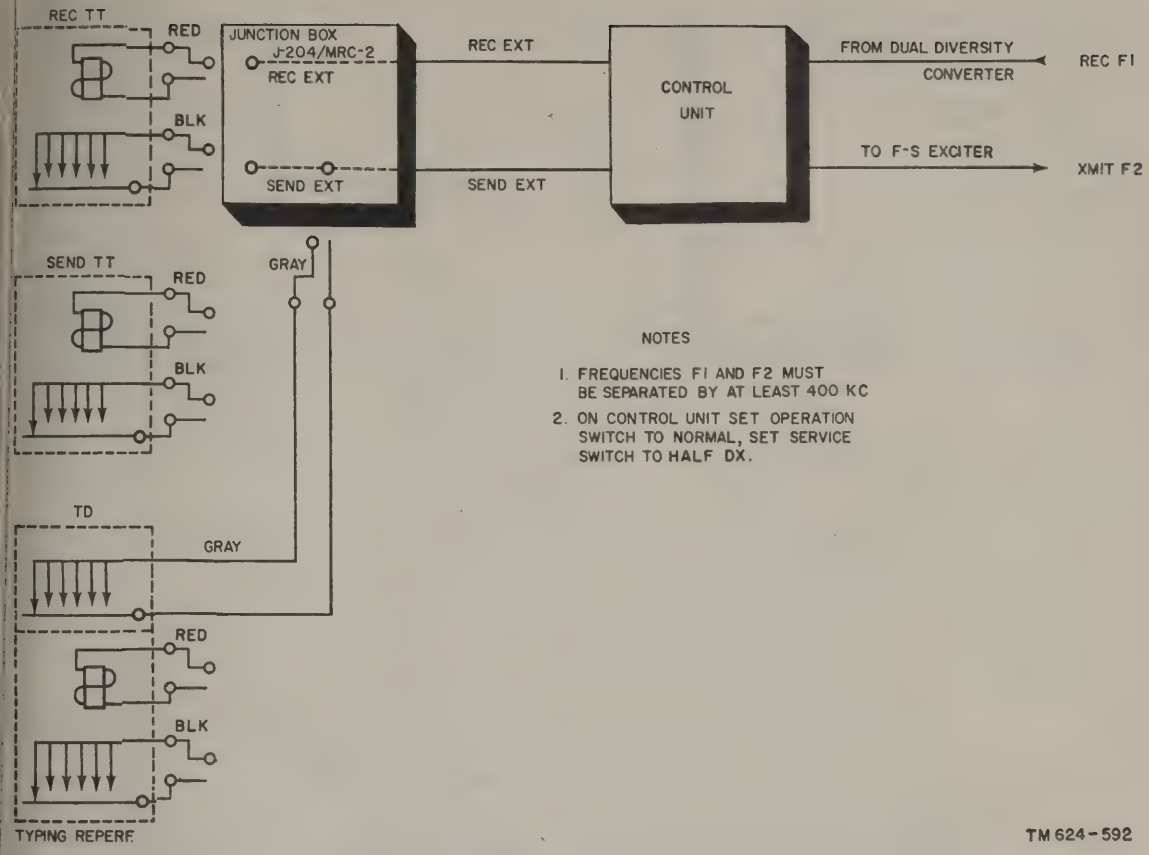


Figure 116. Radio Set AN/MRC-2(*), half-duplex operation, functional diagram.

verter. When this relay is energized, it applies a potential which controls the receiver disabling relays shorting the antenna imputs of the radio receiver assembly. At the same time, the keying relay in the FS exciter is operated, applying power to the exciter unit tubes and connecting those circuits for sending. Transmission from an operating terminal can occur only when the TRANSMITTER switch of the control unit is ON. When the TRANSMITTER switch is in the *off* position, the keying relay in the FS exciter is de-energized and no r-f transmission occurs. At the same time, the relay in the dual-diversity converter is released, and again the radio receiver assembly is in a receiving condition. Break-in operation is not possible when the SERVICE switch is in the ONE-WAY position.

127. Interunit Theory

(fig. 118)

a. Sending Circuits. For normal radioteletype operation, the teletypewriter equipments in the operating shelter of the radio set initiate, by mechanical movements, the d-c teletypewriter impulses which operate a set of contacts. These impulses are transmitted by patch cords and bench wiring to Junction Box J–204/MRC–2, which is a jack box for the teletypewriter equipments. The teletypewriters, the typing-reperforator, and the TD (transmitter distributor) can be patched in a number of combinations, as required, by the use of Cords CC–66 and the junction box (figs. 99 through 103). The junction box introduces the circuit battery required for the neutral d-c teletypewriter signals through its series connected jacks, from Control Unit C–292(*)/TEA–7. Neutral send keying tube V107 in the control unit is operated by the neutral impulses

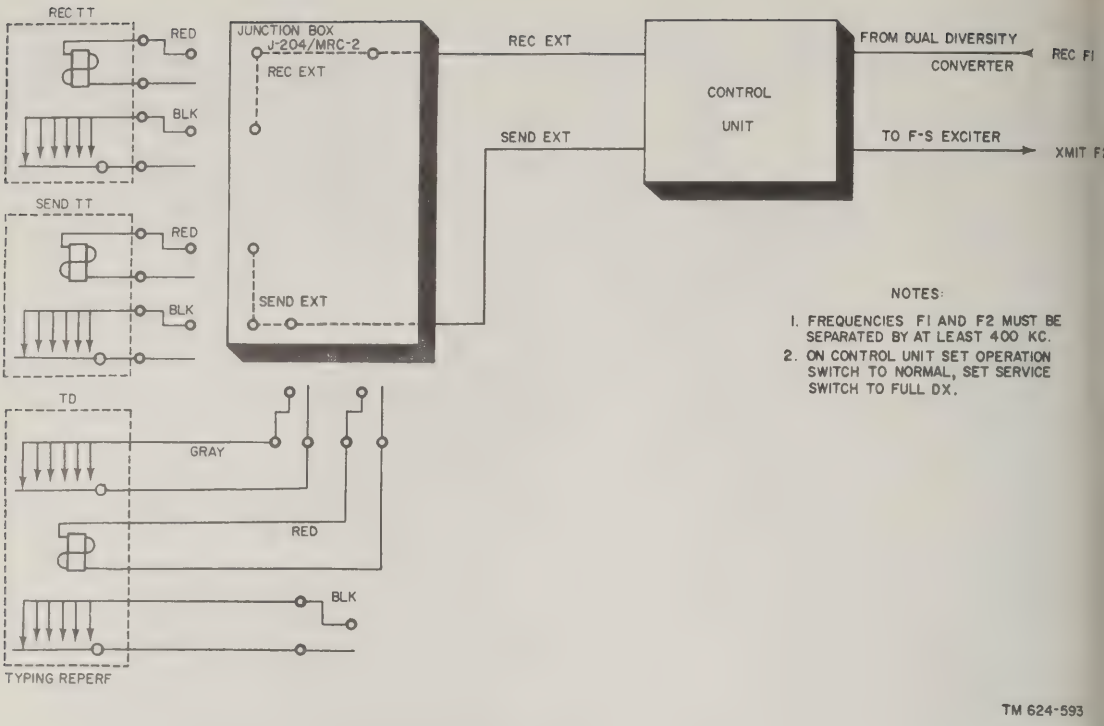


Figure 117. Radio Set AN/MRC–2(*), full-duplex operation, functional diagram.

from the teletypewriter transmitting contacts. Tube V107 controls polar-space driving tube V106 and polar-mark driving tube V105 (fig. 170), producing polar signals which are sent to the FS exciter. The polar signals from the control unit act on shift diode tube V103, of the exciter, which lowers the mark signal produced by oscillator V101 of the exciter whenever a space signal is transmitted by the teletypewriter equipment (fig. 166). This reduction in frequency shift is in an amount dependent on the subsequent frequency multiplication of the r-f signal generated by the oscillator (par. 61). Buffer amplifier tube V102 amplifies the frequency-shifted r-f signal from the oscillator stage and passes it as excitation to the radio transmitter. Radio Transmitter BC–610–(*) receives the exciter FS signals at the oscillator stage of the transmitter. The signal is amplified further and multiplied by the succeeding doubler and ipa (intermediate power amplifier) stages, and then receives the transmitter maximum amplification in the power amplifier stage. The output of the radio transmitter is coupled (as excitation) to the grids of push-pull tubes V1 and V2 in Amplifier AM–141(*)/MRC. The output of the amplifier, frequency-shifted 850 cycles by space signals initiated by the teletypewriter equipments, is passed to a balanced, two-wire transmission line to the transmitting antenna. At the output of the amplifier, the amount of frequency shift is always 850 cycles from mark to space regardless of either the frequency multiplication taking place or the output frequency of the amplifier. The mark signal is always *higher* in frequency than the space signal.

b. Receiving Circuits. Two doublet antennas in space-diversity are used to receive the frequency-shifted r-f signals from the distant RTT terminal (fig. 41). Each of these antennas is connected by coaxial cable to separate input circuits of Radio Receiver Assembly OA–65(*)/MRC–2. The r-f signals, after amplification and conversion, are amplified by the radio receiver i-f stages and the frequency-shifted r-f component is brought out at the last i-f stage of each receiver at a frequency of 470 kc. The frequency-shifted i-f signal from each receiver then is passed over shielded cable to the inputs of Dual-Diversity Converter CV–31(*)/TRA–7, where tuned circuits peaked to 470 kc pass the i-f signals with their FS component to a


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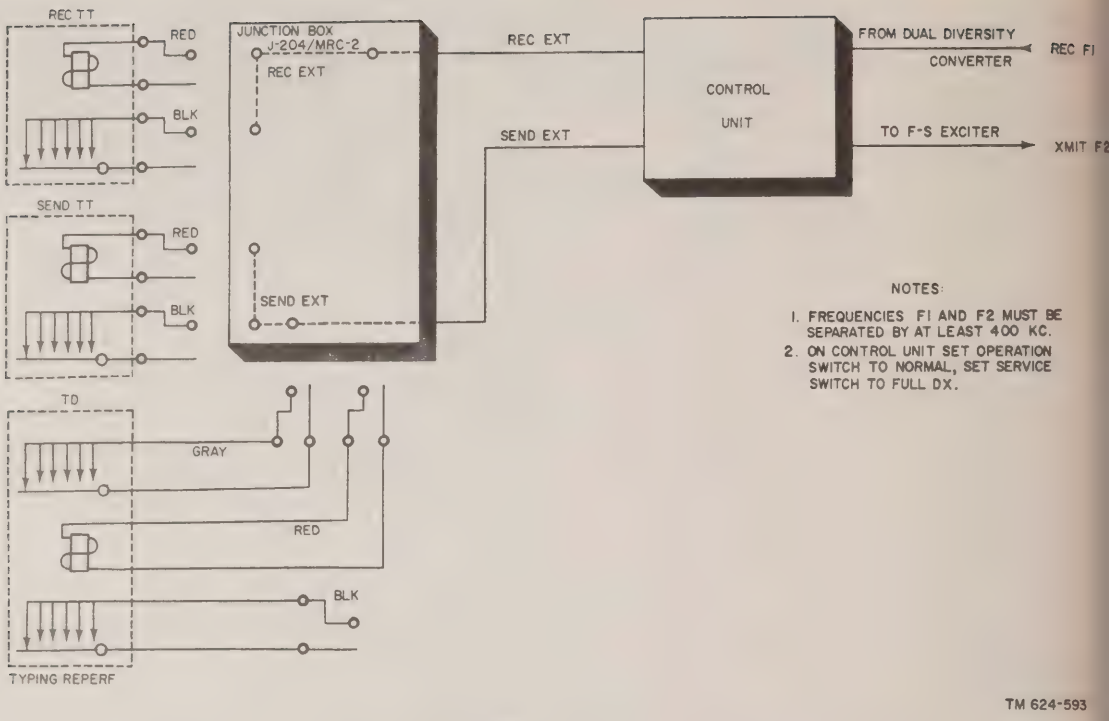


Figure 117. Radio Set AN/MRC–2(*), full-duplex operation, functional diagram.

from the teletypewriter transmitting contacts. Tube V107 controls polar-space driving tube V106 and polar-mark driving tube V105 (fig. 170), producing polar signals which are sent to the FS exciter. The polar signals from the control unit act on shift diode tube V103, of the exciter, which lowers the mark signal produced by oscillator V101 of the exciter whenever a space signal is transmitted by the teletypewriter equipment (fig. 166). This reduction in frequency shift is in an amount dependent on the subsequent frequency multiplication of the r-f signal generated by the oscillator (par. 61). Buffer amplifier tube V102 amplifies the frequency-shifted r-f signal from the oscillator stage and passes it as excitation to the radio transmitter. Radio Transmitter BC–610–(*) receives the exciter FS signals at the oscillator stage of the transmitter. The signal is amplified further and multiplied by the succeeding doubler and ipa (intermediate power amplifier) stages, and then receives the transmitter maximum amplification in the power amplifier stage. The output of the radio transmitter is coupled (as excitation) to the grids of push-pull tubes V1 and V2 in Amplifier AM–141(*)/MRC. The output of the amplifier, frequency-shifted 850 cycles by space signals initiated by the teletypewriter equipments, is passed to a balanced, two-wire transmission line to the transmitting antenna. At the output of the amplifier, the amount of frequency shift is always 850 cycles from mark to space regardless of either the frequency multiplication taking place or the output frequency of the amplifier. The mark signal is always *higher* in frequency than the space signal.

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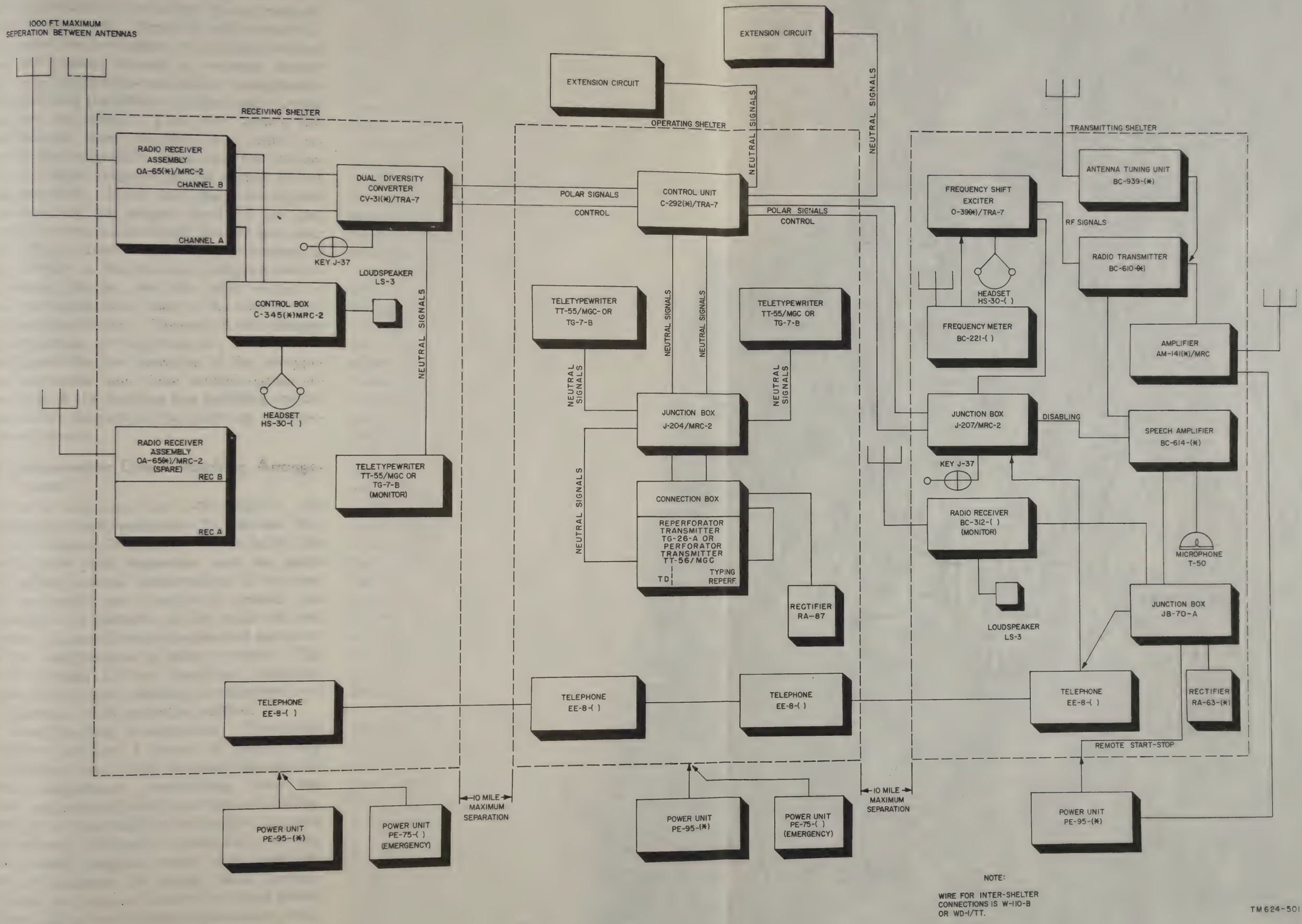


Figure 118.—Radio Set AN/MRC-2(*), block diagram.

nixer stage where frequency conversion takes place and two low-frequency r-f signals, 50 kc for channel A, and 29.3 kc for channel B, are produced by heterodyne action. From the mixer stages of the converter, the low-frequency frequency-shifted signals are passed through a common limiter where a-m (amplitude-modulated) components are removed and the effects of fading and varying signals are minimized. Then the signals are passed through linear discriminators which remove the frequency-shift component for conversion to d-c signal impulses in the output circuit of the converter. Mark and space d-c signals are produced by the output circuit of the converter and are available as both neutral and polar signals. The neutral output of the converter is passed directly to the monitor teletypewriter in the receiving shelter, and the polar output is passed over intershelter lines to the control unit in the operating shelter. The control unit changes the polar signals, arriving from the converter, to neutral signals for the operation of the teletypewriter equipments, and these neutral signals are passed through the junction box patching circuits to the selector magnets of the receiving teletypewriter equipments.

128. Teletypewriter Circuits Patching Arrangements

By use of Junction Box J–204/MRC–2, the connection box on Reperforator-Transmitter TG–26–A or 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 119 through 123 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 transmitter-distributor, transmitting from the normally assigned send teletypewriter 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 119 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 99 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 120 illustrates the circuit paths through the junction box, bench wiring, and cables to the control unit send and receive channels. Figure 100 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 121 should be used. Figure 101 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 122 is a simplified functional schematic diagram of this circuit, and figure 102 is a pictorial drawing.

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 123, 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 typing-

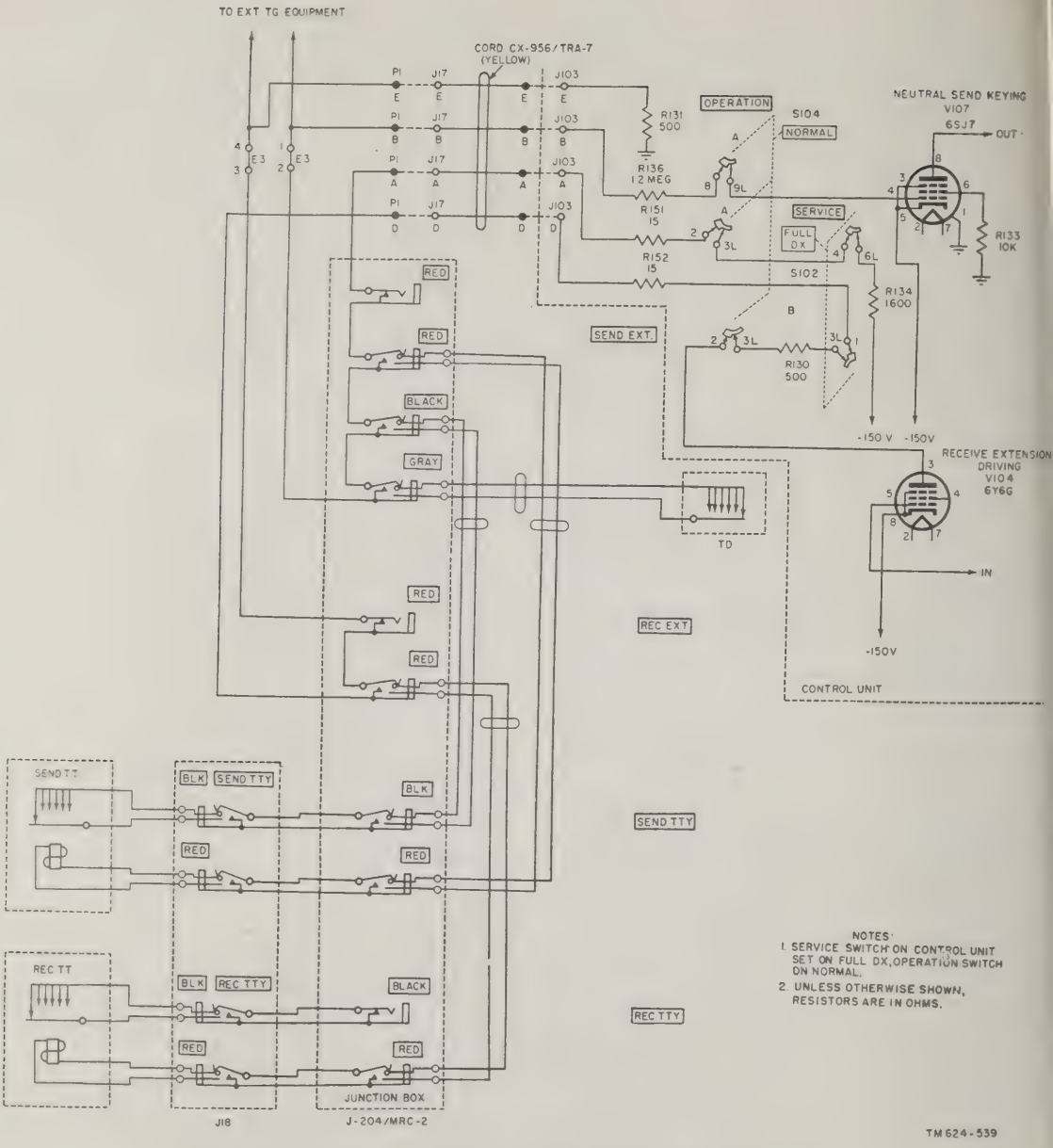


Figure 119. Normal teletypewriter patching, functional schematic diagram.

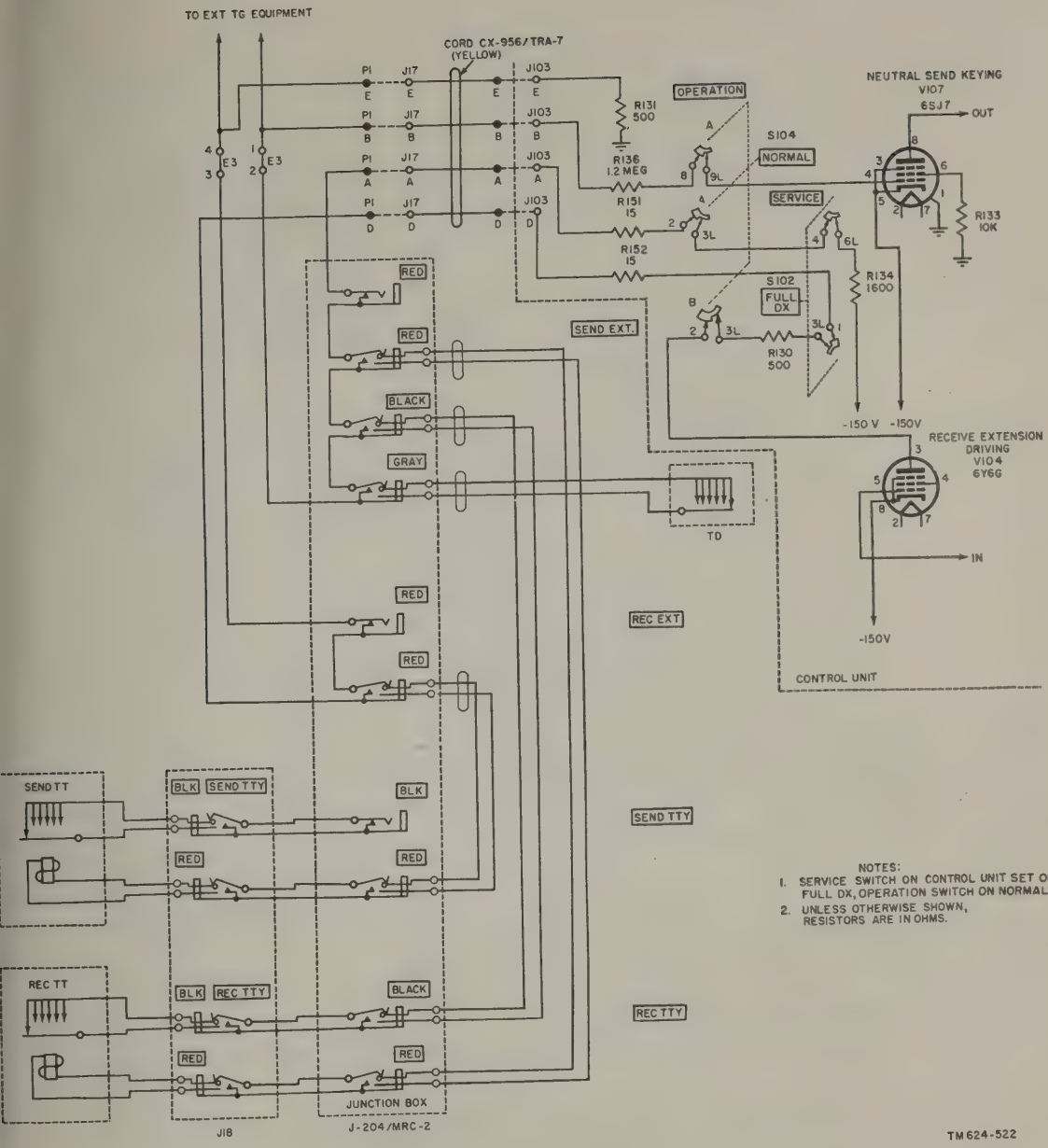


Figure 120. Reverse teletypewriter patching, functional schematic diagram.

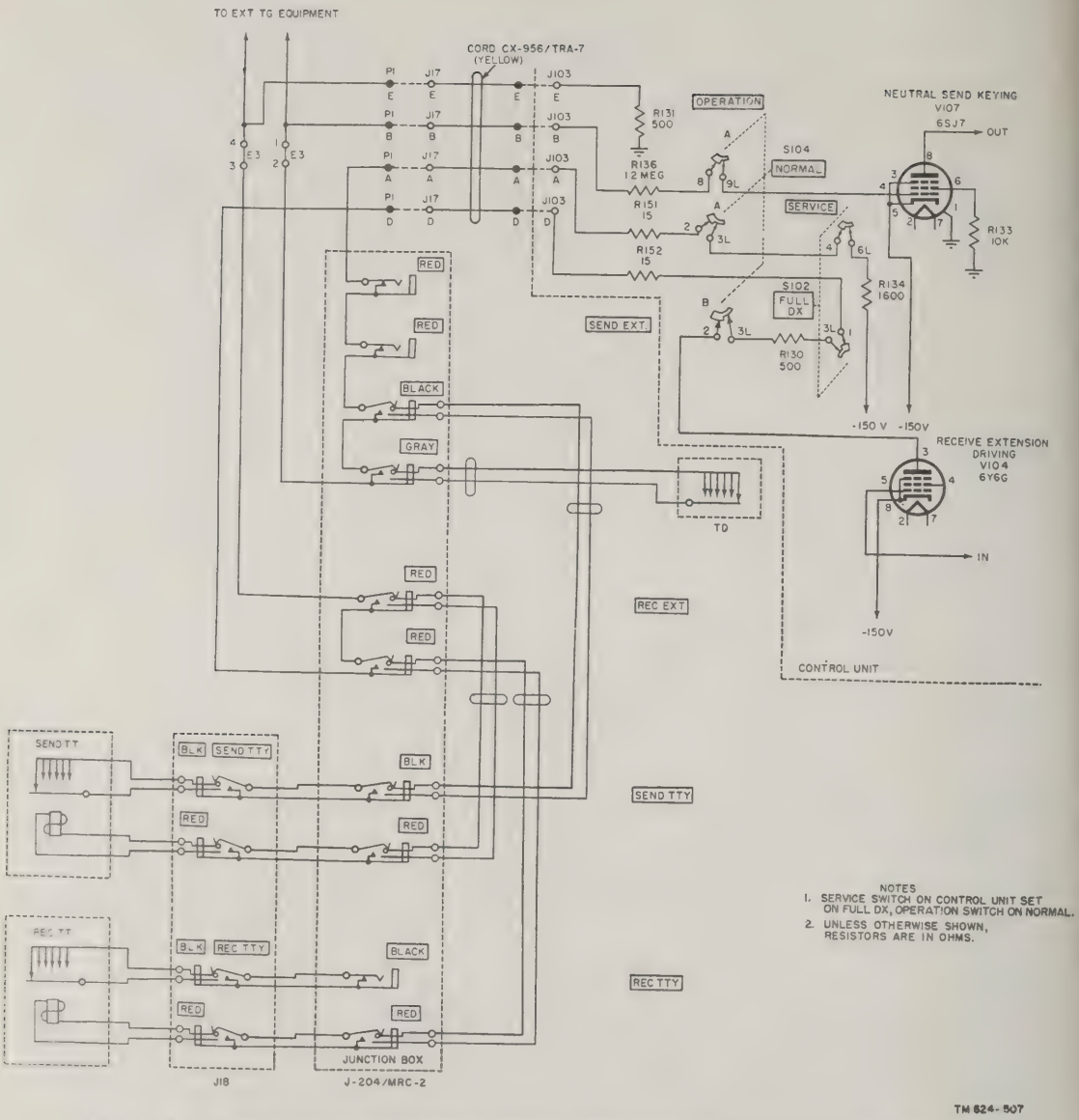


Figure 121. Receive on both teletypewriters, transmit on send teletypewriter, functional schematic diagram.

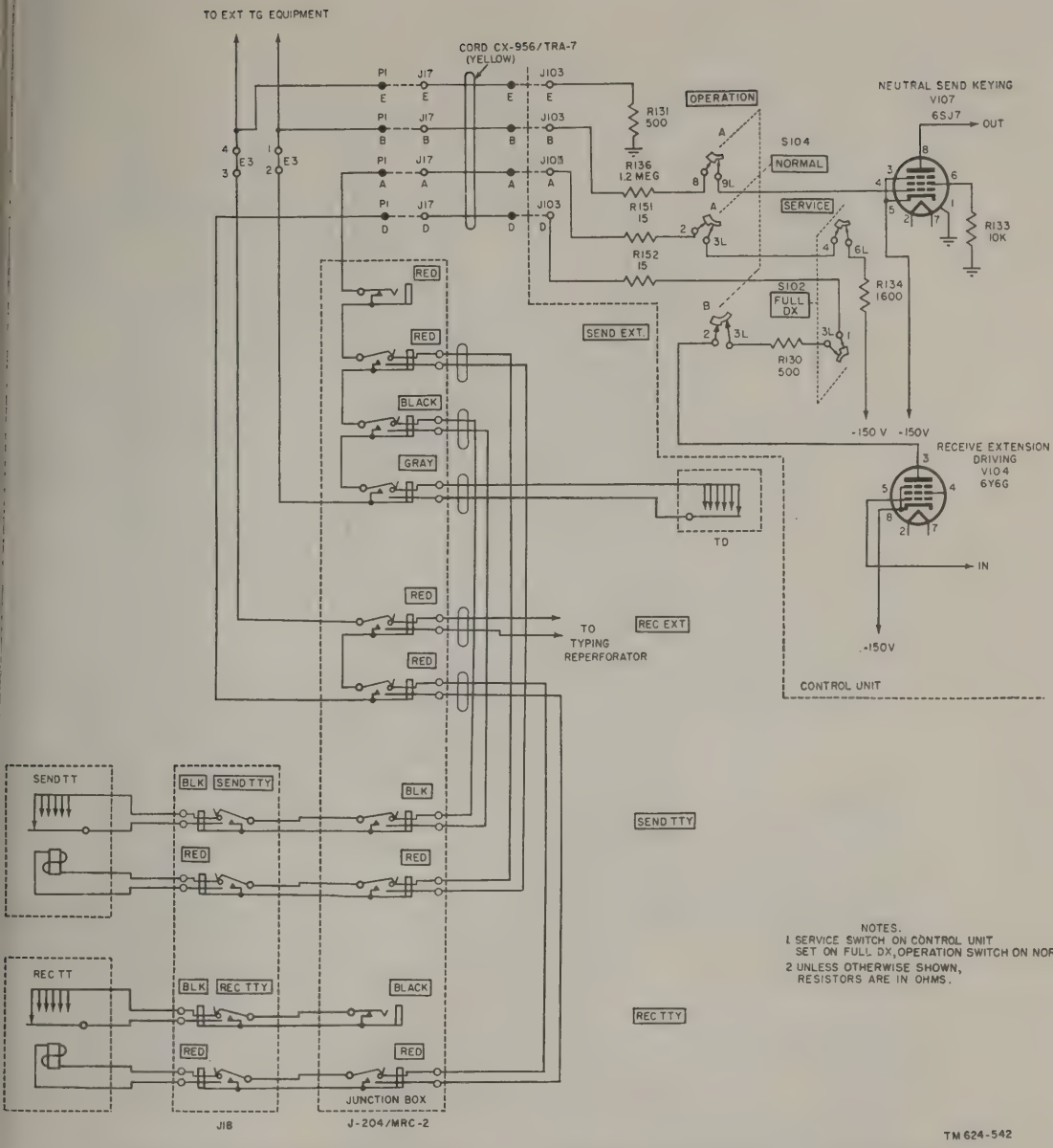


Figure 122. Normal operation and receive on typing-reperforator, functional schematic diagram.

reperforator selector magnet and the keyboard of the typing-reperforator. The receive teletypewriter is patched in the RECEIVE EXTENSION channel of the control unit, as in normal operation. Figure 103 is a pictorial drawing of this patching arrangement.

129. A-C Power Distribution in the Shelters

a. Transmitting Shelter (fig. 124). A-c power for all the components except Amplifier AM–141(*)/MRC is supplied from Junction Box JB–70–A. The a-c power for the amplifier is connected to input jack J2 from the a-c terminals of the generator in Power Unit PE–95–(*) through the circuit breaker, the a-c terminals of the power panel and Power Cable Assemblies CX–1165/U, CX–1166/U, and Cord CX–135/MRC–1 in Radio Set AN/MRC–2B or Cords CX–136/MRC–1 and CX–137/MRC–1, and CX–135/MRC–1 in Radio Set AN/MRC–2 and –2A. A-c power is supplied to terminals 2 and 5 of the POWER INPUT socket

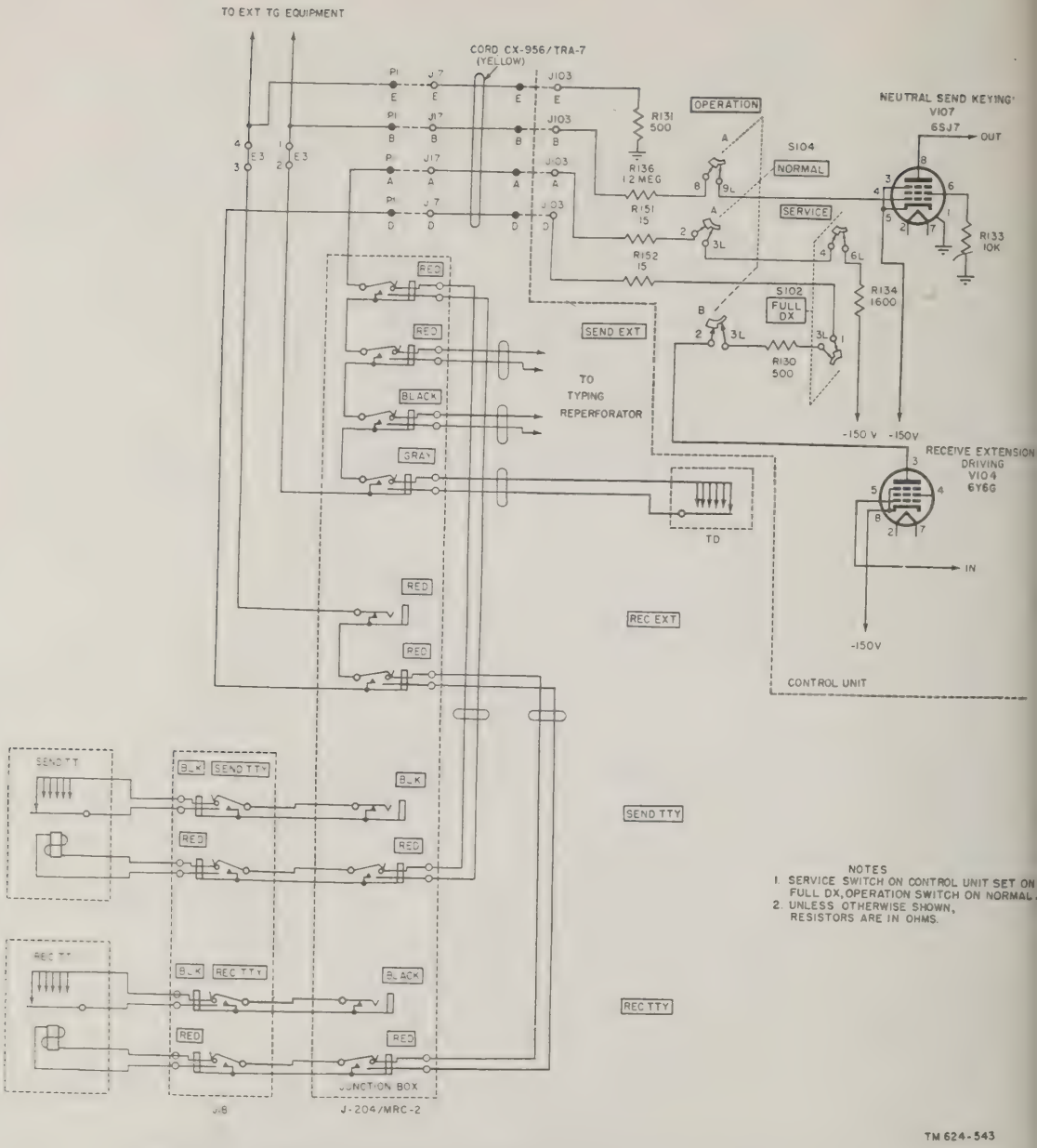


Figure 123. Transmit and punch tape on typing-reperforator, functional schematic diagram.

SO 200 from the a-c terminals of the generator through the circuit breaker, the AC terminals of the power panel, and Cords CO–316, CD–652, and CO–335. Power is supplied to one terminal of sockets SO 208, SO 207, SO 203, SO 202, SO 201, and SO 209 directly from terminal 5 of socket SO 200. The other terminal of these sockets is supplied through a current limiting circuit breaker CB200. Socket SO 208 supplies a-c power through a power cord to an a-c outlet into which the blower and a ceiling lamp are connected (fig. 54). Socket SO 207 supplies a-c power through a power cord to another a-c outlet into which the frequency meter power supply, a ceiling lamp, and the frequency shift exciter are connected (fig. 54). Socket SO 203 supplies a-c power through Cord CX–142/

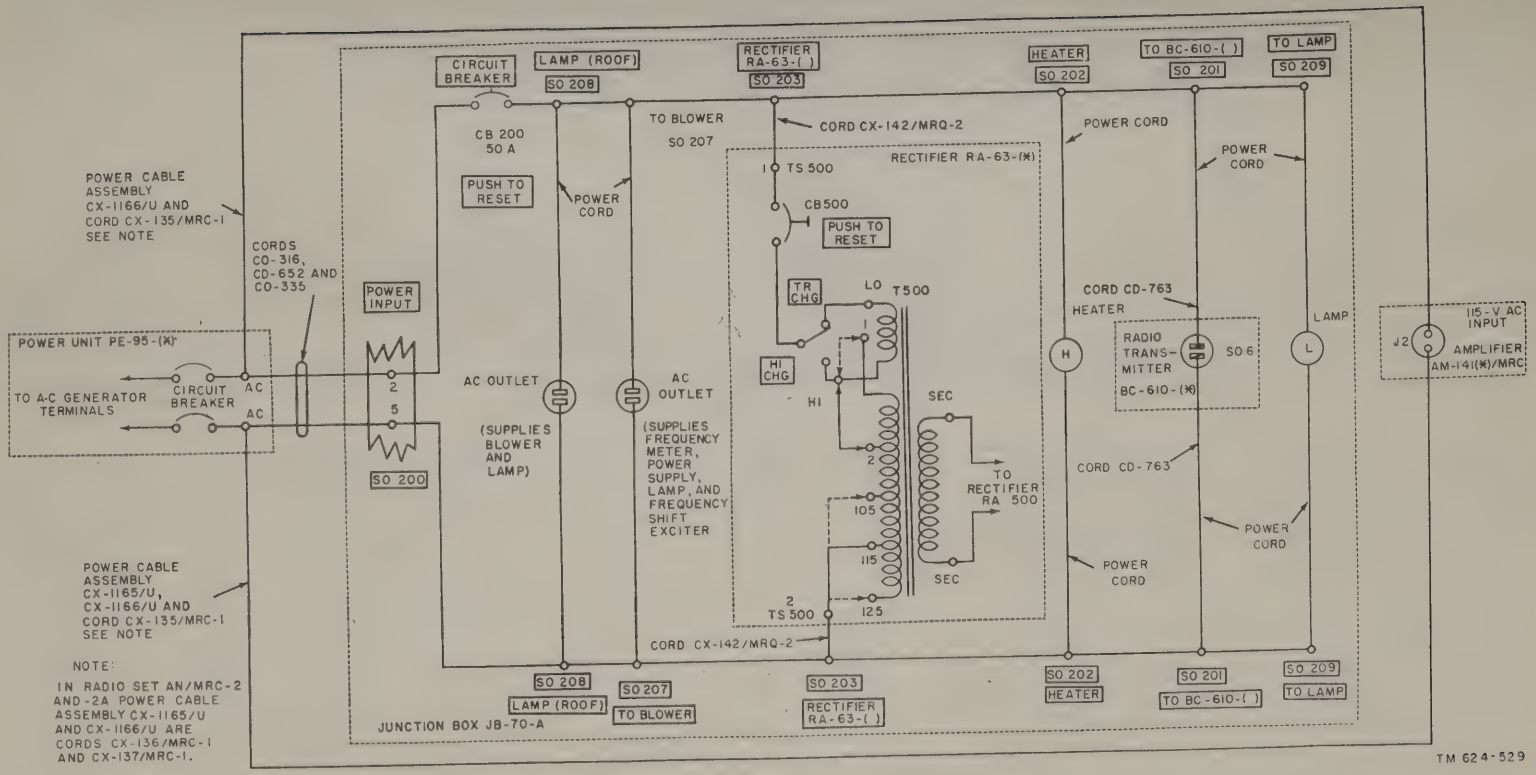


Figure 124. A-c power distribution in the transmitting shelter.

MRQ–2 to terminals 1 and 2 of terminal strip TS500 of Rectifier RA–63–(*). These terminals are connected to the primary of transformer T500. The secondary of this transformer is connected to rectifier RA500. Socket SO 202 supplies a-c power through a power cord to the heater. Socket SO 201 supplies a-c power through Cord CO–763 to the a-c input socket SO 6 of Radio Transmitter BC–610–(*). Socket SO 209 supplies a-c power through a power cord to a lamp.

b. Receiving Shelter.

(1) The power for operating the lights and the receiving shelter components is supplied from Power Unit PE–95–(*). The a-c terminals of the power unit are connected through the feedthrough receptacle to the double-pole circuit breaker by means of Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U (fig. 58).

(2) A-c power is connected to outlets from the circuit breaker. Power for the operation of the lights, ventilating blower, heater, and the components is supplied from the outlets (fig. 58).

c. Operating Shelter.

(1) Power for the operation of the lights and operating shelter components is supplied by Power Unit PE–95–(*). The a-c terminals of the power unit are connected through the feedthrough receptacle to the double-pole circuit breaker by means of Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U (fig. 61).

(2) The power outlets are connected by conduit to the circuit breaker. Power for the operation of the lights, ventilating blower, heater, and the components is supplied from the power outlets (fig. 61).

(3) A-c power for operating the typing-reperforator and the transmitter-distributor is supplied from the connection box.

130. Twelve-Volt D-C Distribution in Transmitting Shelter

(fig. 125).

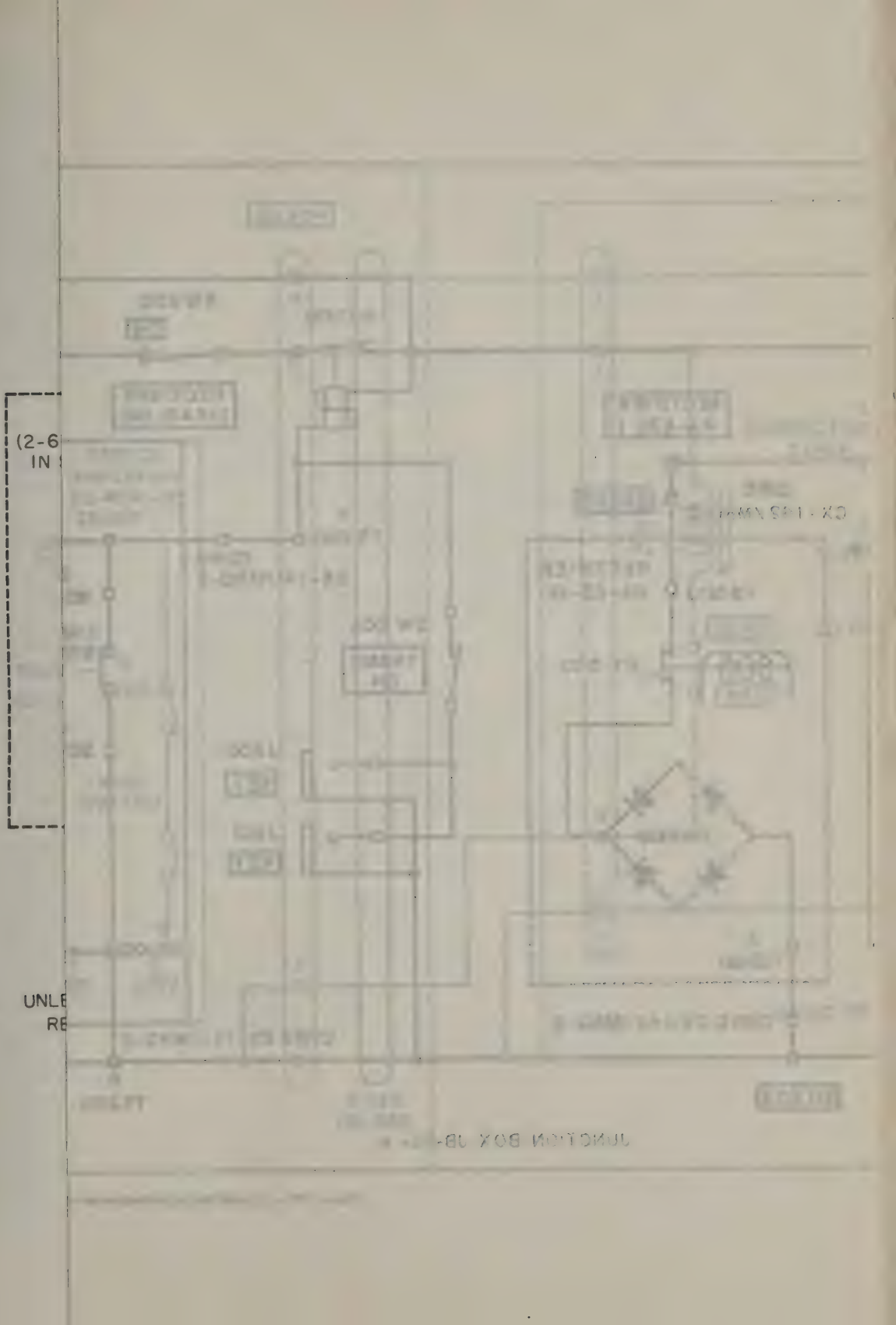
a. D-c power is supplied to Junction Box JB–70–A from one of two sources, depending on the position of the BATTERY SOURCE switch. The 12-volt d-c source from Power Unit PE–95–(*) is supplied to terminals 3 and 4 of socket SO 200 from the battery terminals through the +12 and −12V terminals of the power panel and Cord CO–316, CD–652, and CO–335. The commo terminal of the BATTERY SOURCE switch SW207 is connected to terminal 3 of socke 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 d-c source from Chest CH–109–(*) is supplied to the common terminal of the 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 d-c output from rectifier RA500 is connected to socket SO 206 through terminals 3 and 4 of TS500, Cord CX–142/MRQ–2, and socket SO 203.

c. The +12-volt d-c source is connected to terminal T of socket SO 1 in Radio Receiver BC–312–( ) from the common terminal of the BATTERY SOURCE switch through terminal 4 of socket SO 204 and Cord CD–565. Terminal T of socket SO 1 is connected to the positive terminal of the dynamotor through fuse F1, terminals 3 and 2 of the connection strip, terminal 4 of the terminal strip and switch SW12 in the M. V. C. or A. V. C. position and terminal 1 of the terminal board. The +12-volt a-c supply also is connected to one contact and one side of the coil of relay RY200. This d-c source, when relay RY200 is energized, is connected to one side of the coil of relay RL1 in the receiver through one set of contacts of relay RY200, RECEIVER DISABLING switch SW200 in the ON position, terminal 2 of socket SO 204, Cord CD–565, and terminal J of socket SO 1.

d. The 12-volt d-c supply is connected to the negative terminal of the dynamotor through terminal 3 of socket SO 204, Cord CD–565, terminal D of socket SO 1 of the receiver and terminal 6 of the terminal strip. The 12-volt a-c supply is connected to one side of the coil of relay RL1 in the receiver through terminal 1 of socket SO 204, Cord CD–565, terminal N of socket SO 1, and switch SW1 in the SEND position.

e. D-c power for the operation of Radio Receiver BC–312–( ) is controlled by switch SW12 in the receiver. D-c power for operating the disabling relay RL1 in the receiver is controlled by relay RY200, RECEIVER DISABLING switch SW200, and by the SEND REC switch SW12. The filaments of the receiver are supplied with power simultaneously with the dynamotor. Both of these circuits are protected by fuse F1.



MRQ–2 to terminals 1 and 2 of terminal strip TS500 of Rectifier RA–63–(*). These terminals are connected to the primary of transformer T500. The secondary of this transformer is connected to rectifier RA500. Socket SO 202 supplies a-c power through a power cord to the heater. Socket SO 201 supplies a-c power through Cord CO–763 to the a-c input socket SO 6 of Radio Transmitter BC–610–(*). Socket SO 209 supplies a-c power through a power cord to a lamp.

b. Receiving Shelter.

(1) The power for operating the lights and the receiving shelter components is supplied from Power Unit PE–95–(*). The a-c terminals of the power unit are connected through the feedthrough receptacle to the double-pole circuit breaker by means of Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U (fig. 58).

(2) A-c power is connected to outlets from the circuit breaker. Power for the operation of the lights, ventilating blower, heater, and the components is supplied from the outlets (fig. 58).

c. Operating Shelter.

(1) Power for the operation of the lights and operating shelter components is supplied by Power Unit PE–95–(*). The a-c terminals of the power unit are connected through the feedthrough receptacle to the double-pole circuit breaker by means of Cord CX–136/MRC–1 or Power Cable Assembly CX–1165/U (fig. 61).

(2) The power outlets are connected by conduit to the circuit breaker. Power for the operation of the lights, ventilating blower, heater, and the components is supplied from the power outlets (fig. 61).

(3) A-c power for operating the typing-reperforator and the transmitter-distributor is supplied from the connection box.

130. Twelve-Volt D-C Distribution in Transmitting Shelter

(fig. 125).

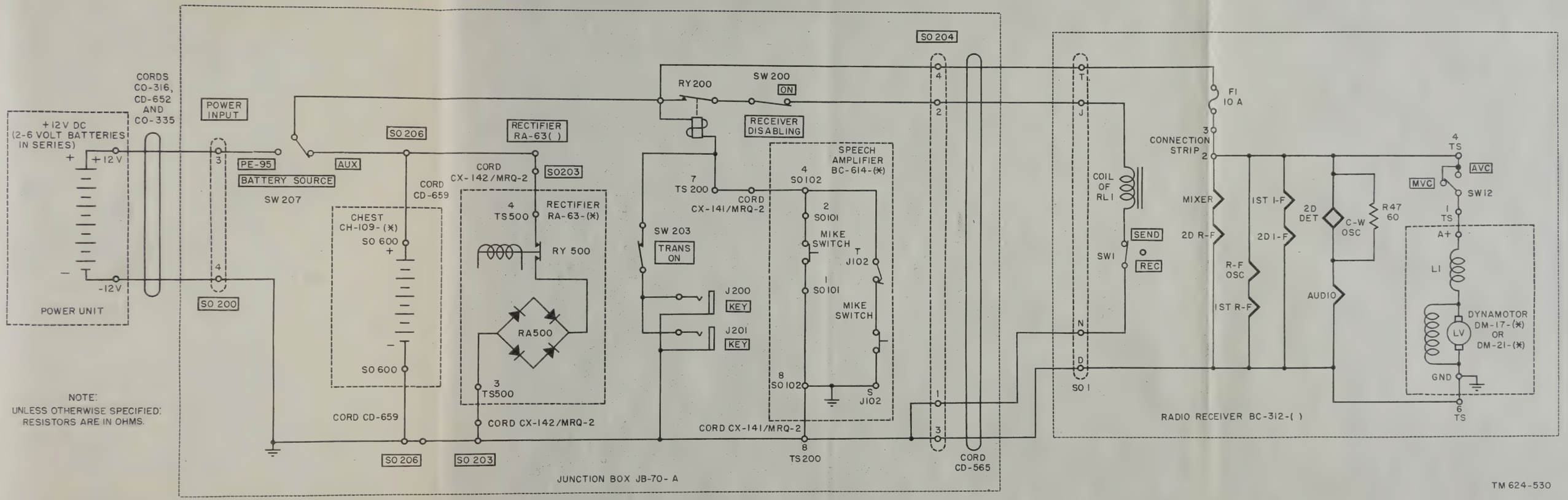
a. D-c power is supplied to Junction Box JB–70–A from one of two sources, depending on the position of the BATTERY SOURCE switch. The 12-volt d-c source from Power Unit PE–95–(*) is supplied to terminals 3 and 4 of socket SO 200 from the battery terminals through the +12V and −12V terminals of the power 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 d-c source from Chest CH–109–(*) is supplied to the common terminal of the 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 d-c output from rectifier RA500 is connected to socket SO 206 through terminals 3 and 4 of TS500, Cord CX–142/MRQ–2, and socket SO 203.

c. The +12-volt d-c source is connected to terminal T of socket SO 1 in Radio Receiver BC–312–( ) from the common terminal of the BATTERY SOURCE switch through terminal 4 of socket SO 204 and Cord CD–565. Terminal T of socket SO 1 is connected to the positive terminal of the dynamotor through fuse F1, terminals 3 and 2 of the connection strip, terminal 4 of the terminal strip and switch SW12 in the M. V. C. or A. V. C. position and terminal 1 of the terminal board. The +12-volt a-c supply also is connected to one contact and one side of the coil of relay RY200. This d-c source, when relay RY200 is energized, is connected to one side of the coil of relay RL1 in the receiver through one set of contacts of relay RY200, RECEIVER DISABLING switch SW200 in the ON position, terminal 2 of socket SO 204, Cord CD–565, and terminal J of socket SO 1.

d. The 12-volt d-c supply is connected to the negative terminal of the dynamotor through terminal 3 of socket SO 204, Cord CD–565, terminal D of socket SO 1 of the receiver and terminal 6 of the terminal strip. The 12-volt a-c supply is connected to one side of the coil of relay RL1 in the receiver through terminal 1 of socket SO 204, Cord CD–565, terminal N of socket SO 1, and switch SW1 in the SEND position.

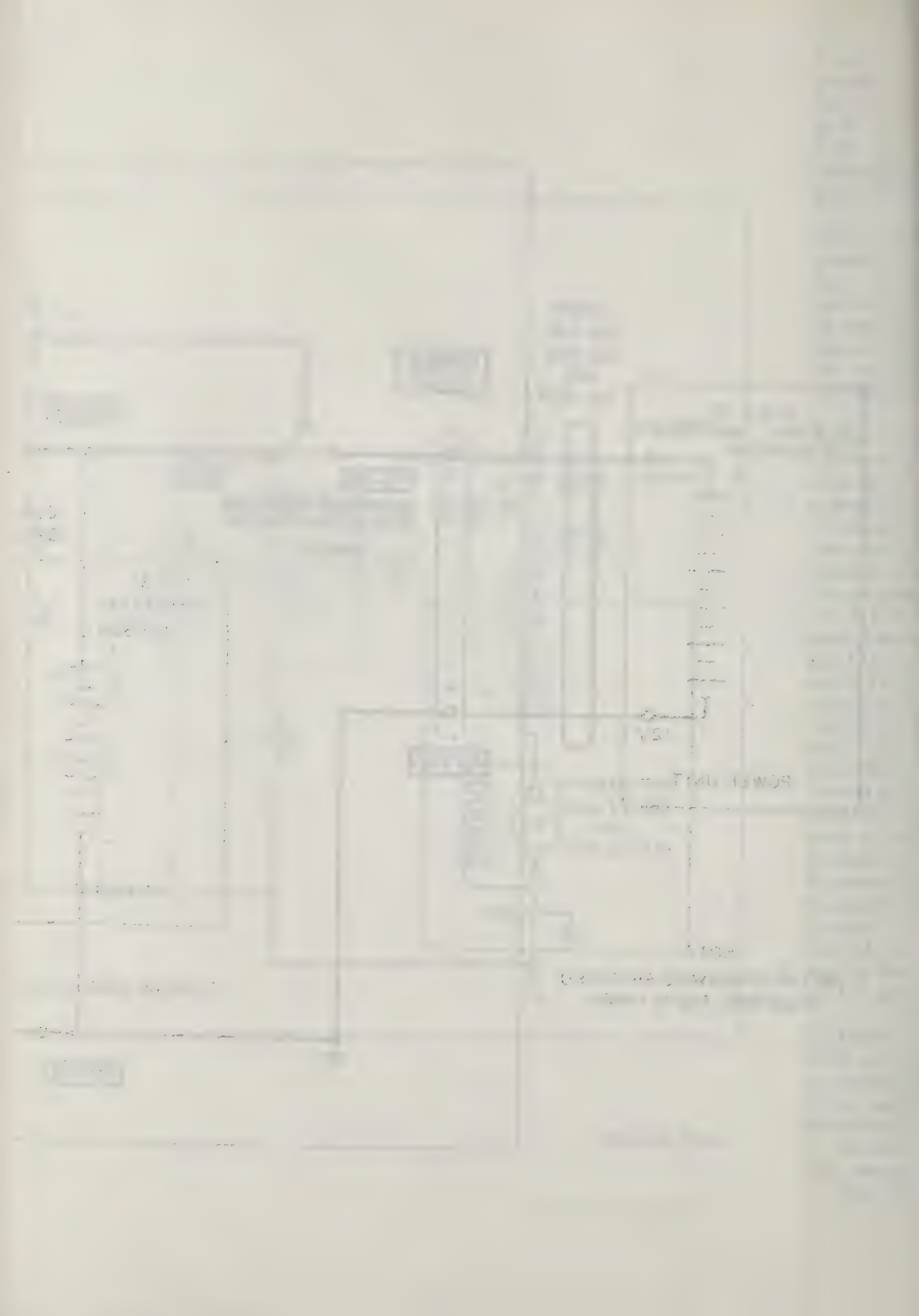
e. D-c power for the operation of Radio Receiver BC–312–( ) is controlled by switch SW12 in the receiver. D-c power for operating the disabling relay RL1 in the receiver is controlled by relay RY200, RECEIVER DISABLING switch SW200, and by the SEND REC switch SW12. The filaments of the receiver are supplied with power simultaneously with the dynamotor. Both of these circuits are protected by fuse F1.

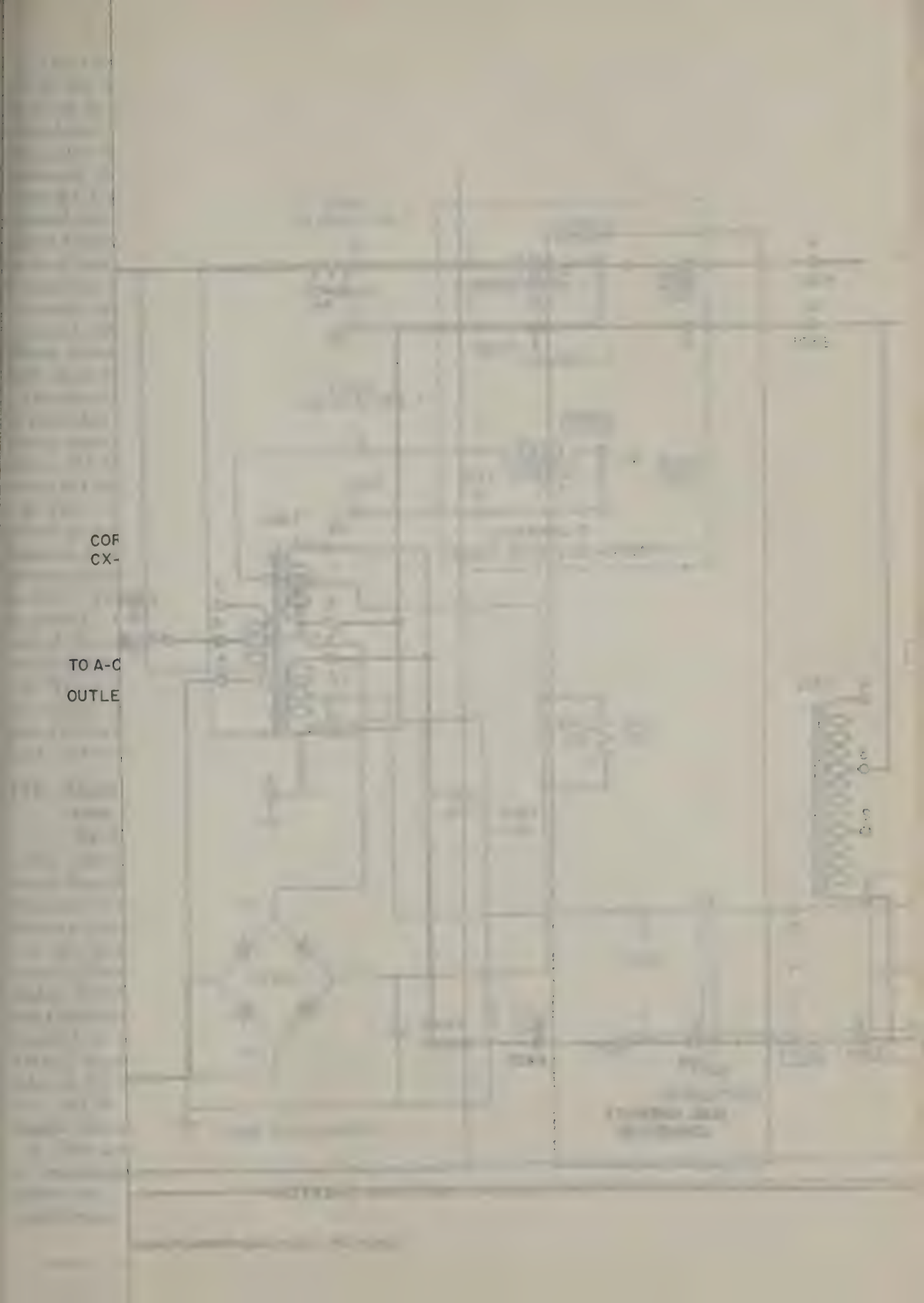


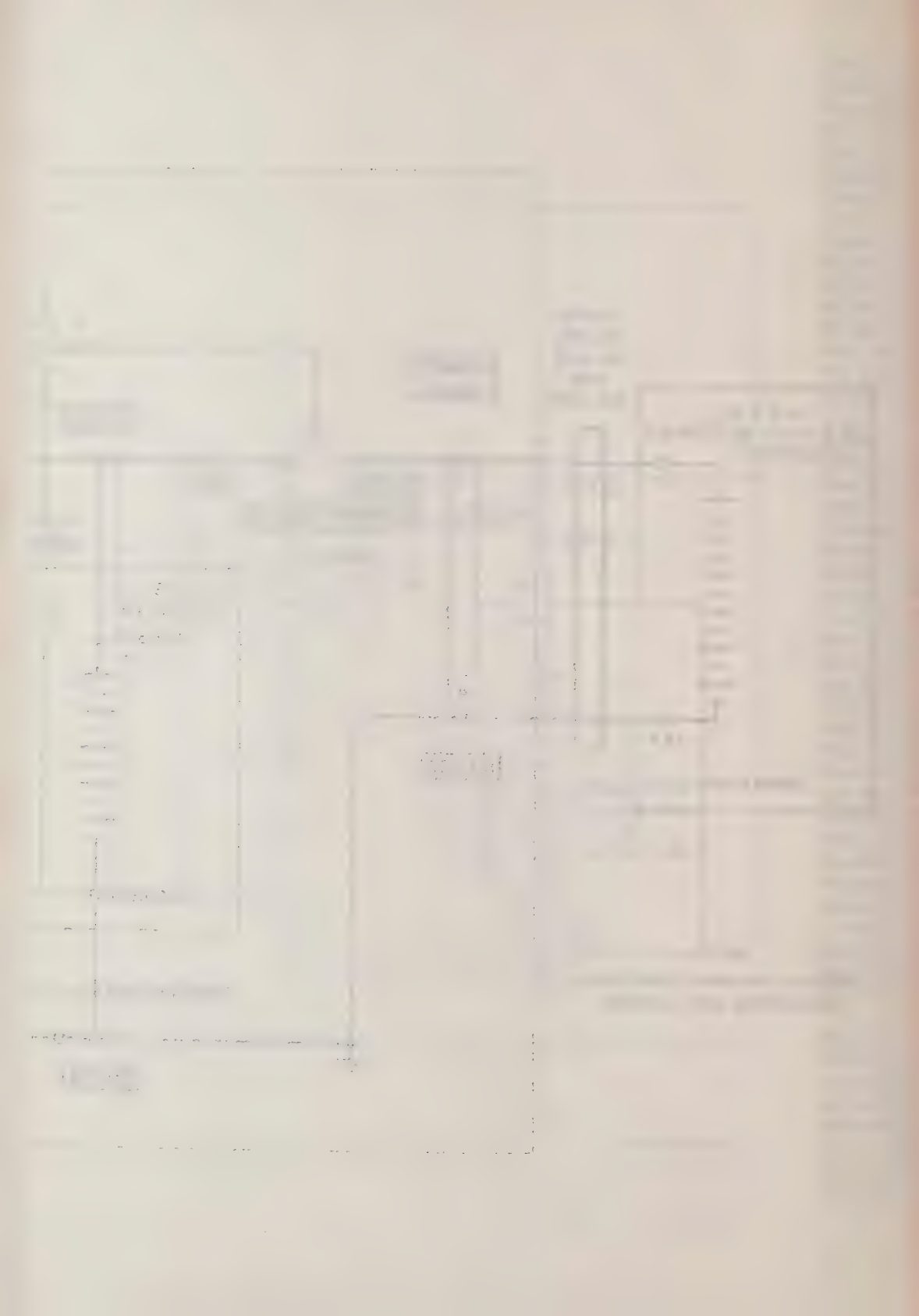
NOTE:
UNLESS OTHERWISE SPECIFIED:
RESISTORS ARE IN OHMS.

Figure 125 —12-volt d-c distribution in the transmitting shelter.

355394 O - 55 (Face p. 208) No. 1




COF
CX-
TO A-C
OUTLE



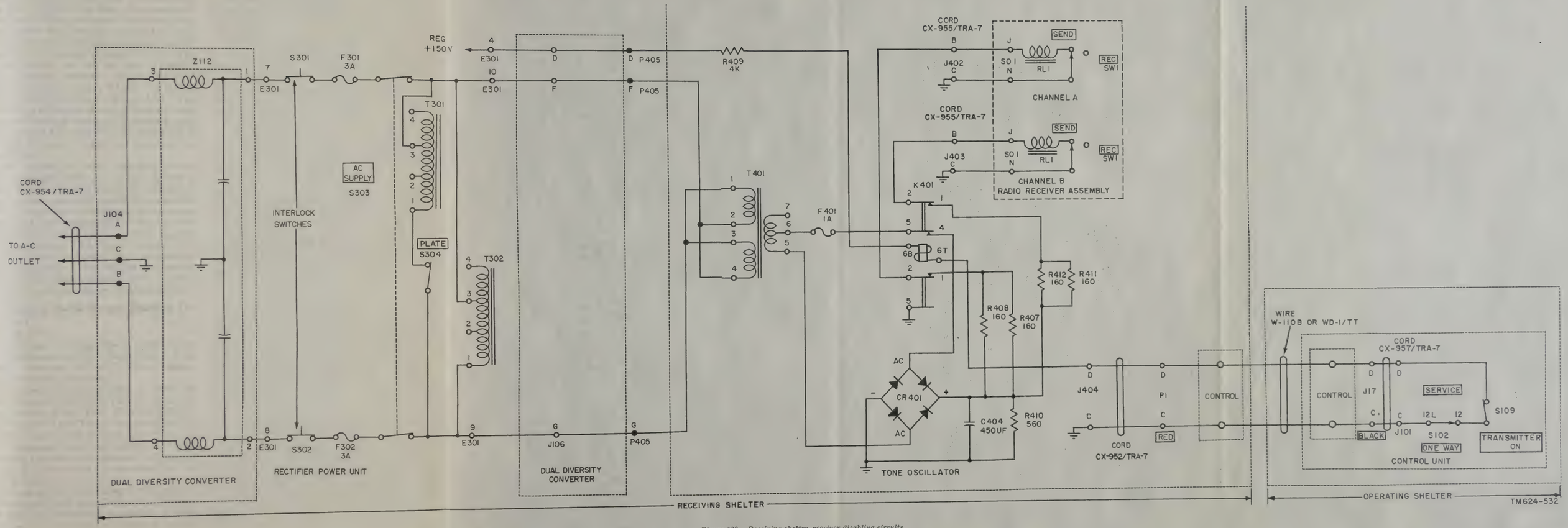


Figure 126.—Receiving shelter, receiver disabling circuits.



f. The 12-volt d-c supply is connected to one side of the coil of relay RY200 in Junction Box JB–70–A by means of a closed switch of either microphone connected to jack J102 or socket SO 101 in the Speech Amplifier BC–614–(*) or by depressing the key of a telegraph key inserted in either KEY jacks J200 or J201. Terminals 8 of terminal strip TS200 and socket SO 102 are connected together by Cord CX–141/MRQ–2. The sleeve of jack J102 and terminal 1 of socket SL 101 is connected to terminal 8 of socket SO 102. The —12-volt side of the coil or relay RY200 is grounded through terminal 7 of terminal strip TS200, terminal 4 of socket SO 102, tip of jack J102, mike switch and sleeve of jack J102. The —12-volt side of the coil of relay RY200 also may be grounded through terminal 7 of terminal strip TS200, terminal 4 of socket SO 102, terminal 2 of socket SO 101, mike switch and terminal 1 of socket SO 101.

g. The —12-volt d-c supply also may be connected to one side of the coil of relay RY200 in Junction Box JB–70–A by means of a closed key inserted in either normally open KEY jacks J200 or J201. The sleeves of both jacks are connected to ground. Ground is connected to the —12-volt side of the coil by means of a telegraph key and switch SW203 in the TRANS ON position.

h. The —12-volt d-c source can be supplied to one side of the coil of relay RY200 by means of jack J102 in the speech amplifier and the disabling cord. This circuit is discussed in paragraph 135.

131. Receiving Shelter Receive Disabling Circuits

(fig. 126)

The following subparagraphs describe the receiver disabling action which takes place in Dual Diversity Converter CV–31(*)/TRA–7 during one-way reversible operation.

a. A-c power for the operation of Dual Diversity Converter CV–31(*)/TRA–7, which includes Rectifier Power Unit PP–193(*)/TRA–7 and Oscillator O–41(*)/TRA–7 (tone oscillator) is supplied to socket J103 through Cord CX–954/TRA–7 connected to an a-c outlet. The two sides of the a-c power are connected to terminal A— and B. Terminal C is connected to the chassis (ground).

b. This a-c power is connected to the primary of transformers T301 and T302 in the rectifier power unit. The circuit to terminals 3 of both transformers is controlled by interlock switch S301 and the other pole of switch S303. The circuit to terminal 1 of transformer T302 is controlled by interlock switch S302, switch S303, and the PLATE power switch S304.

c. A-c power also is connected to the primary of transformer T401 in the tone oscillator. This is controlled by the two interlock switches S301 and S302 and the double-pole AC SUPPLY switch S303.

d. Relay K401 controls the d-c power supplied to the disabling relays in the Channel A and Channel B receivers. This relay also controls the a-c power supplied to rectifier CR401 from the secondary of transformer T401. Operation of relay K401 is controlled by SERVICE switch S102 and the TRANSMITTER ON switch S109 in the control unit.

e. One side of the coil of relay K401 is connected to a regulated 150-volt source through resistor R409. Grounding the other side of the coil energizes the relay. Ground at terminal C of jack S404 is connected to one side of the coil when the SERVICE switch S102 is in the ONE WAY position and the transmitter switch S109 is in the TRANSMITTER ON position.

f. One of the a-c terminals of rectifier CR401 is connected directly to one side of the secondary of transformer T401. The other a-c terminal is connected to the other terminal of the secondary through fuse F401 and one set of contacts (terminals 5 and 4) of relay K401.

g. The negative d-c terminal of rectifier CR401 is connected to the chassis (ground). The positive d-c terminal is connected to one side of the coil of relay RL1 in the channel A receiver through the parallel resistors R407 and R408, terminals 1 and 2 of relay K401, terminal B of socket J402, Cord CX–955/TRA–7, and terminal J of socket SO 1. The other side of the coil or relay RL1 is connected to ground through switch SW1 in the SEND position terminal N of socket SO 1, Cord CY–955/TRA–7, and terminal C of socket J402.

h. The positive terminal of the rectifier CR401 is connected to one side of the coil of relay RL1 in the channel B receiver through the parallel resistors R411 and R412, terminals 1 and 2 of relay K401, terminal B of jack J403, Cord CX–955/TRA–7, and terminal J of socket SO 1. The other side of the coil is connected to ground through switch SW1 in the SEND position, terminal N of socket SO 1, and terminal C of jack J403.

i. Setting the TRANSMITTER switch in the control unit to TRANSMITTER ON with the SERVICE switch S102 in the ONE WAY position energizes the coil of relay K401 and closes the contacts. The a-c input circuit is completed. The d-c output from the rectifier is supplied to the receiver disabling relay and the antenna-input terminals are grounded.

132. Interunit Circuits Controlled by FS Exciter Relay K101

(fig. 127)

a. Normally, transmission is controlled by relay K101 in the FS exciter. Operation of this relay is controlled by OPERATION switch S104B and TRANSMITTER ON switch S110 in the control unit. Since a positive d-c voltage is supplied to one side of the coil of this relay constantly, 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 (BP) in the transmitting and operating shelter, Wire WD–1/TT or W–110–B, and terminal C of the GREEN jack J14. Terminals C and D of socket J102 are connected together through terminal 12L and terminal 10 or 11 of switch S104B, transmitter 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 RED plug P2 through Cord CX–958/TRA–7, terminal D of GREEN jack J14, the binding post of the transmitting shelter, terminal D of BLUE plug P1, Cord CX–961/TRA–7, terminal D of jack J107, and Cord CX–961/TRA–7. Terminal D of the RED plug P2 is connected to the ground side of the relay coil K101 through KEY jack J4, terminal C of the RED plug P2, Cords CX–961/TRA–7, and terminal C of socket J106.

c. Operating relay K101 keys the plates of tube V101 and the cathode of tube V102 in the FS exciter which excites the r-f oscillator of the transmitter. One set of contacts of this relay is in series with the circuit which grounds one side of the coil in relay RY200.

d. Ground at the sleeve of jack J102 is connected to one side of the coil of relay RY200 through Cord CD–1019 in Radio Set AN/MRC–2B or CD–607 in Radio Set AN/MRC–2 and –2A, sleeve of the DISABLING jack J2, terminal B of the RED plug P2, Cord CX–961/TRA–7, terminal B of socket J107, terminal 1 and 2 of relay K101, terminal A of socket J106, Cord CX–961/TRA–7, terminal A of the RED plug P2, tip of the DISABLING jack J2, Cords CD–1019 or CD–607, tip of jack J102, terminal 4 of SO 102, Cord CX–141/MRQ–2, and terminal 7 of terminal strip TS200. Therefore, operating relay K101 operates relay RY200 in Junction Box JB–70–A.

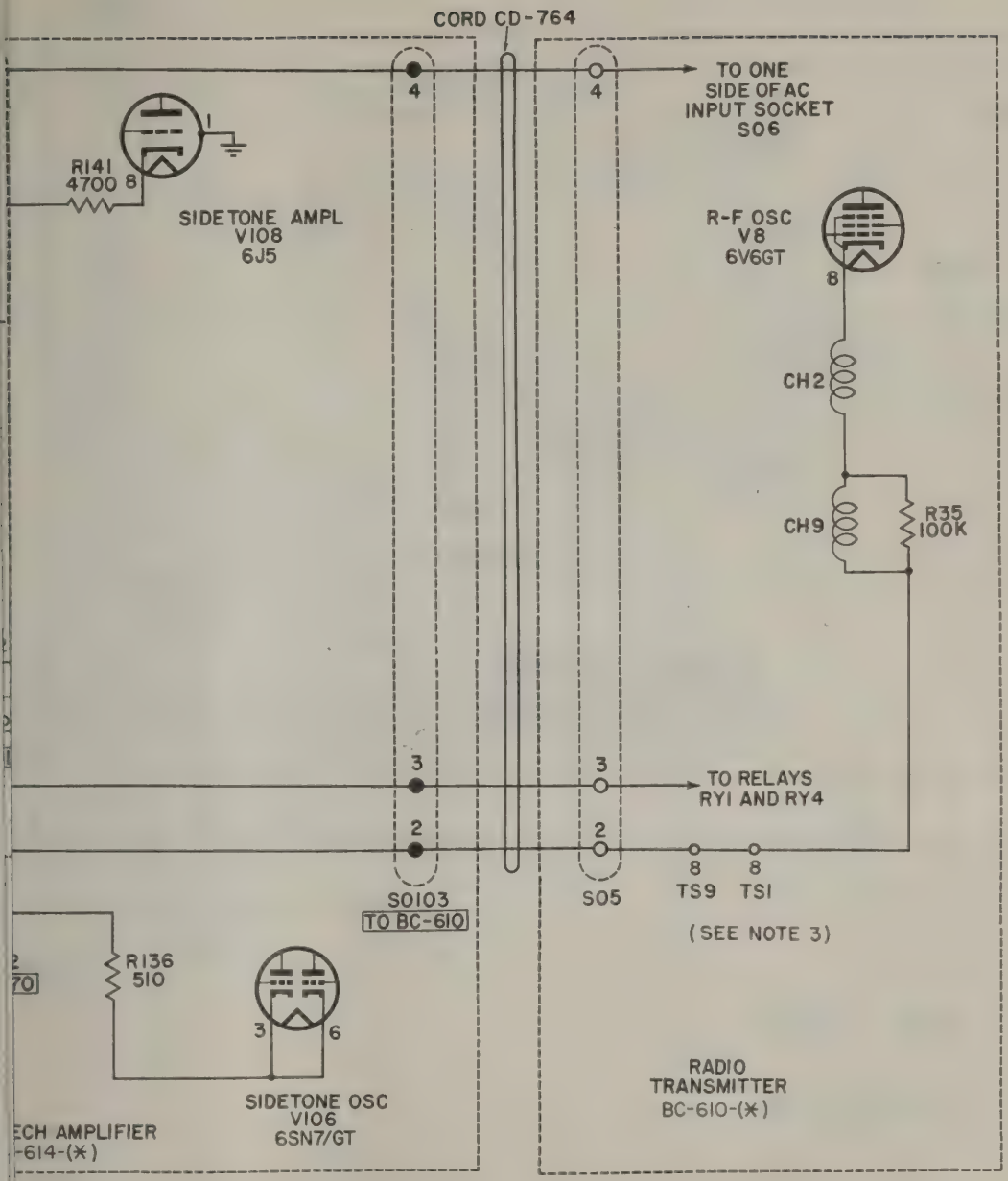
133. Interunit Circuits Controlled by Junction Box Relay RY200

(fig. 127)

a. Relay RY200, through five sets of contacts, controls five circuits. Two sets of contacts ground the sidetone amplifier cathode (tube V108) on the speech amplifier. The cathode of tube V108 is connected to the common terminal of switch SW205A through resistor R141, terminal 5 of socket SO 102 (TO JB–70), Cord CX–141/MRQ–2, and terminal 5 of terminal strip TS200. With switch SW205 in the TO BC–342 position, terminal 3 of this switch is connected to ground through resistor R205, RECEIVER OUTPUT SW204 in the NORMAL position, RECEIVER DISABLING switch SW201 (TO BC–342) in the ON position, and one set of contacts of relay RY200. With switch SW205A in the TO BC–312 position, terminal 3 is connected to ground through resistor R203, RECEIVER OUTPUT switch SW204 in the NORMAL position, RECEIVER DISABLING switch SW200 (TO BC–312) in the ON position, and one set of contacts of relay RY200.

b. The sidetone signal from the cathode of tube V108 is supplied to HEADSETS jacks J204 and J205 with switch SW205 in the TO BC–342 position. Resistor R205, connected from the tip of these jacks to ground provides the load for this signal. The sidetone signal from the cathode of tube V108 is supplied to the HEADSETS jacks J202 and J203 with switch SW205 in the TO BC–312 position. Resistor R203, connected from the tip of these jacks to ground, provides the load for this signal. Switch SW205 determines which set of jacks are available for monitoring the sidetone signal.

c. One set of contacts of relay RY200 grounds the cathode of the r-f oscillator (tube V8) in the radio transmitter and also the cathodes of the sidetone oscillator (tube V106) in the speech amplifier. The circuit from ground to terminal 3 of the ter-


CORD CD-764
TO ONE SIDE OF AC INPUT SOCKET S06
R141 4700 8
SIDETONE AMPL V108 6J5
R-F OSC V8 6V6GT
CH2
CH9
R35 100K
TO RELAYS RY1 AND RY4
S0103 TO BC-610
S05
TS9
TS1
(SEE NOTE 3)
R136 510
SIDETONE OSC V106 6SN7/GT
RADIO TRANSMITTER BC-610-(*)

TM 624-531

i. Setting the TRANSMITTER switch in the control unit to TRANSMITTER ON with the SERVICE switch S102 in the ONE WAY position energizes the coil of relay K401 and closes the contacts. The a-c input circuit is completed. The d-c output from the rectifier is supplied to the receiver disabling relay and the antenna-input terminals are grounded.

132. Interunit Circuits Controlled by FS Exciter Relay K101

(fig. 127)

a. Normally, transmission is controlled by relay K101 in the FS exciter. Operation of this relay is controlled by OPERATION switch S104B and TRANSMITTER ON switch S110 in the control unit. Since a positive d-c voltage is supplied to one side of the coil of this relay constantly, 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 (BP) in the transmitting and operating shelter, Wire WD–1/TT or W–110–B, and terminal C of the GREEN jack J14. Terminals C and D of socket J102 are connected together through terminal 12L and terminal 10 or 11 of switch S104B, transmitter 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 RED plug P2 through Cord CX–958/TRA–7, terminal D of GREEN jack J14, the binding post of the transmitting shelter, terminal D of BLUE plug P1, Cord CX–961/TRA–7, terminal D of jack J107, and Cord CX–961/TRA–7. Terminal D of the RED plug P2 is connected to the ground side of the relay coil K101 through KEY jack J4, terminal C of the RED plug P2, Cords CX–961/TRA–7, and terminal C of socket J106.

c. Operating relay K101 keys the plates of tube V101 and the cathode of tube V102 in the FS exciter which excites the r-f oscillator of the transmitter. One set of contacts of this relay is in series with the circuit which grounds one side of the coil in relay RY200.

d. Ground at the sleeve of jack J102 is connected to one side of the coil of relay RY200 through Cord CD–1019 in Radio Set AN/MRC–2B or CD–607 in Radio Set AN/MRC–2 and –2A, sleeve of the DISABLING jack J2, terminal B of the RED plug P2, Cord CX–961/TRA–7, terminal B of socket J107, terminal 1 and 2 of relay K101, terminal A of socket J106, Cord CX–961/TRA–7, terminal A of the RED plug P2, tip of the DISABLING jack J2, Cords CD–1019 or CD–607, tip of jack J102, terminal 4 of SO 102, Cord CX–141/MRQ–2, and terminal 7 of terminal strip TS200. Therefore, operating relay K101 operates relay RY200 in Junction Box JB–70–A.

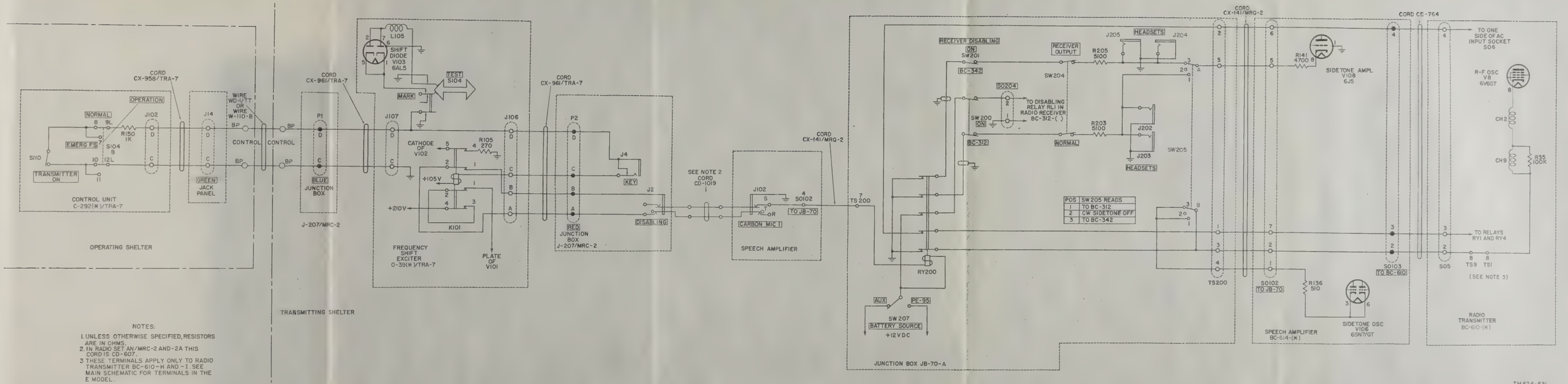
133. Interunit Circuits Controlled by Junction Box Relay RY200

(fig. 127)

a. Relay RY200, through five sets of contacts, controls five circuits. Two sets of contacts ground the sidetone amplifier cathode (tube V108) on the speech amplifier. The cathode of tube V108 is connected to the common terminal of switch SW205A through resistor R141, terminal 5 of socket SO 102 (TO JB–70), Cord CX–141/MRQ–2, and terminal 5 of terminal strip TS200. With switch SW205 in the TO BC–342 position, terminal 3 of this switch is connected to ground through resistor R205, RECEIVER OUTPUT SW204 in the NORMAL position, RECEIVER DISABLING switch SW201 (TO BC–342) in the ON position, and one set of contacts of relay RY200. With switch SW205A in the TO BC–312 position, terminal 3 is connected to ground through resistor R203, RECEIVER OUTPUT switch SW204 in the NORMAL position, RECEIVER DISABLING switch SW200 (TO BC–312) in the ON position, and one set of contacts of relay RY200.

b. The sidetone signal from the cathode of tube V108 is supplied to HEADSETS jacks J204 and J205 with switch SW205 in the TO BC–342 position. Resistor R205, connected from the tip of these jacks to ground provides the load for this signal. The sidetone signal from the cathode of tube V108 is supplied to the HEADSETS jacks J202 and J203 with switch SW205 in the TO BC–312 position. Resistor R203, connected from the tip of these jacks to ground, provides the load for this signal. Switch SW205 determines which set of jacks are available for monitoring the sidetone signal.

c. One set of contacts of relay RY200 grounds the cathode of the r-f oscillator (tube V8) in the radio transmitter and also the cathodes of the sidetone oscillator (tube V106) in the speech amplifier. The circuit from ground to terminal 3 of the ter-



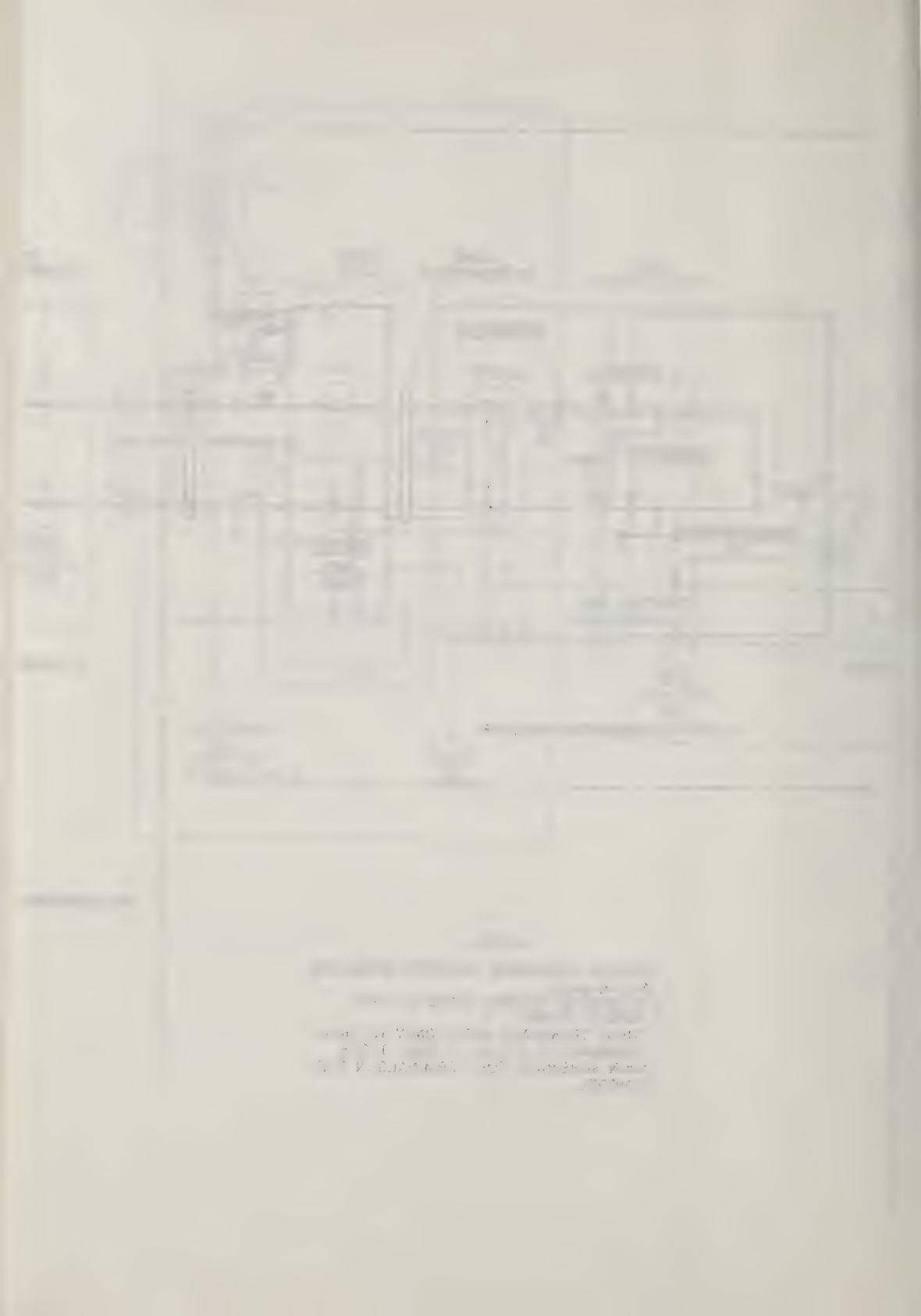
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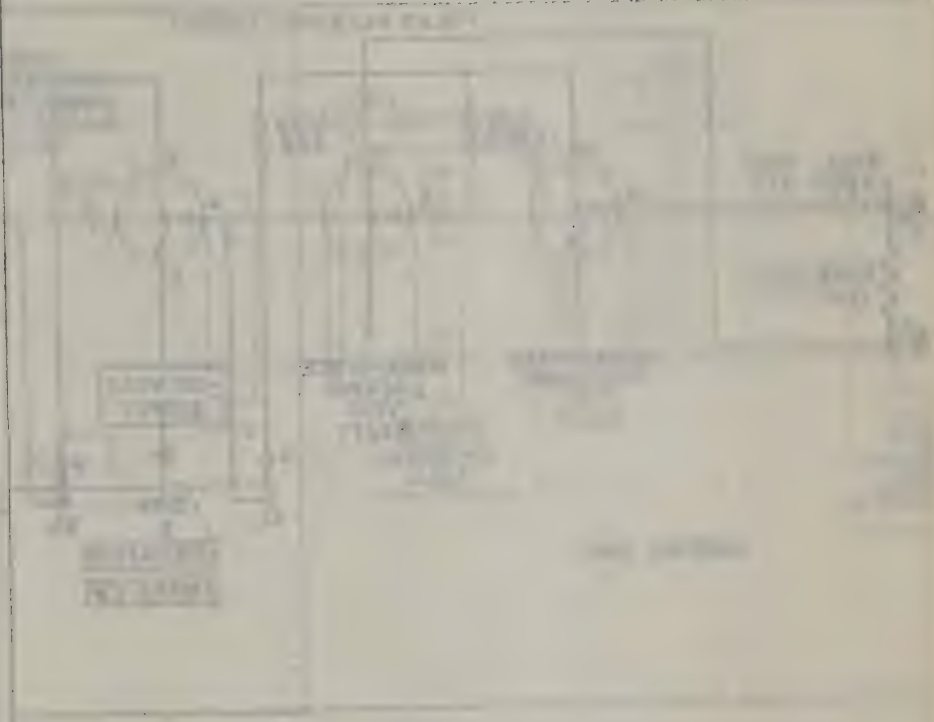
1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE IN OHMS.
2. IN RADIO SET AN/MRC-2 AND -2A THIS CORD IS CD-507.
3. THESE TERMINALS APPLY ONLY TO RADIO TRANSMITTER BC-610-H AND -I. SEE MAIN SCHEMATIC FOR TERMINALS IN THE E MODEL.

Figure 127.—Circuits controlled by relay K101.

TM 624-531

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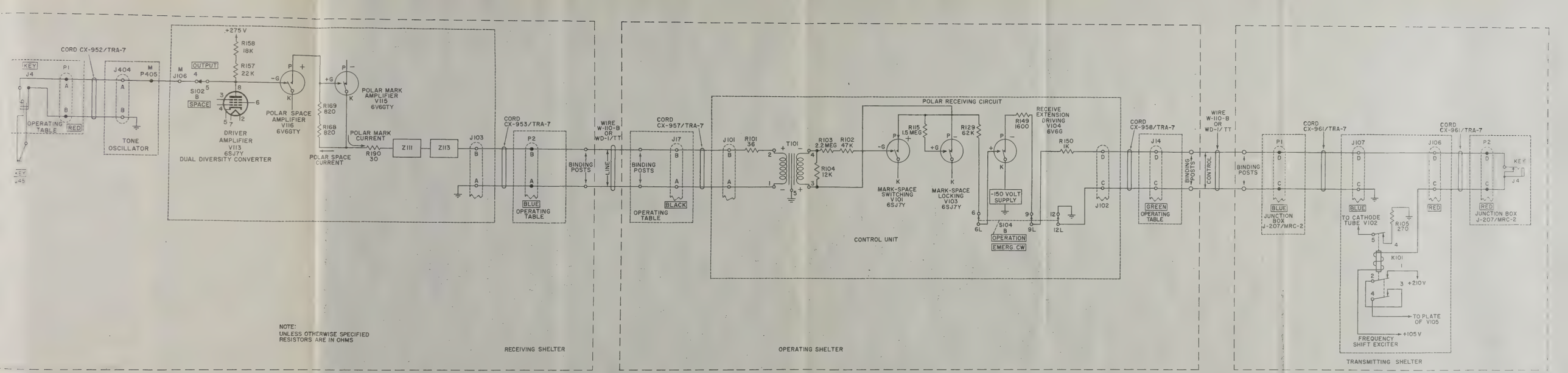


Figure 128.—Intrunit circuits for c-w keying from the receiving shelter.



minal strip TS200 is through one set of contacts of relay RY200. This part of the circuit is common to the cathode of tube V8 and tube V106. Terminal 3 of terminal strip TS200 is connected to the cathode of tube V8 through Cord CX–141/MRQ–2, terminal 2 of socket SO 102 (TO JB–70), terminal 2 of socket SO 103 (TO BC–610), Cord CD–764, terminal 2 of socket SO 5, terminals 8 and 8, of terminal strip TS9, and TS1, respectively, the parallel choke CH9 and resistor R35, and choke CH2. In Radio Transmitter BC–610–E the path from socket SO 5 is terminal 8 of socket SO 1, terminal 8 of plug PL1 and terminal 3 of TS1. Terminal 3 of terminal strip TS200 is connected to the cathodes of tube V108 through switch SW205 in either the TO BC–352 or TO BC–312 position, terminal 4 of terminal strip TS200, Cord CX–141/MRQ–2, terminal 1 of socket SO 102 (TO JB–70), and resistor R136.

d. One set of contacts of relay RY200 connects the +12-volt d-c source to one side of the disabling relay RL1 in Radio Receiver BC–312–( ). The +12-volt d-c source from the common terminal of the BATTERY SOURCE switch SW207 is connected to one side of the coil through two contacts of the relay, RECEIVER DISABLING switch SW200 (BC–312) in the ON position, and terminal 2 of socket SO 204. The circuit from socket SO 204 to relay RL1 is discussed in paragraph 130*c* and *d*.

e. One set of contacts is in series with one side of the a-c power from the radio transmitter. The circuit from terminal 4 of socket SO 5 to terminal 3 of socket SO 5 is through Cord CD–764, terminal 4 of socket SO 103 (TO BC–610), terminal 6 of socket SO 102 (TO JB–70), Cord CX–141/MRQ–2, terminal 2 of terminal strip TS200, two contacts of relay RY200, terminal 1 of terminal strip TS200, Cord CX–141/MRQ–2, terminal 7 of socket SO 102 (TO JB–70), terminal 3 of socket SO 103 (TO BC–610), and Cord CD–764. The circuit from one side of the a-c source at socket SO 6 to terminal 4 of socket SO 5 and from terminal 3 of socket SO 5 to relays RY1 and RY4 are discussed in TM 11–826.

134. Interunit Circuits for C-W Keying From Junction Box J–207/MRC–2

(fig. 127)

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 FS exciter. With switch S104 in the MARK position, control of relay K101 is removed from the control unit. The plates of the shift diode tube V103 are grounded and the cathode circuit is open. The shift diode is disabled and the transmitter output is the mark frequency.

b. A telegraph key inserted in the KEY jack opens the circuit to ground from one side of the coil of relay K101. This de-energizes the coil and the circuits controlled by the relay are open. Depressing the key energizes the coil and operates the relay. C-w signals are produced by depressing and releasing the telegraph key.

135. Interunit Circuits for C-W Keying From Receiving Shelter

(fig. 128)

a. C-w keying from the receiving shelter is controlled by the OPERATION switch on the control unit in the operating shelter set to EMERG. CW position and depends on the operation of relay K101 in the FS exciter in the transmitting shelter. With the OUTPUT switch in 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, c-w keying is accomplished by depressing and releasing the key.

b. Depressing the key grounds the plate of the 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 the OUTPUT switch S102B in the space position (terminals 5 and 4), terminals M of Socket J106 and M of plug P405, socket J404, Cord CX–952/TRA–7, terminal A of RED plug P1, Key J–45 (closed) terminal B of RED plug P1, and Cord CX–952/TRA–7. Grounding the plate of tube V113 decreases the positive voltage which is connected to 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 J03, Cord CX–953/TRA–7, the BLUE plug P2, the LINE binding posts in the receiving and operating shelters, Wire W–110–B or WD–1/TT, the BLACK

jack J17, Cord CX–957/TRA–7, Socket J101, and resistor R101.

d. The direction of the polar-mark current, from terminals 2 to 1 in transformer T101, in the loop circuit produces a voltage at the grid of the mark space switching tube V101 which is negative 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 the transformer T101. When tube V101 is nonconducting, tube V104 becomes conducting and relay K101 in the FS exciter operates.

e. One side of the coil is supplied from a +105-volt source. The circuit to ground from the other side of the coil involves Socket J106 (RED), Cord CX–961/TRA–7, Plug P2 (RED), KEY jack J4, RED plug P2, Cord CX–961/TRA–7, socket J186, socket J107, Cord CX–961/TRA–7, blue plug P1, CONTROL binding post in the transmitting shelter and the operating shelter, Wire W–110–B or WD–1/TT, the GREEN jack J14, 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.

f. Depressing Key J–45 inserted in the KEY jack on the operating table in the receiving shelter energizes the coil of relay K101 in the FS exciter. Energizing this coil closes the contacts of the relay which keys the cathode of tube V102 and the plate of tube V101 and also completes the circuit to the coil of relay RY200 in Junction Box JB–70–A as explained in paragraph 132. Energizing the coil of relay RY200 closes the contacts of this relay and, through one set of contacts, a-c power is connected to the coils of Relay RY1 and RY4 in the transmitter. This is explained in paragraph 133. Energizing relay K101 causes the transmitter to transmit a mark signal.

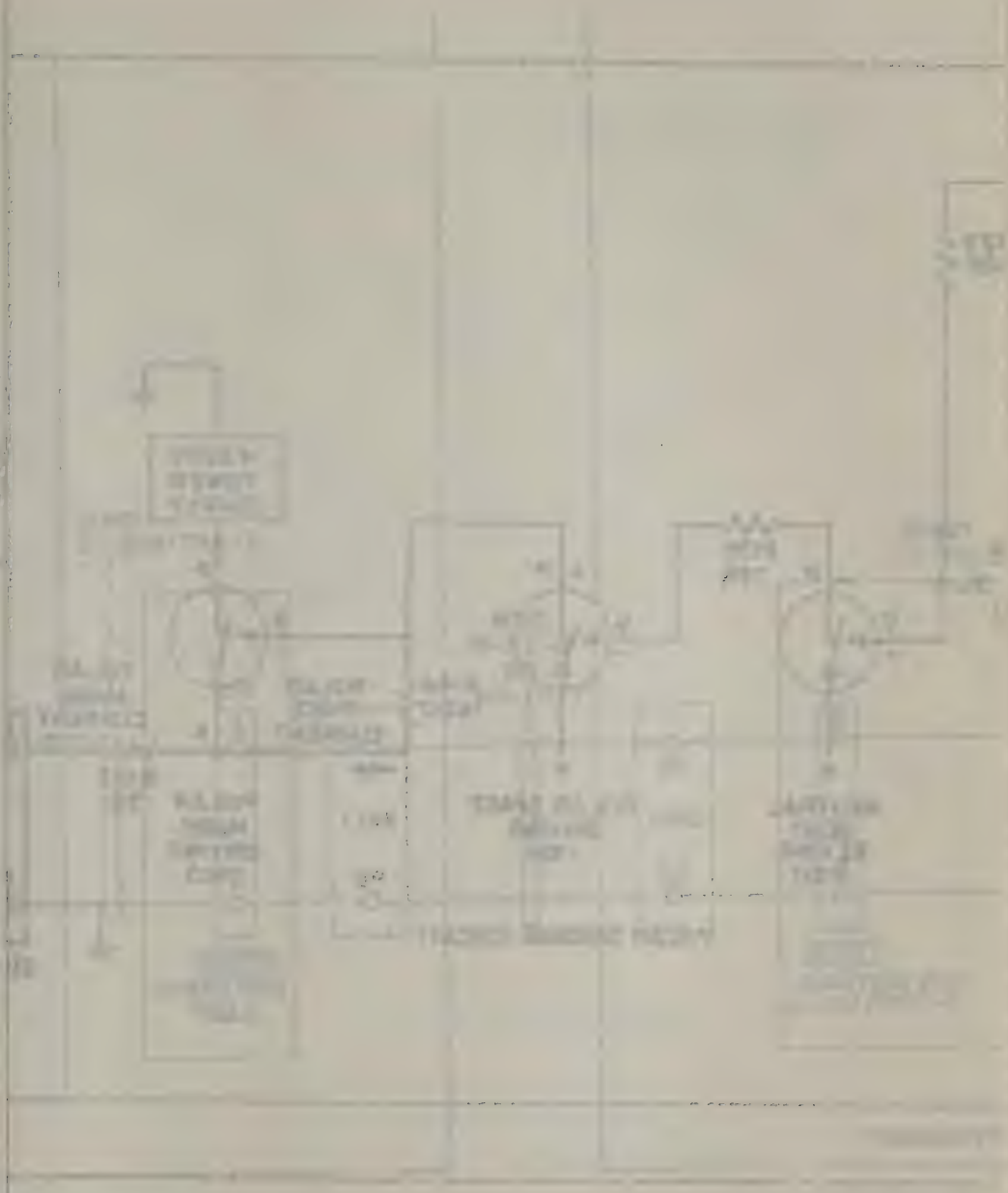
g. Releasing Key J–45 causes a polar-space current to flow in the polar-loop circuit which includes transformer T101 in the control unit. The direction of flow is such that tube V104 becomes nonconducting and the coil of relay K101 is deenergized. Deenergizing the coil of relay K101 opens the contacts of this relay and no transmission occurs. In this manner c-w keying from the receiving shelter is accomplished.

136. Interunit Circuits for Manual FS Keying From Receiving Shelter
(fig. 128)

a. FS 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, FS 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 the 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 137.

c. A polar-mark current in the primary of transformer T101 results in tube V101 not conducting. 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 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-spacing 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, the LINE binding posts in the operating and transmitting shelter, Wire W–110–B or WD–1/TT, the BLUE plug P1, Cord CX–961/TRA–7, Socket J107, Chokes L109 and L110, resistor R108, resistor R11, and tube V103.



jack J17, Cord CX–957/TRA–7, Socket J101, and resistor R101.

d. The direction of the polar-mark current, from terminals 2 to 1 in transformer T101, in the loop circuit produces a voltage at the grid of the mark space switching tube V101 which is negative 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 the transformer T101. When tube V101 is nonconducting, tube V104 becomes conducting and relay K101 in the FS exciter operates.

e. One side of the coil is supplied from a +105-volt source. The circuit to ground from the other side of the coil involves Socket J106 (RED), Cord CX–961/TRA–7, Plug P2 (RED), KEY jack J4, RED plug P2, Cord CX–961/TRA–7, socket J186, socket J107, Cord CX–961/TRA–7, blue plug P1, CONTROL binding post in the transmitting shelter and the operating shelter, Wire W–110–B or WD–1/TT, the GREEN jack J14, 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.

f. Depressing Key J–45 inserted in the KEY jack on the operating table in the receiving shelter energizes the coil of relay K101 in the FS exciter. Energizing this coil closes the contacts of the relay which keys the cathode of tube V102 and the plate of tube V101 and also completes the circuit to the coil of relay RY200 in Junction Box JB–70–A as explained in paragraph 132. Energizing the coil of relay RY200 closes the contacts of this relay and, through one set of contacts, a-c power is connected to the coils of Relay RY1 and RY4 in the transmitter. This is explained in paragraph 133. 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 tube V104 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 c-w keying from the receiving shelter is accomplished.

136. Interunit Circuits for Manual FS Keying From Receiving Shelter

(fig. 128)

a. FS 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, FS 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 the 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 137.

c. A polar-mark current in the primary of transformer T101 results in tube V101 not conducting. 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 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-spacing 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, the LINE binding posts in the operating and transmitting shelter, Wire W–110–B or WD–1/TT, the BLUE plug P1, Cord CX–961/TRA–7, Socket J107, Chokes L109 and L110, resistor R108, resistor R11, and tube V103.

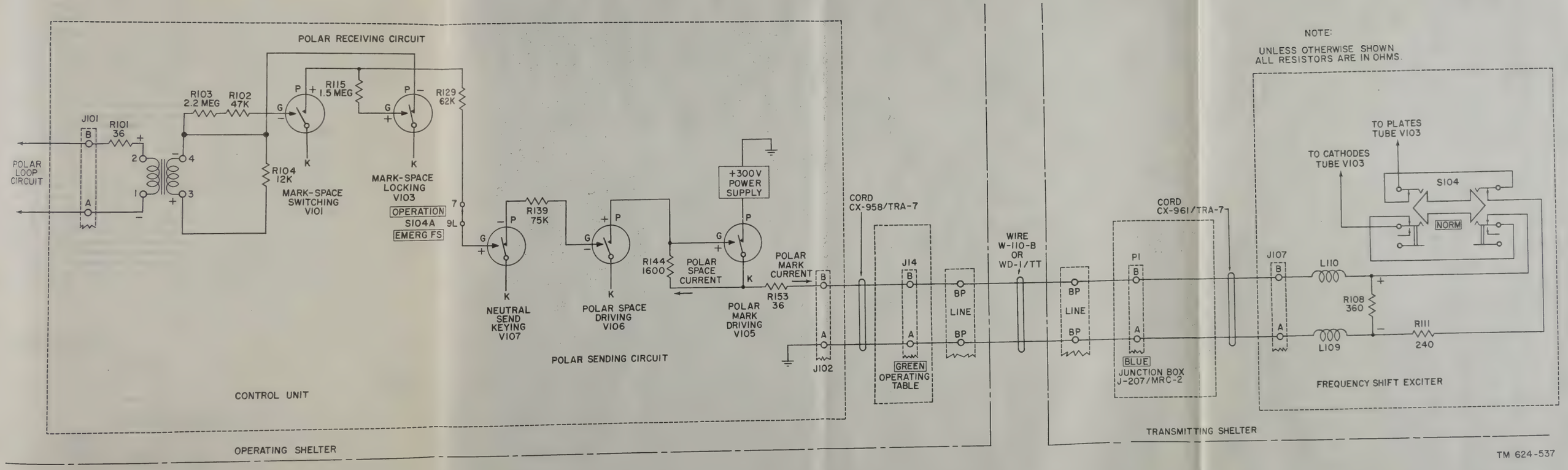
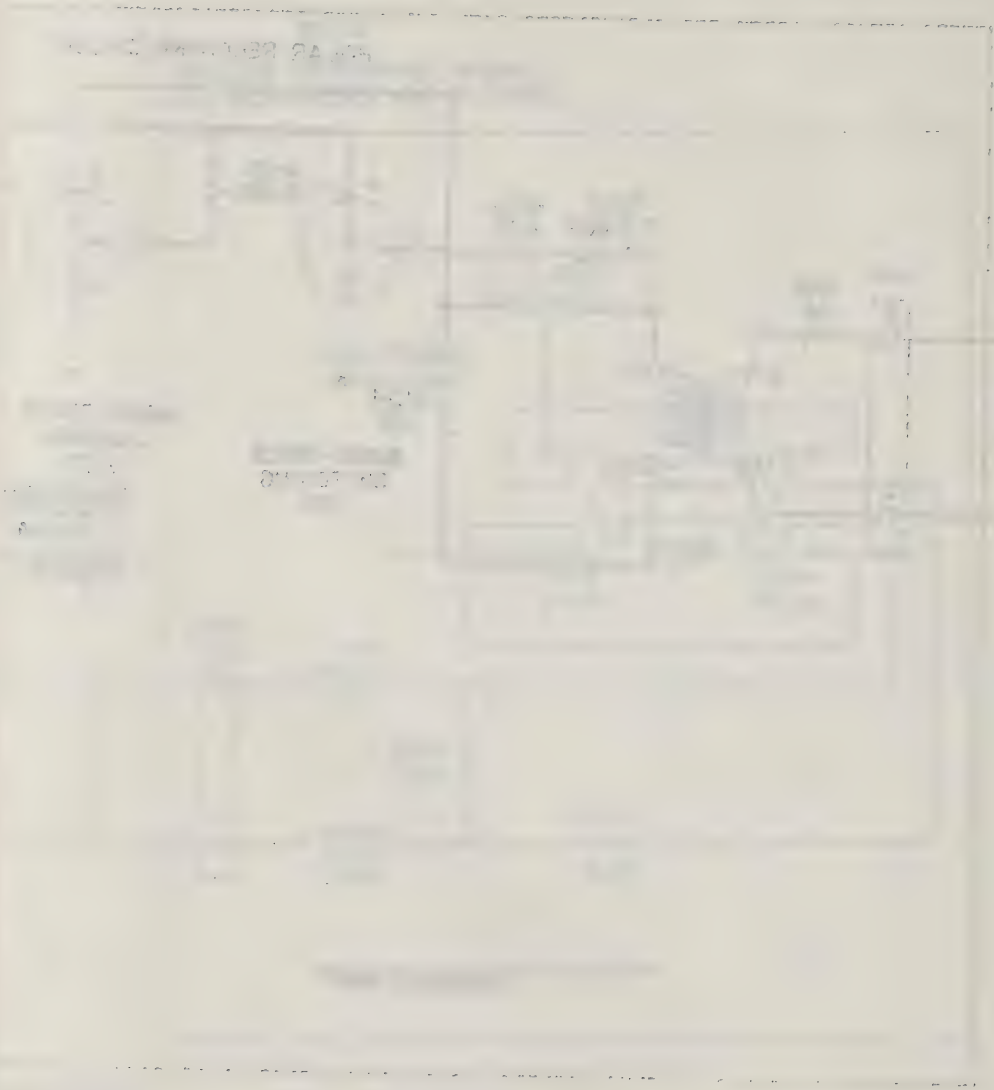


Figure 129.—Interunit circuits for manual FS keying from the receiving shelter.



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. Tube V103 is nonconducting 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 connected to the cathodes and plates of tube V103 in the FS exciter are reversed. 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 FS keying except that Key J–45 is removed and the OUTPUT switch is in the NORMAL or REVERSE position, depending on the setting of the band switch 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.

137. Interunit Circuits for Emergency C-W Keying From the Speech Amplifier

(fig. 130)

a. Emergency c-w keying from the speech Amplifier is accomplished by operating Key J–37 inserted in the KEY jack J101. With PLATE POWER switch SW6 in the on (up) position, control by relay RY200 in Junction Box JB–70–A is removed. Operating the PLATE POWER switch to on (up) operates relays RY1 and RY4 (antenna shorting relay). Operating RY4 removes the short across the antenna-output terminals (fig. 164).

b. Depressing Key J–37 closes the circuit from the cathode of the r-f oscillator tube V8 to ground 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 antenna must be removed or the receiver must be tuned to a frequency at least 400 kc from the transmitter frequency.

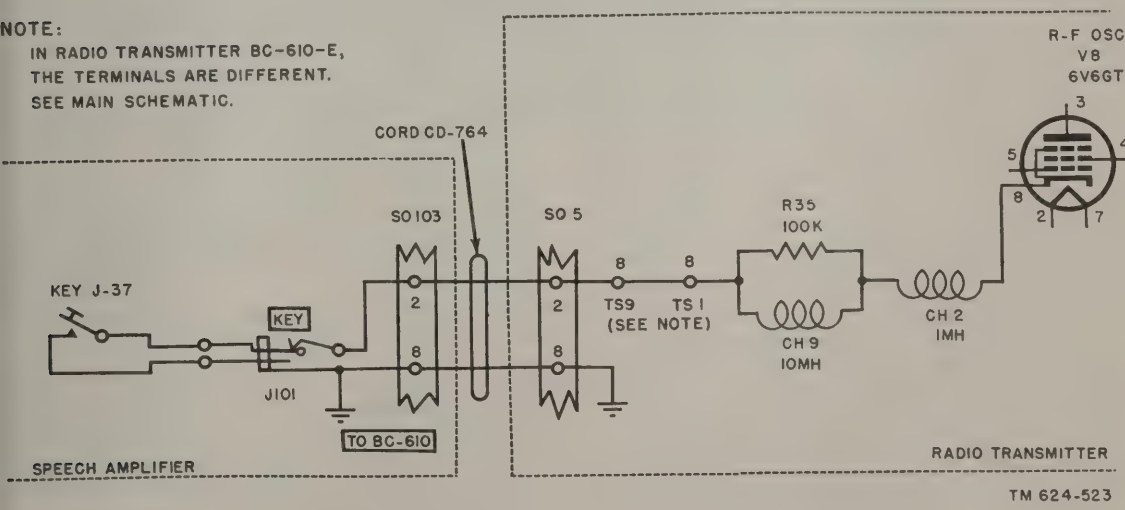


Figure 130. Emergency c-w keying circuits from the speech amplifier.

138. General

The theory of the components as given in paragraphs 139 through 148 supplements the information on system theory given in paragraphs 124 through 137. The theory of the individual components is abbreviated necessarily; however, detailed theory of each component will be found in the technical manual associated with that component. Refer to paragraph 123 for a listing of the components and the technical manuals concerned.

139. Radio Receiver Assembly OA–65(*)/MRC–2

(figs. 118 and 167)

Radio Receiver Assembly OA–65(*)/MRC–2 consists of an oscillator coupling amplifier (Oscillator-Amplifier O–59(*)/MRC) and two modified Radio Receivers BC–342–( ). The modifications are designed specifically to facilitate the use of these receivers for dual-diversity operation in Radio Set AN/MRC–2(*). In the bottom receiver, the Channel A receiver, the h-f oscillator is modified to serve as the h-f oscillator in both receivers. The top receiver, the Channel B receiver, has the h-f oscillator tube removed, and receives its r-f injection voltage from the Channel A receiver (fig. 131).

a. Each receiver operates as a conventional superheterodyne receiver. Two r-f amplifiers are provided to give optimum carrier signal voltage amplification and to provide selectivity and image rejection. The h-f oscillator of the Channel A receiver, coupled to the Channel B receiver, converts in the mixer stages of both receivers, the incoming carrier signal from the r-f stages to an intermediate frequency of 470 kc for the input to the two i-f amplifier stages. The i-f stages give additional voltage amplification and provide maximum rejection of unwanted signals by providing a high degree of selectivity. The 470-kc output of each receiver is connected to individual coaxial connectors (J107) for further connection to the inputs of the dual-diversity converter. For purposes of c-w and a-m reception, the i-f outputs pass, in a conventional manner, to a detector circuit (V7) where heterodyne action from the output of the c-w oscillator (V9) makes the carrier signals audible. These a-f signals are amplified further by the second audio amplifier (V8) for driving a loudspeaker (Loudspeaker LS–3) through Control Box C–345(*)/MRC–2, which has additional audio attenuation controls. An a-f output for operating a headset (Headset HS–30–( )) is provided by either the output of the second audio amplifier or the first audio amplifier, which is a function of tube V7.

b. The oscillator coupling amplifier, Oscillator-Amplifier O–59(*)/MRC, is a two-stage, r-f amplifier designed to supply the proper signal voltages from the Channel A receiver h-f oscillator to the mixer stage of the Channel B receiver. Mechanically, the oscillator-amplifier consists of a small chassis provided with plugs P1 and P2 which engage jacks J8 and J108 of the Channel A and Channel B receivers, respectively (fig. 50). Electrically, the amplifier consists of a type 6C4 tube, resistance-coupled to a type 6AK6 tube. The grid of the 6C4 is connected to plug P2, which receives the h-f oscillator voltages from the Channel A receiver via J108. The type 6AK6 tube amplifies the h-f oscillator signal, and delivers, through plug P1 and J108, the voltage for injection to the mixer tube V3 in the Channel B receiver. The oscillator amplifier performs the important function of isolating the two receiver circuits (the h-f oscillator of Channel A and the mixer of Channel B) so that the inter-reaction does not exist, and it provides a mixer injection voltage of the same magnitude in both receivers. Figure 50 shows the connections for the oscillator-amplifier, and figure 169 is the complete schematic diagram of the unit.

140. Dual Diversity Converter CV–31(*)/TRA–7

(figs. 118, 171, 172, and 173.)

Dual Diversity Converter CV–31(*)/TRA–7 converts the i-f output of the Channel A and Channel B radio receivers into polar and neutral d-c teletypewriter signals for operation of receiving teletypewriters.

a. I-f signals from the two radio receivers are converted separately by heterodyne action to a lower frequency and amplified in a band-pass and mixer stage. Following this is a limiter stage to eliminate undesirable amplitude variations in the incoming signals before they are connected to a frequency discriminator for detection. This discriminator stage combines the frequencies origi-

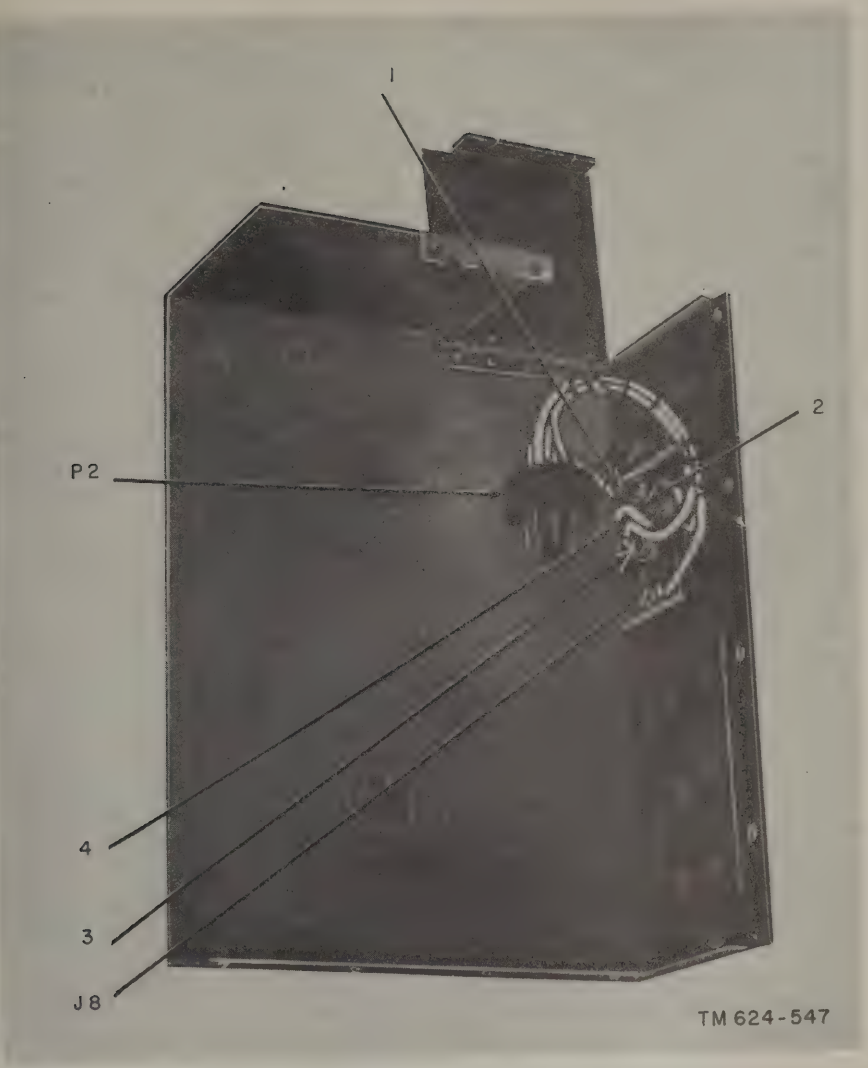


Figure 131. Radio Receiver Assembly OA–65(*)/MRC–2, h-f oscillator compartment.

nating from the Channel A and Channel B receivers and produces d-c mark and space signals. These signals are connected to an output control circuit where they produce neutral and polar telegraph signals.

b. A tone oscillator and radio receiver disabling circuit, also a part of the dual-diversity converter unit, provides an audible means of indicating mark and space impulses by tones in a headset, and a circuit for disabling the two radio receivers when transmitting on a one-way reversible basis.

141. Control Unit C–292(*)/TRA–7

(figs. 118 and 170)

The basic functional circuits of the control unit consist of a receiving circuit, a sending circuit, and a power supply. A complete schematic diagram of the control unit appears in figure 170.

a. Receiving Circuit. The receiving circuit converts polar teletypewriter signals from the dual-diversity converter into neutral d-c signals. These neutral signals energize, through external receive extension circuits, the printing selector

magnet in the teletypewriter. In some cases, the neutral signals are applied to a receiving relay type 255A or a Line Unit BE–77–( ), which, in turn, controls current to operate the teletypewriter selector magnet.

b. Sending Circuit. The teletypewriter sending contacts are connected, through the send extension circuit, to the input of the control unit sending circuit. The neutral signals, formed by the open (space) and closed (mark) teletypewriter sending contacts, are converted into polar signals by the sending circuit. These polar signals key the FS exciter.

c. Power Supply. The power supply provides both a-c and d-c voltages required to energize and operate the circuits of the control unit and associated receiving teletypewriters, and also supplies polar current for the FS exciter line.

142. Frequency Shift Exciter O–39(*)/TRA–7

(figs. 118 and 166)

Frequency Shift Exciter O–39(*)/TRA–7 controls the frequency of the r-f oscillator in Radio Transmitter BC–610–(*), and provides the FS necessary to transmit a space signal.

a. A space signal from the control unit decreases the frequency of the r-f oscillator in the FS exciter. A mark signal from the control unit does not change the frequency of the r-f oscillator in the FS exciter. The frequency developed by the FS exciter is applied through the buffer amplifier stage to the crystal tuning unit of the radio transmitter.

b. An audio monitoring circuit, consisting of an 850-cycle oscillator stage, a mixer stage, and an amplifier stage, provides a means for monitoring the frequency difference between the mark and the space frequency produced by the radio transmitter. This frequency is mixed with the 850-cycle frequency developed by the 850-cycle oscillator. The resulting frequency is zero when the difference between the mark and space frequencies developed by the transmitter is 850 cycles. This condition is indicated audibly by a zero beat in the headset and visually by the smallest shadow angle on the indicator tube.

c. The a-c and d-c voltages necessary for the operation of the FS exciter are supplied by the power supply which is an integral part of the component.

143. Speech Amplifier BC–614–(*)

(figs. 118 and 174)

Speech Amplifier BC–614–(*) raises a microphone output to a level suitable to drive the input of the audio circuit in the transmitter.

a. When in use, a remote Telephone EE–8–( ) or dynamic Microphone T–50 is connected to the input of the first a-f amplifier, but the carbon microphone (Microphone T–17–( ) or T–45) is connected to the input of the second a-f amplifier. This arrangement provides proper impedance matching. The output of the first amplifier is applied to the input of the second amplifier, which in turn feeds the third a-f amplifier and phase inverter. A portion of the a-f output of the third amplifier is applied to the modulation limiter. The modulation limiter producers a d-c control voltage which is applied to the second audio stage as a bias voltage which reduces the gain and prevents overmodulation of the transmitter. The outputs of the third a-f amplifier and phase inverter are coupled to the fourth amplifier. The output voltage of the fourth amplifier is used to excite the driver stage for the modulator in Radio Transmitter BC–610–(*).

b. A-c power is supplied to the speech amplifier from Radio Transmitter BC–610–(*). A schematic diagram (fig. 174) is in the back of this manual.

144. Radio Transmitter BC–610–(*)

(figs. 118, 163, and 164)

Radio Transmitter BC–610–(*) covers a 2- to 18-mc frequency range by means of eight plug-in transmitter tuning units, seven plug-in coil units, and a plug-in vacuum capacitor.

a. Frequency is determined by a master oscillator, crystal control, or the output of the FS exciter in the grid circuit of the r-f oscillator stage. When set for master oscillator control, the frequency can be varied over the range of the particular transmitter tuning unit used. When set for crystal control, a fixed frequency is generated, the value of which depends on the particular crystal used. The output of this stage is fed to a buffer-doubler stage.

b. When the variable-frequency master oscillator is used, the buffer-doubler stage operates as a frequency doubler for all frequencies up to 12 mc, and as a frequency quadrupler for frequencies from 12 to 18 mc. Under crystal control, the stage operates as a buffer amplifier, a frequency doubler, or as a quadrupler, depending on the frequency range covered. The output of this stage is fed through an intermediate p-a stage to the final p-a stage.

c. The r-f output power is coupled inductively the input of Amplifier AM–141(*)/MRC for rther amplification. When the amplifier is not ed, a doublet antenna is connected directly to e r-f output terminals of the transmitter.

d. For voice modulation, audio frequencies from peech Amplifier BC–614–(*) are fed through an dio driver stage to the modulator section. This dio power output of the modulator stage modutes the final r-f p-a stage, thereby superimposing n a-f voice wave on the r-f carrier wave. Amplier AM–141(*)/MRC cannot be used for voice odulation.

145. Perforator-Transmitter TT–56/MGC and Reperforator-Transmitter TG–26–A

(figs. 118 and 191)

The perforator-transmitter consists of a eperforator-transmitter and a transmitter-istributor.

a. The typing-reperforator functions in response o the standard five-unit teletypewriter code in a nanner similar to Teletypewriter TT–55/MGC or TG–7–B (par. 125). Code perforations are punched on a tape and corresponding characters re printed on the tape.

b. The transmitter-distributor contains a tapeending mechanism which follows the perforated ode on the tape being transmitted. Contacts hus are completed which open and close the signal line in succession to produce impulses corresponding to the perforations on the tape.

146. Teletypewriter TT–55/MGC or TG–7–B

(figs. 118 and 190)

Teletypewriters TT–55/MGC and TG–7–B use the standard five-unit code, operating in response to neutral signals.

a. At the sending teletypewriter, the five-unit code is set up in mechanical form by depressing a key representing the desired letter to be transmitted. The sending mechanism of the teletypewriter transforms this particular mechanical setup into electrical impulses (neutral signals).

b. At the receiving teletypewriter, a selector mechanism positions the five-unit code into a mechanical arrangement, in response to received neutral signals. A typing unit prints page copy in accordance with the mechanical setup.

147. Power Supply Units for Frequency Meter BC–221–(*)

(figs. 118, 182, and 183)

Two power supply units for 115-volt, 50- to 60-cps a-c operation have been furnished for use with Frequency Meter BC–221–( ) in Radio Set AN/MRC–2 to eliminate the need for the batteries which are issued as part of Frequency Meter Set SCR–211–( ). Power Supply PP–79/UR was issued with Radio Set AN/MRC–2, and Rectifier Power Unit RA–133–(*) was issued with Radio Sets AN/MRC–2A and AN/MRC–2B. The individual units are described below and the figures showing schematics of each unit are in the back of this manual.

a. Power Supply PP–79/U. This unit operates on a line input of 110- to 115-volt, 50- to 60-cps alternating current and delivers a regulated output of 150-volt direct current at 100 ma and an output of 6.3-volt alternating current. Figure 183 is the schematic diagram of this power supply. The unit is protected against overload by fuse F1 (1 ampere) in series with one side of the primary winding of transformer T2. A separate low-voltage winding furnishes 6.3-volt alternating current for the heater of the full-wave rectifier tube 6X5GT, V6. The rectified voltage is taken off at the cathode of tube V6 and smoothed by a capacitor-input pi-filter network consisting of chokes L6 and L7, and capacitors C21, C22, and C23. Voltage regulator tube OD3, V7, is connected directly across the output capacitor of the filter section and maintains the output voltages at 150-volt direct current, even though the line input voltage or the load across the power supply output may vary slightly. No a-c power switch is provided in the primary circuit of this unit; the plug must be removed from the associated shelter a-c power receptacle to shut off the unit. No bleeder resistor is supplied; therefore, before servicing the power unit, the capacitors should be discharged by shorting the B+ to ground.

b. Rectifier Power Unit RA–133–(*). Complete technical data for this unit are given in TB 11–300–3. An a-c power switch and an indicating lamp, mounted in the switch housing, is connected in the line cord of the power unit. No bleeder resistor is connected across the output of this unit.

Before servicing this unit, discharge the filter section by shorting the B+ to ground. Figure 182 is a schematic diagram of the rectifier power unit.

c. Batteries. In an emergency, when the power supply unit supplied with the frequency meter is inoperative, and repairs cannot be made readily or quickly, batteries can be installed and the unit operated as Frequency Meter Set SCR–211–( ). Remove the power supply unit which is installed in the battery compartment. Select, from fresh stock if possible, four *A* Batteries BA–23, and six *B* Batteries BA–2. Connect the six Batteries BA–2 in series and cover the splices with friction tape (or insulated tubing). Connect the four Batteries BA–23, as shown in figure 12 in TM 11–300, by means of the wiring harness. Connect the other end of the wiring harness and the terminals (positive and negative) of the series-connected Batteries BA–2 to the proper terminal of terminal board 36 of the frequency meter. The batteries may be inserted in the battery compartment. If no wiring harness is available, Batteries BA–23, which are 1.5-volt cells, may be connected in series with short lengths of hook-up wire, and their end terminals connected to the A+ and A— binding posts or connectors on the frequency meter terminal board.

148. Schematic Diagrams

All components of Radio Set AN/MRC–2(*) are covered by at least one schematic diagram in the back of this manual. Where differences in models exist, refer to the individual technical manual for the circuit differences. Detailed theory and field maintenance instructions are not given on components already covered by individual technical manuals. See paragraph 123 for a listing of the components which are covered in other manuals and a listing of the pertinent technical manuals.

Section IV. THEORY OF AMPLIFIER AM–141(*)/MRC

149. General

(fig. 132)

Amplifier AM–141(*)/MRC is divided electrically, for discussion in this section, into three parts: the r-f section, the power supply section, and the power distribution and control circuits. The r-f section is a class C r-f amplifier using two type 833A triodes connected in push-pull. The amplifier delivers a power output of approximately 2 kilowatts when operated with an a-c power input of 5,000 volt-amperes at 115 volts, 60 cps. R-f excitation to the grids of the 833A tubes is accomplished by connecting the tuned grid circuit by a link coupling to the r-f output terminals of Radio Transmitter BC–610–(*). The balanced r-f output of the amplifier is coupled by a variable link on the plate tank coil to the antenna bowl feed-through insulators at the top of the cabinet. A bias power supply provides the proper negative voltage for operating the amplifier as class C. 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 amplifier block diagram is shown in figure 132. The schematic diagram for Amplifier AM–141/MRC and early models of Amplifier AM–141A/MRC is shown in figure 161 and the schematic diagram applying to Amplifier AM–141A/MRC, on Order No. 19624–Phila–50, and Amplifier AM–141B/MRC, is shown in figure 162.

150. Differences in Models

Radio Set AN/MRC–2(*) uses one of three models of the amplifier; either Amplifier AM–141/MRC, Amplifier AM–141A/MRC, or Amplifier AM–141B/MRC. No differences exist between these models which would affect their use where the radio set as a whole is concerned; however, the differences, listed below, require explanation from a theory standpoint.

a. In Amplifier AM–141B/MRC, 4,700-$\mu\mu$f (micromicrofarad) capacitors C19, C20, and C21 have been added as r-f bypass capacitors. Amplifiers AM–141/MRC and AM–141A/MRC do not have these capacitors.

b. In Amplifier AM–141B/MRC, a switch S16 has been added to function as a protective device to ground the high-voltage plate supply in the event the plate coil compartment panel is opened and the normal interlock circuit fails.

c. In Amplifier AM–141/MRC and early models of Amplifier AM–141A/MRC, the plate power rectifier tubes V5 and V6 are mercury-vapor type 872A, and the bias rectifier tubes V3 and V4 are mercury-vapor type 866A. In later models of Amplifier AM–141A/MRC and in all models of

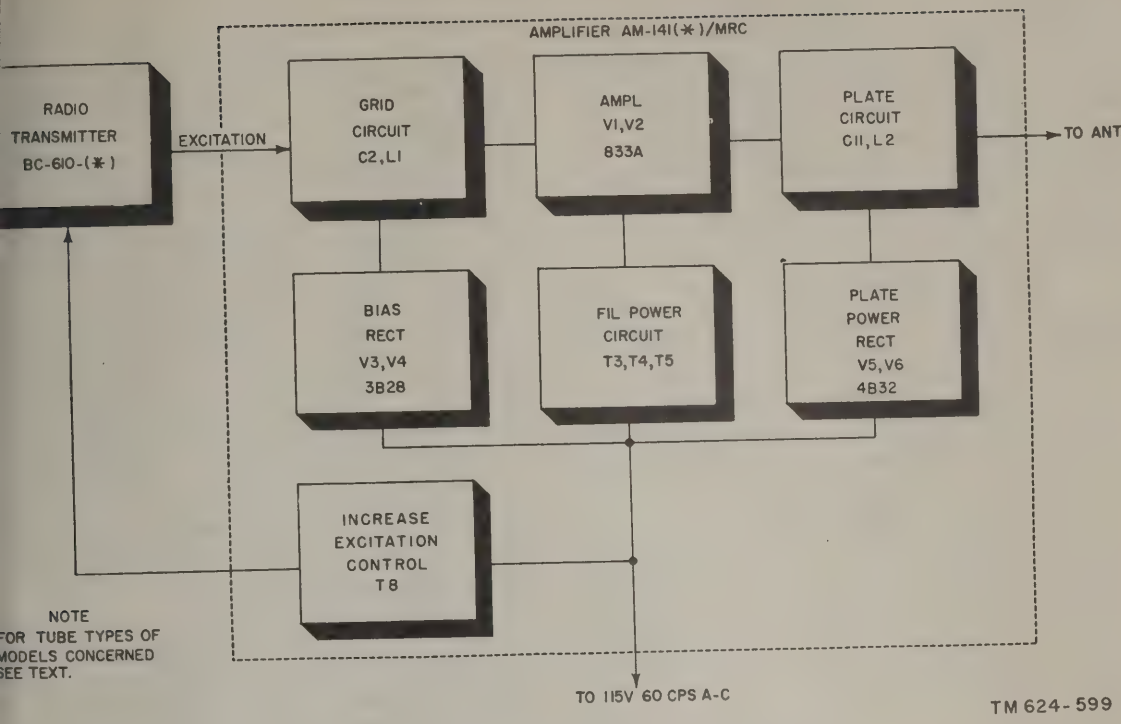


Figure 132. Amplifier AM–141(*)/MRC, block diagram.

Amplifier AM–141B/MRC, tubes V5 and V6 are gas-filled type 4B32, and V3 and V4 are gas-filled type 3B28. In all models of the amplifier, tubes V1 and V2 are type 833A. All rectifier tubes are now replaceable by type 4B32 and 3B28.

d. Thermal switches S3 and S4, included in Amplifiers AM–141/MRC and AM–141A/MRC, are not included in Amplifier AM–141B/MRC. These switches are not necessary in units of the amplifier which use gas-filled rectifier tubes in place of the mercury-vapor rectifier tubes.

e. External rectifier tube heaters E1, E2, E3, and E4 are eliminated in models of the amplifier using the gas-filled rectifier tubes 3B28 and 4B32. The models are Amplifier AM–141A/MRC on Order No. 19624–Phila–50, and all models of Amplifier AM–141B/MRC.

f. In Amplifier AM–141/MRC and early models of Amplifier AM–141A/MRC, a vacuum capacitor C10 is plugged in parallel with capacitor C11 to increase the capacitance of the plate tank circuit when operating between 1 and 2 mc with the BAND SWITCH in position 3. Since this is not a requirement of Radio Set AN/MRC–2(*), facilities for the use of this capacitor have been omitted from Amplifier AM–141A/MRC on Order No. 19624–Phila–50, and on all units of Amplifier AM–141B/MRC.

g. Plate overload relay K3 in Amplifier AM–141A/MRC has been replaced by a physically smaller unit in Amplifier AM–141B/MRC, the function remaining the same. The difference between Amplifier AM–141B/MRC on Order No. 25495–Phila–49 and on Order No. 1908–Phila–51 is that relay K3 in the latter is a physically larger unit, the function remaining the same.

h. Bias relay K2 in Amplifier AM–141A/MRC is changed to a physically smaller unit for Amplifier AM–141B/MRC, the function remaining the same.

i. Plate contactor K4 has been removed from the relay panel (where it is located in Amplifiers AM–141/MRC and AM–141A/MRC) and, in Amplifier AM–141B/MRC, placed on the left side of the frame, on the bias circuit shelf. The unit is physically larger in Amplifier AM–141B/MRC.

j. The time-delay relay K1 in Amplifier AM–141/MRC is a thermal-delay type. In all other models of the amplifier, this has been replaced by a time-delay switch K1 of the motor-driven type.

k. Resistors R8 and R9 in Amplifier AM–141/MRC and in some models of Amplifier AM–141A/

MRC have a value of 9 ohms each. In later models (Order No. 19624–Phila–50) of Amplifier AM–141A/MRC and all Amplifiers AM–141B/MRC, the value of each resistor R8 and R9 is 13.5 ohms. The functions remain the same.

l. Blower plug P1 and jack J1 on Amplifier AM–141/MRC are two-contact connectors. On all other models of the amplifier, the connectors are three-contact type.

m. Amplifier AM–141/MRC uses GR Variac type No. 200CU for T5 and T8. Amplifier AM–141A/MRC and Amplifier AM–141B/MRC use Superior Electric No. 116U Powerstat. The schematic diagrams of the different models of the amplifier show the proper terminal connections. The variable transformers (Variac and Powerstat) may be used interchangeably if the proper terminal connections are observed.

n. In Amplifier AM–141/MRC and some Amplifiers AM–141A/MRC, capacitors C4, C5, C6, and C7 are 5,000-$\mu\mu$f filament bypass capacitors. These have been changed to 5,100-$\mu\mu$f filament bypass capacitors in later models of Amplifier AM–141A/MRC and all Amplifiers AM–141B/MRC.

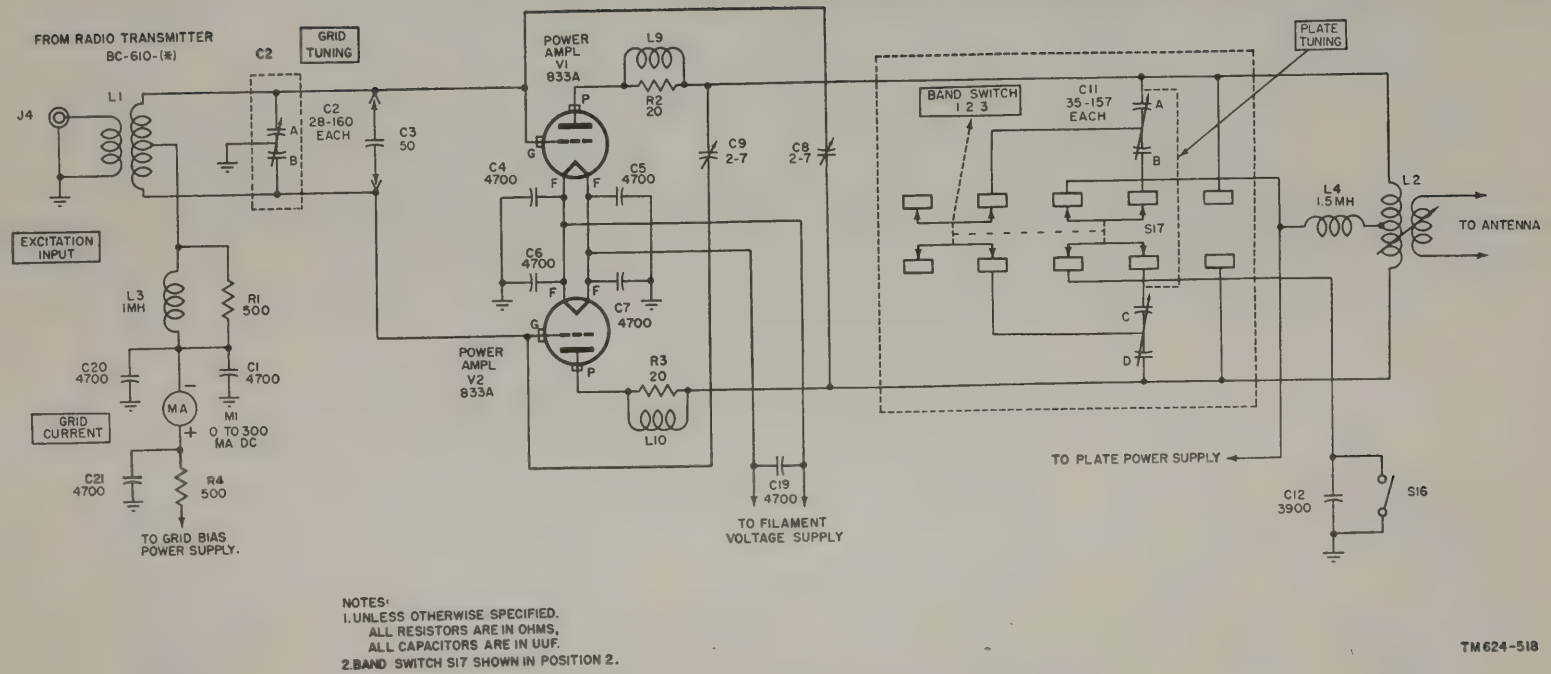
151. R-f Section

a. Exitation (fig. 133). Exitation is obtained by connecting the r-f output terminals of Radio Transmitter BC–610–(*) to coaxial connector J4 on the amplifier by coaxial Cable CG–65/MRC–1. Since the grid coil L1 of the amplifier is supplied with a fixed link, the amount of exitation supplied to the amplifier must be varied by changing the position of the variable link-coupling coil mounted inside the final plate tank coil of Radio Transmitter BC–610–(*).

b. Grid Circuit (fig. 133). The r-f power from the transmitter is coupled inductively to the grid circuit of the pa by the fixed link-coupling coil inside grid coil L1. Coil L1 is a plug-in type, which necessitates proper selection for use with a given band of frequencies. Tuning of the grid circuit to the transmitter frequency is accomplished by the two-section variable grid tuning capacitor C2. Plug-in vacuum capacitor CA423 (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 flow during excitation effectively increases the fixed negative bias delivered by the bias power supply, thereby increasing the plate circuit efficiency of tubes V1 and V2 and compensating for improper grid excitation conditions. R-f choke L3 and resistor R1 are provided to aid equalization of the drive to the amplifier tubes and, in conjunction with capacitor C1, form an r-f filter, preventing the flow of r-f current through grid current meter M1 and the bias power supply. In late Amplifier AM–141A/MRC models and Amplifier AM–141B/MRC, capacitors C20 and C21 serve as additional r-f bypass elements to prevent r-f current from flowing through the grid current meter M1 and the bias power supply.

c. Plate Circuit (fig. 133). The plate tank circuit of the pa consists of plug-in coil L2 and the variable capacitor unit formed by the ganging of the individual capacitors C11A, C11B, C11C, and C11D. 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 (h-f range) connects capacitors C11A, C11B, C11C, and C11D in series across coil L2. Position 3 (l-f 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 r-f choke L4 to the center tap of plate tank coil L2. Choke L4 prevents the r-f energy from entering the power supply. The r-f energy in the plate tank circuit is coupled inductively to the antenna through the secondary winding (a variable link) of coil L2. The secondary coil can be rotated through 360°, providing 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 with noninductive resistor R2. Choke L10 is paralleled with R3 for the same purpose.

d. Neutralization (fig. 133). Neutralization of the pa is accomplished by feeding a portion of the output of each tube to the grid of the opposite tube through the variable neutralizing capacitors C8 and C9. Neutralizing capacitor C8 is adjusted so that the magnitude of the current passing through it equals the current passing through the interelectrode (plate to grid) capacity of tube V1. The currents, being equal and 180° out of phase, cancel each other. This also applies to capacitor C9 and



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 133. Amplifier AM-141(*)/MRC, r-f section, schematic diagram.

-tube V2. With this type of neutralization, self-oscillation of tubes V1 and V2 is prevented, and the pa remains neutralized sufficiently over the entire band of frequencies upon initial neutralization for any one frequency of operation.

e. Filament Circuit (fig. 133). 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 rf to ground. In late models of Amplifier AM–141A/MRC and Amplifier AM–141B/MRC, capacitor C19, connected across filament voltage meter M2, is an additional r-f bypass.

152. Amplifier AM–141(*)/MRC, Power Supply Section

Two separate power supplies are included in the pa, a bias supply and a plate supply. The a-c input power applied to the bias and plate supplies is controlled by an interlock circuit (par. 154). Opening of the interlock circuit always will disable the plate supply and, depending on the point of opening, the bias supply.

a. Bias Power Supply (fig. 134). Negative grid bias voltage for tubes V1 and V2 is supplied by a bias power supply using two gas-filled 3B28-type tubes or mercury-vapor tubes type 866A, V3 and V4, in a conventional full-wave rectifier circuit. The filament voltage 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 r-f chokes L5 and L6. These chokes serve to suppress the r-f interference (hash) generated by the rectifier tubes. The negative output of the rectifier, present at the center tap of transformer T1, is filtered by a two-section choke L7, and capacitors C14 and C15 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 power supply, thus assuring good regulation. The contacts of relay K2 open if the bleeder current falls below 115 to 135 ma, and close when the current increases to 190–210 ma. When a condition of insufficient grid bias voltage is present, application of plate power to tubes V1 and V2 is prevented, thereby protecting the tubes against damage. In the event of failure in the bias supply circuit caused by an open circuit in any of the components, the self-bias voltage developed by the grid current flow of the amplifier tubes due to excitation will bias the tube adequately, and also hold contacts of relay K2 closed, thus maintaining amplifier operation. If the excitation to the amplifier be interrupted momentarily after a failure in the bias supply, relay K2 contacts will open, breaking the interlock circuit and disabling the high-voltage power supplies of the amplifier and the transmitter. It then will not be possible to reapply excitation until the bias supply deficiency is corrected.

b. Plate Power Supply (fig. 135). The high-voltage plate power supply for the pa consists of two gas-filled 4B32-type tubes or mercury-vapor 872A-type tubes, V5 and V6, in a conventional full-wave rectifier circuit. The filament voltage for the two rectifier tubes is supplied by transformer T6. The positive output of the rectifier present at the center top of transformer T6 is filtered by a choke-input filter consisting of choke L8 and capacitor C13. Transformer T7 supplies plate voltage to the rectifier tubes, and its center tap is connected to ground through the load 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, will flow through this circuit to ground and will be indicated by PLATE CURRENT meter M3. The PLATE POWER switch S1 never should be set to ON before setting the NORMAL-TUNEUP switch to TUNEUP; otherwise full power will be applied immediately to the high-voltage power supply components, causing high current and voltage surges in them, which in turn may cause release of overload relay K3 or damage to circuit elements. PLATE POWER indicator lamp E6 will glow when the high-voltage power supply is operating.

153. Power Distribution Circuits, A-C, Input

a. A-c input power is applied to the filament, bias, plate supplies, and other components of Amplifier AM–141(*)/MRC and Radio Transmitter BC–610–(*) through protective circuits as shown in the simplified power distribution circuit diagram (fig. 136). The 115-volt 60-cycle power source is connected to the amplifier by a detachable power cord (CX–135/MRC–1) to connector J2. The circuit diagram shows the positions of relay contacts and switches in the normal position (power off). The filament power indicator lamp E5 will glow, showing application of a-c power to the distribution circuits, when the main power switch, CIRCUIT BREAKER K5, is thrown to the ON position.

b. Primary wiring of the amplifier is divided into

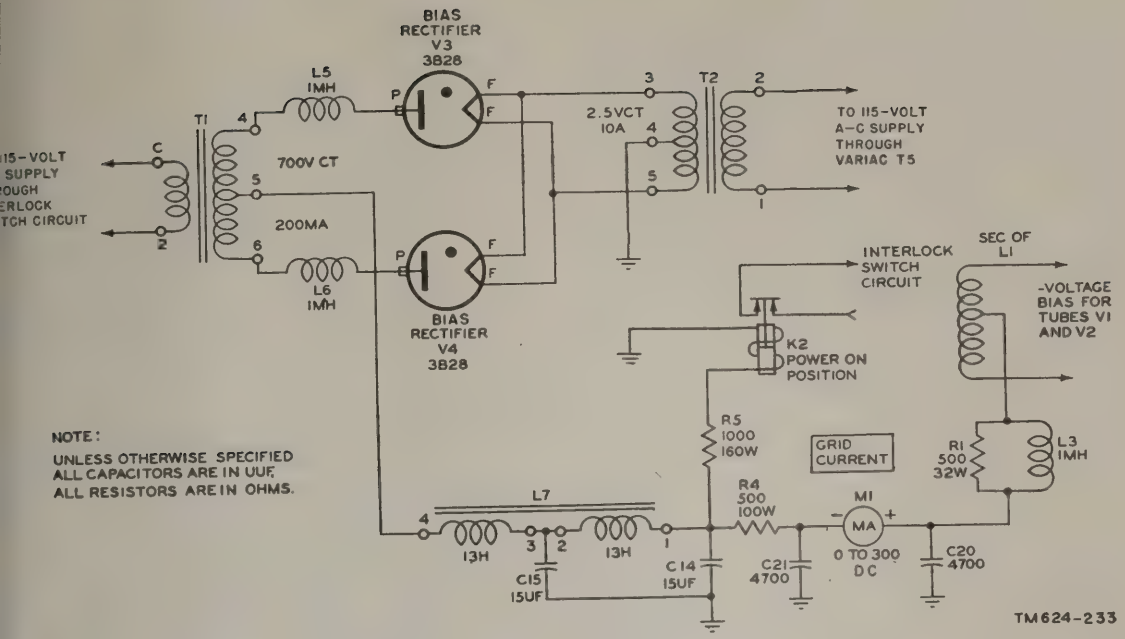


Figure 134. Amplifier AM-141(*)/MRC, bias power supply, schematic diagram.

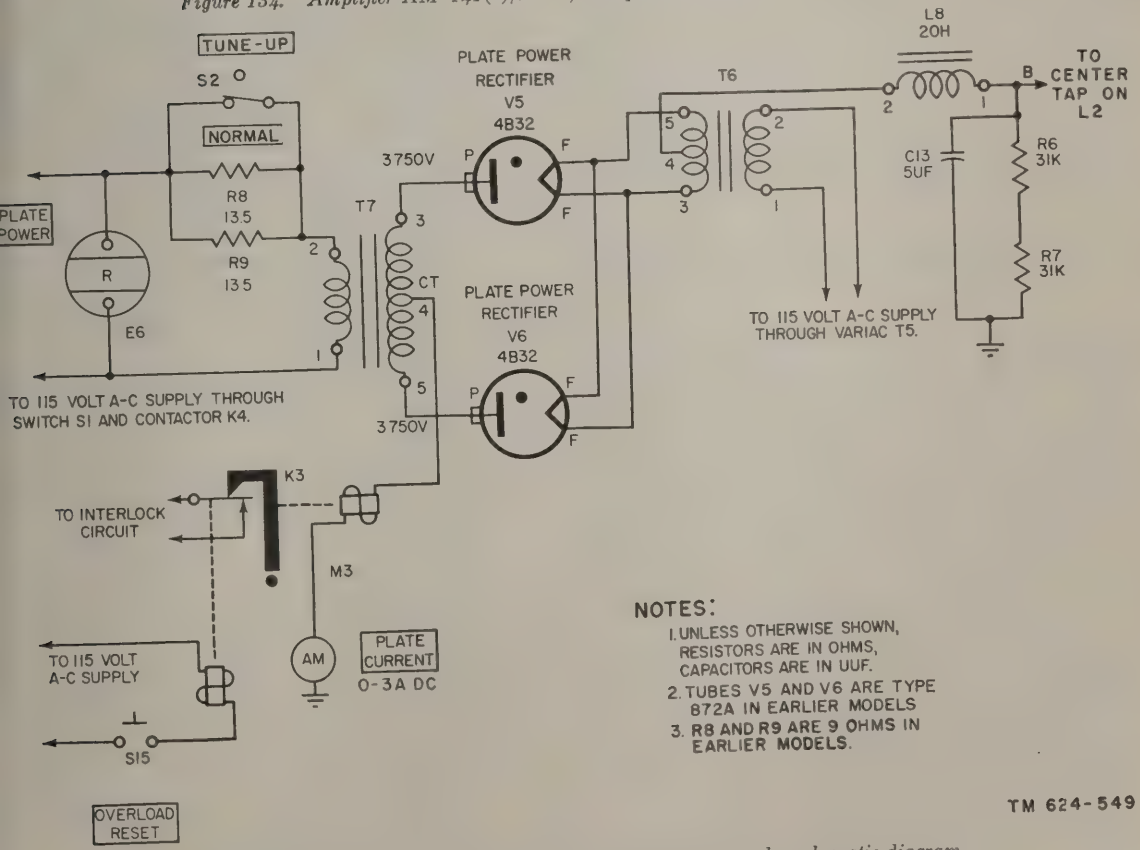


Figure 135. Amplifier AM-141(*)/MRC, plate power supply, schematic diagram.

two main circuits; one circuit is connected to the main power source without provision for voltage adjustments, and the other circuit is connected to the first circuit through variable transformer T5 which provides it with voltage adjustment. The adjustable power from T5 is connected to filament transformers T2, T3, T4, and T6; blower motors B1, B2, and B3; the time-delay switch K1; and to the coils of a-c operated relay K4. When the filament voltage of tubes V1 and V2 is adjusted to 10 volts by variable transformer T5 (indicated by the reading of FILAMENT VOLTAGE meter M2), 115 volts ±5 volts will be present on the preceding components associated with T5, regardless of the main power source voltage which may range from 95 to 135 volts. Filament variable transformer T5 should be set so that the FILAMENT VOLTAGE meter indicates 10 volts (maximum tolerance ±5 volts). The neutral sides of both circuits are common with the neutral terminal of connector J2. Observance of polarity in connecting the main power source to the amplifier is not necessary. The three-circuit plug P1 connected to blower B3 (the two-circuit plug in Amplifier AM–141/MRC) allows the adjustable variac power to be fed to time-delay switch K1 (or relay K1). Blower B3 prevents overheating of the components of the amplifier. The small blowers B1 and B2 provide cooling for amplifier tubes V1 and V2.

154. Power Distribution Circuits, Interlocks

(fig. 136)

The interlock circuit of Amplifier AM–141(*)/MRC performs a number of functions necessary in the operation of high-powered equipment. It insures proper operational sequence of controls and circuits, protects components from damage should control settings or circuits conditions be abnormal, and protects operating personnel from accidentally contacting dangerously high voltages within the amplifier, if the doors or panels are opened. The interlock circuit consists of switches S5 to S13, inclusive, operating in conjunction with relays K1, K2, K3, and K4. Opening any of the interlock switches (switch S14 set to OFF) will disable the plate power supplies of the amplifier and transmitter, blower B3, and the bias power supply of the amplifier. The locations of the interlock switches are as follows:

a. S5: back panel interlock, access door to tubes V5 and V6.

b. S6: back panel interlock, access door to tubes V3 and V4.

c. S7: left side panel interlock.

d. S8: top panel interlock.

e. S9: right side panel interlock.

f. S10: front panel interlock, relay access door.

g. S11: front panel interlock, grid coil access door.

h. S12: front panel interlock, band switch control.

i. S13: front panel interlock, plate coil access door.

155. Power Distribution Circuits, Relays

(fig. 136)

a. Time-Delay Switch K1. Time-delay switch K1 is a synchronous-motor-operated microswitch. The complete assembly is mounted in a hermetically sealed metal container

(1) When circuit breaker K5 is placed in the ON position, the following action takes place: current from the power source flows through the motor winding and causes rotation. This motion turns a cam which, after a preset interval of from 45 to 60 seconds, actuates the microswitch. At this point the motor stops and holds the cam in position and holds the switch contacts closed.

(2) When circuit breaker K5 is placed in the OFF position, removing the current supply from the motor, the motor and the cam rotate back to their starting position instantly. This opens the microswitch contacts.

(3) The microswitch is connected into, and works in conjunction with, the interlock circuit.

(4) Opening of the microswitch disables the plate power supplies of the amplifier and transmitter, blower B3, and the bias power supply of the amplifier.

b. Time-Delay Relay K1. Relay K1 of Amplifier AM–141/MRC is a temperature-controlled relay having a time-delay feature. When CIRCUIT BREAKER K5 is placed in the ON position, the following action of relay K1 takes place:

(1) Current from the power source (neutral side) flows through the contacts of the small a-c operated relay (deenergized position) mounted on relay K1, and the heater coil that is mounted by the bimetal switch blade.

two main circuits; one circuit is connected to the main power source without provision for voltage adjustments, and the other circuit is connected to the first circuit through variable transformer T5 which provides it with voltage adjustment. The adjustable power from T5 is connected to filament transformers T2, T3, T4, and T6; blower motors B1, B2, and B3; the time-delay switch K1; and to the coils of a-c operated relay K4. When the filament voltage of tubes V1 and V2 is adjusted to 10 volts by variable transformer T5 (indicated by the reading of FILAMENT VOLTAGE meter M2), 115 volts ±5 volts will be present on the preceding components associated with T5, regardless of the main power source voltage which may range from 95 to 135 volts. Filament variable transformer T5 should be set so that the FILAMENT VOLTAGE meter indicates 10 volts (maximum tolerance ±5 volts). The neutral sides of both circuits are common with the neutral terminal of connector J2. Observance of polarity in connecting the main power source to the amplifier is not necessary. The three-circuit plug P1 connected to blower B3 (the two-circuit plug in Amplifier AM–141/MRC) allows the adjustable variac power to be fed to time-delay switch K1 (or relay K1). Blower B3 prevents overheating of the components of the amplifier. The small blowers B1 and B2 provide cooling for amplifier tubes V1 and V2.

154. Power Distribution Circuits, Interlocks

(fig. 136)

The interlock circuit of Amplifier AM–141(*)/MRC performs a number of functions necessary in the operation of high-powered equipment. It insures proper operational sequence of controls and circuits, protects components from damage should control settings or circuits conditions be abnormal, and protects operating personnel from accidentally contacting dangerously high voltages within the amplifier, if the doors or panels are opened. The interlock circuit consists of switches S5 to S13, inclusive, operating in conjunction with relays K1, K2, K3, and K4. Opening any of the interlock switches (switch S14 set to OFF) will disable the plate power supplies of the amplifier and transmitter, blower B3, and the bias power supply of the amplifier. The locations of the interlock switches are as follows:

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c. S7: left side panel interlock.

d. S8: top panel interlock.

e. S9: right side panel interlock.

f. S10: front panel interlock, relay access door.

g. S11: front panel interlock, grid coil access door.

h. S12: front panel interlock, band switch control.

i. S13: front panel interlock, plate coil access door.

155. Power Distribution Circuits, Relays

(fig. 136)

a. Time-Delay Switch K1. Time-delay switch K1 is a synchronous-motor-operated microswitch. The complete assembly is mounted in a hermetically sealed metal container.

(1) When circuit breaker K5 is placed in the ON position, the following action takes place: current from the power source flows through the motor winding and causes rotation. This motion turns a cam which, after a preset interval of from 45 to 60 seconds, actuates the microswitch. At this point the motor stops and holds the cam in position and holds the switch contacts closed.

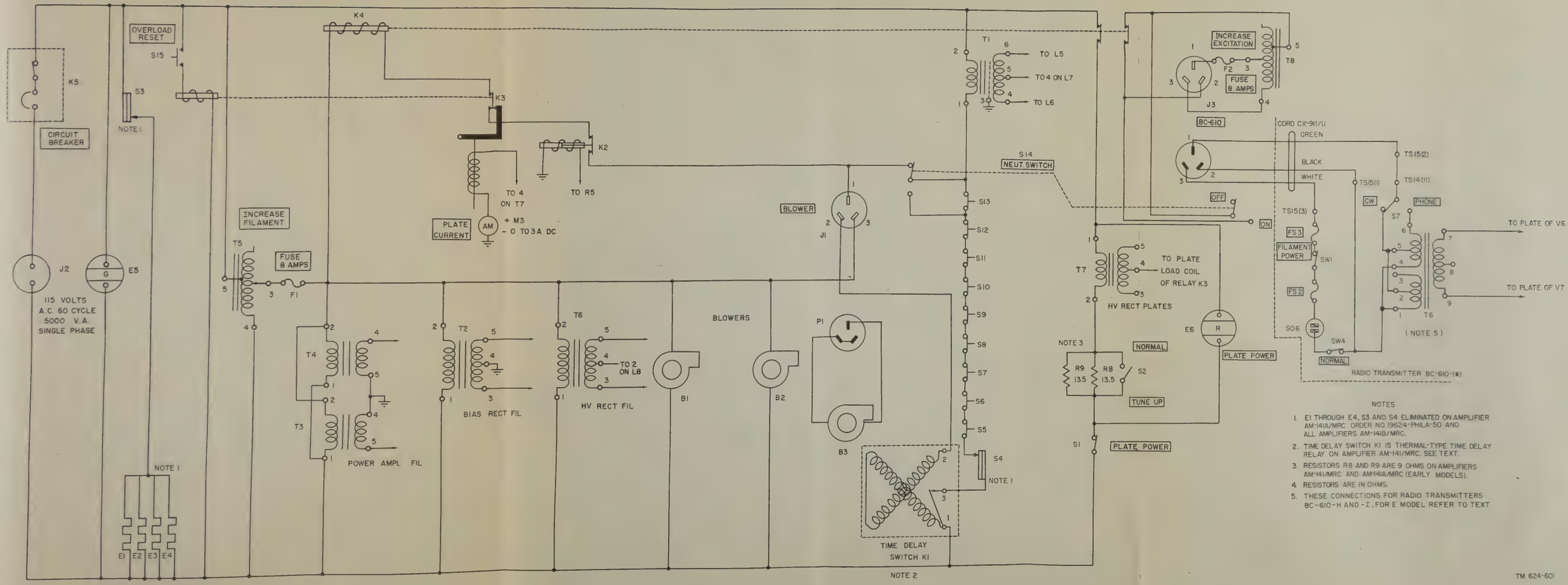
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(3) The microswitch is connected into, and works in conjunction with, the interlock circuit.

(4) Opening of the microswitch disables the plate power supplies of the amplifier and transmitter, blower B3, and the bias power supply of the amplifier.

b. Time-Delay Relay K1. Relay K1 of Amplifier AM–141/MRC is a temperature-controlled relay having a time-delay feature. When CIRCUIT BREAKER K5 is placed in the ON position, the following action of relay K1 takes place:

(1) Current from the power source (neutral side) flows through the contacts of the small a-c operated relay (deenergized position) mounted on relay K1, and the heater coil that is mounted by the bimetal switch blade.



NOTES

1. E1 THROUGH E4, S3 AND S4 ELIMINATED ON AMPLIFIER AM-141A/MRC ORDER NO. 19624-PHILA-50 AND ALL AMPLIFIERS AM-141B/MRC.
2. TIME DELAY SWITCH K1 IS THERMAL-TYPE TIME DELAY RELAY ON AMPLIFIER AM-141/MRC. SEE TEXT.
3. RESISTORS R8 AND R9 ARE 9 OHMS ON AMPLIFIERS AM-141/MRC AND AM-141A/MRC (EARLY MODELS).
4. RESISTORS ARE IN OHMS.
5. THESE CONNECTIONS FOR RADIO TRANSMITTERS BC-610-H AND -I, FOR E MODEL REFER TO TEXT.

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Figure 136—Amplifier AM-141(*)/MRC, power distribution and excitation control circuits.

(2) After being heated for approximately 30 seconds, the bimetal switch blade becomes flexed or bent, then snaps outward to contact another fixed contact. Upon contact of the switch blade, the a-c circuit of the relay coil is completed to the neutral side of the power source, and the relay armature is drawn toward the coils, thereby changing the relay contacts.

(3) When the relay contacts change ((2) above), the a-c circuit to the heater coil is opened, causing the bimetal blade to cool. After 30 seconds, the switch blade snaps back to its original position, closing the a-c circuit, neutral side, to the thermal switch S4 and interlock switches S5 through S13. The first fixed contact of the bimetal switch is equipped with a small permanent magnet to provide the snapping action for the switch blade. Chattering of a-c relay K1 will occur if blower motor B3 is disconnected and variable transformer (variac) filament control T5 is turned fully counterclockwise. This is caused by the reversal of the power source polarity by the variac through transformer T1. The motor winding of blower B3 acts as a low-resistance shunt across the relay coil, preventing the relay from chattering.

c. Bias Relay K2. Failure of the bias power supply to furnish sufficient grid bias voltage (excitation off) to the pa would cause excessive plate current to flow and damage the amplifier tubes. Bias protective relay K2, part of the bias supply bleeder circuit, safeguards the pa tubes in the following manner: When the bias supply bleeder current drops to 115 to 135 ma (low bias voltage condition), because of failure of the bias power supply components or its power source, or excitation off, the relay contacts open. This opens the interlock circuit and removes the a-c power source from the high-voltage plate supply transformer of both the pa and Radio Transmitter BC–610–(*) (SW14 set to OFF). The contacts of relay K2 will close when a bleeder current of 190–210 ma is flowing through the relay coil.

d. Plate Supply Overload Relay K3. The plate overload relay, part of the high-voltage power supply d-c circuit, is designed to protect 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 actuated by the load coil of the relay. When excessive plate current flows (above 1.325 amperes) through the load coil, the latch trips, opening the relay contacts. When the relay contacts are open, the a-c interlock circuit is opened, and a-c power sources to both the high-voltage power supply transformer T7 of the amplifier and the high-voltage power supply transformer of the transmitter are removed (S14 set to OFF). After the condition that created the overload is removed, the contacts can be closed again by momentarily pressing OVERLOAD RESET switch S15. Pressing the OVERLOAD RESET switch places the reset coil of relay K3 directly across the main power source, causing the coil to be energized and the contacts closed. The load coil is provided with a delay mechanism to prevent premature tripping of the relay by momentary load current surges, created by c-w keying and the switching of the plate power supply. The movable iron core within the load coil normally is held out of the coil by an expansion spring the tension of which is adjustable. Adjustment also is provided for placing the core initially in any degree of engagement with the load coil. The distance the iron core moves into the load coil is determined by the relative amount of plate current flowing through the load 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, when the plate power is first switched on, is exceedingly intense, or abnormally prolonged.

e. Contactor K4. Contactor K4 is equipped with two sets of contacts. One set closes the a-c primary circuit of the high-voltage transformer of Radio Transmitter BC–610–(*) (fig. 136) (SW14 set to OFF). When the contacts are closed, INCREASE EXCITATION variable transformer T8 varies the a-c voltage applied to the primary winding of the plate power transformer in the transmitter, through control Cord CX–911/U connected between receptacle J3 of the pa and terminal strip TS15 or TS3 (in Radio Transmitter BC–610–E) of the transmitter (fig. 55). The r-f output of the transmitter can be controlled by varying the EXCITATION con-

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trol. The second set of contacts on contactor K3 completes the a-c power input circuit to the primary winding of the high-voltage plate supply transformer T7 of the amplifier. 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, and PLATE POWER indicator lamp E6 will glow. During the tuning up procedure, NORMAL-TUNEUP switch S2 is set to the TUNEUP position, which places voltage-dropping resistors R8 and R9 in series with the primary winding of power transformer T7, thereby reducing the output voltage of the plate power supply by approximately 60 percent. When NORMAL-TUNEUP switch S2 is placed at the NORMAL (on) position, the full voltage of the main power source is applied to transformer T7.

156. Power Distribution Circuits, Neutralizing Switch

To gain access to the plate coil compartment for the purpose of neutralizing the pa, the plate coil access door must be opened. When the door is opened, interlock switch S13 is opened and the a-c power sources to the plate power supply of the transmitter, blower R3, and the bias and plate power supplies of the pa are removed, disabling these circuits. Provision is made whereby the a-c input power sources can be restored to the transmitter plate power supply and the amplifier bias power supply by using neutralizing switch S14 (fig. 136). When the NEUT. SWITCH is placed at the ON position, power is restored to the bias power supply and to the plate power supply of the transmitter, 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 furnishing power to blower B3 and the contacts of relay K2, and reconnects bias supply transformer T1 to the power source through interlock switch S12 by bypassing open interlock switch S13. The second pole of switch S14 bridges the open contacts on contactor K4 in the variable transformer T8 circuit, thereby restoring connections to jack J3 (fig. 136). A 115-volt a-c supply is fed from Radio Transmitter BC–610–(*) to variable transformer T8 through this jack on terminals 2 and 3. Terminal 1 connects the variable voltage output of T8 to the plate power transformer of the transmitter. During normal operation of the amplifier, the NEUT. SWITCH is set at the OFF position.

157. Power Distribution Circuits, Thermal Switches and Tube Heaters

(fig. 136)

a. The thermal switches and tube heaters are used only in Amplifier AM–141/MRC and some of the early issues of Amplifier AM–141A/MRC.

b. When the main power switch, CIRCUIT BREAKER K5, is thrown to the ON position, FILAMENT POWER indicator lamp E5 will glow, showing application of a-c power to the distribution circuits. Thermal switch S3, when closed, completes the a-c circuit to the external rectifier tube heaters E1, E2, E3, and E4. The tube heaters will remain on as long as the internal cabinet temperature in the arc of thermal switch S3 (adjacent to the tube V5) remains below 80° F. When the temperature rises above 80° F, thermal switch S3 disconnects the tube heaters. Another thermal switch, S4 (located adjacent to thermal switch S3), disables the bias and high-voltage plate power supplies by opening the interlock circuit whenever the internal cabinet temperature is below 55° F. This prevents damage to the mercury-vapor rectifier tubes if plate voltage is applied to them before the tubes are heated sufficiently. When the cabinet temperature is below 55° F, the external tube heaters to which power is applied below 80° F heat the tubes and adjacent area; thermal switch S4, after it reaches a temperature of approximately 55° F, closes and reconnects the bias and high-voltage plate power supplies. Temperature in the area adjacent to the tubes continues to rise and causes thermal switch S3 to open and to disconnect the external tube heaters when it reaches approximately 80° F.

Section V. ANTENNA SYSTEMS

158. 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

eing radiated to any location other than the one esired usually are wasted, and communications ecurity is jeopardized since enemy monitoring tations are more likely to locate the signals. The following paragraphs of this section discuss ntenna theory as related to Radio Set AN/MRC–2(*) and its applications. For a more detailed liscussion of radio wave propagation and antenna nd transmission line theory, refer to TM 11–666.

159. Frequency Considerations

There are two principal paths for radiated waves from a transmitter to a receiver: the ground wave and the sky wave. The ground wave follows a relatively low path along the ground to reach the receiver, and is useful only for short distance signal communications, because of the high attenuation caused by ground absorption. For longer distance signal communication, the sky wave is utilized. This propagation path is founded on the principle that certain layers in the atmosphere, called the ionosphere, will reflect a radio wave and cause it to be returned to the earth. While ground wave signal communications are relatively constant, the conditions affecting the reflection of the sky wave are subject to sudden and periodic changes. The ionosphere is made up of a number of layers ranging from 60 to 200 miles above the earth. The bending of a radio wave in an ionized layer is a function of the frequency of the wave as well as the density of the ionized layer. The layers have a higher index of refraction for low frequencies; that is, lower frequencies will be refracted more than higher frequencies. This fact is of importance in deciding whether a particular frequency will be usable between two points. For a given distance, there will be an approximate maximum freqeuncy at which the sky wave will be refracted back to earth. The MUF (maximum usable frequency) is the highest frequency which a single refraction by the ionosphere will return to earth at the point of reception. Note that the MUF is determined by the condition of the ionosphere at the point of refraction, or control point, of the radio wave. 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 series.

160. 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 traffic, but in the case of high-speed telegraphy and RTT 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 mutual effects of two or more waves that are components of the received signal, traveling over different path lengths, 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 avc (automatic volume control), frequency diversity, space diversity, and polarization diversity. Of these, only the space diversity method is utilized for RTT operation by Radio Set AN/MRC–2(*).

(1) *Automatic volume control.* Avc circuits are used in Radio Receiver Assembly OA–65(*)/MRC–2; however, they cannot be used for RTT 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 RTT service.

(2) *Space diversity.* A space-diversity system makes use of the diversity of fading which exists at receiving antennas spaced a number of wavelengths apart. 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, RTT, or radiotelephone operation).

161. Half-Wave Antenna

a. Length of Resonant Wire. The shortest length of wire that will resonate to a given frequency is one just long enough to permit an electric charge to travel from one end to the other and back again in the time of one r-f cycle. Since the charge traverses the wire twice, the length of the wire needed to permit the charge to travel a distance of 1 wavelength in 1 cycle is ½ wavelength. Therefore, the shortest resonant wire will be ½ wavelength.

b. Harmonic Operation. If there is reflection from the end of a wire, the number of current maxima (loops) on the wire will be equal to the length of the wire divided by its ½ wavelength. If the wire is 2 half-waves long, there will be two current loops; if 3 half-waves long, three loops, and so on. Therefore, these longer wires, each multiples of a ½ wavelength, also will be resonant to the same frequency as the single half-wave wire. When an antenna is 2 or more half-waves at the operating frequency, it is said to be harmonically resonant, or to operate at a harmonic, the number of the harmonics being the number of standing waves on the wire. A wire of 2 half-waves is said to be operating on the second harmonic.

c. Calculation of Antenna Length. The current at the ends of the antenna does not quite reach zero since there is some current flowing into the end capacity because of the end effect. The electrostatic capacity at the end of a half-wave antenna is higher than might be expected, because of the presence of the insulators which support the antenna. For ordinary purposes, this end effect causes the physical length of the antenna to be about 5 percent less than the length of a half-wave in free space. A formula sufficiently accurate for calculating the length of a half-wave antenna (doublet antenna) is: length in feet equals 468/f where f is the frequency in mc.

d. Feed System. The function of any feede system for an antenna is to transport power fron the transmitter to the antenna with a minimum loss. If a line were infinitely long, a current started down it eventually would dissipate because of the resistance of the line, with the result that there would be no reflection of the current at the end, and, consequently, no standing waves. Every type of line has a *characteristic impedance* which depends on the size and spacing of the conductors. If a line is cut to a definite length, and a resistance equal to the characteristic impedance is used to replace the length of line that would have made the line of infinite length, there will be no reflection at the end of the wire and no standing waves. If the end of this feeder line could be connected to a point on the half-wave antenna which had an impedance equal to the characteristic impedance of the feeder line, the feeder would be matched to the antenna, and maximum power transfer would occur. When mismatching occurs, the feeder also becomes a radiator with consequent power loss. The radiated wave leaving the feeder may cancel partially radiated wave from the antenna. The presence of hot spots along a feeder line is an indication of a resonant or mismatched feeder line.

e. Radiation Patterns (figs. 137 and 138). The pattern of the half-wave antenna in space is modified when the antenna is brought within proximity of the ground. The radiation angle of any antenna is stated in terms of degrees, and it is that angle, with respect to ground, at which the radiated waves are most intense. It would be difficult to predict the exact angle of radiation (the directivity) of a half-wave antenna at any particular location without actually field-testing the antenna and feeder setup. It is possible, however, to get an approximate idea of results to be expected for work over long distances. The radiation patterns of a half-wave antenna operating on its fundamental and sixth harmonic frequencies at a radiation angle of 15° are shown in figure 137. The patterns shown should be interpreted merely as an indication of the results to be expected. Operating an antenna at its harmonic frequencies changes the characteristics of its radiated pattern (fig. 138). In the case of a doublet antenna (half-wave) with a fundamental operating frequency of 2,500 kc, the same antenna becomes 1½ wavelengths at the third harmonic and 2½ wavelengths

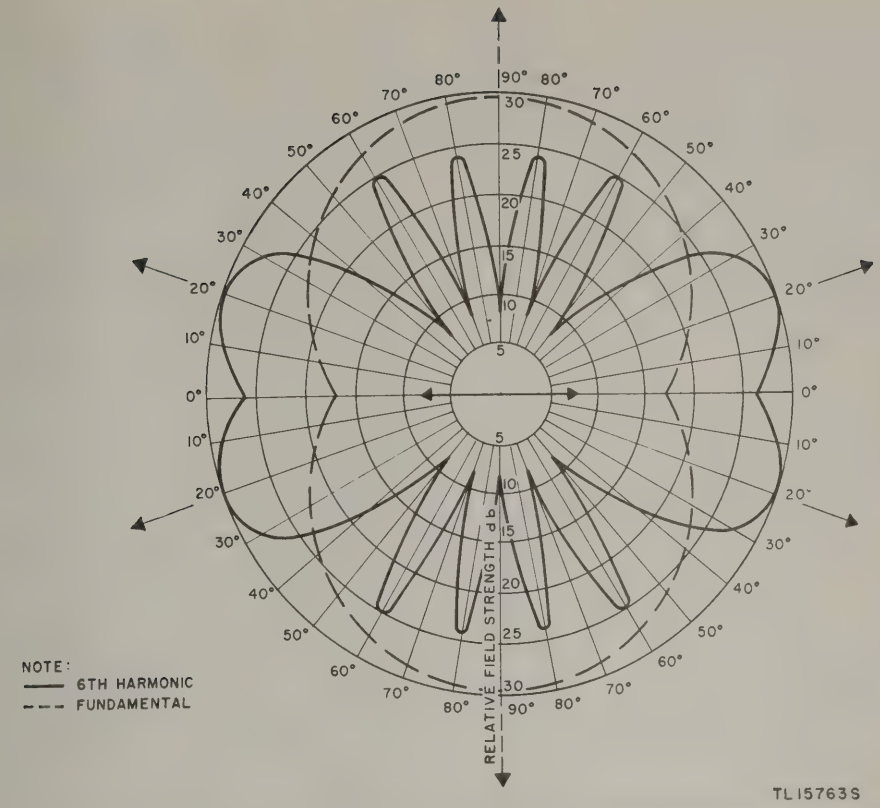


Figure 137. Radiation pattern of half-wave antenna on fundamental and sixth harmonic at radiation angle of 15°.

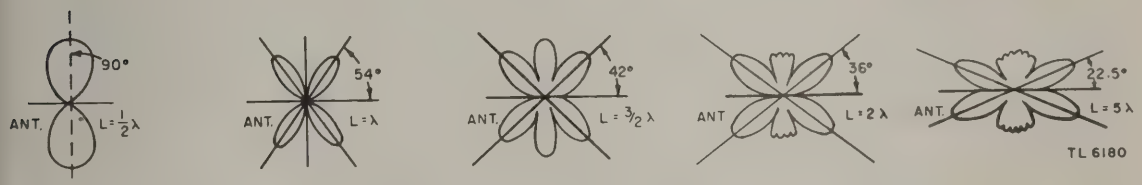


Figure 138. Free space pattern of long-wire antenna.

at the fifth harmonic. When the wire is a wavelength or more, the radiation tends to concentrate more off the ends of the wire and radiates more power in its most favorable directions than a half-wave antenna in its favorable directions. The free space patterns of long-wire antennas are shown in figure 138.

162. 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 wavelengths which are terminated at the center by a special coaxial cable connector. Current is fed to that point by coaxial RF Cable Assembly CG–145/MRC–1. The antenna wire is broken up into sections; each section is connected to the other by insulators. The antenna wire can be made to have several fundamental resonant frequencies by placing jumper wires around the insulators. 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, the field pattern takes the shape of elongated lobes pointing almost toward the ends of the antenna wire, producing a more directive signal and concentration of the r-f radiation.

The transmission line for the antenna is an impedance-matched untuned line using a 70-ohm concentric cable. The coaxial r-f 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.

163. Receiving Antennas

Two doublet antennas, spaced a minimum of 3 wavelengths 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. 41). The antenna construction is similar to that used in the transmitting antenna. RF Cable Assembly CG–557/U or Cord CG–388/MRC–2 is used for the signal feed line between the antenna and the shelter; since both lead-ins are 500 feet in length, this sets the 1,000-foot limit for antenna separation. 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 reciprocal directional patterns.

164. 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 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.

165. 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 noninductive resistance which equals the characteristic resistance of the transmission line. The antenna gives excellent results over a frequency range of 6 to 18 mc, and 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 66 and 67. and design data is given in paragraph 23.

CHAPTER 6

FIELD MAINTENANCE INSTRUCTIONS

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 caution notices of individual equipment technical manuals before attempting repairs.

166. Introduction

This chapter contains field maintenance instructions for Amplifier AM–141(*)/MRC. The extent of repairs that can be accomplished by units having field maintenance responsibility is limited only by the skill and ingenuity of the repairman and the tools and equipment available. Higher echelon maintenance skill is required if serious trouble develops in the following components which have individual technical manuals covering the unit. Refer to appendix I for a supplementary list of publications.

Component	Publication
Antenna Support AB–38(*)/CR	TM 11–2620.
Control Unit C–292(*)/TRA–7	TM 11–262.
Dual Diversity Converter CV–31(*)/TRA–7.	TM 11–261.
Frequency Shift Exciter 0–39C/TRA–7	TM 11–257.
Perforator-Transmitter TT–56/MGC:	
Reperforator-transmitter	TM 11–2223.
Transmitter-distributor	TM 11–2222.
Power Unit PE–95–(*)	TM 11-904.
Radio Receiver Assembly OA–65(*)/MRC–2.	TM 11–850.
Radio Transmitter BC–610–(*) and Antenna Tuning Unit BC–939–(*).	TM 11–826.
Rectifier RA–87	TM 11–957.
Speech Amplifier BC–614–(*)	TM 11–5054.
Telephone EE–8–( )	TM 11–333.
Teletypewriters TG–7–B or TT–55/MGC.	TM 11–352.

167. Test Equipment Required

Multimeter TS–352/U is suitable for making all voltage and resistance measurements on Amplifier AM–141(*)/MRC.

168. Troubleshooting Procedures

a. General. The tests listed below will aid in isolating the source of the trouble. 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, r-f arcing, and shorted transformers often can be located by sight and smell. Most faults, however, must be localized by checking 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 forestalling future failures and in avoiding additional damage to the amplifier, 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 is practicable before starting a detailed examination of the amplifier. If possible, obtain information from the operator of the equipment regarding performance at the time 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) *Troubleshooting chart.* The equipment performance checklist (par. 121) is important because it indicates frequently 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.

169. Localizing Trouble in Amplifier AM–141(*)/MRC

After the trouble has been localized to Amplifier AM–141(*)/MRC by applying the equipment performance checklist (par. 121), 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 following chart:

Symptoms	Probable troubles	Corrections
1. CIRCUIT BREAKER does not remain in up position (ON).	Overload, short circuit, or defective CIRCUIT BREAKER.	Wait 30 seconds and try again. If breaker does not stay up, disconnect power cable Cord CX–135/MRC–1 and repeat. If breaker remains up with power off, replace the circuit breaker.
2. Green light out, CIRCUIT BREAKER ON, tubes do not light.	No power to amplifier	See that Cord CX–135/MRC–1, Power Cable Assembly CX–1165/U or Cord CX–137/MRC–1, and Power Cable Assembly CX–1166/U or Cord CX–136/MRC–1 and their fittings are making good connections. Check continuity of cables.
	Defective CIRCUIT BREAKER	Replace CIRCUIT BREAKER K5.
3. Green light out, tubes light	Burned-out lamp	Replace lamp E5.
	Defective socket	Replace socket.
	Broken wire to socket	Resolder or replace wire.
4. Filament voltage low, FILAMENT control at highest point.	Low supply voltage	Check and adjust voltages at Power Unit PE–95–(*). Refer to TM 11–904.
	Defective INCREASE FILAMENT control T5.	Clean all contacts and contact surfaces. Replace carbon brush in rotor if required. Replace control if required.
	Defective meter	Replace FILAMENT VOLTAGE meter M2.
5. GRID CURRENT low, FILAMENT VOLTAGE normal.	Off resonance	Check coils, capacitors, and dial settings according to the tuning charts. See tuneup procedure (par. 65). Readjust PLATE TUNING of transmitter and GRID TUNING of amplifier.
	Low excitation	Change setting of INCREASE EXCITATION control; increase coupling of output coil in transmitter.
	Shorted or loose connections in r-f Cord CG–65/MRC–1.	Tighten all connections. Check cord and replace if required.
	Loose coils	Check to see that all coils are firmly seated. Examine for loose, bent, or broken banana plugs or connections.
	Weak or defective tubes in amplifier.	Replace tubes V1 and V2 if required.
6. GRID CURRENT low	High grid bias voltage on tubes V1 and V2.	Check bias voltage, tighten all grid circuit connectors, replace resistor R4 if required.
	Defective GRID CURRENT meter.	Replace meter M1.

Symptoms	Probable troubles	Corrections
7. GRID CURRENT high	Excessive excitation	Reduce INCREASE EXCITATION control. Reduce coupling in output of transmitter.
	Defective tubes V1 and V2	Check tubes, replace if required. (Tubes may show grid current without excitation.)
8. GRID CURRENT varies with PLATE TUNING, PLATE POWER switch OFF.	Improper neutralization	Readjust neutralizing capacitors C8 and C9 (par. 180).
9. Red light out, PLATE POWER switch ON, TUNEUP-NORMAL switch set to TUNEUP.	Open interlock switch (not used in B model).	See that all cabinet panels and doors are tight, NEUT. SWITCH is OFF, BAND CHANGE is properly positioned. (K1, K2, and K4 must be closed but cannot be inspected because of interlock on access door.)
	Defective thermostat switch (not used on B model).	Replace as required.
	Overload relay tripped	Press OVERLOAD RESET button.
	Burned-out lamp	Replace lamp E6.
	Broken wire to lamp	Replace wire.
10. PLATE CURRENT low, TUNEUP-NORMAL switch set to NORMAL.	Insufficient excitation	Check GRID CURRENT. Readjust all excitation controls.
	Low plate voltage	Check for weak rectifier tubes V5 and V6, defective switch S2, open choke L4 or L8, open overload coil on relay K3, or defective transformer T6 or T7.
	Insufficient antenna coupling	Readjust rotor of plate coil L2.
	Antenna does not load at proper frequency.	Check antenna for proper adjustment. Check for grounded antenna and transmission line, for loose or broken connections, or short circuits.
	Defective tubes V1 and V2	Replace tubes V1 and V2 if required.
11. PLATE CURRENT high, trips overload relay.	Antenna overcoupled	Readjust rotor of plate coil L2. Press OVERLOAD RESET button. Set TUNEUP-NORMAL switch to TUNEUP position before applying PLATE POWER.
	Shorted transmission line	Remove plate coil L2; check across antenna terminals for shorted line or antenna; check from antenna terminals to ground for ground or leakage.
	Wrong harmonic	Recheck all coils capacitors, and dial settings according to tuning chart. See tuneup procedure (par. 65); retune as indicated.
12. Blower B1 or B2 inoperative.	Rotor stuck or binding	Check for bent rotor, solidified lubricant, or gummed bearings. If necessary, clean bearings and lubricate as specified (par. 107). Bent rotors which have been repaired should be carefully checked for balance before returning to service.
13. Blower B3 inoperative	No power to motor	Check to see that plug P1 is inserted and that cord connections are not broken.
	Rotor stuck or binding	Check for bent rotor or gummed bearings. If necessary, clean and lubricate bearings (par. 107).
	Defective motor starting capacitor.	Replace capacitor.
14. Tubes V1 and V2 hot as evidenced by discolored plate and grid terminals.	Blowers not delivering enough air.	Check to see that air duct is clean and able to exhaust heated air. (A strong headwind outside shelter will prevent proper exhaust. Open duct into shelter.) Check air filter and clean if required.
		Check B1 and B2 for air flow onto tubes. Check cord on blower B3 and plug P1. Check all blowers for gummed or binding rotors. Clean and lubricate if required.

Symptoms	Probable troubles	Corrections
15. GRID TUNING does not resonate.	Wrong coil	Check to see that grid coil L1 agrees with tuning chart and that transmitter is properly tuned.
	Capacitor C3 installed	Check with tuning chart to see if required.
	Capacitor C3 omitted	Check with tuning chart to see if required.
	Poor coil connections	Check contacts on coil L1. Tighten if necessary and reinstall coil firmly.
16. PLATE TUNING does not resonate.	Wrong coil or wrong position of BAND SWITCH.	Correct according to tuning chart. (If the antenna is not properly matched for frequency, the BAND CHANGE switch may have to be moved to obtain resonance.)
	Poor coil connections	Check contacts on coil L2, tighten if necessary. Reinstall coil firmly.
17. PLATE TUNING changes GRID TUNING and vice versa.	Improper neutralizing	Check neutralization (par. 180).
18. Meters do not indicate correctly.	Meter defective	Check against meter of known accuracy. If error exceeds 5 percent, meter should be replaced.
19. Time-delay K1 slow or inoperative.	Low voltage	Adjust FILAMENT VOLTS to 10V.
Relay K2, K3, or K4 inoperative.	Improper adjustment	Readjust.
	Overload relay K3 tripped	Push OVERLOAD RESET button.
20. Time-delay switch slow or operative.	Defective unit	Replace complete unit assembly.
		Adjust filament voltage to 10V.

170. 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. 139), a supplementary voltage measurement chart (*b* below), and a supplementary resistance measurement chart (*c* below) are included in this manual.

a. Tube Socket Voltage and Resistance Diagram (fig. 139).

(1) When making voltage measurements on the amplifier, apply excitation in accordance with the measurement chart. Measure the plate voltage with the NORMAL-TUNEUP 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.

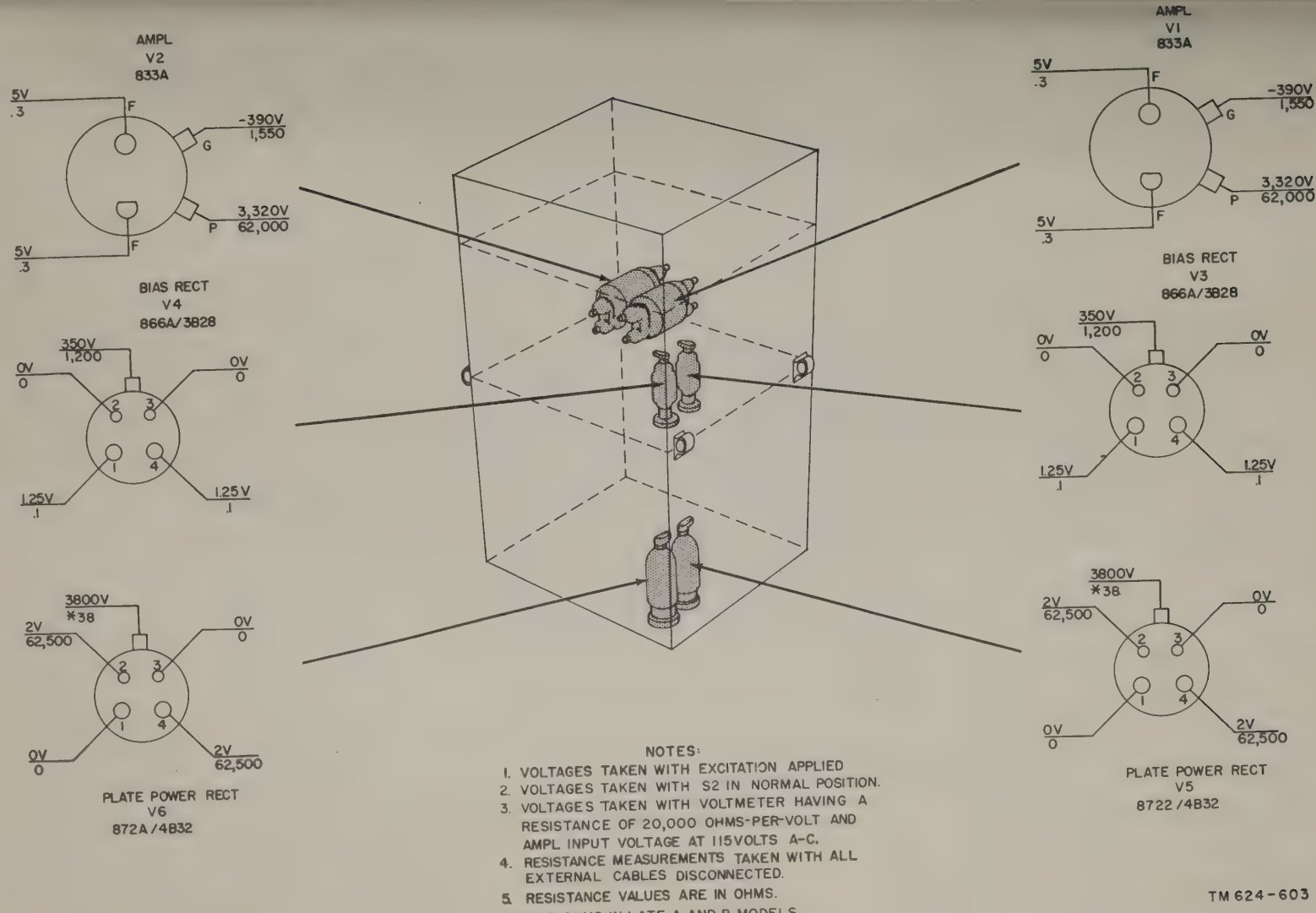


Figure 139. Amplifier AM-141(*)/MRC, tube socket voltage and resistance diagram.

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	−400 v dc.
Plate voltage	Plate bypass cap	C12	Top	350-ma PLATE CURRENT, switch S2 in TUNEUP position.	Ground	+1,370 v dc.
Plate voltage	Plate bypass cap	C12	Top	900-ma PLATE CURRENT, switch S2 in NORMAL position.	Ground	+3,320 v dc.
Filament voltage	Filament, tube	V1 and V2	Fil	FILAMENT VOLTS set to 10V AC, PLATE POWER off.	V1 and V2 fil	10 v ac.
Filament voltage	Filament, tube	V3 and V4	Fil	FILAMENT VOLTS set to 10V AC, PLATE POWER off.	V3 and V4 fil	2.5 v ac.
Filament voltage	Filament, tube	V5 and V6	Fil	FILAMENT VOLTS set at 10V AC, PLATE POWER off.	V5 and V6	5.0 v ac.
H-v bias transformer a-c output.	Bias rectifier tubes	V3	Plate	PLATE POWER off	V4 plate	760 v ac.
H–v plate transformer a-c output.	H-v plate transformer	T7	CT	S2 in TUNEUP position, 350-ma PLATE CURRENT.	Either h-v terminal.	1,400 v ac.
H-v plate transformer a-c output.	H-v plate transformer	T7	CT	S2 in NORMAL position, 900-ma PLATE CURRENT.	Either h-v terminal.	3,780 v ac.
H-v plate transformer a-c output.	H-v plate transformer	T7	CT	S2 in TUNEUP position, plate leads removed from V5 and V6.	Either h-v	3,360 v ac.
H-v plate transformer a-c output.	H-v plate transformer	T7	CT	S2 in NORMAL position, plate leads removed from V5 and V6.	Either h-v terminal.	3,980 v ac.

c. Supplementary Resistance Measurement Chart.

From—	To—	Resistance in ohms	Action or condition
Plates of tubes V1 and V2	Ground	62,000	
Grids of tubes V1 and V2	Ground	1,550	
Filament of tubes V1 and V2	Ground	0.3	
Plates of tubes V3 and V4	Ground	1,250	
Filament of tubes V3 and V4	Ground	0.1	
Plates of h-v rectifier tubes V5 and V6.	Ground	38	23 ohms in B model.
Plate h-v rectifier tube V5	Plate of V6	69	46 ohms in B model
Filament of h-v rectifier tubes V5 and V6.	Plates of V1 and V2	58	
Plate of bias rectifier tube V3	Plate of V4	50	20 ohms in A model and 160 ohms in B model.
Bias rectifier choke, term. 1	Term. 4 (term. 3 in B model).	127	
Bias rectifier choke, term. 1	Term. 3 (term. 2 in B model).	64	
Bias rectifier choke, term. 2	Term. 4 (term. 3 in B model).	63	
A-c input, measured across J2		1.5	CIRCUIT BREAKER K5 closed.
A-c 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	Terminals	80	Disconnected.
Blower B3, P1	P1	30	
Relay K1 coil, term. 1	Term. 2	610 (unlettered models)	(500 ohms in other models).
Relay K1 heater, term. 1	Term. 3	670 (unlettered models)	Armature depressed (560 ohms in other models).
Relay K2 coil, term. 1 (term. 2 in B model).	Term. 2 (chassis in B model).	23.6	
Relay K3 overload coil, term. 1	Term. 5 (term. 2 in B model).	4.3 (1 in B model)	
Relay K3 reset coil, term. 3	Term. 7 (term. 4 in B model).	105 (1,500 in B model)	
Relay K4 coil, term. 1 (across coil in B model).	Term. 2	93.4 (10 in B model)	K3 overload tripped.
INCREASE EXCITATION control T8, term. 1.	Term. 4	1.8	Cord CX–911/U disconnected.
INCREASE EXCITATION control T8, term. 1.	Term. 3	0–2.0	Cord CX–911/U disconnected.
INCREASE FILAMENT control T5, term. 1.	Term. 4	1.8	Leads to terms. 1 and 3 disconnected.
INCREASE FILAMENT control T5, term. 1.	Term. 3	0–2.0	Leads to terms. 1 and 3 disconnected.
Dropping resistors R8 and R9, in parallel, top of switch S2.	Bottom of S2	6.7 (This value will vary with various models.)	Switches S1 and S2 open.
Time delay switch, term. 1 in A model (lead #77 in B model).	Term. 2 (lead #80 in B model).	550	Disconnected.
Heaters E1, E2, E3, E4, rear term. S3 (these heaters and S3 are not used in late A or B models).	Top of S1	29	Switch S3 opened manually.

171. Continuity Checks

In order to facilitate the location of trouble on a system basis, continuity checks are given for Junction Box JB–70–A, 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–A.

Measurements made from—	Term. No.	Conditions	Measurements made to—	Resistance in ohms
Terminal Strip TS200	1	Switch SW203 at TRANS ON	Term. 2 of TS200	0
	3	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	5,000
	5	Switch SW205 in position 1 and switch SW204 at TRANSPOSED.	Term. 10 of TS200	5,000
	6	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
	12		Term. 11 of TS200	1,300
	12		Sleeve of jacks J200, J201, J202, J203, J204, and 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		A-c term. of socket SO 203	0
	2		One side of a-c sockets SO 201, SO 202, SO 207, SO 208 and SO 209.	0
	3	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 TS200, SO 204	
	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 SW202 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 binding post.	100

a. Junction Box JB–70–A—continued

Measurements made from—	Term. No.	Conditions	Measurements made to—	Resistance in ohms
	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		Ungrounded side of SO 201, SO 202, SO 207, SO 208, SO 209 and SO 203.	
	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
	4		Chassis (ground)	0
Socket SO 206	Ground terminals.		Chassis (ground)	0
Socket SO 210	1		Tip of jacks J202 and J203	5, 000
	1	Switch SW205 at position 1	Term. 5 of TS200	5, 000
	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, 000
	2	Switch SW205 at position 3 and switch SW204 at TRANSPOSED.	Term. 5 of TS200	5, 000

b. Operating Table FN–22/MRC–2.

Measurements made from—	Term. No.	Conditions	Measurements made to—	Resistan in ohms
TO TRANSMITTING SHELTER binding posts.	EE–8		Tip of EE–8 jack J13	
			Sleeve of EE–8 jack J13	
	EE–8	Switch S1 in COMBINED position.	Tip of EE–8 jack J16	
	EE–8	Switch S1 in COMBINED position.	Sleeve of jack J16	
	CONTROL		Term. D of jack J14	
	CONTROL		Term. C of jack J14	
	LINE		Term. A of jack J14	
	LINE		Term. B of jack J14	
Junction Box J–204/MRC–2 SEND TTY BLK jack J2.	Tip		Tip of SEND TTY BLK jack J19.	
	Sleeve		Sleeve of SEND TTY BLK jack J19.	0
SEND TTY RED jack J3	Tip		Tip of SEND TTY RED jack J20.	0
	Sleeve		Sleeve of SEND TTY RED jack J20.	0
REC TTY BLK 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 Plug P1	0
	Sleeve	SEND EXT binding post 2 and 1 strapped.	Term. C of Plug P1	0
SEND EXT BLK jack J7.	Tip		Term. B of Plug P1	0
	Sleeve	SEND EXT binding post 2 and 1 strapped.	Term. C of Plug P1	0
SEND EXT RED jack J8.	Tip		Term. A of Plug P1	0
	Sleeve		Term. B of Plug P1	0
SEND EXT RED jack J9.	Tip		Term. A of Plug P1	0
	Sleeve		Term. B of Plug P1	0
REC EXT RED jack J10.	Tip	REC EXT binding post 3 and 4 strapped.	Term. E of Plug P1	0
	Sleeve		Term. D of Plug P1	0
REC EXT RED jack J11.	Tip	REC EXT binding posts 3 and 4 strapped.	Term. E of Plug P1	0
	Sleeve		Term. D of 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 jack J17	0
	CONTROL		Term. D of jack J17	0
	LINE		Term. A of jack J17	0
	LINE		Term. B of jack J17	0

c. Operating Table FN–23/MRC–2.

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 plug P1	0.
	CONTROL		Term. D of Plug P1	0.
	LINE		Term. A of Plug P2	0.
	LINE		Term. B of Plug P2	0.
Plug P2	D		Tip of jack J6	0.
	E		Sleeve of jack J5	0.
TTY BLK jack J5	Tip		Sleeve of jack J6	Less than 0.1.
Plug P1	A		Tip of jack J4	Less than 0.1.
	B		Sleeve of jack J4	Less than 0.1.

d. Junction Boxes J–207/MRC–2 and J–199/MRC–2.

Measurements made from—	Term. No.	Conditions	Measurements made to—	Resistance in ohms
TO OPERATING SHELTER binding posts.	EE–8		Tip of jack J3	0
	EE–8		Sleeve of jack J3	0
	CONTROL		Term. D of Plug P1	0
	CONTROL		Term. C of Plug P1	0
	LINE		Term. A of Plug P1	0
	LINE		Term. B of Plug P1	0
Plug P2	A		Tip of jack J2	0
	B		Sleeve of jack J2	0
	C		Tip of jack J4	0
	D		Sleeve of jack J4	0

Section II. REPAIRS

172. Scope

This section covers the repairs necessary for Amplifier AM–141(*)/MRC. Repair instructions for other components of Radio Set AN/MRC–2(*) can be found by referring to their respective instruction books or technical manuals which are listed in paragraph 166 and appendix I.

173. Replacement of Parts

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.

a. 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.

b. A number of the smaller parts are fastened to the front panel or to 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 or the side panels or both. The side panels are held by Dzus fasteners. It will be found that 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–(*) in place; however, it is necessary to temporarily relocate the transmitter if full access to the left side is needed.

c. 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 r-f amplifier tubes.

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Caution: Always short B+ circuits to the chassis or frame after removing a panel for access.

d. 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. Identify the leads disconnected from a part with tags for correct connection to the replacement part. Soldered connections must be made with care in that a trouble arising from a bad solder connection is one of the most difficult to trace down. Refer to figures 140 through 147 for locations of the amplifier parts.

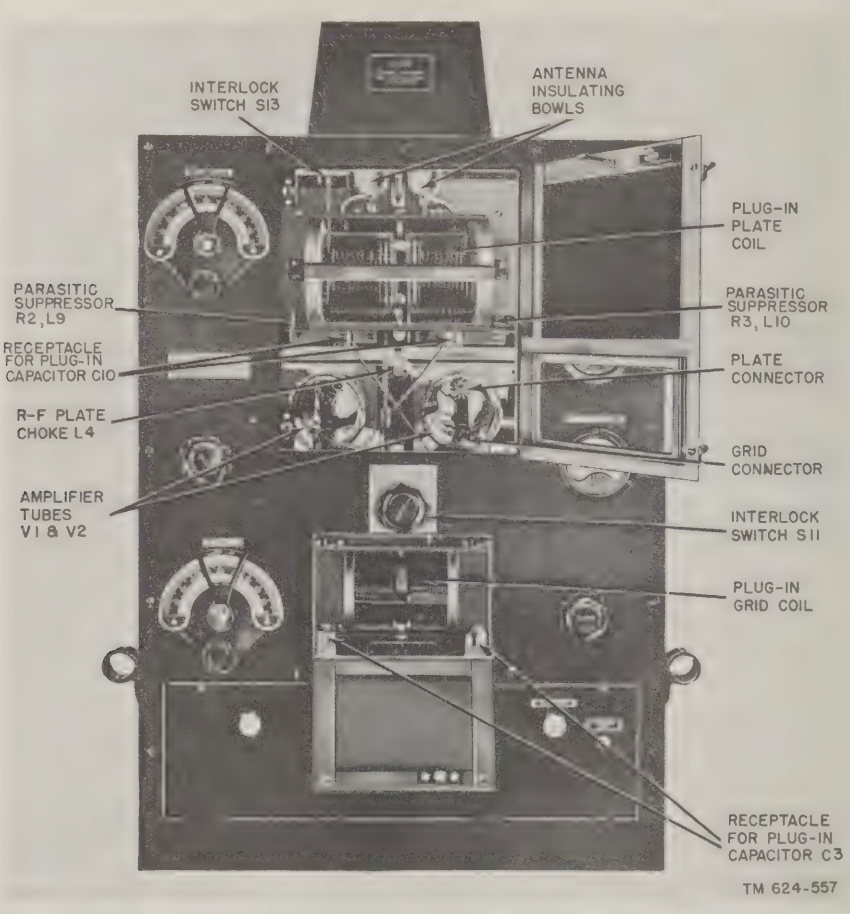


Figure 140. Amplifier AM–141/MRC and early model Amplifier AM–141A/MRC, coil access doors open.

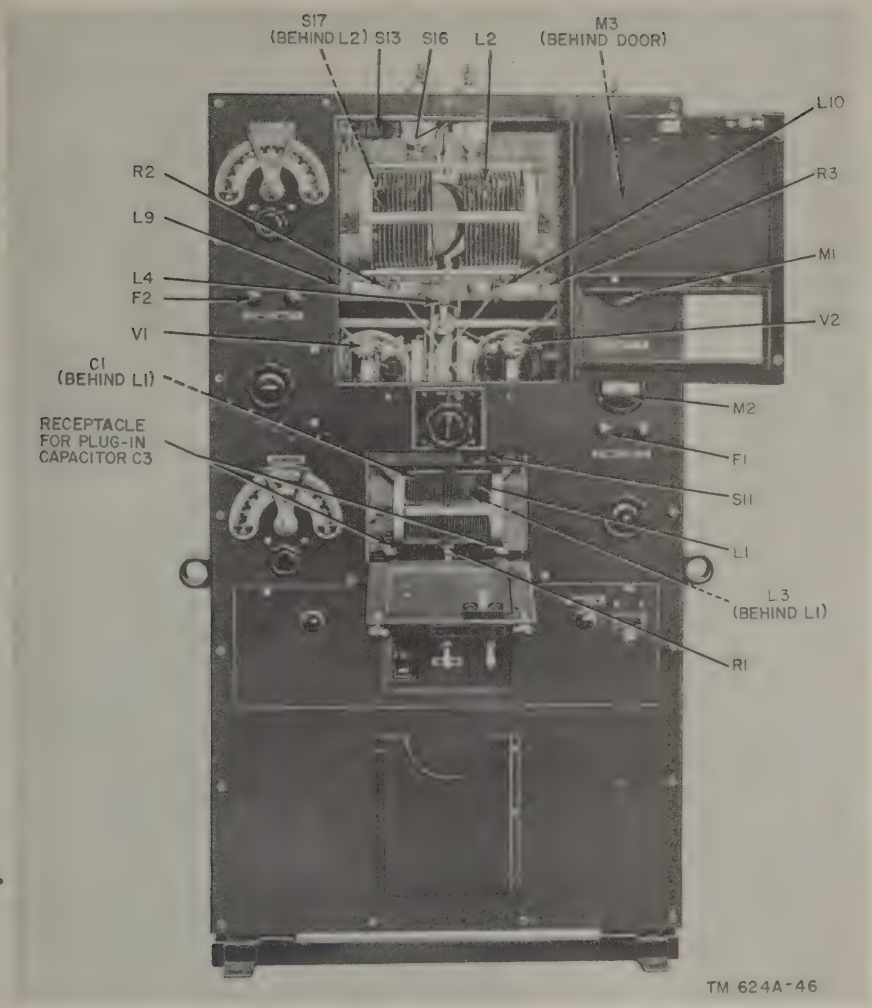


Figure 141. Amplifier AM–141A/MRC (Order No. 19624–Phila–50) and Amplifier AM–141B/MRC, coil access doors open.

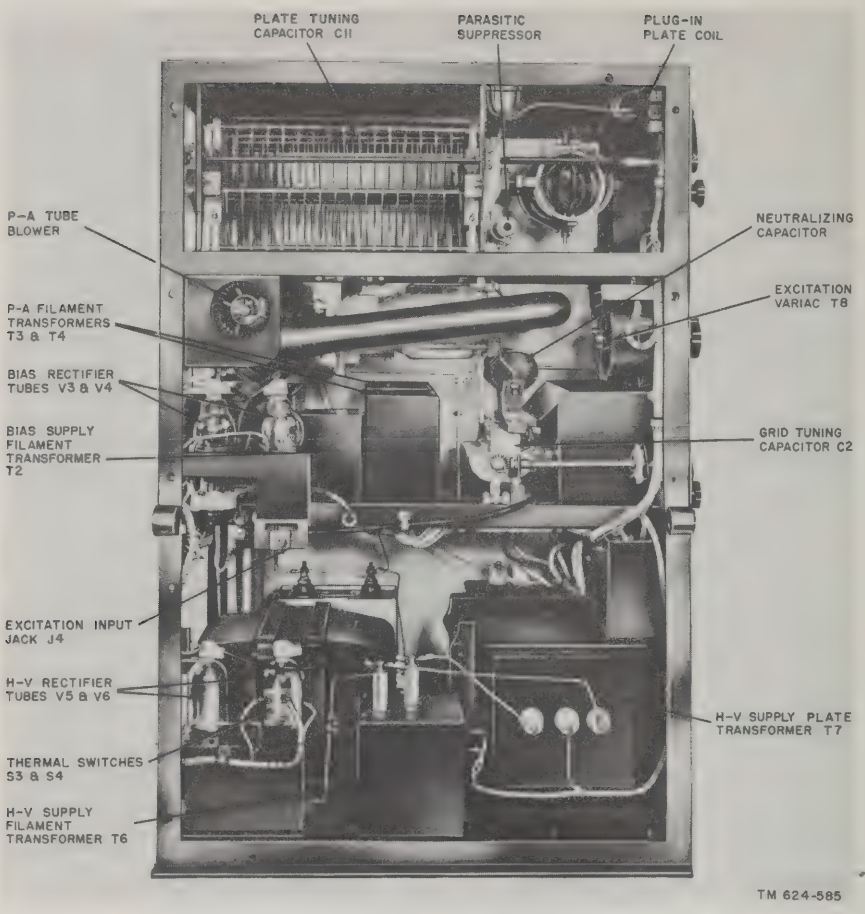


Figure 142. Amplifier AM–141/MRC, left side panel removed.

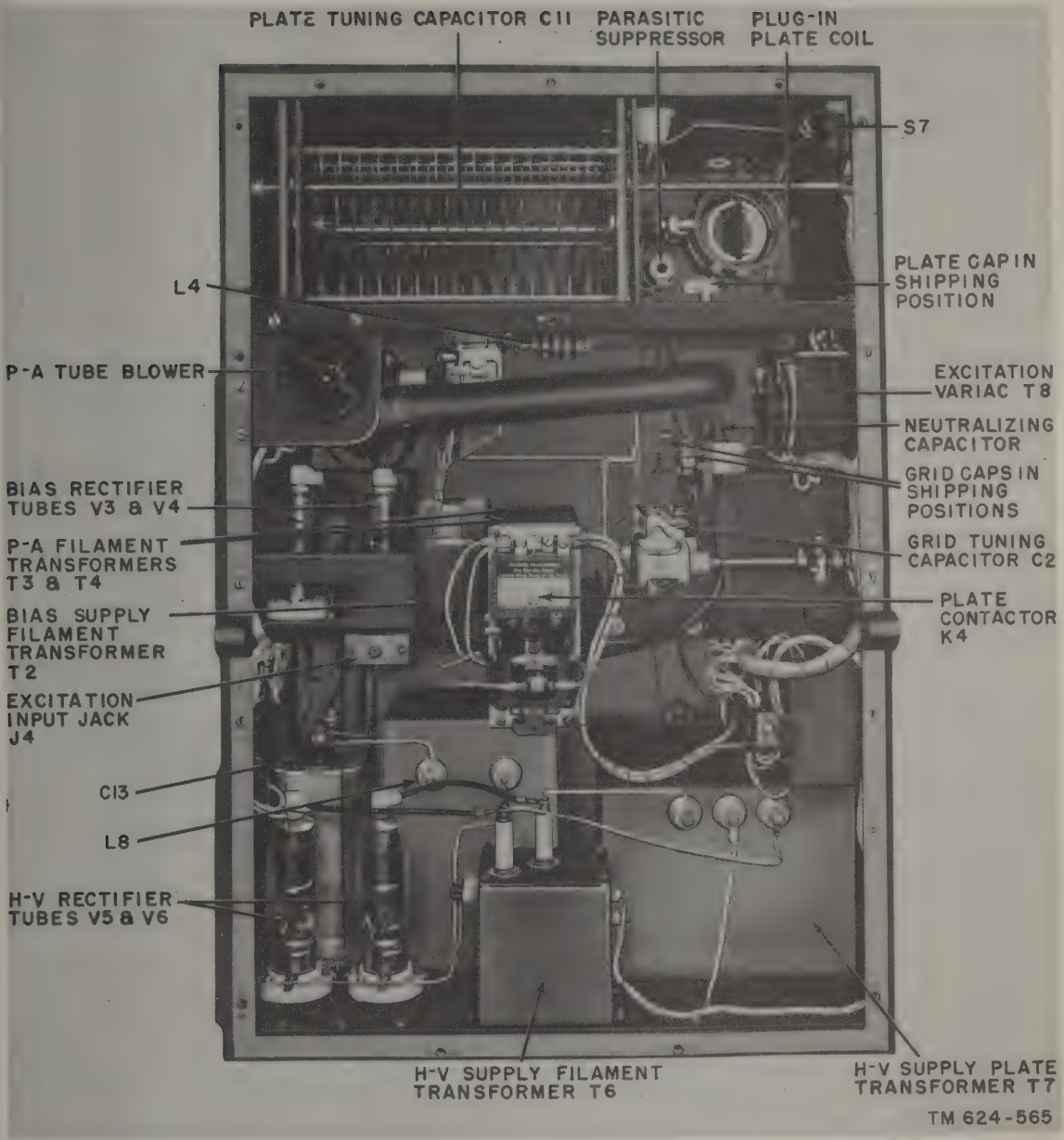


Figure 143. Amplifier AM–141A/MRC (Order No. 19624–Phila–50) and Amplifier AM–141B/MRC, left side panel removed.

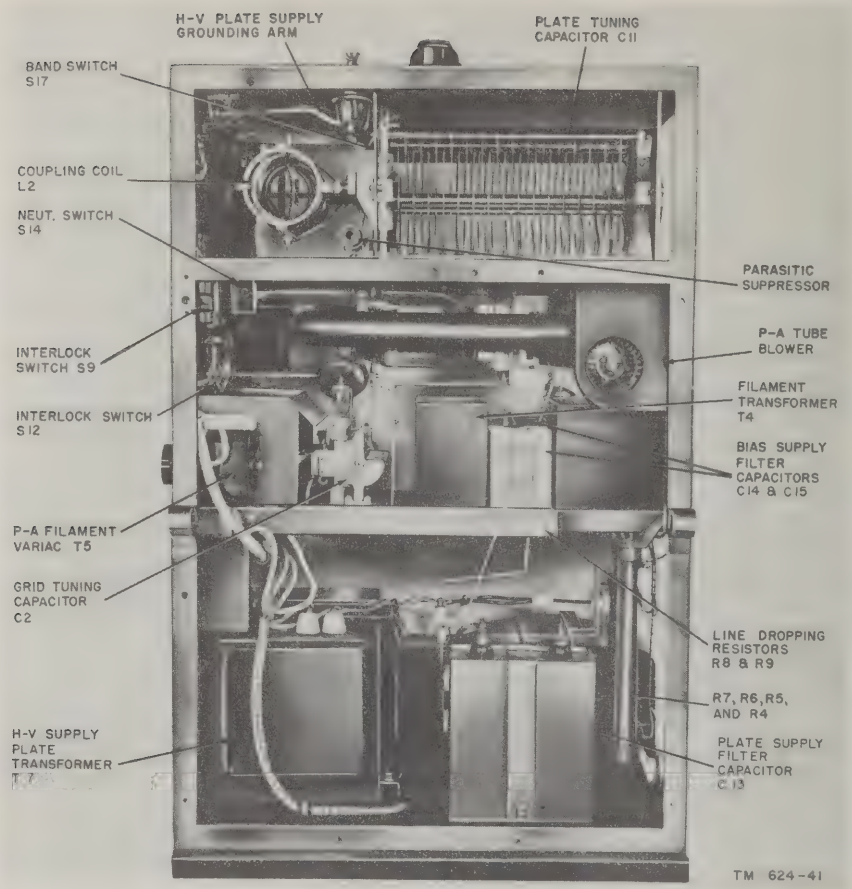


Figure 144. Amplifier AM–141/MRC, right side panel removed.

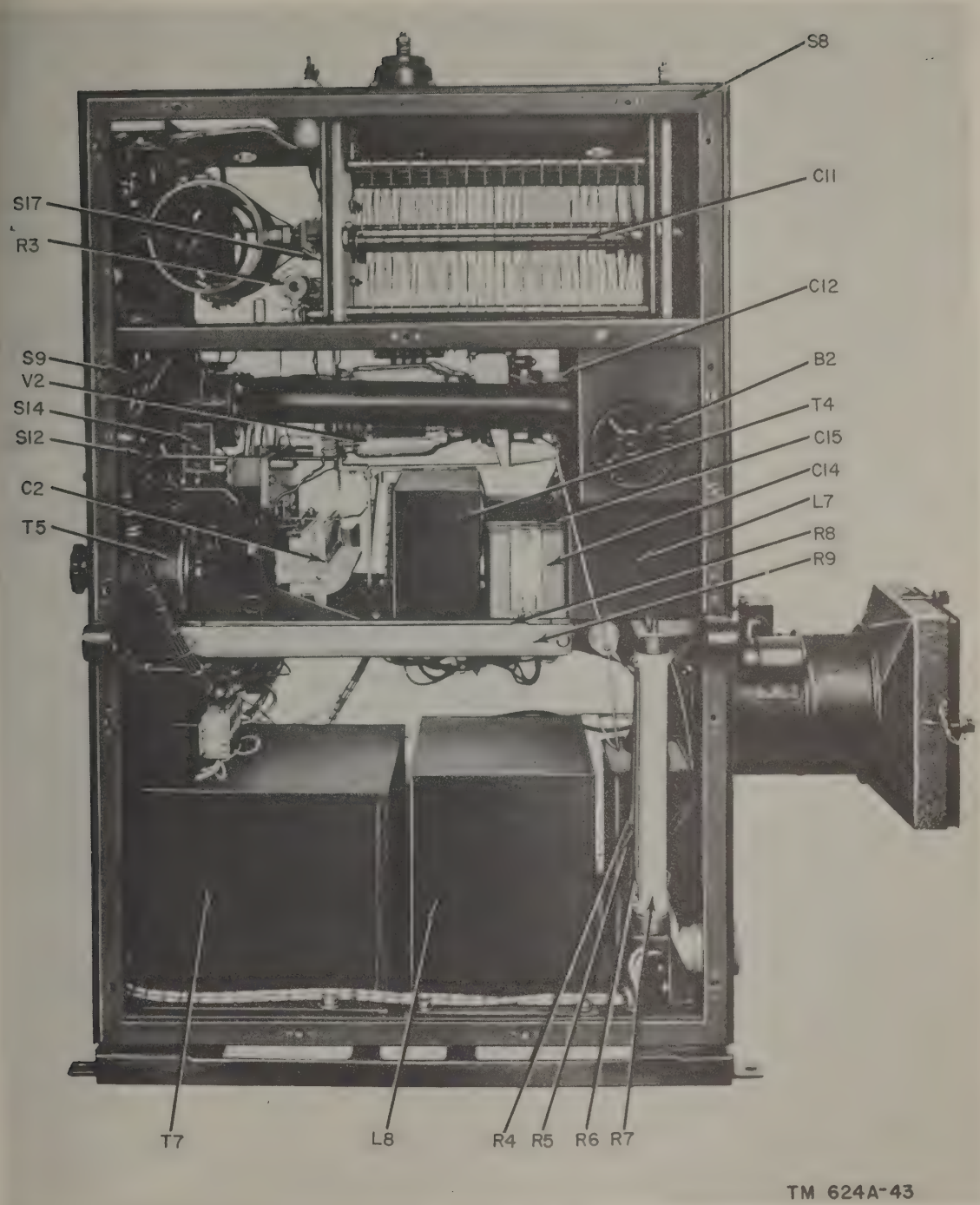


Figure 145. Amplifier AM–141A/MRC (Order No. 19624–Phila–50) and amplifier AM–141B/MRC, right side pane removed.

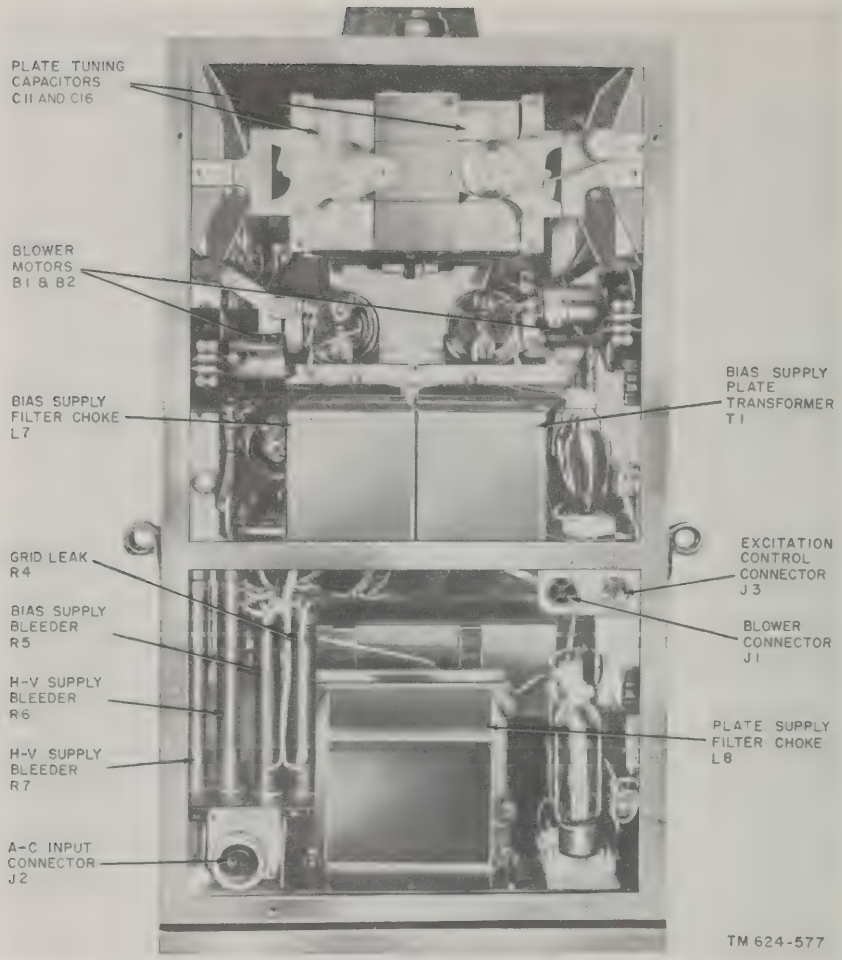


Figure 146. Amplifier AM–141/MRC, rear panel removed.

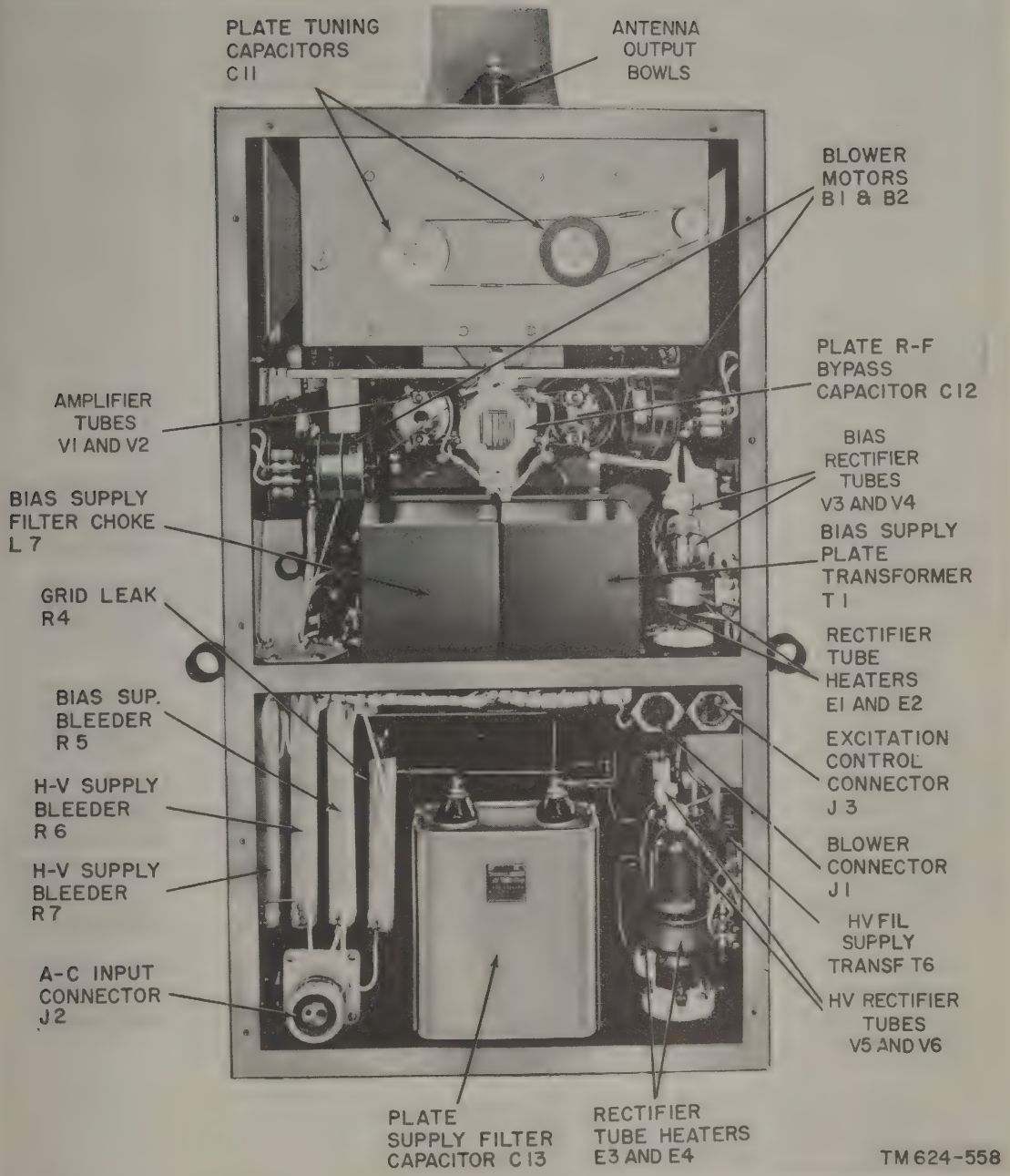


Figure 147. Amplifier AM–141A/MRC (early model), rear panel removed.

174. Replacement of Power Amplifier Tubes

Be careful when removing or installing the p-a tubes in the amplifier. These tubes are ruggedly constructed, but careless handling can easily damage them.

a. Installing Tubes. These tubes are held in place by their filament prongs which connect to adjustable clamps. The plate and grid connections are made to the caps on top of the tubes. To install the tubes, proceded as follows:

(1) Loosen the knurled fasteners on the filament connectors so that the tube will fit in easily.

(2) Gently insert the tube into the filament connectors with the filament pins having the flat milled side at the top.

(3) When the filament caps are firmly seated, tighten the knurled fasteners with the fingers. *Do not use pliers or a wrench.*

(4) Loosen the plate and grid connectors and slide them into place over the corresponding top caps. The plate connector attached to the suppressor resistor fastens to the upper cap (plate). The grid connector fastens to the lower tube cap (grid).

(5) Use the knurled fasteners to make the grid and plate connectors tight. *Do not use pliers or a wrench.*

b. Removing Tubes. Although these tubes are heavily built, they can be broken by rough handling. Do not attempt to force 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 as the seals at the filament leads break easily.

(4) Move the plate connector out of the way when removing the tube.

175. Running-In Mercury Vapor Tubes

In models of the amplifier using mercury vapor tubes type 866A for the bias supply rectifier, and type 872A for the plate power rectifier, care must be taken to be sure that newly installed mercury vapor tubes receive the proper running-in time before being placed in continuous service. This running-in consists of operating the tubes with filament voltage applied but no plate voltage applied. To run-in the tubes, leave the tube access door open to disable the plate power supply, and turn on the filament power for at least 15 minutes at normal ambient temperature. If temperatures are low at the operating site of the amplifier, the running-in time must be longer. Figures 148 and 149 show locations of the rectifier tubes and access doors.

176. Replacement of Variable Transformers T5 and T8

When replacing defective transformers T5 and T8, care should be taken that the proper terminal connections are observed. Two models of transformer T5 and T8 were used in different procurements of Amplifier AM–141(*)/MRC. The following table lists the models of the amplifier concerned, and a cross reference of the proper terminal connections for use with the particular model transformer (see appendix II, Identification Table of Parts for Amplifier AM–141(*)/MRC). If proper terminal connections are observed, the two types of variable power transformers can be used interchangeably on all models of Amplifier AM–141(*)/MRC.

	Amplifier AM–141/MRC GR Variac 200 CU	Amplifier AM–141A/MRC and B. Superior Electric 116U
TERMINAL	4	1
	1	2
	3	3
	2	4
	5	5

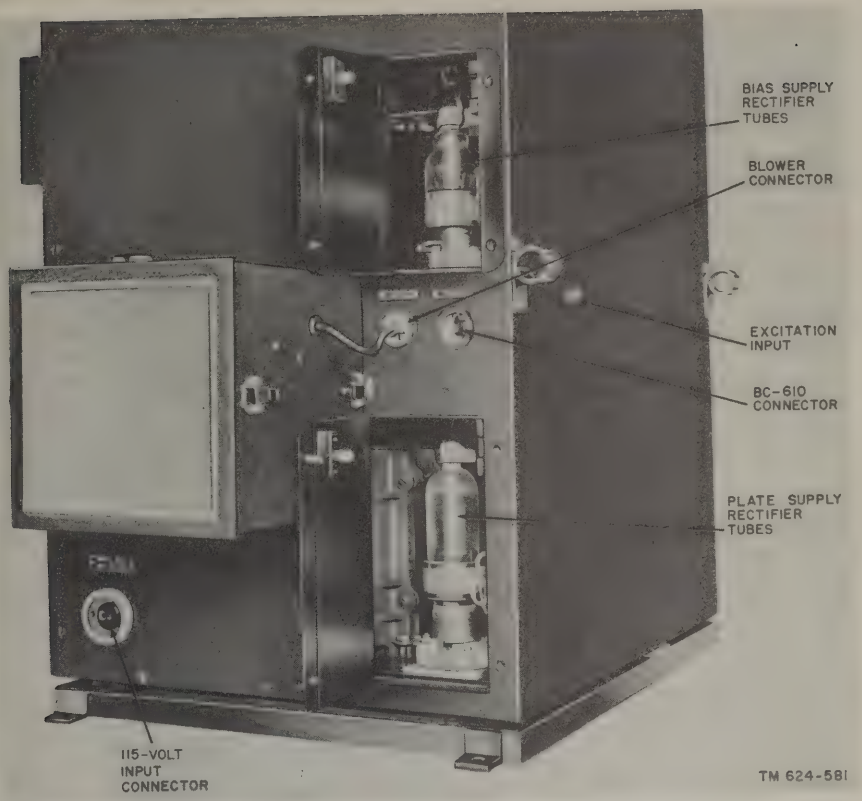


Figure 148. Amplifier AM–141/MRC and early model Amplifier AM–141A/MRC, rectifier tube access doors open.

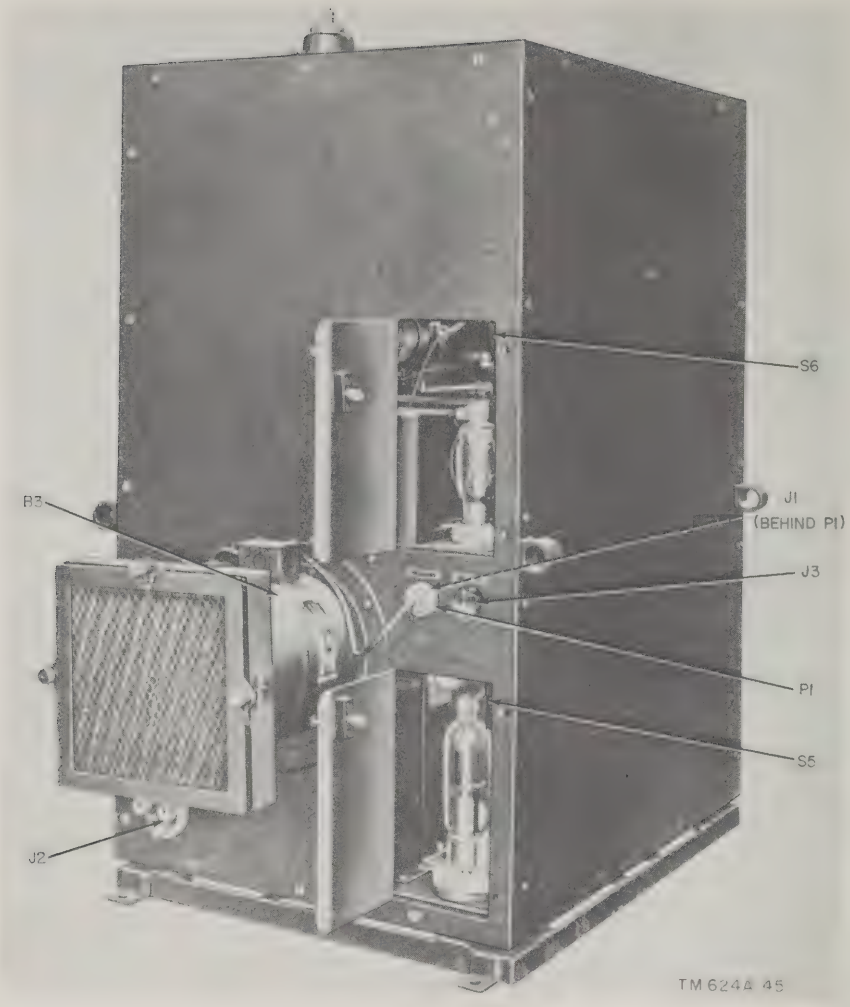


Figure 149. Amplifier AM–141A/MRC (Order No. 19624–Phila–50) and Amplifier AM–141B/MRC, rectifier tube access doors open.

177. Disassembly of High-Pressure Blower Motor for Lubrication

Caution: The amplifier should not be operated with the blower motor in an inoperative condition 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. Amplifier AM–141/MRC.

(1) Remove the high-pressure blower B3 air filter and blower housing (fig. 148) by unfastening the seven snaps holding them to the amplifier and by unplugging the a-c twist-lock plug from the blower socket.

(2) Remove the four bolts holding the blower motor to the fan casing.

(3) Push the fan and motor assembly forward, loosen the Allen-head screw in the fan hub, and remove the fan from the motor shaft. The motor can now be removed from the blower housing.

(4) 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 will go back to their original positions when assembled.

(5) If it is necessary to remove the two end bearings from the shaft, use pressure only against the inner race. Be careful when forcing bearings either 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.

(6) Lubricate the motor as indicated in paragraph 107.

(7) Reverse the above procedure when reassembling the motor. Center the motor on the mounting plate and tighten the four holddown bolts. After the motor has been bolted to the mounting plate, make sure that the shaft revolves freely and that the fan rotates in the clear.

b. Amplifier AM–141A/MRC and AM–141B/MRC.

(1) Remove the high-pressure blower B3 air filter and blower housing (fig. 149) by unscrewing the ¼-inch machine screw and turning the five Airloc studs counterclockwise.

(2) 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.

(3) 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 moved carefully to the rear, and thus removed.

(4) 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.

(5) If it is necessary 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.

(6) Lubricate the motor as described in paragraph 107.

(7) Reverse the procedure when reassembling the motor. Make sure 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.

178. Emergency Repairs

Trouble may exist in a component of Radio Set AN/MRC–2(*) when the equipment is urgently needed. By becoming familiar with the equipment, it may be possible to make emergency repairs which will keep the set on the air although the efficiency or output may be decreased.

a. Receiving Shelter. A resourceful operator should have little difficulty in keeping the set on the air under adverse conditions.

(1) If a receiver fails to operate, replace it with the spare receiver assembly. If the antenna is not functioning, an emergency antenna may be made from another length of wire. If masts are blown down

or lost in transit, other masts can be substituted or suitably located. If replacement masts are unavailable, trees, towers, buildings, or other fixtures can be utilized.

(2) If the teletype receiving equipment is not functioning and it is impossible to substitute a spare component for the faulty one, operation is possible on c-w signals, copying manually.

Note. A typewriter is available at the operating shelter.

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 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 with c-w signals.

c. Transmitting Shelter. In the event of major failure at the transmitter location, emergency repairs will be more difficult, but many improvisations are possible.

(1) The transmitter may be used without the power amplifier although the output power will be greatly reduced. Couple the antenna through the antenna tuning unit to the transmitter if a whip or long-wire antenna is to be used. When using the regular half-wave transmitting doublet, antenna coupling is accomplished by connecting the transmission line directly to binding posts on the left side of the radio transmitter without utilizing the antenna tuning unit.

(2) The power unit in use at the receiving or operating shelter may be replaced temporarily with Power Unit PE–75–( ). In this manner one Power Unit PE–95–(*) will be available for use at the transmitting shelter should trouble develop in that unit. If commercial 60-cycle a-c power of proper voltage is available, it can be used.

(3) Emergency antennas can be erected easily if required. If possible, the emergency antenna should approximate the original in length and method of feed.

(4) Emergency repairs to Amplifiers AM–141–(*)/MRC should be made only if absolutely necessary. Serious injury to personnel and damage to equipment may be the result of unauthorized repairs. Repairs should be made only by competent maintenance personnel.

Section III. ALINEMENT AND ADJUSTMENT

179. General

a. From time to time the components of Radio Set AN/MRC–2(*) will require adjustment or alinement. These adjustments should not be confused with the normal operating adjustments described in chapter 3. It is the responsibility of the repairman to see that all components are adjusted and alined properly. Improper adjustment of the components 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) of Radio Set AN/MRC–2(*) may be found in the publications which are listed in paragraph 166.

180. Neutralization of Amplifier AM–141(*)/MRC

Warning: Be careful when working on the amplifier. There may be dangerous r-f potentials present when the radio transmitter is applying exitation 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 from occurring. Reneutralization of the amplifier should be done only when a p-a tube has been replaced or repair work has been done in the r-f section. Neutralization of the amplifier is accomplished as follows:

a. Tune up Radio Transmitter BC–610–(*) on 2,500 kc. Use Tuning Unit TU–48 and Coil Unit C–387–D. Follow the tuning procedure as in TM 11–826 or paragraph 62 in this manual. Turn off the plate voltage.

b. Be sure that grid coil 2.546 and plate coil 2.553 are in their proper sockets in the amplifier. Be sure that the BAND SWITCH is in the No. 1 position.

c. Open the plate-coil compartment door and

place the NEUT. SWITCH in the ON position. Disconnect the antenna transmission line.

d. Throw CIRCUIT BREAKER K5 on the amplifier to ON but do not turn on the plate power. Turn on the radio transmitter plate power.

e. Tune the GRID TUNING control to obtain a maximum reading on the GRID CURRENT meter and adjust the INCREASE EXCITATION 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 burn out because of 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 neutralized or the lamp may be burned out. If the lamp lights, the set probably is not neutralized. Proceed with the following neutralizing procedure.

g. Turn off the plate power of the radio transmitter and the CIRCUIT BREAKER on the amplifier. Slightly loosen the two locknuts on each of the grid plates of each neutralizing capacitor C8 and C9. Adjust both capacitors equally, that is, either reduce or increase the capacitance of each capacitor by the same amount. Use the neutralizing tool for moving the plates of capacitors C8 and C9.

h. Turn on the power and proceed as in *f* above. If the neutralizing indicator does not light, the amplifier may be considered neutralized. If it continues to light, turn the neutralizing capacitor by means of the polystyrene neutralizing tool.

i. Repeat the procedure given in *f* and *h* above until the amplifier is neutralized completely, or a minimum indication on the neutralizing indicator lamp is obtained.

j. If it is impossible to neutralize the amplifier, obtain a minimum indication and repeat the neutralizing procedure, adjusting 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. More sensitive indications can be obtained by lifting the shorting bar.

k. When the amplifier is neutralized completely, turn off all power and carefully tighten the nuts on the grid plates of the neutralizing capacitors. Recheck the neutralization.

l. As a further check of the neutralization, apply plate power to the amplifier and 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.

m. If a neutralizing indicator is not available or all lamps are burned out, the GRID CURRENT meter may be used as a neutralizing indicator. Adjust capacitors C8 and C9 so that no dip occurs in the grid current meter reading when the PLATE TUNING dial is rotated. 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.

181. 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 their calibration is to be maintained. 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. Four relays are provided in Amplifier AM–141/MRC, and three relays and a time-delay switch are provided in Amplifiers AM–141A/MRC and AM–141B/MRC for the protection and control 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 150, 151, and 152 for the locations of the relays in the various models of the amplifier. Adjustment points are shown in figures 153 and 154.

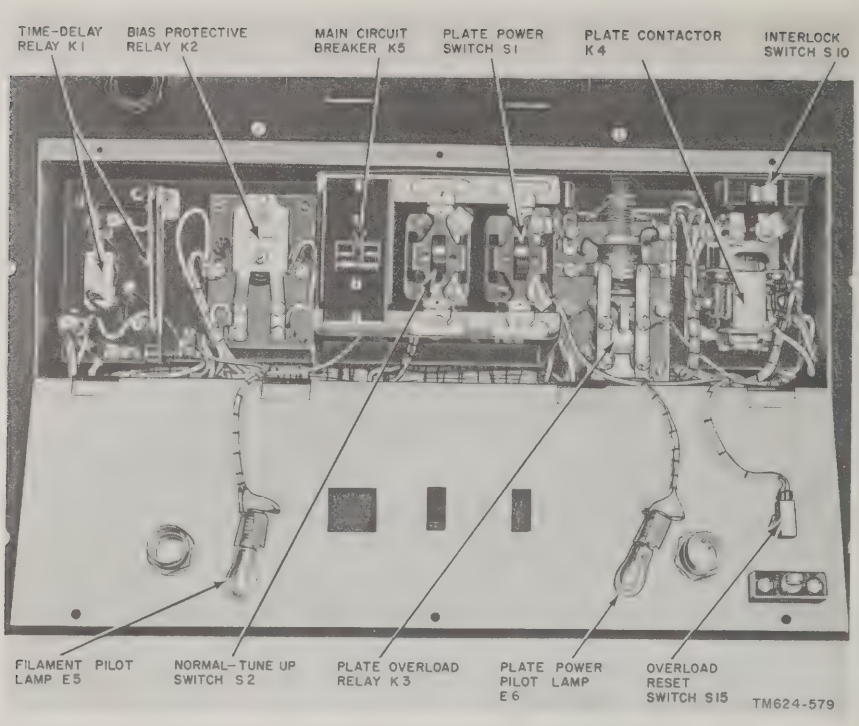


Figure 150. Amplifier AM–141/MRC, relay panel.

(1) *Time-delay relay K1 adjustment* (*Amplifier AM–141/MRC*) (fig. 153). Time-delay relay K1 is mounted on the relay panel at the extreme left-hand end (fig. 150). This and other relays may be tested and adjusted through the access door without removing them from the panel. Relay K1 must be shielded from currents of air when the relay panel access door is open to prevent erratic timing. To test the timing, close CIRCUIT BREAKER K5, observing the time required for the thermal switch blade to snap to the right, and later to snap back to the left. The FILAMENT control should be adjusted until FILAMENT VOLTS meter M2 reads 10 volts which is equal to 115 volts applied to the relay. The first snap should occur after approximately 25 seconds and the second snap approximately 20 seconds later. Repeat this test while watching the contacts of the thermal switch for signs of sparking. Timing of the first cycle can be adjusted by moving the heater toward or away from the blade of the thermal switch. In no case should the heater touch the thermal switch blade nor should the switch blade be bent when making adjustments. If sparking occurs at the contacts of the thermal switch, the contacts should be disassembled and burnished. Carefully check the small permanent magnet on the left contact to be sure that it and the adjacent part of the thermal switch blade are free of dust, rust, filings, and fungicidal lacquer. The magnet also should be checked to see that is still capable of holding the thermal switch blade against the left contact when the heater is cold. When reassembling, the mounting post should be alined so that the magnet pole pieces are parallel with the face of the thermal switch blade. The contact screw is installed and adjusted until a nonmagnetic shim gage or sheet of paper about 0.003 inch thick can be slipped freely between the magnet and thermal switch blade. The right-hand contact should be adjusted

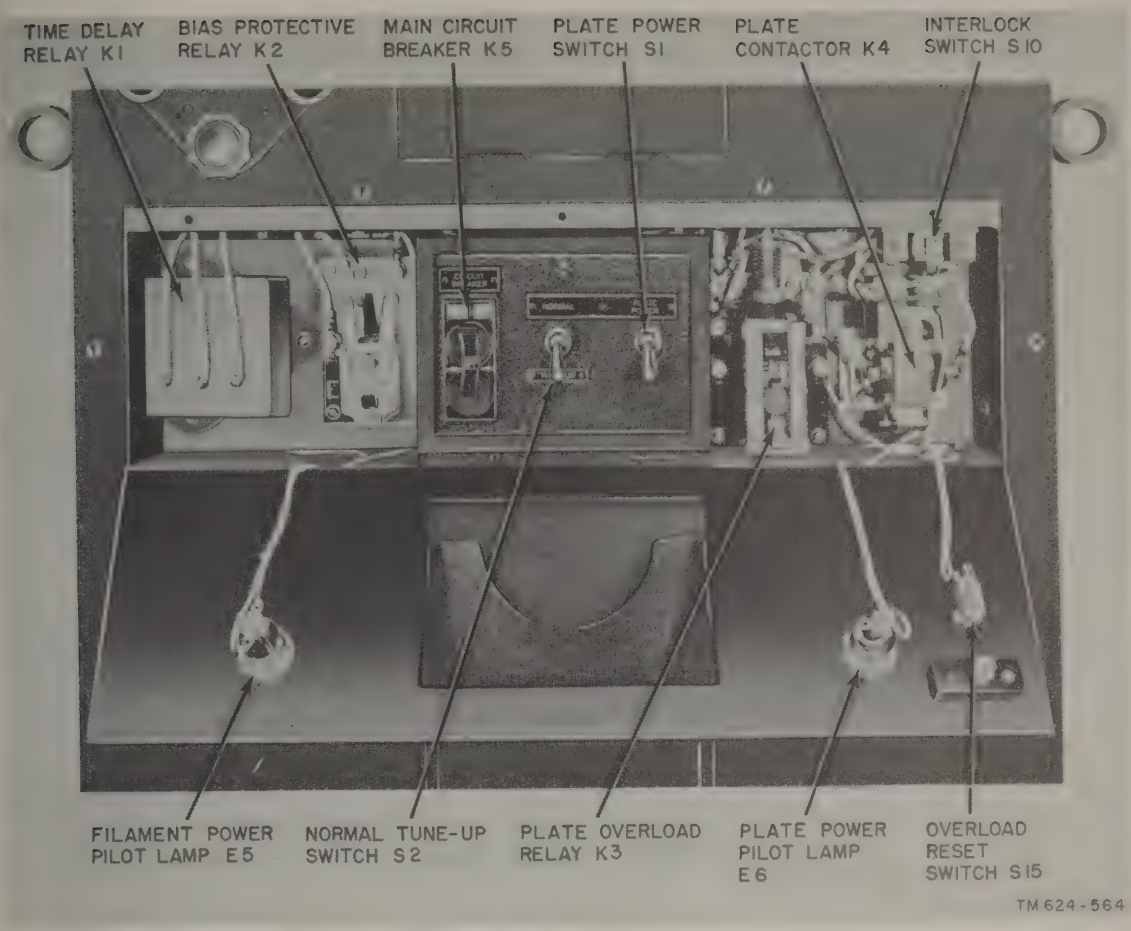


Figure 151. Amplifier AM–141A/MRC, early model, relay panel.

until the normal gap is about 0.010 inch wide. The magnetic relay portion of K1 can be checked visually. The armature should hold in electrically after the thermal switch has cycled until the line voltage is interrupted. Filings and dust may be removed from the pole pieces with a piece of sticky friction tape. Burnish contacts to remove pits, dirt, and fungicidal lacquer. Examine the pivots and the spring for binding due to deposits of fungicidal lacquer. If lacquer is found, remove it by scraping.

(2) *Time-delay switch K1 adjustment* (*Amplifiers AM–141A/MRC and AM–141B/MRC*) (fig. 154). Time delay switch K1 is mounted on the left side of the left relay mounting bracket behind the front panel relay access door. This and other relays may be tested and adjusted without removing them from the amplifier. Time delay switch K1 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.

(3) *Bias protective relay K2* (figs. 153 and 154). 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

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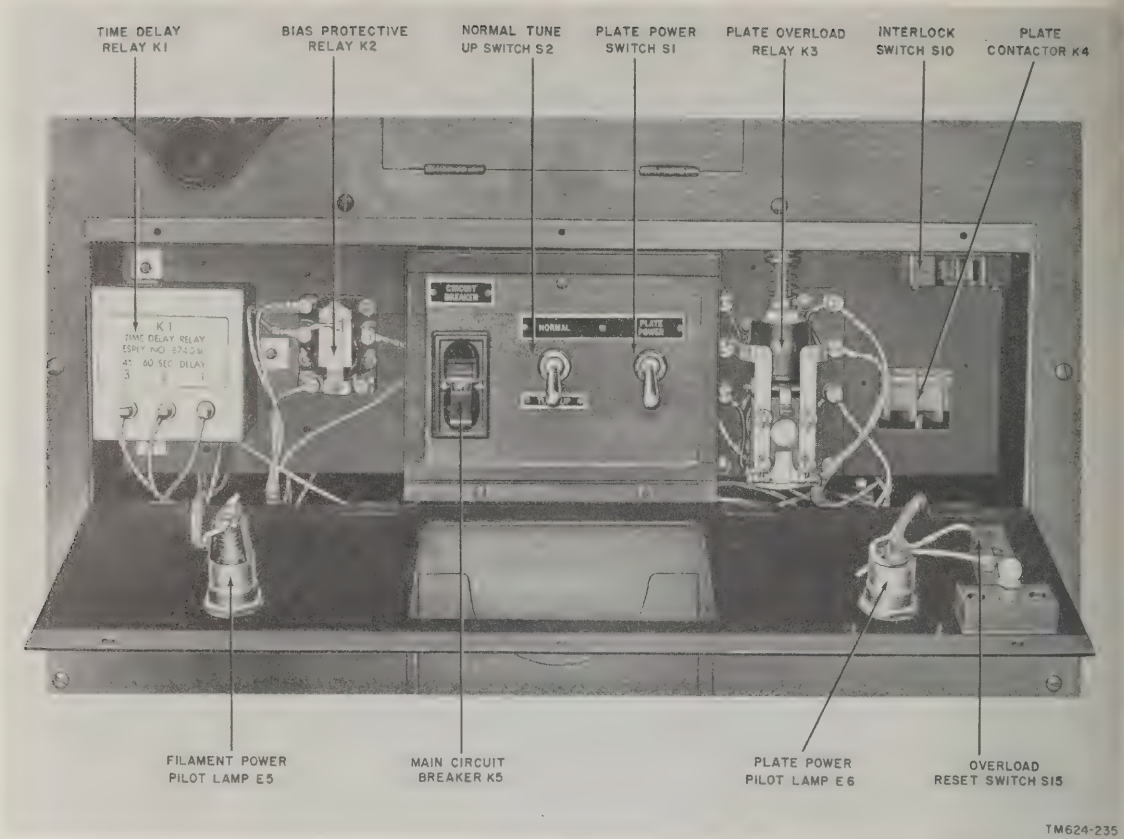


Figure 152. Amplifier AM–141A/MRC (Order No. 19624–Phila–50) and Amplifier AM–141B/MRC, relay panel.

Transmitter BC–610–(*) and the amplifier GRID TUNING control to resonance and backing the EXCITATION control clear off. 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 increase the EXCITATION control until relay K2 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 remain closed at 210 ma, the relay coil should be tested for resistance 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 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 crusted, clean with No. 0000 sandpaper and lightly coat the bared iron with oil (PL Special). The contacts should be burnished

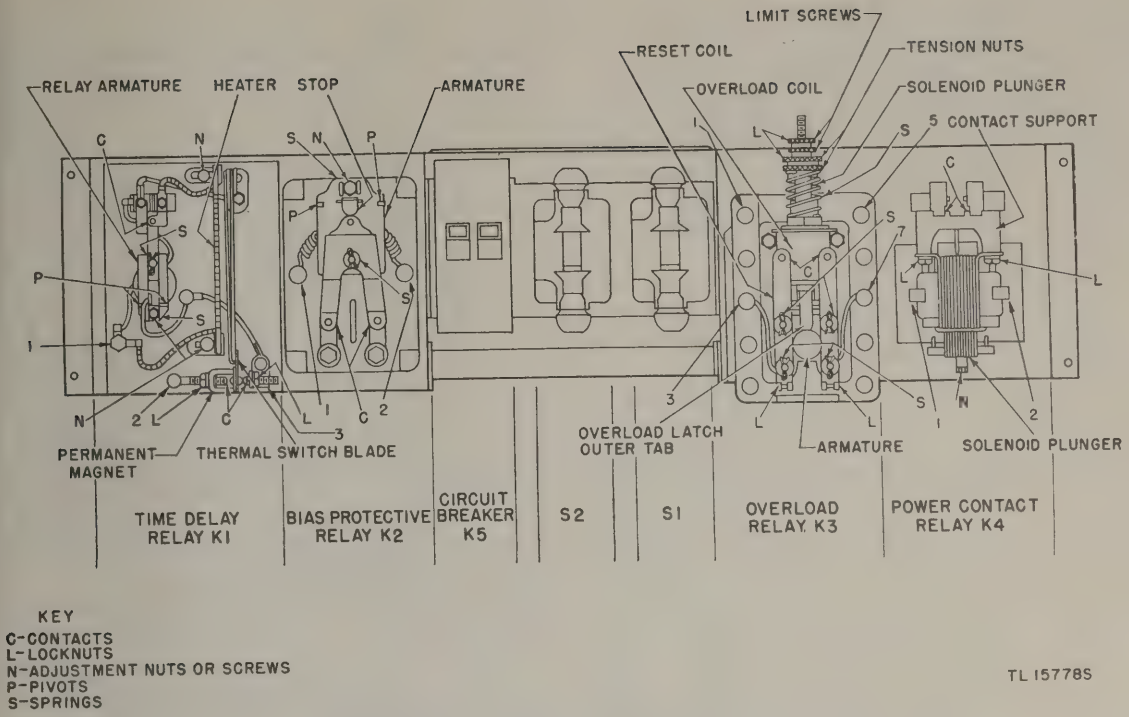


Figure 153. Amplifier AM–141/MRC, relay panel adjusting and checking points.

thoroughly with a WECo No. 265C burnishing tool. If the contacts are badly pitted or otherwise defective, they should be replaced and adjusted as indicated in (*c*) below. Clean the pivots and springs by wiping or brushing; scrape off any deposits of fungicidal lacquer.

(*c*) In Amplifiers AM–141/MRC and AM–141A/MRC (early models), adjust the relay until the contacts just touch the *armature contacts* with a spacing of 0.017 inch between the pole piece and the armature. Adjust the dropout (release) of the relay (by means of the hexagonal nut) to open between 115- and 135-ma GRID CURRENT. Adjust the closing of the relay by bending the stop *out* for more current and *in* for less current. The closing current as indicated on the GRID CURRENT meter generally approximates 175 ma. If much bending of the stop is required, the dropout current should be rechecked and readjusted.

(*d*) In late model Amplifier AM–141A/MRC and Amplifiers AM–141B/MRC, adjustments may be made by loosening the spring tension of the armature tail and by lengthening or shortening the normally closed contact screw. Once actuated, if the relay fails to drop out at 115 ma as the excitation is reduced, 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 should be adjusted to reduce the space between the armature and the pole piece. If the closing current is less than 190 ma, the contact screw should be adjusted to increase the space between the armature and the pole piece. If unusual difficulty is encountered in the adjustments outlined above, an accurate measurement of relay current may indicate the trouble.

(4) *Overload relay K3 adjustment* (figs. 153 and 154).

(*a*) Overload 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 TUNE UP switch S2 is changed from the TUNE-UP to the NORMAL position several times. With the same antenna adjustment and the TUNEUP switch at NORMAL, 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 conform to these values, inspect it for loose adjustments and dirty or defective parts. The locknut must be tight. Inspect the solenoid plunger (relay mechanism in late model Amplifier AM–141A/MRC and AM–141B/MRC) 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 there is very little sidewise motion of the armature.

(*b*) Clean 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 coated lightly with oil (PL Special) to prevent rusting. In no case should any abrasive be applied to the solenoid plunger or relay mechanism.

(*c*) In Amplifiers AM–141/MRC and early model AM–141A/MRC, adjust the limit screw in the solenoid plunger so that the plunger will have a travel of nine-sixteenths of an inch when moved manually. Adjust the larger thumbnuts on the solenoid so that the solenoid responds to the current as indicated for the test. Tighten each pivot screw on the bottom of the relay armature until the armature binds slightly. Back off each pivot screw one-fourth of a turn and tighten the locknut. Adjust the relay contacts by bending the armature contact arms until both contacts just close with a gap of 0.035 inch between the pole piece and the armature. Adjust the overload latch by bending the large outer tab so that the contacts open approximately three-sixteenths of an inch. Bend the short inner tab on the latch so that it will hold the contacts closed when latched, and leave a gap at the pole piece of about 0.008 inch. The latch should have a definite spring-accelerated downward motion with no evidence of binding while holding the armature *in* manually. These adjustments are approximate and may vary slightly with different relays.

(*d*) Adjust the relay to operate on the proper latch release current in the late A and B models by increasing or decreasing the tension of the upper, or vertical spring. Set the spacing between the fixed contacts on the lower part of the relay at approximately one-eighth of an inch. The left-hand screw contact should apply sufficient pressure to the armature contact (in the latched position) to insure reliable operation. After the proper adjustments have been made, tighten the locknuts.

(5) *Power contactor relay K4 in amplifiers AM–141/MRC and AM–141A/MRC (early models)* (fig. 153).

(*a*) Relay K4 may be tested and adjusted in the cabinet through the relay access door. This relay is not critical of adjustment but is subject to dirt, rust, pitted contacts, and broken or otherwise defective components and, therefore, it should be inspected, cleaned, and tightened regularly. The plunger should be moved by hand to make certain that it is not binding, and to be

sure that the spring pressure accelerates the opening of the relay. Inspect the contacts to see that they are alined properly and are not pitted. Inspect the contact supports for breaks, flash-overs, and dust.

(*b*) Tighten all terminal screws and assembly bolts. Clean the dust from this relay by brushing or wiping. Burnish the contacts with a WECo No. 265C burnishing tool. Remove all rust and excess fungicidal lacquer by scraping. Bared steel parts should be lightly coated with oil (PL Special).

(*c*) Adjust the plunger tension by the thumbnut at the bottom; tighten the thumbnut five turns from the loose position. To aline contacts, loosen the four locknuts which hold the bakelite contact supports for the metal brackets, then tighten the four locknuts again.

(6) *Power contactor relay K4 in Amplifiers AM–141A/MRC (late models) and AM–141B/MRC* (fig. 155). In the late A and B models, relay K4 is located on the left side of the bias shelf and is accessible only after the left side panel is removed (fig. 143). This relay is not critical of adjustment but is subject to troubles from dirt and broken or otherwise defective components, and for these reasons should be inspected, cleaned, and tightened regularly. The plunger should be moved by hand to make certain that it is not binding because of dirt or deposits of fungicidal lacquer. Inspect the contacts to see that they are alined properly. To reach the contacts, remove the large nut that holds the nameplate at the side of the contactor. Inspect the contact supports for breaks, evidences of flash-overs, and dust.

c. Thermostats in Amplifiers AM–141/MRC and AM–141A/MRC (Early Models). There are two thermostats to insure proper operating of the amplifier. The thermostats are factory adjusted and can be tested only for operation.

(1) Tube heater thermostat S3 will open when the temperature exceeds 80° F., and will close when the temperature is below 70° F.

(2) Ambient temperature thermostat S4 will open when the temperature falls below 55° F., and will close when the temperature reaches 65° F.

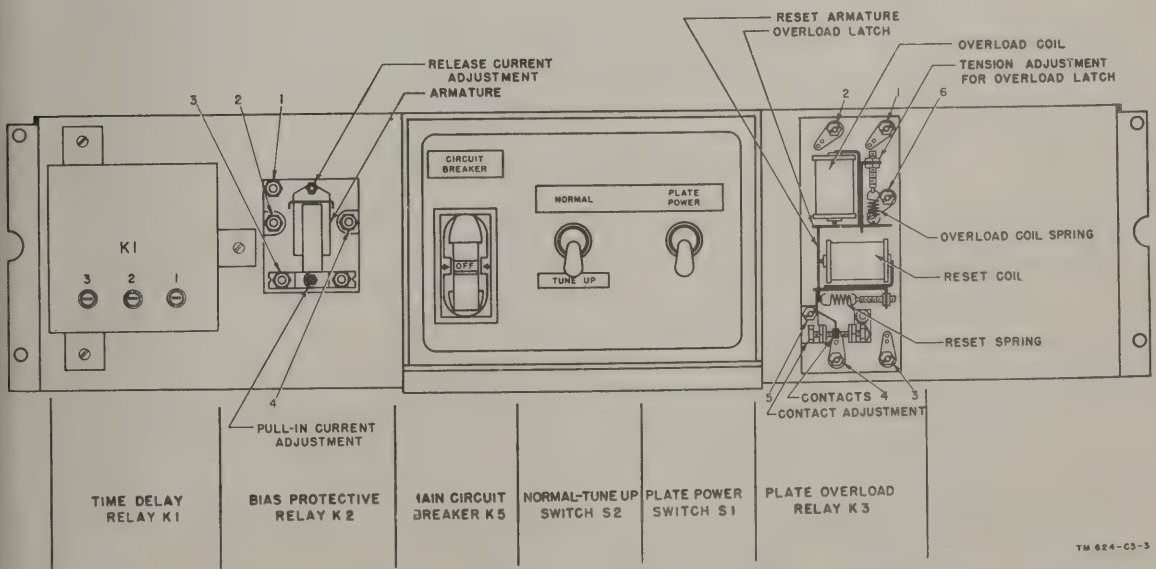


Figure 154. Amplifier AM–141A/MRC (Order No. 19626–Phila–50) and amplifier AM–141B/MRC, relay adjustment points.

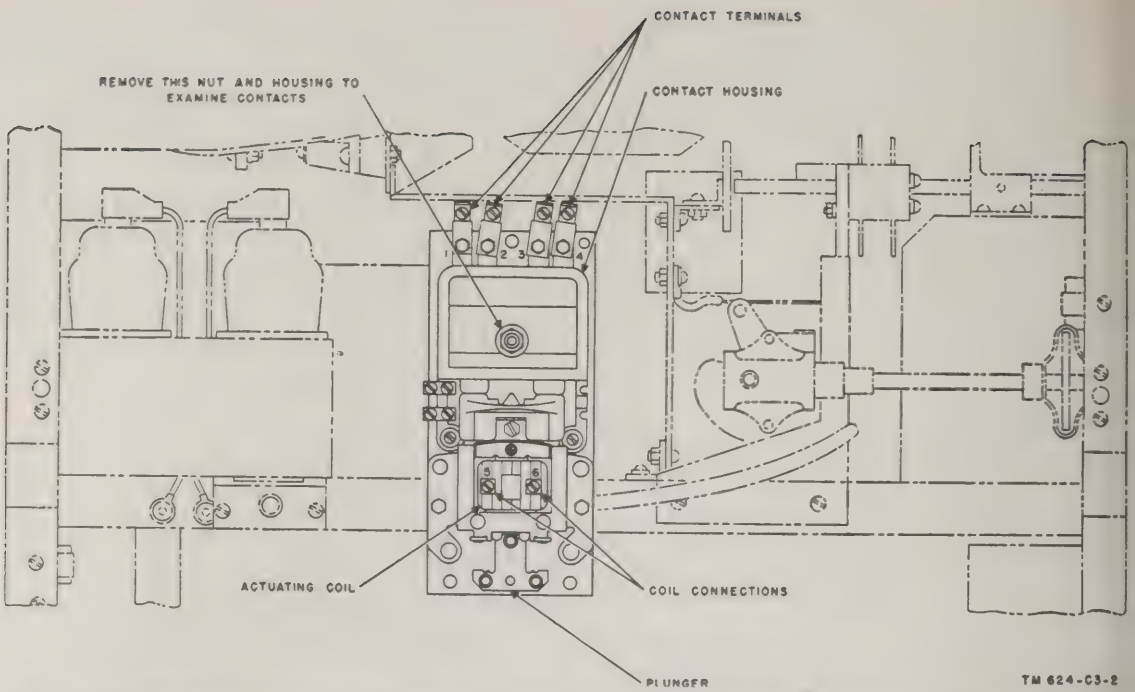


Figure 155. Amplifier AM–141A/MRC (Order No. 19624–Phila–50) and amplifier AM–141B/MRC, relay adjustment.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

182. Disassembly

The circumstances of field transportation differ widely and, therefore, no definite repacking procedure can be given. The following procedure is recommended as a guide for preparing the radio set for field transportation.

a. Transmitting Shelter.

(1) Disconnect all outside field lines and power cords. Stow cordage on the floor of the shelter. Reel up the field wire.

(2) Loosen the plate on the rear of the shelter through which the Power Cord CD–335 passes. Disconnect both ends of the cord and stow the cable on the floor of the shelter.

(3) Dismantle the receiving whip antenna and stow it in seat Chest CH–89–(*).

(4) Disconnect the antenna coaxial cable, and screw the cap over the hole through which the cable normally passes.

(5) Disconnect the ground cable, and stow it in the operating bench. Pull out the Ground Rod GP–26 (modified) and stow it in the holder provided.

(6) Make sure that all ventilators and wire feedthrough holes are closed tightly to prevent seepage of dust and water into the shelter.

(7) Remove Canopy CW–153/U; fold it and stow it on the floor of the shelter.

(8) Remove tubes 833–A from the power amplifier, and stow them in a box provided in Case CY–521/MRC–2. Secure the plate and grid leads in the amplifier after removal of the tubes.

(9) Remove the plate and grid coils from the power amplifier; 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–(*)

(10) Disconnect Frequency Meter BC–221–(*) and stow it in wall Case CY–521/MRC–2.

(11) Stow all loose items such as headsets and technical manuals in the chest compartments provided.

(12) Check for tightness of all light bulbs and holddown bolts on the equipment. Make sure that Radio Receiver BC–312–( ) is fastened securely in place and that safety wires are in place. Check to see that hold-in pins for back rests are in place.

(13) If possible, place protective wrappings about the heater, fire extinguisher, Rectifier RA–63–(*), and other components for which there is no space in the chests.

(14) Before closing and locking the chests, stuff any available filler into compartments that require such material to prevent damage to the contents. Cover the components for which canvas covers are provided. After making sure that all stowed equipment is secure, check all chest fasteners and lock all doors.

Note. Transmitting antenna components are repacked in accordance with the procedure outlined in TM 11–2620 and stowed in the operating shelter. This equipment normally is transported by a fourth vehicle in the field.

b. Receiving Shelter.

(1) Disconnect all outside field wires, power cords, and coaxial cables from the shelters.

(2) Reel up the field wire and roll up the power cords.

(3) Take down the antenna and repack it.

(4) Reel up the two coaxial antenna leads on the drums provided.

(5) Dismantle the whip antenna and stow it

on the floor. Remove the mast base from the shelter.

(6) Disconnect the ground cables and stow them on the floor. Pull up the Ground Rod GP–26 and stow it in the holder provided.

(7) Remove the typing units from Teletypewriters TG–7–B or TT–55/MGC and place them in the shipping boxes (Chest CH–62–(*)) as follows:

(*a*) Remove the crank and cover and place the crank in the shipping box.

(*b*) Lock the carriage in place; use fastening clips provided.

(*c*) Loosen the three thumbscrews that hold the typing unit to its base.

(*d*) Remove the typing unit and place it in Chest CH–62–(*). Fasten the unit securely.

(8) See that all light bulbs are tight in their sockets.

(9) See that all receivers are locked securely into the cabinet.

(10) Fasten the chairs to the walls and stow all loose materials on the floor of the shelter.

(11) Remove Canopy CW–153/U and stow it in the shelter

(12) Make sure that all ventilators and wire feedthrough holes are closed tightly to prevent seepage of dust and water into the shelter. Close the doors securely.

c. *Operating Shelter.*

(1) Disassemble and stow the teletypewriter equipment as in *b*(7) above.

(2) Place Covers BG–198, BG–199, and BG–200 over the teletypewriter equipment (typing-reperforator and transmitter-distributor).

(3) Disconnect all outside field lines. Reel up the field wire and stow it in the racks provided. Disconnect the power cords, roll them up, and stow them in shelter.

(4) Remove all loose equipment from the operating bench and pack it securely in storage cabinets.

(5) Disconnect Rectifier RA–87, place it in the carrying Chest CH–158, and stow it on floor of shelter.

(6) Securely pack the stamping clock and Line Unit BE–77–( ) in the tape compartment on the operating bench.

(7) All loose cords and material may be stowed in the tape receptacle.

(8) Secure the portable typewriter in the place provided on the operating bench.

(9) Securely stow and fasten the chairs.

(10) Remove Canopy CW–153/U from the front of the shelter, and after folding it up, stow it on the floor of the shelter.

(11) Check for tightness of all light bulbs and holddown bolts on the equipment.

(12) If possible, place protective wrapping about the heaters, fire extinguishers, and any other loose items in shelter.

(13) Make sure all ventilators are closed tightly and that covers for wire feedthrough holes are fastened securely.

(14) If a fourth vehicle is not available. the transmitting antenna components are packed in the operating shelter.

(15) After making sure that all stowed equipment is secure, check all fastenings and lock the shelter doors.

183. Repacking for Shipment or Limited Storage

a. The exact procedure in repacking for shipment or limited storage depends on the material available and the conditions under which the equipment is to be shipped or stored.

b. Whenever practicable, place a dehydrating agent such as silica gel inside the chests. Protect the chests with a waterproof sealing compound or tape. Pack the protected chests in a padded wooden case, providing at least 3 inches of excelsior padding or some similar material between the paper barrier and the packing case.

c. Figures 156, 157, and 158 show the interiors of the transmitting, receiving, and operating shelters, respectively, packed for shipment, and illustrate a method of placing wooden props and bags of dehydrating agent (silica gel).



Figure 156. Interior of transmitting shelter, packed for shipment.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

184. General

The demolition procedures in paragraph 185 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.

185. Methods of Destruction

a. Smash. Smash the crystals, controls, tubes, coils, switches, capacitors, transformers, and headsets, using sledges, axes, handaxes, hammers, crowbars, or heavy tools.

b. Cut. Cut cords, headsets, and wiring, using axes, handaxes, or machetes.

c. Burn. Burn cords, resistors, capacitors, coils, wiring, and technical manuals, using gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend panels, cabinet, and chassis.

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

f. Disposal. Bury or scatter the destroyed parts in slit trenches, foxholes, or other holes, or throw them into streams.

g. Destroy. Destroy everything.

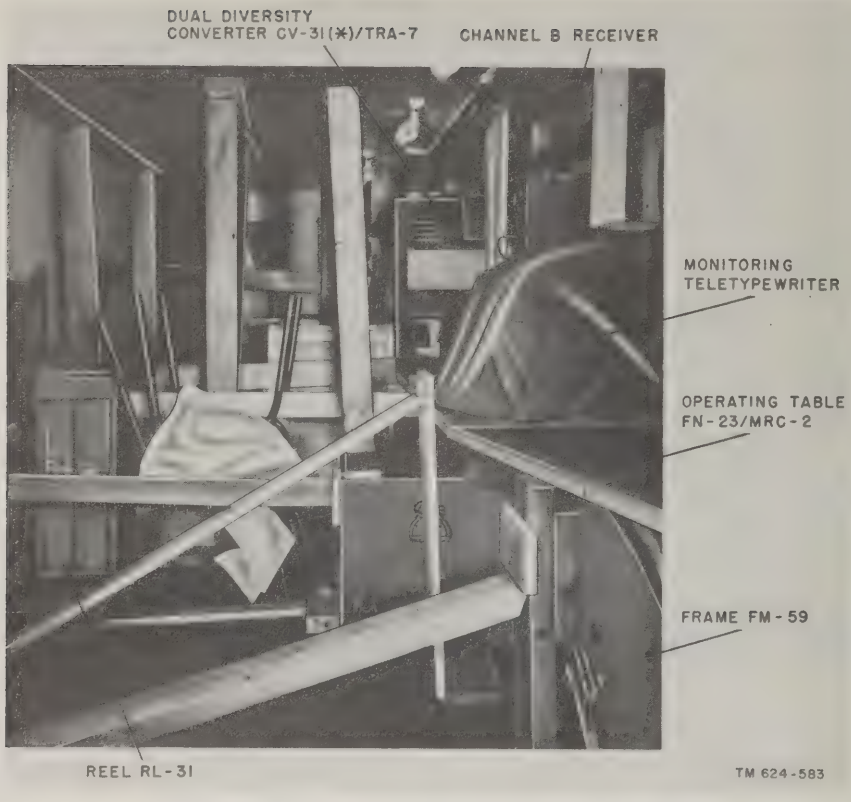


Figure 157. Interior of receiving shelter, packed for shipment.



Figure 158. Interior of operating shelter, packed for shipment.

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310–20–3, SR 310–20–4, and SR 310–20–5. Check Department o the Army Supply Manual SIG 1 for Signal Corps Supply Manuals.

1. Army Regulations

AR 380–5	Military Security—Safeguarding Security Information.
AR 750–5	Maintenance of Supplies and Equipment—Maintenance Responsibilities and Shop Operation.

2. Auxiliary Equipment and Test Equipment

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, and AN.
TM 11–303	Test Sets I–56–C, I–56–D, I–56–H, and I–56–J.
TM 11–321	Test Set I–56–E.
TM 11–2524	Oscillators I–151–A and I–151–E.
TM 11–2526	Oscilloscope BC–1060–A.
TM 11–2613	Voltohmmeter I–166.
TM 11–2624B	Voltohmmeters TS–294/U, TS–294B/U, and TS–294C/U.
TM 11–2626	Test Unit I–176, I–176–A, and I–176–B.
TM 11–2627	Tube Tester I–177 and I–177–A.
TM 11–5511	Electronic Multimeter TS–505/U.
TM 11–4700	Electrical Indicating and Measuring Instruments Repair Instructions.
TM 11–2684A	Audio Oscillator TS–382A/U.
TM 11–5527	Multimeter TS–352/U.

3. Painting, Preserving, and Lubrication

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

4. Camouflage, Decontamination, and Demolition

FM 5–20	Camouflage, Basic Principles.
FM 5–25	Explosives and Demolitions.
TM 3–220	Decontamination.

5. Other Publications

FM 24–18	Field Radio Techniques.
SR 310–20–3	Index of Training Publications.
SR 310–20–4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SR 310–20–5	Index of Administrative Publications.
SR 700–45–5	Unsatisfactory Equipment Report (Reports Control Symbol CSGLD–247 (RI)).
SR 725–405–5	Preparation and Submission of Requisitions for Signal Corps Supplies.
SR 745–45–5 Navy Shipping Guide, Article 1850–4. AFR 71–4	Shipment of Supplies and Equipment—Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD–66 (Army), S and A–70–6 (Navy), and AF–MC–U2 (Air Force)).

TB SIG 4	Methods for Improving the Effectiveness of Jungle Radio Communication.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.
TB SIG 223	Field Expedients for Wire and Radio.
TB 11–300–3	Rectifier Power Units RA–133, RA–133–A, and RA–133–B.
TB 11–499–( )*	Basic Radio Propagation Predictions.
TM 9–2857	Storage Batteries, Lead-Acid Type.
TM 11–257	Frequency Shift Exciters O–39/TRA–7, O–39A/TRA–7, O–39B/TRA–7, and O–39C/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.
TM 11–262	Control Unit C–292/TRA–7, C–292A/TRA–7, and C–292B/TRA–7.
TM 11–333	Telephone EE–8, EE–8–A, and EE–8–B.
TM 11–359	Line Units BE–77, BE–77–A, BE–77–B, and BE–77–C.
TM 11–430	Batteries for Signal Communication, except those pertaining to Aircraft.
TM 11–455	Radio Fundamentals.
TM 11–466	Radar Electronic Fundamentals.
TM 11–477	Fixed Station Radio Repair and Maintenance (Personnel Training Text).
TM 11–483	Suppression of Radio Noises.
TM 11–496	Training Text and Applicatory Exercises for Amplitude-Modulated Radio Sets.
TM 11–499	Radio Propagation.
TM 11–661	Electrical Fundamentals (Direct Current).
TM 11–666	Antennas and Radio Propagation.
TM 11–681	Electrical Fundamentals (Alternating Current).
TM 11–352	Printer TG–7–A and Teletypewriters TG–7–B, TG–37–B, and TT–55/MGC.
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, –B, –C, –D, –J, –K, –P, –S, –T, –U, –W, –AA, –AB, –AC, –AD, and –AE.
TM 11–850	Radio Receivers BC–312–A, –C, –D, –E, –F, –G, –J, –L, –M, and –N; BC–314–C, –D, –E, –F, and –G; BC–344, and D, and Radio Receiver Assemblies OA–65/MRC–2, and OA–65A/MRC–2.
TM 11–900	Power Units PE–75–A, –B, –C, –F, –G, –H, –I, and –K.
TM 11–904	Power Units PE–95–A, –B, –C, –F, –G, –H, –I, and –K.
TM 11–957	Rectifier RA–87.
TM 11–962	Rectifier RA–63–B.
TM 11–2201	Reperforator Teletypewriter Sets TC–16 and TC–17 (including Reperforator Transmitters TG–26–A and TG–26–B, and Perforator-Transmitter TT–56/MGC).
TM 11–2222	Receiving Transmitter Distributors TT–12/FGQ–1, and Transmitter Distributors TT–21/FG (including other Teletype Model 14 Transmitter Distributors).
TM 11–2223	Typing and Nontyping Reperforators, Teletype Model 14.
TM 11–2620	Antenna Support AB–38/CR.
TM 11–2620A	Antenna Support AB–38B/CR.
TM 11–2737	Installation of Radio and Facsimile Equipment in Shelter HO–17–( ).
TM 11–5054	Speech Amplifier BC–614–E, –F, –H, and –I.

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

APPENDIX II

IDENTIFICATION OF REPLACEABLE PARTS

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as a specific T/O & E, T/A, SIG 7 & 8, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Manual applicable to the equipment covered in this manual is SIG 7 & 8 AN/MRC–2. For an index of available supply manuals in the Signal portion of the Department of the Army Supply Manual, see the latest issue of SIG 1.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
				(*)	(*)	(*)	RADIO SETS AN/MRC–2, –2A, and –2B: a-m-c-w radioteletype freq shift; output 2 kw w/ampl 400 w cw, 300 w voice w/o ampl; input 115 v 50 to 60 cyc ac; freq range: xmtr 2 to 18 mc; rec 1.5 to 18 mc; installed in 3 Shelters HO–17 or HO–17–A for mtg on 2½ ton, 6 x 6 cargo trucks.	Transmits and receives radioteletype, c-w, and a-m signals.	2S3007–2.
				(*)	(*)	(*)	Technical Bulletin 11–300–3	Describes rectifier RA–133, –A, and –B.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–257	Describes Frequency Shift Exciters O–39/TRA–7, O–39A/TRA–7, O–39B/TRA–7, and O–39C/TRA–7.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–261	Describes Dual Diversity Converters CV–31/TRA–7, CV–31A/TRA–7, CV–31B/TRA–7, CV–31C/TRA–7, and CV–31D/TRA–7.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–262	Describes Control Units C–292/TRA–7, C–292A/TRA–7, and C–292B/TRA–7.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–281	Describes Radio Sets SCR–399–A and SCR–499–A.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–333	Describes Telephone EE–8–(*).	Order through TAGO.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
				(*)	(*)	(*)	Technical Manual 11–352	Describes teletypewriters.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–359	Describes Line Units BE–77, –A, and –B.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–624	Describes Radio Sets AN/MRC–2, –2A, and –2B.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–850	Describes radio receivers.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–957	Describes Rectifier RA–87–(*).	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–962D	Describes Rectifier RA–63–D.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–2201	Describes reperforator teletypewriter sets.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–2222	Describes transmitter distributor.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–2223	Describes typing and nontyping reperforators.	Order through TAGO.
				(*)	(*)	(*)	Technical Manual 11–2620	Describes Antenna Support AB–38/CR.	Order through TAGO.
			(*)	----	----	(*)	ADAPTER M–359: male one end, female other end; single round male cont; 90° angle type; adpt for Socket SO–239 and Plug PL–259.	Coaxial adapter for transmitting antenna connection.	2Z299–359.
			(*)	(*)	(*)	(*)	AMPLIFIER, AF: Speech Amplifier BC–614–H–I; .5 w output; 16½″ lg x 9¾″ d x 9½″ h incl shock mount; Army spec 71–1683–A.	Raises microphone output level for modulating the transmitter.	2C214H. 2C214I.
			(*)	----	----	(*)	AMPLIFIERS AM–141A/MRC and AM–141B/MRC: freq 2–18 mc; 44¼″ lg x 28″ d x 23½″ wd o/a; Army spec 71–3238–A.	Amplifies output of radio transmitter.	2C449–141A.
			(*)	(*)	(*)	----	AMPLIFIER AM–141/MRC: freq 2–18 mc; 44¼″ lg x 23½″ wd x 28″ d; Sig spec 71–3238.	Amplifies output of radio transmitter.	2C449–141.
			(*)	(*)	(*)	(*)	ANTENNA KIT MX–852/MRC–2: rhombic type; not sectionalized; freq range 6–18 mc; B&W part #180.	Provides necessary materials for construction of a rhombic transmitting antenna.	2A278A.
			(*)	(*)	(*)	(*)	BALL, corona: ⅝″ dia; B&W part #219.	Cap for whip antenna.	2A315.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B–Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock N
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	(*)	(*)	(*)	BASE, mast: Mast Base AB–15/GR; 15¼″ lg x 3⅜″ dia o/a; Sig dwg #SC–D–12517.	Receives mast section for monitor receiver whip antenna.	2A2081–15.
			(*)	(*)	(*)	(*)	BASE, mast: Mast Base MP–47–A; 20″ lg x 8½″ dia o/a; Sig dwg #SC–D–11221–A.	Receives mast section for transmitter whip antenna.	2A2088–47.
		(*)	----	(*)	(*)		BASE, mast: Mast Base MP–65–A; base for whip ant.; 3$\frac{1}{16}$″ dia x 12¼″ lg o/a approx; RCA part #T–619172–501.	Receives mast section for receiver whip antenna.	2A2088–65.
			(*)	(*)	(*)	(*)	BATTERY BB–221/U: 6 v; 10¼″ lg x 7″ wd x 9⅜″ h o/a; Willard type #MR–2–125.	Supplies 12 volts dc to Junction Box JB–70–A.	3B275–221.
	(*)	(*)	(*)	----	(*)	(*)	BLOCK, protector: lightning prot, carbon block; 1¼″ lg x ⅜″ wd x ¼″ thk; Cook cat. #41–2001.	Lightning protection for components in the shelters.	4E683–1.
	(*)	(*)	----	----	----	(*)	BLOCK, telephone protector: 1¼″ lg x ⅜″ wd x ¼″ thk; Cook cat. #41–1907.	Protects telephone in receiving and operating shelters from lightning.	4E4430–1.
	(*)	(*)	(*)	(*)	(*)	(*)	CABLE, power; indoor; single #8 AWG stranded cond; round, 0.285″ OD o/a; Packard #8 type #60.	Shelter power wiring----	1B3008–1.3.
			(*)	(*)	(*)	(*)	CABLE, power: two #6 AWG stranded cond; Army spec #71–4945.	Power extension----------	1B3006–2.1.
	(*)	(*)	----	----	----	(*)	CABLE, power: two #10 AWG stranded cond; UL type #"S" Army spec #71–4945.	Part of Cord CX–918/MRC–2.	1B810.11–1.
			(*)	----	----	(*)	CABLE, power: 2 cond #12 AWG; UL type #"S" Army spec #71–4945.	Part of Cords CD–763, CD–659, bulk.	1B812.11–1.
			(*)	----	----	(*)	CABLE, power: portable installation: 4 cond, two #12 AWG, two #20 AWG; stranded copper wire; ins Army spec #71–4945; round ½″ dia.	Part of Cord CD–565----	1B3020–4.7.

1. Identification Table of Parts for Radio Sets AM/NRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	----	----	(*)	CABLE, power: portable installation; 6 cond; four #8 AWG, two #12 AWG, stranded copper wire ins, spec #71–4945; round 1 1/16" OD.	Part of Cords CO–316, CD–652, and CD–335.	1B6000–6.
			(*)	(*)	(*)	(*)	CABLE, RF: Radio Frequency Cable RG–8A/U; coax; 52 ohms impedance, 29.5 μμf per ft.	Connects radio transmitter output to power amplifier.	1F425–8A.
		(*)	(*)	----	(*)	(*)	CABLE, RF: Radio Frequency Cable RG–11/U: coax; 75 ohms impedance; 20 μμf per ft.	Receiving antenna transmission line.	1F425–11.
			(*)	(*)	(*)	(*)	CABLE, RF: Radio Frequency Cable RG–34A/U: coax; 71 ohms impedance; 21.5 μμf per ft; p/o Cord CG–145/MRC–1.	Connects power amplifier output to transmitting antenna.	1F425–34A.
			(*)	(*)	(*)	(*)	CABLE RF: Radio Frequency Cable RG–63B/U: coax 125 ohms impedance, 10 μμf per ft; p/o Cord CG–389/U.	Connects r-f output of frequency shift exciter to the radio transmitter.	1F425–63B.
		(*)	(*)	----	(*)	(*)	CABLE, RF: Radio Frequency Cable RG–11A/U; coax type; 70 ohm nom-impedance.	Connects receiving antenna mast bases with associated receivers.	1F425–11A.
		(*)	(*)	(*)	(*)	(*)	CABLE, RF: Radio Frequency Cable RG–58/U; coax; 53.5 ohm nom-impedance 28.5 μμf per ft: (p/o Cords CG–390/U, CG–406/TRA–7).	Connects the frequency meter output to the frequency shift exciter; connects dual diversity converter to radio receivers.	1F425–58B.
			(*)	----	----	(*)	CABLE, special purpose: Cordage CO–144; speaker, control: 2 cond, #18 AWG; round 0.300" OD; spec 71–684–C; (p/o Cord CX–143/MRQ–2).	Connects loudspeaker to Junction Box HB–70–A.	3E2144.

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1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	----	----	(*)	CABLE, special purpose: Cordage CO–146; 4 cond, #20 AWG stranded copper; round 0.345″ OD; spec #71–935–D; (p/o Cord CX–143/MRQ–2).	Connects Junction Box JB–70–A and audio of Radio Receiver BC–312–(*); connects Junction Box JB–70–A and telephone and Junction Box J–207/MRC–2.	3E2146.
			(*)	----	----	(*)	CABLE, special purpose: Cordage CO–213; 7 cond #20 AWG stranded copper; round 0.485″ OD; spec #71–700; (p/o Cord CX–141/MRQ–2, Cord CD–764).	Connects power control and audio from Junction Box JB–70–A to the speech amplifier and from the speech amplifier to the radio transmitter.	3E2213.
			(*)	----	----	(*)	CABLE, special purpose: Cordage CO–119–A: for tg Key J–45; 2 cond #20 AWG stranded; round 0.280″ OD; B&W part #C–86.	Connects Key J–45 to telephone type plug.	3E2119A.
			(*)	----	----	(*)	CABLE, special purpose: 3 cond, #14 AWG stranded copper; round 0.560″ OD spec #71–4945; (p/o Cord CX–911/U).	Connects excitation from the transmitter to the power amplifier.	1B3014–3.
	(*)	(*)	----	----	----	(*)	CABLE, special purpose: three #18 AWG stranded copper cond; round 0.335″ OD; spec #71–4945; (p/o Cords CX–954/TRA–7, CX–959/TRA–7).	Connects a-c power from outlet to dual diversity converter; connects a-c power from outlet to the control unit.	1B818.56.
		(*)	----	(*)	(*)	(*)	CABLE, special purpose: Cordage CO–122–A; three #22 AWG stranded cond; round 9.280″ OD; spec #71–886–A.	Connects i-f outputs from receivers to the dual diversity converter.	3E2122A.
							CABLE, telephone: indoor connections; 2 cond #20 AWG shielded; Amphenol #153–114.	For Telephone EE–8–(*) connections inside shelters.	1E1020–2.1.
							CABLE, WF–12/U: 2 cond #10 AWG; 0.485″ max dia o/a; spec MIL–P–10255.	Conductors for Cord CX–142/MRQ–2.	1B3018–4.13.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
	(*)	(*)	(*)	(*)	(*)	(*)	CABLE, special purpose: four #22 AWG stranded copper cond; round 0.315 OD; spec #71–4945.	Conductors for Cords CX–952/TRA–7, CX–957/TRA–7, CX–958/TRA–7, CX–961/(blue) and CX–961/TRA–7 (red).	3E4035–144.
	(*)	(*)	----	(*)	(*)	(*)	CABLE, special purpose: for low freq signal transmission; five #22 AWG stranded copper cond.	Conductors for Cords CX–953/TRA–7 and CX–956/TRA–7.	1B3022–5.
	(*)	----	----	----	----	(*)	CABLE ASSEMBLY, power electrical: Cord CD–338 uses Cordage CO–144; 20 ft lg o/a; Sig dwg #SC–D–4834.	A-c power extension cord.	3E1338.
		(*)	----	(*)	----	----	CABLE ASSEMBLY, power electrical: Cord CD–564; two #16 AWG stranded cond; 3 ft lg o/a; Hallicrafters dwg #87A032.	Power cord for the radio receivers.	3E1564.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CD–565; 4 cond; two #20 AWG, two #12 AWG, approx 4 ft 3 in. o/a; Hallicrafters dwg #67A034.	Connects power and disabling circuits from Junction Box JB–70–A to Radio Receiver BC–312–(*).	3E1565.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CD–652; 6 cond; four #8 AWG, two #12 AWG, stranded; 100 ft lg excluding term. Hallicrafters dwg #87A070.	Connects power and control circuit from Cord CO–316 to Cord CD–335, from power unit to junction box.	3E1652.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, power, electrical: Cord CD–763; 2 cond #12 AWG stranded; 13 ft o/a.	Connects a-c power from Junction Box JB–70–A to the radio transmitter.	3E1763.
	(*)	(*)	(*)	----	----	(*)	CABLE ASSEMBLY, power, electrical: Cord CO–313–A; 2 cond #6 AWG stranded; 100 ft lg o/a; B&W part #197.	A-c power extension	3E2313.
	(*)	(*)	(*)	----	----	(*)	CABLE ASSEMBLY, power: Cord CO–316; 6 cond, four #8 AWG, two #12 AWG stranded; 11 ft lg o/a; Sig dwg #SC–D–26552.	Connects power and control from the power unit to Cord CD–652.	3E2316.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters 1 Operating shelter	Shelters 2 Receiving shelter	Shelters 3 Transmitting shelter	Models 4 Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Models 5 Radio Set AN/MRC–2, Serial Nos. 1 through 87	Models 6 Radio Sets AN/MRC–2A and –2B	Name of part and description	Function of part	Signal Corps stock No.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CO–335; 6 cond stranded, four #8 AWG, two #12 AWG; 14 ft lg excluding term.; Hallicrafters dwg #870179.	Connects power and control from cord CD–652 to Junction Box JB–70–A.	3E2335.
			(*)	(*)	(*)	(*)	CASE ASSEMBLY, power: Cord CD–135/MRC–1; 2 cond #6 AWG stranded; 19 ft lg o/a; B&W dwg #WS–B–4116, part #120.	Connects a-c power from Cord CX–137/MRC–1 to the power amplifier.	3E6000–135.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY, power: Cord CX–918/MRC–2; 2 cond #10 AWG stranded; 25 ft lg excluding term.; B&W dwg #WS–B–4023, part #18.	Connects a-c power from auxiliary power unit to the shelter circuit breakers.	3E6000–918–300.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY, power electrical: Cord CX–954/TRA–7; 3 cond #18 AWG stranded; 6 ft lg o/a; B&W dwg #WE–B–2414.	Connects a-c power from outlet to dual diversity converter.	3E6000–954–72.
	(*)	----	----	(*)	(*)	(*)	CABLE ASSEMBLY, power: Cord CX–959/TRA–7; 3 cond #18 AWG stranded; 6 ft lg; B&W dwg #WE–B–2920.	Connects a-c power from outlet to control unit.	3E6000–959–72.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, power: Cord CX–962/TRA–7; 3 cond #18 AWG stranded; 4 ft lg; B&W dwg #WE–B–2210.	Connects a-c power from outlet to frequency shift exciter.	3E6000–962–48.
			(*)	----	----	(*)	CABLE ASSEMBLY, power: Power Cable Assembly CX–1165/U; two #6 AWG cond; 12 ft lg excluding term.; B&W part #247.	A-c power extension for transmitting shelter.	3E6000–1165.1.
	(*)	----	----	----	----	(*)	CABLE ASSEMBLY, power: Power Cable Assembly CX–1165/U; two #6 AWG cond; 50 ft lg excluding term.	A-c power line extensions for the receiving and for the operating shelters.	3E6000–1165.2.
			(*)	----	----	(*)	CABLE ASSEMBLY, power: Power Cable Assembly CX–1166/U; two #6 AWG stranded cond; 100 ft lg excluding term.	Connects a-c power from power units to shelter of Power Cable Assembly CX–1165/U.	3E6000–1166.2.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	---	----	(*)	CABLE ASSEMBLY, RF: coax 72 ohms impedance; 33″ lg o/a.	Connects radio transmitter output to antenna tuning unit.	3E7350–2.1.10.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, RF: pickup antenna AT–137/MRC–2; uses Radio Frequency Cable RG–8/U; approx 5 ft 3″ lg o/a; B&W dwg #26–516B.	Connect pickup antenna with frequency meter.	2A203–137.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, RF: Cord CG–65A/MRC–1; uses Radio Frequency Cable RG–11A/U; 50″ lg o/a; B&W dwg #WS–B–4027.	Connects radio transmitter output to the power amplifier.	3E6015–65A.1.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, RF: Cord CG–145A/MRC–1; uses Cable RG–34A/U; 100 ft lg excluding term; B&W part #171.	Connects output of power amplifier with doublet transmitting antenna.	3E6015–145A.1.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, RF: Cord CG–389/U; uses Cable RG–63A/U; 72″ lg o/a; B&W dwg #WE–C–2180.	Connects output of frequency shift exciter to tuning unit in the radio transmitter.	3E6015–389.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, RF: Cord CG–390/U; uses Cable RG–58/U; 36″ lg o/a; B&W #WE–B–2190.	Connects output of frequency meter to frequency shift exciter.	1F430–390.36.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY, RF: Cord CG–406A/TRA–7; uses Cable RG–58C/U; 8 ft 6 in. lg o/a; B&W dwg #WE–B–2413.	Connects disabling circuit from dual diversity converter to the two radio receivers.	1F430–406.96.
		(*)	----	----	----	(*)	CABLE ASSEMBLY, RF: Cord CG–557/U; uses Cable RG–11A/U; 500 ft 8 in. lg o/a; Sig dwg #SC–D–22840.	Connects receivers to diversity antennas.	3E6015–557.2.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose: Cord CD–132; uses Cordage CO–144; 11″ lg excluding term.	Connects Key J–37 key jacks in Junction Box JB–70–A.	3E1132.
		(*)	----	----	(*)	(*)	CABLE ASSEMBLY, special purpose: Cord CD–135; 17″ lg excluding term.; Sig dwg SC–D–5386–F.	Connects loudspeaker to Control Box C–345(*)/MRC–2.	3E1135.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
		(*)	----	(*)	----	(*)	CABLE ASSEMBLY, special purpose: Cord CD–267; uses Cordage CO–145; 46″ lg excluding term.	Used with Loudspeaker LS–3.	3E1267.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, power: Cord CD–659; 2 stranded cond #12 AWG; 10 ft 6 in. lg excluding term.; spec #71–1683–A.	Connects battery in chest CH–109–(*) with Junction Box JB–70–A.	3E1659–126.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose electrical: Cord CD–764; uses Cordage CO–213; 14 ft lg excluding term.; Sig dwg SC–D–27457.	Connects power, audio and control from speech amplifier to radio transmitter.	3E1764.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose electrical: Cord CD–1019; 2 cond stranded #20 AWG; 10 ft lg excluding term.; Sig dwg #SC–D–4822.	Connects CARBON MIC 1 jack of speech amplifier to DISABLING jack on Junction Box J–207/MRC–2.	3E1999–19.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY, power electrical: Cord CD–1251; uses Cordage CO–144 ft lg excluding term.	Connects Junction Box J–207/MRC–2 to the telephone; connects jack panel to telephone.	3E1999–251–48.
			(*)	(*)	(*)	(*)	CASE ASSEMBLY, special purpose electrical: Cord CX–141/MRQ–2; uses Cordage CO–213; 2 ft lg excluding term.; Sig dwg #SC–D–7870–A.	Connects audio, control and power from speech amplifier to Junction Box JB–70–A.	3E6000–141.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose electrical: Cord CX–142/MRQ–2; 4 stranded cond, two #10 AWG; two #12 AWG; 3 ft lg excluding term.; Hallicrafters dwg #87C460.	Connects a-c and d-c power from rectifier RA–63–(*) to Junction Box JB–70–A.	3E6000–142.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CX–143/MRQ–2; uses Cordage CO–146 and CO–144; 4 ft lg excluding term.; Sig dwg #SC–D–25156–A.	Connects Junction Box JB–70–A to loudspeaker, radio receiver, and telephone.	3E6000–143.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, power: Cord CX–911/U; 3 cond #14 AWG stranded 6 ft lg excluding term.; Spec #71–3238–A.	Connects excitation from radio transmitter to power amplifier.	3E6000–911–72.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose electrical: Cord CX–952/TRA–7; 4 cond #22 AWG stranded; 6 ft 3 in. lg o/a; B&W dwg #WE–B–2411.	Connects dual diversity converted to RED jack on jack panel.	3E6000–952–72.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CX–953/TRA–7; 5 cond #22 AWG stranded; 72″ lg; B&W dwg #WE–B–2412.	Connects dual diversity converter to BLUE jack or jack panel.	3E6000–953–72.
		(*)	----	(*)	(*)	(*)	CABLE ASSEMBLY; special purpose, electrical: Cord CX–955/TRA–7; 3 cond #22 AWG stranded; 7 ft 3 in. lg o/a; B&W dwg #WE–B–2410.	Connects Amplifier 0–41 (*)/TRA–7 to the radio receivers.	3E6000–955–84.
	(*)	----	----	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CX–956/TRA–7; 5 cond #22 AWG stranded; 72″ lg excluding term.; B & W dwg #WE–B–2890.	Connects control unit (J103) to YELLOW plug on jack panel.	3E6000–956–72.
	(*)	----	----	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CX–957/TRA–7; 4 cond #22 AWG stranded; 72″ lg excluding term.; B & W dwg #WE–B–2910.	Connects control unit (J101) to BLACK jack on jack panel.	3E6000–957–72.
	(*)	----	----	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CX–958/TRA–7; 4 cond #22 AWG stranded; 6 ft lg; spec #71–3276–A.	Connects control unit (J102) to GREEN jack on jack panel.	3E6000–958–72.
			(*)	(*)	(*)	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CX–961/TRA–7; (red); 4 cond #20 AWG stranded 4 ft lg.	Connects frequency shift exciter (SEND AND CONTROL) to BLUE plug on jack panel.	3E6000–961–48.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters: 1 Operating shelter	2 Receiving shelter	3 Transmitting shelter	Models: 4 Radio Set AN/MRC-2, Serial Nos. 1 through 26 CSL	5 Radio Set AN/MRC-2, Serial Nos. 1 through 87	6 Radio Sets AN/MRC-2A and -2B	Name of part and description	Function of part	Signal Corps stock No.
			×	×	×	(*)	CABLE ASSEMBLY, special purpose, electrical: Cord CX–961/TRA–7; (blue) 4 cond #22 AWG stranded 48″ lg; WECo dwg #B–463539–1.	Connects frequency shift exciter (LOCAL-CW CONTROL) to RED plug on jack panel.	3E6000–961–48.1.
			×	×	×	×	CAPACITOR, fixed: mica: 470 $\mu\mu$f plus 20%; 500 vdcw; JAN type CM20C471M.		3K2047134
			(*)	(*)	(*)	(*)	CHARGER, battery: Rectifier RA–63–E; metallic rect type; 12 v charging; 5 or 15 amp; 105–125 v 50–60 cps ac; $13^{9}/_{16}$ in. lg x 10 in. wd x $17^{3}/_{8}$ in. h o/a Hallicrafters dwg #21DQ62.	Charges batteries in Chest CH–109–(*). Controls a-c power.	3H4691–63.
(*)				(*)	(*)	(*)	CIRCUIT BREAKER; air arc quenching; DPDT; $5^{7}/_{8}$″ h x $3^{7}/_{8}$ d; Square D type mo, #131722S.	Controls a-c power to receiving and operating shelters.	3H900–20–18.
	(*)			(*)	(*)	(*)			
(*)						(*)	CLAMP; cable: for ½″ cable; 1″ h x $1^{5}/_{16}$″ wd x $1^{1}/_{16}$″ lg; GE #SP–7050.	Armored cable box connectors.	6Z1932–34.
	(*)					(*)			
		(*)				(*)			
(*)				(*)	(*)	(*)	CLAMP M–284: fastening cable; $1^{5}/_{16}$″ dia x $1^{5}/_{64}$″ lg o/a; for ⅜″ to ½″ dia cable; Amphenol #AN–3057–6.	Part of Cords CX–952/TRA–7, CX–955/TRA–7.	2Z1587–284.
	(*)			(*)	(*)	(*)			
		(*)		(*)	(*)	(*)			
	(*)			(*)	(*)	(*)	CLAMP, cable: antistrain clamp for cable assy; $1^{1}/_{16}$″ dia x $1^{1}/_{8}$″ lg; accom cable up to $^{5}/_{8}$″ OD; ANA type #AN–3057–8.	Part of Cord CX–9541/TRA–7	2Z2636–1.
	(*)			(*)	(*)	(*)	CLOCK; aircraft: 8-day movement: $2^{9}/_{32}$″ dia x $1^{1}/_{4}$″ d o/a; Elgin type A–11	Indicates time	6Z1958.
		(*)		(*)	(*)	(*)			
(*)						(*)	CONNECTOR, adapter: male 1 end triple-ended female; 2 flat parallel male cont, 3 pair flat parallel female cont; straight; adapts std light and power outlets to apparatus power cords; 2″ lg x 1″ wd x $1^{1}/_{4}$″ h, less cont; Hubbell Cat. #207.	Provides 3 a-c outlets from 1 a-c outlet.	6Z7566.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
		(*)	----	----	----	(*)	CONNECTOR, adapter: male 1 end, female other end; single, male and female cont, round; 90° angle type adapts single cont Plug PL–259 to shielded binding post assembly.	Connects Cord CG–557/U to radio receivers.	2Z307–124.
		(*)	----	(*)	(*)	(*)	CONNECTOR, adapter: Plug PL–258; double-ended female; double-ended 2 round hole cont; straight type; adapter, connection between two PL–259 plugs; 1⅛″ lg x 0.625″ dia o/a; Sig dwg SC–D–5887.	Connect cords CG–388/MRC–2 to receivers.	2Z7226–258.
		(*)	----	(*)	(*)	(*)	CONNECTOR, female contact: 4 flat pol female cont; straight; 3⁹⁄₁₆″ lg x 1⁵⁄₁₆″ wd x 1⅝″ h o/a Appleton #7685.	Line connector	6Z7809–15.
			(*)	(*)	(*)	(*)	CONNECTOR, female contact: 2–T slot cont and 3 rectangular female cont; straight type; 2.750″ lg x 1.500″ wd x 1.281″ h; Hubbell part #7054.	Line connector	6Z7794.
			(*)	----	----	(*)	CONNECTOR, plug; Radio Frequency Plug UG–21B/U; 1 round male coax cont; straight; approx 2⅛″ lg x ²⁵⁄₃₂″ dia o/a.	Part of Cord CG–389/U	2Z7390–12B.
		(*)	----	(*)	(*)	(*)	CONNECTOR, plug: 1 round male cont; straight coax type; JAN type Radio Frequency Plug UG–85/U.	For Cord CG–390/U	2Z7390–85.
			(*)	(*)	(*)	(*)			
		(*)	----	(*)	(*)	(*)	CONNECTOR, plug: Sig C Plug PL–114; 14 round pol female cont; 90° angle; 1⅝″ dia x 1¹⁵⁄₁₆″ wd x 1¹³⁄₁₆″ d o/a; Sig dwg SC–D–2591.	For Cord CD–565	2Z7214.
			(*)	(*)	(*)	(*)			
		(*)	----	(*)	(*)	(*)	CONNECTOR, plug: Plug PL–259–A; 1 round male cont; straight 1½″ lg.	For Cord CG–388/MRC–2.	2Z7226–259–A.
		(*)	----	(*)	----	----	CONNECTOR, plug: 2 parallel cont slots pol; straight 1.655″ lg x 1.375″ dia o/a; Hubbell #7259.	For Cord CD–564	6Z7568–1.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 2 curved female cont; straight; 1.671″ OD x 2.281″ lg o/a; Hubbell part #7101.	For Cord CD–763	6Z3149.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: coax; 2 lug cont; straight; 5⅝″ lg x 6⅝″ wd x 1¼″ thk o/a.	For Cord CG–388/MRC–2.	2Z3065–73.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 2 round male locking cont; straight; 3″ dia x 4½″ lg o/a; Crouse-Hinds #BP8732M3.	For Cord CX–137/MRC–1.	6Z7564.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 2 round male cont; straight; 1⅞″ dia; Crouse-Hinds #BRM70732M3.	For Cord CX–137/MRC–1.	2Z3022–103.
		(*)	----	(*)	----	----	CONNECTOR, plug: 2 twist lock male cont; straight; 1.468″ dia x 1 13/64″ lg o/a; Hubbell part #7542.	For lamp fixture cord	6Z1734.4.
		(*)	----	(*)	(*)	(*)	CONNECTOR, plug: 1 pressure bead cont; straight type; 1½″ lg x ¾″ dia o/a; Amphenol type #75–MCIF.	For Cord CG–406/TRA–7.	2Z8671.23.
			(*)	----	----	(*)	CONNECTOR, plug: 8 round female cont; straight; 1⅞″ lg x 1¼″ dia; Amphenol part #79–08F1.	For Cord CD–764	2Z8678.87.
			(*)	----	----	(*)	CONNECTOR, plug: 8 round male cont; straight; 1⅞″ lg x 1¼″ dia; Amphenol part #79–08M.	For Cord CD–764	2Z7118.6.
			(*)	----	----	(*)	CONNECTOR, plug: 8 round male cont; straight; 1⅞″ lg x 1¼″ dia; Amphenol #79–08M–MT.	For Cord CX–141/MRQ–2.	2Z3028–71
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 4 flat male cont; straight; 2″ lg x 1¼″ dia; Amphenol #92M.	For Cord CD–565	2Z7114.20.
P1	----	(*)	----	----	----	(*)	CONNECTOR, receptacles: 4 round pol male cont; straight; 1 3/16″ h x 15/16″ lg o/a; AN type AN–3102–14S–2P.	Connector for Cord CX–952/TRA–7 from dual diversity converter.	2Z8799–220

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
P1, P2	(*)	----	----	----	----	(*)	CONNECTOR, receptacle: 5 round pol male cont; straight; 1 5/16″ h x 1 5/16″ lg o/a; AN type AN–1302–14S–5P.	Connector for Cord CX–952/TRA–7 from control unit. Connector for Cord CX–952/-TRA–7 from dual diversity converter.	2Z8799–180.
J14	(*)	----	----	----	----	(*)	CONNECTOR, receptacle, 4 round female cont; straight; 1 5/16″ h x 1 5/16″ lg; AN type AN–3102–14S–11S.	Connects external lines from transmitting shelter to control unit by Cord CX–958/TRA–7.	2Z3065–93.
	(*)	----	----	(*)	(*)	(*)	CONNECTOR, plug: 5 female round cont, pol; straight; 1 11/32″ lg x 1 1/16″ dia; AN–3106–14S–5S.	For Cord CX–956/TRA–7.	2Z7226–P200.
	(*)	----	----	(*)	(*)	(*)	CONNECTOR, plug: 4 round pol male cont; straight; 1 11/32″ lg x 1 1/16″ dia; AN–3106–14S–10P.	For Cord CX–957/TRA–7.	2Z3024–72.
	(*)	----	----	(*)	(*)	(*)	CONNECTOR, plug: 4 round pol male cont; straight; 1 11/32″ lg x 1 1/16″ dia; AN–3106–14S–11P.	For Cord CX–958/TRA–7.	2Z3024–71.
		(*)	----	(*)	(*)	(*)	CONNECTOR, plug: 3 round male pol cont; 90° angle; 1 23/32″ h x 2 1/8″ x 1 1/8″ dia shell; AN–3108–14S–1P.	For Cord CX–955/TRA–7.	2Z7113.14.
		(*)	(*)	(*)	(*)	(*)	CONNECTOR, plug: 4 round pol cont; 90° angle; 1 23/32″ h x 2 1/8″ lg x 1 1/8″ dia shell; AN–3108–14S–2P.	For Cord CX–961/TRA–7 and Cord CX–952/TRA 7	2Z3024.64.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 4 round female pol cont; 90° angle shell; 1 23/32″ h x 2 1/8″ lg x 1 1/8″ dia shell; AN–3108–14S–2S.	For Cord CX–961/TRA–7 and Cord CX–952/TRA–7.	2Z3065–54.
	(*)	(*)	----	(*)	(*)	(*)	CONNECTOR, plug: 5 round male pol cont; 90° angle shell; 1 23/32″ h x 2 1/8″ lg x 1 1/8″ dia shell; AN–3108–14S–5P	For Cord CX–953/TRA–7 and Cord CX–956/TRA–7.	2Z3025–12.
		(*)	----	(*)	(*)	(*)	CONNECTOR, plug: 5 round female pol cont; 90° angle 1 23/32″ h x 2 1/8″ lg x 1 1/8″ dia shell; AN–3108–14S–5S.	For Cord CX–953/TRA–7.	2Z8675.53.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
	(*)			(*)	(*)	(*)	CONNECTOR, plug: 4 round pol female cont; 90° angle; $1^{23}/_{32}$'' h x 2⅛'' lg x 1⅛'' dia; AN–3108–14S–10S.	For Cord CX–957/TRA–7	2Z3065–72.
	(*)			(*)	(*)	(*)	CONNECTOR, plug: 4 round pol female cont; 90° angle; $1^{23}/_{32}$'' h x 2⅛'' lg x 1⅛'' dia; AN–3108–14S–11S.	For Cord CX–958/TRA–7	2Z3065–71.
		(*)		(*)	(*)	(*)	CONNECTOR, plug: 3 round female pol cont; 90° angle type; 2¾'' lg x $1^{5}/_{32}$'' max dia o/a; AN–3108–16S 6S.	For Cord CX–954/TRA–7	2Z3064–86.
			(*)			(*)	CONNECTOR, plug: 6 round male cont, pol; straight; $3^{11}/_{16}$'' dia x $8^{13}/_{16}$'' lg; Appleton dwg #56627–1.	Part of Cord CO–335	2Z3026–22.
			(*)			(*)	CONNECTOR, plug: 6 round female cont; straight; 9'' lg incl rubber grommet x 4''-dia o/a; Appleton part #56628–1.	Part of Cord CO–335	2Z3067–20.
	(*)					(*)	CONNECTOR, plug: 2 flat parallel female cont; straight; $1^{13}/_{16}$'' lg x 1⅛'' dia; Belden part #H–838.	A-c power converter	2Z7230.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 2 round male cont; straight; 1⅞'' dia x 5⅝'' lg; Crouse-Hinds APJ–3273.	For Cord CX–135/MRC–1.	2Z3022–102.
							CONNECTOR, plug: 2 round male cont; straight; 5'' lg x 1⅜'' OD o/a; Crouse-Hinds #8732–BW.	For Cord CX–137/MRC–1.	6Z7564–5.
			(*)			(*)	CONNECTOR, plug: 2 round female cont; straight; 4¼'' lg x $3^{1}/_{16}$'' dia o/a; Crouse-Hinds #BRM–70732–BW.		6Z564–6.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: pin shape male cont; 1⅛'' lg x 5/16'' hex. head o/a; Gen Radio #274P.	For Cord CG–389/U	2Z7227–4.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	----	----	(*)	CONNECTOR, plug: 2 flat female cont; straight; 1 1/16" dia x 1 5/16" lg; Hubbell part #7224.	A-c power converter	6Z3150.
	(*)	(*)	(*)	(*)	(*)	(*)	CONNECTOR, plug: 2 curved locking male cont; straight; 1 1/16" dia x 1 5/16" lg; Hubbell part #7238.	For Cord CX–918/MRC–2.	6Z1734.1.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 4 curved male cont; straight; 2 5/8" lg x 2 5/8" dia o/a; Hubbell part #7411.	For Cord CX–142/MRQ–2.	2ZK7114.12.
	(*)	(*)	(*)	(*)	(*)	(*)	CONNECTOR, plug: 2 flat parallel blades; straight type; 1 7/64" lg excluding blades, 1" dia.	A-c power plug	6Z3148–1.
			(*)	(*)	(*)	(*)	CONNECTOR, plug: 2 curved parallel female cont, straight; 2.108" lg x 1.375" dia o/a; Hubbell part #7506.	For Cord CD–659	6Z3150–1.
	(*)	----	(*)	(*)	(*)	(*)	CONNECTOR, plug: 3 curved pol female cont; straight type; 1½" dia x 2" lg o/a; Hubbell #7555G.	For Cord CX–962/TRA–7 and Cord CX–959/TRA–7.	2Z3064–88.
			(*)	----	----	(*)	CONNECTOR, plug: 3 semi-circular female cont; straight; 1.968" lg x 1.500" dia o/a; Hubbell part #7559.	For Cord CX–911/U	6Z7591–3.1.
	(*)	(*)	(*)	(*)	(*)	(*)	CONNECTOR, plug: 3 semi-circular pol male cont; straight; 1 9/16" dia x 1 1/8" lg less cont; Hubbell part #7572.	Part of Cable Assembly CX–959/TRA–7.	6Z7591–12.
	(*)	(*)	----	(*)	(*)	(*)	CONNECTOR, plug: 2 male twist-lock term.; straight; 2¼" lg x 1½" dia; Hubbell part #9765.	For power line	2Z3021–117.
J17	(*)	----	----	----	----	(*)	CONNECTOR, receptacle: 4 round female cont; straight; 1 3/16" wd x 1 3/16" h x 1 5/16" lg o/a; AN type AN–3102A–14S–10S.	Part of operating table J15.	2Z2636–107.
			(*)	(*)	(*)	(*)	CONNECTOR, solderless: straight; for two #8 AWG wire; ⅞" lg x ½" wd x ⅜" h o/a; Burndy #KS–15.	For antenna	2Z2636–95.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 C–SL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and 2B			
	(*)	(*)	(*)	(*)	(*)	(*)	CONNECTOR, receptacle: duplex, double female 3 pol cont; straight; approx 3⅝″ lg x 1 9/16″ wd x 1¼″ d o/a; Hubbell part #7580.	Line connector	6Z7809–9.
	(*)	(*)	(*)	(*)	(*)	(*)	CONNECTOR, receptacle: 4 flat double "T" female cont; straight type; 2.625″ lg x 1.328″ wd x 1⅛″ thk; Hubbell Cat. #9575.	Line connector	6Z7786–1.
	(*)	(*)	----	(*)	(*)	(*)	CONNECTOR, receptacle: 2 curved female cont; straight; 3⅝″ lg x 1 7/16″ wd x 1¼″ h.	Line connector	6Z7808.
		(*)	----	(*)	(*)	(*)	CONTROL UNIT, radio receiver Control Box C–345 (*)/MRC–2; 6″ lg x 3½″ wd x 2″ d o/a; B&W part #61.	Controls audio output of Receivers A and B.	2C666–345.
	(*)	----	----	(*)	(*)	(*)	CONTROL UNIT C–292(*)/TRA–7; 19″ wd x 14⅛″ d x 10½″ h o/a; spec #71–3276–A.	Changes neutral to polar signals and polar to neutral signals for teletypewriter operation.	2C684–292B.
		(*)	----	(*)	(*)	(*)	CONVERTER, frequency shift: Dual Diversity Converter CV–31/TRA–7; 22″ lg x 21″ wd x 27″ h o/a.	Provides dual diversity signal combining from two receivers and converts r-f signal to d-c pulses for operation of teletypewriter equipments.	2C720–31.
			(*)	(*)	(*)	(*)	CORD CD–318, –A, –B: 8 ft lg excluding term.; Sig dwg #SC–D–14613, SC–D–14639 and SC–D–14640.	Cable for Microphone T–50.	3E1318.
	(*)	----	----	(*)	(*)	(*)	CORD CC–66: uses Cordage CO–144; 18″ lg excluding term.; Sig dwg #SC–D–1128.	Used with Junction Box J–204/MRC–2.	3E66.
	(*)	----	----	(*)	(*)	(*)	CORD CC–68: uses Cordage CO–144; 72″ lg excluding term.; Sig dwg #SC–D–1128.	Used with Junction Box J–204/MRC–2.	3E68.
		(*)	(*)	(*)	(*)	(*)	CORD CD–605: 2 tinsel cond; 6 ft 10″ lg o/a; spec #71–1525.	Extension cord for Headset HS–30–(*).	3E1605–6.5

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	(*)	(*)	(*)	CORD CD–201–A: 2 tinsel cond, 5 ft 3″ lg o/a; Sig dwg #SC–D–6609.	For Key J–37	3E1201A.
		(*)	(*)	----	----	(*)	COUPLER, antenna: straight; 5¾″ lg x 1¼″ thk x 6⅞″ o/a; B&W part #CC–51.	Antenna coupler	2A746–5.
	(*)	(*)	----	(*)	(*)	(*)	COVER BG–198: 18½″ wd x 21⅜″ d x 15⅞″ h; Sig dwg SC–D–19826–A.	Covers Teletypewriters TG–7–B or TT–55/MGC.	2Z3400–198.
	(*)	----	----	(*)	(*)	(*)	COVER BG–199: 17⅝″ wd x 21¾″ d x 13⅜″ h, Sig dwg SC–D–19828–A.	Weather protection	4TFPR/1.
	(*)	----	----	(*)	(*)	(*)	COVER BG–200: 9″ wd x 17½″ lg x 10¼″ h; Sig dwg SC–D–19830–A.	Weather protection	4TXD/1.
	(*)	(*)	(*)	(*)	(*)	(*)	COVER: Canopy CW–153/U; 54″ wd (5″ h x 3½″ d x 64″ lg folded); Sig dwg ES–D–41130–A.	Weather shield	2Z3350–153.
		(*)	----	----	----	(*)	CRADLE, chassis: supports receiver chassis; 17$\frac{3}{16}$″ wd x 17″ d x 19″ h; B&W dwg #WE–D–2420.	Chassis support	2Z3404–2.
		(*)	----	(*)	(*)	(*)	ENGINE-GENERATOR: Power Unit PE–75; incl suffix ltr-C, -J, -K, -S, -T, -U, -W, AA, AB, AC, AD, AE: rated 2.5 kva, 2,500 w, 100% pf 120 v single ph, 60 cyc, 3 wire; 40″ lg x 19″ wd x 27½″ h.	Emergency power unit	3H4575.
	(*)	(*)	(*)	(*)	(*)	(*)	ENGINE-GENERATOR: Power Unit PE–95–G, H, I, gasoline engine driven; 12.5 kva at full load, 10 kw at 80% pf; 120/240 vac 104/52 amp, 60 cyc 1 ph, 2 wire 11% regulation; 67½″ lg x 28¼″ wd x 38½″ h.	Provides 115-volt 50–60 a-c power for operation of the radio set.	3H4595G.
	(*)	(*)	(*)	----	----	(*)	FITTING, conduit: conduit bushing ½″ size; thd connection; Appleton type EBS, #29121.	For shelter power wiring	6Z3858–22.
	(*)	(*)	----	----	----	(*)	FIXTURE, lighting: bkt type, ⅜″ pipe thd; 8½″ lg x 3¾″ wd x 4¼″ h o/a; B&W dwg #WS–B–4127.	For shelter illumination	6Z3874–18.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters: 1 Operating shelter	Shelters: 2 Receiving shelter	Shelters: 3 Transmitting shelter	Models: 4 Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Models: 5 Radio Set AN/MRC–2, Serial Nos. 1 through 87	Models: 6 Radio Sets AN/MRC–2A and –2B	Name of part and description	Function of part	Signal Corps stock No.
			(*)	----	----	(*)	FIXTURE, lighting: bkt type, ⅜″ pipe thd; 8½″ lg x 3¾″ wd x 4¼″ h o/a; B&W dwg #WS–B–4127.	For shelter illumination	6Z3874–17.
			(*)	(*)	(*)	(*)	FLASHLIGHT TL–122–D: uses 2 Battery BA–30.	General purpose use	6Z4002D.
			(*)	(*)	(*)	(*)	GUY: for xmtr ant.; 114″ lg o/a; Hallicrafters #1C245B.	Holddown guy for transmitting whip antenna.	2A1359–7.
			(*)	(*)	(*)	(*)	GUY: for rec ant.; 95″ lg o/a; Hallicrafters #1C246B.	Holddown guy for receiving whip antenna.	2A1359–6.
		(*)	(*)	(*)	(*)	(*)	HEADSET HS–30, HS–30–A, B, C, D, E, F, G, H, J, K, L, R, U; magnetic; 250-ohm impedance; 0.90″ x 1 1/16″ d x ⅜″ wd.	Converts a-f voltages to audible signals for general monitoring and operation of equipment.	2B830
	(*)	(*)	(*)	(*)	(*)	(*)	HEATER, air: elec pri energy source; 115 v ac, 60 cyc input; 12½″ wd x 10⅛″ d x 10¾″ h; Elec Air Htr type #AAT–15.	Heats shelter	2Z5020.
	(*)	(*)	(*)	(*)	(*)	(*)	HOLDER, protector block: 2″ lg x 1″ wd x 1″ d o/a; Cookeco #423–35.	Holds carbon block protectors.	4E2601.
	(*)	----	----	(*)	(*)	(*)	HOUSING: for female connector; 4⅜″ dia x 1 13/16″ h; Crouse-Hinds #BR302, #QE8302 modified.	Shell for containing connector.	6Z6020.
			(*)	(*)	(*)	(*)	HYDROMETER: designed for sulphuric acid service; float type, graduated from 1.175 to 1.330 sp gr; Edelman #60–1.	For checking general condition of all storage batteries.	3B2230–1.
		(*)	----	(*)	----	----	INSULATOR IN–86: round post shape; #L4A Steatite per spec #JAN–1–10; 4¼″ lg o/a; body 2″ lg x ¾″ dia.	For antenna construction	3G586.
			(*)	(*)	(*)	(*)	INSULATOR, strain: cylindrical; JAN type #NS4B5540.	Strain insulator for antenna construction.	3G3555–40.
							INSULATOR, bushing: cylindrical shouldered; steatite grade G; 1¼″ lg o/a; 17/64″ ID, 9/16″ OD, 1″ OD x ¾″ lg shoulder; B&W part/dwg #CC–50–2.	Standoff insulator bushing.	3G100–257.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	(*)	(*)	(*)	JUNCTION BOX J–199/MRC–2: contains 6 Binding Post TM–145–A, 6 lighting protectors w/carbon blocks; 7″ lg x 2½″ wd x 3″ h; B&W dwg #WS–C–4003.	Line protection	2Z5600–199.
	(*)	----	----	(*)	(*)	(*)	JUNCTION BOX J–204/MRC–2: 10 Jack JK–24; 5½″ lg x 6″ d x 3″ wd; B&W dwg #WS–B–4005.	For patching teletype components.	2Z5600–204.
			(*)	(*)	(*)	(*)	JUNCTION BOX J–207/MRC–2: contains 2 Connectors #AN–3102–14S–2P, 1 Jack JK–33, 1 Jack JK–34 and 1 Carter Jack IMP #2; 7″ lg x 2½″ wd x 3″ d; B&W dwg #WS–B–4004.	For FS exciter connection.	2Z5600–207.
			(*)	(*)	(*)	(*)	JUNCTION BOX JB–70–A: 7 female connectors, 1 male connector 6 jacks, 2 binding posts, ckt breaker and Switch SW–199; 19½″ lg x 12⅝″ wd x 7⅛″ h; Army spec #71–1683–A.	Connection box for components.	2Z5652–70.
	(*)	----	----	(*)	(*)	(*)	JACK JJ–024: for 2 cond plug .250″ dia.	For patching components	2Z5524.
			(*)	----	----	(*)	JACK JJ–033: for 3 cond plug 0.2065″ dia.	For patching components	2Z5533.
J2, J4, J13, J16.	(*)	(*)	----	----	----	(*)	JACK JJ–034: for 2 cond plug 0.250″ dia.	For patching components	2Z5534.
J5, J6, J19 through J22.	(*)	(*)	----	----	----	(*)	JACK JJ–089: for 2 cond plug 0.253″ dia.	For patching components	2Z5598A–89.
		(*)	(*)	(*)	(*)	(*)	KEY J–37: manual type; 5¼″ lg x 2⅝″ wd x 1″ h; Sig dwg #RL–D–5932.	Manual telegraph key for c-w operation.	3Z3437.
		(*)	----	(*)	(*)	(*)	KEY J–45: manual type; 5½″ lg x 4¼″ wd x 6″ h; Sig dwg #SC–D–1059.	Manual telegraph key with leg clamp for c-w operation.	3Z3445.
			(*)	(*)	(*)	(*)	KNIFE TL–29: electrician's; 3¾″ lg, closed; Sig dwg #RL–A–532.	General purpose use, installation and maintenance.	6Q60229.

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1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 20 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	(*)	(*)	(*)	MAST SECTION MS–50: approx 39¼″ lg x ½″ dia o/a; Sig dwg #SC–D–1241.	Couples to yellow end of Mast Section MS–51.	2A2350.
			(*)	(*)	(*)	(*)	MAST SECTION MS–51: approx 39$\frac{5}{16}$″ lg x $\frac{5}{16}$″ dia o/a; Sig dwg #SC–D–1241.	Couples to red end of Mast Section MS–52.	2A2351.
			(*)	(*)	(*)	(*)	MAST SECTION MS–52: approx 39½″ lg x ⅝″ dia o/a; Sig dwg #SC–D–1241.	Couples to blue end of Mast Section MS–53.	2A2352.
			(*)	(*)	(*)	(*)	MAST SECTION MS–53: approx 39⅝″ lg x $1\frac{1}{16}$″ dia o/a; Sig dwg #SC–D–1241.	Couples to gray end of Mast Section MS–54.	2A2353.
			(*)	(*)	(*)	(*)	MAST SECTION MS–54: approx 39⅝″ lg x ¾″ dia o/a; Sig dwg #SC–D–1241.	Couples to base	2A2354.
		(*)	(*)	---	(*)	(*)	MAST SECTION MS–116–A: 39½″ lg x 0.393″ dia; Sig dwg #SC–D–12521.	Used with Mast Base AB–15/GR and Mast Sections MS–117–A and MS–118–A.	2A2416.
		(*)	(*)	---	(*)	(*)	MAST SECTION MS–117–A: 39½″ lg tapers from 0.373″ to 0.252″ dia: Sig dwg #SC–D–12521.	Used with Mast Base AB–15/GR and Mast Sections MS–116–A and MS–118–A.	2A2417.
		(*)	(*)	---	(*)	(*)	MAST SECTION MS–118–A: 39½″ lg tapers from 0.246″ to 0.130″ Sig dwg #SC–D–12521.	Used with Mast Base AB–15/GR and Mast Sections MS–116–A and MS–117–A.	2A2418.
			(*)	(*)	(*)	(*)	MICROPHONE T–17, T–17–B, –D: low impedance for 35-to 90-ohm ckt; unidirectional; approx 5¾″ lg x 2⅝″ dia housing.	Hand-held push-to-talk carbon microphone for voice communication.	2B1617.
			(*)	(*)	(*)	(*)	MICROPHONE T–45: impedance 100 ohm; unidirectional; 4″ lg x 3″ wd x ½″ thk.	Lip microphone for voice communication.	2B1645.
			(*)	(*)	(*)	(*)	MICROPHONE T–50: high impedance; unidirectional; approx $3\frac{3}{32}$″ lg x 2½″ wd x $2\frac{1}{16}$″ thk.	Hand-held push-to-talk dynamic microphone for voice communication.	2B1650.
		(*)	(*)	(*)	(*)	(*)	MOUNTING FT–178: snubber type; approx 12″ lg x 2⅜″ sq o/a.	Vehicular mounting for radio receivers.	2Z6718.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
			(*)	(*)	----	----	OSCILLATOR, RF: Frequency Shift Exciter O–39/TRA–7, O–39A/TRA–7; freq range 2 to 6 mc in 2 bands; 21½″ lg x 16⅞″ d x 13″ h.	Converts d-c teletypewriter signals to frequency shifted r-f signals for RTT operation of the radio set.	2C2710–39.
			(*)	----	----	(*)	OSCILLATOR, RF: Frequency Shift Exciter O–39B, –C/TRA–7; freq range 2 to 6 mc; 19″ lg x 17⅝″ d x 11¼″ h o/a; spec #71–3276–A.	Converts d-c teletypewriter signals to frequency shifted r-f signals for RTT operation of the radio set.	2C2710–39B.
(*)	(*)	----	(*)	(*)	(*)		PAPER, recording: 8½″ wd approx 350 ft rolls; Fed spec UU–P–547C, type #1; class A.	Paper for teletypewriters.	4T1.
(*)	(*)	----	(*)	(*)	(*)		PAPER, recording: 8½″ wd, approx 350 ft rolls; Fed spec #UU–P–547C.	Paper for teletypewriters.	4T3.
(*)	----	----	(*)	(*)	(*)		PERFORATOR-TRANSMITTER TT–56/MGC: std commercial type arrangement w/PO; 5 unit code; approx 24″ lg x 18″ wd x 18″ h o/a.	Transmits from perforated 5-unit code tape, transmits from keyboard, punches 5-unit code tape.	4TTT56.
	(*)	(*)	(*)	(*)	(*)	(*)	PLUG PJ–055B: tel	For Cord CD–201	2Z7228A–55B.
			(*)	(*)	(*)	(*)	PLUG PJ–068: tel	For Cords CD–607 and CX–143/MRQ–2.	2Z7168.
			(*)	(*)	(*)	(*)	POST, binding: Binding Post TM–145–A; screw type; ½″ dia x ⅞″ h o/a; Sig dwg SC–D–530.	For Junction Box J–199/MRC–2.	3Z245A.
(*)	----	----		(*)	(*)	(*)	POWER SUPPLY: Rectifier RA–87, RA–87–A; metallic disk type; output 115 v dc 400 ma, 115 v ac, 500 v at 50/60 cyc; input voltage 95–125 or 190–250 v; 50/60 cyc ac, 600 w; approx 13¾″ lg x 8¼″ wd x 7½″ h o/a; Sig dwg #SC–D–9543F.	Supplies 115 volts 50–60 cps ac for operation of teletypewriter motors; supplies 115 volts dc for teletypewriter loop operation.	3H4699–87.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and 2B			
			(*)	(*)	(*)	(*)	POWER SUPPLY: Rectifier Power Unit RA–133, RA–133–A, –B; electronic type; output 12A.5 v to 135 v dc, 20 ma, 5 v to 66 v ac, 1 amp; input 110–130 v or 220–260 v, 50/60 cyc, single ph; approx 8⅜″ wd x 4⅞″ h x 6″ d.	Power supply for operation of frequency meter.	3H4691–133.
			(*)	(*)	(*)	(*)	RECEIVER, radio: Radio Receiver BC–312; incl all suffix letters cw or mcw; 1,500 to 18,000 kc; 18″ x 10½″ x 8⁴⁵⁄₆₄″ o/a.	Receiver in transmitting shelter used for monitoring and setting up transmitting equipment.	2C4312.
		(*)	----	(*)	----	----	RECEIVING SET, radio: Radio Receiver Assembly OA–65/MRC–2; freq shift, radio teletype com; freq 1.5 to 18 mc, 6 bands; 18″ wd x 8¾″ d x 21″ h o/a.	Radio receivers in receiving shelter used for circuit operation.	2C5137–65.
		(*)	----	----	(*)	(*)	RECEIVING SET, radio: Radio Receiver Assembly OA–65A/MRC–2 freq shift, radio teletype com; freq 1.5 to 18 mc, 6 bands, 18″ wd x 8¾″ d x 21″ h o/a; #71–3238.	Radio receivers in receiving shelter used for circuit operation.	2C5137–65A.
		(*)	----	----	(*)	(*)	REEL ASSEMBLY RL–122/GRA–4: 8″ lg x 4⅜″ dia x 1¾″ wd; Sig dwg #SC–C–34891.	Holds receiving antenna wire.	2A3155–122.
		(*)	----	(*)	----	----	REEL RL–29: Sig dwg #SC–D–1040.	Holds wires for counterpose.	2A3129.
	(*)	(*)	(*)	----	(*)	(*)	ROD, ground: steel, cad. pl; 4 ft 6″ lg x ½ dia.	For making earth grounds.	2Z8051–44.
							SHELL, connector: 5¹¹⁄₁₆″ lg x 3⅞″ wd x ⅝″ thk; B&W part/dwg #CC–50–1.	Outer housing of connector.	2Z8276–76.
	(*)	(*)	(*)	(*)	(*)	(*)	SHELTER HO–17, HO–17–A: radio equip; assembled; approx 134¼″ lg x 60¾″ h x 70¾″ wd.	Houses all radio and teletypewriter equipments during operation and movement.	3Z7700–17.
	(*)	----	----	----	----	(*)	SHOCK MOUNT M–449: sq mtg; 2⅜″ sq o/a; Sig dwg #SC–D–19169–C.	Protects equipment from road shock.	2Z8415–449.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelters			Models			Name of part and description	Function of part	Signal Corps stock No.
	1	2	3	4	5	6			
	Operating shelter	Receiving shelter	Transmitting shelter	Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Radio Set AN/MRC–2, Serial Nos. 1 through 87	Radio Sets AN/MRC–2A and –2B			
		(*)	(*)	(*)	(*)	(*)	SPEAKER, dynamic: Loudspeaker LS–3: 6″ cone; PM type; input 1.5 w normal, 3 w peak; 8¼″ x 8¼″ x 5¼″ o/a; Sig dwg #SC–D–1600.	Converts a-f signal voltages to audible signals.	2Z6303.1.
			(*)	(*)	(*)	(*)	SUPPORT, antenna: Antenna Support AB–38B/CR; 50 ft h assembled; Sig dwg #SC–B–21958–A and #SC–B–21950–A.	Supports transmitting antenna.	2A248–38B.
	(*)	----	----	----	----	(*)	SWITCH, toggle: DPST; locking normally open; JAN type ST23K.	COMBINED-INDIVIDUAL switch in operating table FN–22/MRC–2.	3Z9863–23K.
	(*)	(*)	----	(*)	(*)	(*)	TAPE, blank recording: teletype 1 1/16″ wd, 8″ OD roll 2″ ID core; Fed spec #UU–P–547C, type #111.	For recording 5-unit code perforations from Teletypewriter TT–56/MGC.	4A2702.2.
	(*)	(*)	(*)	(*)	(*)	(*)	TELEPHONE EE–8, EE–8–A, –B, –C: field set; self-contained; 9½″ h x 7 1/16″ wd x 3½″ thk; spec #71–631C.	Telephone for intershelter communication.	4B5008.
	(*)	(*)	----	(*)	(*)	(*)	TELETYPEWRITER TT–55/MGC: std commercial keyboard w/PO; English characters; 72 characters per line; B&W modification of Teletype Corp Teletypewriter TG–7–B. Teletypewriter TG–7–B modified by the addition of two capacitors.	Transmits and receives d-c teletypewriter signals and makes page copy of outgoing and incoming traffic.	4TTT55.
		(*)	----	(*)	(*)	(*)	TERMINAL, lug: straight; 1⅛″ lg x 5/16″ dia, 3/16″ stud hole.	Solder lug	3Z11085–1.
			(*)	(*)	(*)	(*)	TERMINAL, lug: straight; 2 1/16″ lg x ½″ dia, 1 1/32″ dia stud hole.	For cables	3Z11085–5.
	(*)	----	----	(*)	(*)	(*)	TERMINAL, lug: straight; 2 1/16″ lg x ½″ dia, 1 1/32″ stud hole.	Solder lug	3Z12025.
	(*)	(*)	(*)	----	----	(*)	TERMINAL, lug: straight; 61/64″ lg x 15/32″ wd w/#10 stud hole; B&W #S560.	Solder lug	3Z12073–31.1.

1. Identification Table of Parts for Radio Sets AN/MRC–2, AN/MRC–2A, and AN/MRC–2B—Continued

Ref symbol	Shelter: 1 Operating shelter	Shelter: 2 Receiving shelter	Shelter: 3 Transmitting shelter	Models: 4 Radio Set AN/MRC–2, Serial Nos. 1 through 26 CSL	Models: 5 Radio Set AN/MRC–2, Serial Nos. 1 through 87	Models: 6 Radio Sets AN/MRC–2A and –2B	Name of part and description	Function of part	Signal Corps stock No.
			(*)	(*)	(*)	(*)	TRANSMITTER, radio: Radio Transmitter BC–610–H; A 1 and A 3 type of emission; 2 to 18 mc freq range; output 2 to 8 mc, cw voice 400 w, 300 w, 8 to 12 mc 300 w, 250 w, 12 to 18 mc, 275 w, 200 w; 32⅝″ lg x 21⅜″ wd x 39⅞″ h o/a; Hallicrafter dwg #114X1209.	Used as driver for Amplifier AM–141(*)/MRC. May be used for transmission without amplifier for lowpower requirements.	2C6500H.
			(*)	(*)	(*)	(*)	TUNER, radio frequency: Antenna Tuning Unit BC–939; BC–939A and B; 21¼″ lg x 9$\frac{3}{32}$″ wd x 13$\frac{5}{16}$″ h o/a; spec #71–1683–A.	Matches output of radio transmitter to whip antenna.	2C527–939.
			(*)	(*)	(*)	(*)	WRENCH TL–567/U: Allen type; $\frac{1}{16}$″ across flats; for use w/Allen type #5, #6 setscrews.	Tool	6R57400–6.
			(*)	(*)	(*)	(*)	WRENCH: Allen type; $\frac{3}{32}$″ across flats; short arm ¾″, lg arm 2$\frac{3}{32}$″; Navy spec #41W15 type #XVII style A.	Tool	6R55496.
			(*)	----	----	(*)	WRENCH: Allen type hex; ⅛″ across flats; lg arm 2¼″, short arm ¾″, Navy spec #41W15, type #XVII, style A.	Tool	6R55075.
			(*)	(*)	(*)	(*)	WRENCH: Allen type; $\frac{5}{64}$″ across flats; short arm $\frac{5}{64}$″, lg arm 1$\frac{1}{32}$″; Navy spec #41W15 type #XVII style A.	Tool	6R57400.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
					AMPLIFIER AM–141/MRC: freq range 2 to 18 mc; 2 kw output; 115 v ac 50/60 cyc, single ph input; 23½" wd x 28" d x 44¼" h.	Amplifies output of Radio Transmitter BC–610–(*).	2C449–141.
					AMPLIFIERS AM–141A/MRC: freq range 2 to 18 mc; 2 kw output; 115 v ac, 60 cyc, single ph, 50 amp input; 23½" wd x 28" d x 44¼" h.	Amplifies output of Radio Transmitter BC–610–(*).	2C449–141A.
M1	------	(*)	(*)	(*)	AMMETER: dc; 0 to 300 ma; JAN type MR26W–300DCMA.	Measures d-c grid current.	3F930–40.
M1	(*)	------	------	------	AMMETER: dc; 0 to 300 ma; JAN type MR36W–300DCMA.	Measures d-c grid current.	3F930–43.
M3	------	(*)	(*)	(*)	AMMETER: dc; 0 to 3 amp; JAN type MR26W–003DCAA.	Measures d-c plate current.	3F1003–32.
M3	(*)	------	------	------	AMMETER: dc; 0 to 3 amp; JAN type MR34W–003DCAA.	Measures d-c plate current.	3F1003–21.
	(*)	(*)	(*)	------	BELT, flat: steel; 7.437" lg x ½" wd x 0.006" thk; B&W part #WN–186.	Drive belt for plate tank capacitor C11.	2Z601.
O1	------	------	------	(*)	BELT, flat: steel; 7¾" lg x ⅜" wd x 0.006" thk; Stephen Decatur #B27.–2620–A.	Drive belt for plate tank capacitor C11.	2Z601–7.
	(*)	(*)	(*)	------	BELT, flat: steel; 10.281" lg x ½" wd x 0.008" thk; B&W #WN185.	Drive belt for plate tank capacitor C11.	2Z601–1.
O2, O9	------	------	------	(*)	BELT, flat: steel; 10⅝" lg x ⅜" wd x 0.006" thk; Stephen Decatur #B27.–2619A.	Drive belts for plate tank capacitor C11.	2Z601–8.
	(*)	(*)	(*)	------	BELT, flat: steel; 11.625" lg x ⅜" wd x 0.008" thk; B&W #WN–187.	Drive belt for plate tank capacitor C11.	2Z601–2.
O3	------	------	------	(*)	BELT, flat: steel; 12" lg x ⅜" wd x 0.006" thk; Stephen Decatur #B27.2607–A.	Drive belt for plate tank capacitor C11.	2Z601–9.

2. Identification Table of Parts for Amplifiers AM-141/MRC, AM-141A/MRC, and AM-141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM-141/MRC	Models 2: Amplifier AM-141A/MRC, Order No. 11779-Phila-48	Models 3: Amplifier AM-141A/MRC, Order No. 19624-Phila-50	Models 4: Amplifier AM-141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
B3		(*)	(*)	(*)	BLOWER: 1/16 hp, 3200 rpm, 60 cyc, single ph, 115 v ac, 1 amp; 410 cfm at 3,200 rps; 7½" h x 9½" OD; Dynamic Air #M6861P-1A.	Ventilates and cools amplifier.	3H381-9.1.
B1		(*)	(*)	(*)	BLOWER: motor; 1/250 hp, 1550 rpm 60 cyc single ph, 115 v ac; 50 cfm at 1,550 rpm; 20½" lg x 5¾" wd x 6" d; Redmond AG model #L-3746.	Cools type 833A tubes.	3H381-18.
	(*)				BRACKET: support; 10⅞" lg x 1" wd x 4⅛" h o/a; irregular shape; B&W part #WN-490-7-1.	Supports components.	2Z1239.85.
		(*)	(*)		BRACKET: neutralizing disk support bar; 12" lg x 1⅜" wd x ¼" thk; irregular shape; B&W #WN-B-1030-24.	Supports neutralizing capacitor.	2Z1240-32.
	(*)	(*)	(*)	(*)	BRACKET: ampl support, snubber arm; 13¾" lg x 1" wd x 1" h; L-shaped angle iron; Hallicrafters part/dwg #67-1771.	Supports components.	2Z1239.170.
	(*)	(*)	(*)	(*)	BRACKET: ampl support, front wall; L-shaped angle iron; 20⅜" lg x 1¼" wd x 3¾" h; Hallicrafters part/dwg #67-1773.	Supports components.	2Z1239.172.
	(*)	(*)	(*)	(*)	BRACKET: ampl support, snubber arm; L-shaped angle iron; 23⅛" lg x 1" wd x 1" h; Hallicrafters part/dwg #67-1770.	Supports components.	2Z1239.171.
	(*)	(*)	(*)	(*)	BRACKET: ampl support, side wall; L-shaped angle iron; 23¾" lg x 1¼" wd x 3¾" h; Hallicrafters part/dwg #67-1745.	Supports components.	2Z1239.173.
		(*)	(*)		BUSHING; 13/16" lg o/a x ⅜" OD x ½" lg below shoulder; B&W part #129-141.	For movable plate of neutralizing capacitor.	2Z1409-278.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
C22				(*)	CAPACITOR, fixed: paper dielectric; 3 μf +20% −10%; 220 v ac; 2⅞″ lg x 2¼″ OD; Solar #ACY2.2–3.	Splits phase of fan motor for blower B3.	3D9003–53.
C13	(*)	(*)	(*)	(*)	CAPACITOR, fixed: paper dielectric; 5 μf ±10%; 5,000 vdcw; 9″ lg x 8″ wd x 4½″ thk; Dublier type #PFD–502–40, dwg #SK–5128.	Filters high voltage	3D85–95.
C14, C15	(*)	(*)	(*)	(*)	CAPACITOR, fixed: paper dielectric; 15 μf ±10%; 600 vdcw; 3¾″ lg x 1¾″ wd x 4⅝″h; Dublier type #TJH–6150–G.	Bias power supply filters.	3DB15–44.
C3	(*)	(*)	(*)	(*)	CAPACITOR, fixed: vacuum dielectric; vacuum capacitor CA–423; 55 μμf +2 μμf −5 μμf; 6½″ lg x 2¼″ dia o/a.	Low-frequency padder.	3D423.
C12	(*)	(*)	(*)	(*)	CAPACITOR, fixed: mica dielectric; 3,900 μμf ±5%; 8,000 vdcw; JAN type CM80B392J.	V1 and V2 plate circuit r-f bypass capacitor.	3K8039222.
C17 through C21				(*)	CAPACITOR, fixed: mica dielectric; 4,700 μμf ±10%; 500 vdcw; JAN type CM35B472K.	R-f bypass capacitors for meters M1 and M2.	3K3547221.
C1, C4 through C7.				(*)	CAPACITOR, fixed: mica dielectric; 4,700 μμf ±10%; 2,500 vdcw; JAN type CM50B472K.	C1: V1 and V2 grid circuit bypass capacitor. C4 through C7: V1 and filament r-f bypass capacitors.	3K504 7221.
C1, C4, C5, C7, C8.	(*)				CAPACITOR, fixed: mica dielectric; 5,100 μμf ±5%; 2,500 vdcw: JAN type CM50B512J.	C1: V1 and V2 grid circuit bypass capacitors. C4, C5, C7, C8: V1 and V2 filament r-f bypass capacitors.	3K5051222.
C1, C4 through C7.		(*)	(*)			C1: V1 and V2 grid circuit bypass capacitors. C4 through C7: V1 and V2 filament r-f bypass capacitors.	

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 1179–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
C17, C18	------	(*)	(*)	------	CAPACITOR, fixed: mica dielectric; 6,200 μμf ±5%; 500 vdcw; JAN type CM35B6222J.	Meter M2 r-f bypass	3K3562222.
	(*)	------	------	------	CAPACITOR, variable: air dielectric; 4 to 14 μμf; 3″ dia x 4½″ lg; B&W dwg #WN–245.	Neutralizing capacitor.	2Z7091–61.
C2	(*)	(*)	(*)	(*)	CAPACITOR, variable: air dielectric; 28 to 160 μμf; 11½″ lg x 4¼″ wd x 3¾″ h; Cardwell type #XD160XD.	Grid tuning capacitor	3D9160V–12.
C11A, C11B, C11C, C11D.	(*)	(*)	(*)	(*)	CAPACITOR, variable: air dielectric; 4 sect.; 35 to 157 μμf ea sect.; 18¼″ lg x 18″ wd x 9⅝″ d o/a; Stephen Decatur #MB–150–KS.	Plate tuning capacitors.	3D915TV.
N1	(*)	(*)	(*)	(*)	CHART: calibration; 7⅞″ lg x 5¾″ wd x 1/32″ thk; B&W part #129–421, dw #WN–C–1072.	For approximate settings of grid and plate tuning capacitors.	6D10105–32.
K5	------	(*)	(*)	------	CIRCUIT BREAKER: magnetic; single pole; 115 v ac, 50 amp; 1½″ wd x 5⅛″ h x 3⅜″ d o/a; Heinemann #0711–S.	Protects equipment against overloads.	3H900–50–24.
K5	------	------	------	(*)	CIRCUIT BREAKER: magnetic; SPST; 230 v ac, 50 amp, 60 cyc; 5¼″ lg x 1½″ wd x 3⅜″ d; Heinemann #1163SM6.	Protects equipment against overloads.	3H900–50–31.
K5	(*)	------	------	------	CIRCUIT BREAKER: thermal; 2 pole 115 v ac, 25 amp; 3¾″ lg x 1 11/16″ wd x 2¼″ h; B&W #WN–497–80.	Protects equipment against overloads.	3H900–25–25.
	------	(*)	(*)		CLEANER ELEMENT, air: galv steel mesh; reusable; 10″ h x 10″ lg x 1 13/16″ wd; Air Filter Corp. #F2.	Filters air entering amplifier cabinet.	3H955–27.
O 6				(*)			
	------	(*)	(*)		CLIP, electrical: fuse; 13/16″ max jaw opening; ¾″ lg x 15/32″ wd x 7/16″ o/a; Littelfuse type #105001.	Hold choke L3	3Z1013.
O 15, O 16				(*)			

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 1179-Phila-48	Models 3: Amplifier AM–141A/MRC, Order No. 19624-Phila-50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
	(*)	(*)	(*)		CLIP, electrical: fuse; 13/16" max jaw opening; 1 7/32" h x 7/8" wd x 0.750" h; Littelfuse type #129001.	Hold and provide electrical contact for capacitor C3.	3Z1013.8.
O 17, O 18				(*)			
	(*)	(*)	(*)		CLIP, electrical: tube cont; 1½" lg x 13/16" wd x 13/16" h o/a; Natl Co. part #SPP–9.	Rectifier tube plate caps.	2Z2725.2.
O 23 through O 26.				(*)			
	(*)	(*)	(*)		COIL, exploring: neutralization; approx 5⅞" lg x 4⅜" dia; B&W #WN–B–1044.	Used for neutralization of amplifier by indication of presence of r-f current.	3F30698.
E62				(*)			
L9, L10	------	------	------	(*)	COIL, RF: 4½" lg x 1 9/16" dia o/a; Espey #A16 301–A.	Part of plate parasitic suppressors.	3C321–43.
L3	------	------	------	(*)	COIL, RF: choke: unshielded; 1 mh, 10 ohms dc at 300 ma; ¾" lg x ¼" dia; Natl Co. part #R–300.	Grid bias circuit parasitic choke.	3C326–300.
L3, L5, L6	(*)	(*)	(*)	------	COIL, RF: choke; unshielded; 1 mh; 10 ohm dc at 300 ma; 2 11/16" lg x 1 7/32" dia; Natl Co. part #R–300–U.	Suppression of r-f current in bias rectifier circuit.	3C326–300.1.
L5, L6	------	------	------	(*)	------	------	
L4	(*)	(*)	(*)	(*)	COIL, RF: choke; unshielded; 1.5 mh, 3.6 ohms dc at 100 ma; 3½" lg x 1¼" dia; Miller JW part #4535.	Prevents r-f current from entering high-voltage supply.	3C342–24.
	------	(*)	(*)		CONNECTOR, plug: single round male cont; straight banana type; 0.94" lg x 5/16" wd; Johnson EF part #75C.	Plug-in mounts and electrical connections for L1.	2Z7249.6.
C78 through E82.				(*)			
	(*)	(*)	(*)		CONNECTOR, plug: single male cont; straight banana type; 1.15" lg x ½" across flats; Johnson EF part #77–A.	Plug-in mounts and electrical connection for L2.	2Z3021–111.
E73 through E77.				(*)			
	(*)	------	------	------	CONNECTOR, plug: 2 twist lock, male cont; straight; 1 13/16" lg x 1.468" dia; Hubbell part #7542.	A-c power connection tion for blower.	6Z1734.4.
P1	------	(*)	(*)	(*)	CONNECTOR, plug: 3 curved male cont, pol; straight; 5/8" thk x 1 9/16" dia; Hubbell #7572.	A-c power connection for blower.	6Z7591–12.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1	2	3	4	Name of Part and Description	Function of Part	Signal Corps Stock No.
	Amplifier AM 141/MRC	Amplifier AM–141A/MRC; Order No. 1179-Phila-48	Amplifier AM–141A/MRC; Order No. 1924-Phila-50	Amplifier AM–141B/MRC			
	(*)	------	------	------	CONNECTOR, receptacle: single round female cont; straight; 5/8" lg x 3/8" hex. head; Johnson EF Part #74.	Receiver plugs E78 through E82.	2Z5594.5.
		(*)	(*)	------	CONNECTOR, receptacle: single round female cont; straight; 25/32" lg x 3/8" across hex. head; B&W #WN–A–1030–4.	Receiver plugs E78 through E82.	2Z3067–157.
E68 through E72.	(*)	(*)	(*)	(*)	CONNECTOR, receptacle: single round female cont; straight; 1" lg x 0.286" dia; B&W part #L–7.	Mounting and electrical connection for L2.	2Z3062–158.
J4	(*)	(*)	(*)	(*)	CONNECTOR, receptacle: socket SO–239, Navy type #49194; single round female cont; straight; 1" sq x 1 1/16" lg o/a; Navy dwg #RE49F167.	Grid input coaxial connector.	2Z8799–239.
	(*)	------	------	------	CONNECTOR, receptacle: 2 curved parallel female cont; straight; 1 3/8" dia x 1 1/16" h body, 2 1/32" lg mtg pl; Sig dwg #SC–D–23565.	Receptacle for blower power plug.	6Z7813–6.
J2	(*)	(*)	(*)	(*)	CONNECTOR, receptacle: 2 round female cont; pol; straight; 3 3/16" lg x 3 3/8" wd x 3 3/8" h; Crouse-Hinds #AR–325.	A-c power line input	2Z3063–35.
J1	------	(*)	(*)	(*)	CONNECTOR, receptacle: 3 female cont, 2 curved cont and 1 cylindrical center cont; pol; straight; Hubbell part #7557.	Receptacle for blower power plug.	6Z7813–1.
J3	(*)	(*)	(*)	(*)	CONNECTOR, receptacle: 3 flat male cont; pol; straight; 1 3/8" lg x 2 5/16" wd x 1 3/4"h; Hubbell part #7556.	Provides connection from transformer T8 to the radio transmitter.	6Z7813–2.
E63 through E67.	------	------	------	(*)	CONTACT, electrical: single round female cont; banana type; straight; 1" lg x 3/8" wd; Espey part/dwg #32.777.	Mounting and electrical connections for L1.	2Z3193–143.
O 7, O 13	(*)	(*)	(*)	(*)	COUPLING, flexible: 2 1/8" lg x 2 5/8"wd; Cardwell part #PL5004 type "C".	Couples grid and plate capacitor drive shaft	2Z3291–1.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, ans AM–141B/MRC—Continued

Ref Symbol	Models 1 Amplifier AM–141/MRC	Models 2 Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3 Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4 Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
I 1, I 2	------	(*)	(*)	(*)	DIAL CONTROL: grid and pl tuning indication; 5¾″ dia x 3⅛″ h; Ulmer AJ part #F–1770–3.	Used for tuning grid and plate variable capacitors.	2Z3723–309.
O 37	------	------	------	(*)	DRIVE, tuning: for tuning capacitor C2; 4″ lg x 3⅝″ wd x 2¾″ h; Espey part #17.045.	Right-angled drive for capacitor C2.	2Z3876.138.
F1, F2	------	(*)	(*)	(*)	FUSE, cartridge: 8 amp; 1¼″ lg x ¼″ dia; Littelfuse #314008.	F1: Protects filament control variac from overloads. F2: Protects excitation control variac from overloads.	3Z2608.8.
E11, E57, E58, E59.	------	(*)	(*)	(*)	FUSEHOLDER: extractor post type; for single 3AG cartridge fuse; approx 2⅜″ lg x 1⅜″ dia o/a; Littelfuse #342001.	Holds fuses F1 and F2 and 2 spare fuses.	3Z3275–1.
O 8	------	------	------	(*)	GASKET: blower seal; neoprene; 7 holes; round, 8⅛″ OD x 7″ ID x 3/32″ thk; Espey part #B27.2805.	Forms seal for blower.	
O 12	------	------	------	(*)	GASKET: blower seal; neoprene; 7 holes, round, 10⅛″ OD x 8⅝″ ID x 3/32″ thk; Espey part #B27.2804.	Forms seal for blower.	2Z4868.975.
H3	------	(*)	(*)	(*)	GASKET: neoprene; single; hole; round 1⅛″ OD x 0.204″ ID x 1/16″ thk; Espey part #A35.1298.	Cushion for standoff insulator E25.	2ZA4868.1134.
H2	------	------	------	(*)	GASKET: neoprene; single hole; round, 1½″ OD x 0.204″ ID x 1⅛″ thk; Espey part #A35.1297.	Cushion for standoff insulator E28.	2Z4868.1133.
H1, H8	------	(*)	(*)	(*)	GASKET: rubber; single hole; round, 2½″ OD x 1⅞″ ID x 1/16″ thk; Espey part #27.2857.	Cushion for antenna feedthrough insulator.	2Z4868.1132.
	------	(*)	(*)	(*)	GEAR ASSEMBLY: rack type; tuning capacitor sw drive; 10⅜″ lg x ½″ dia; B&W part #129–156.	Tuning capacitor drive.	2Z4875–432.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
E1 through E4	(*)	(*)	------	------	HEATING ELEMENT, electrical: tubular type; 100 v, 100 w; 1 9/16″ lg x 1½″ dia; Rad Receptor part/dwg #B–131–70A.	Reduces primary voltage of high-voltage transformer during initial adjustment.	2Z5017.
R8, R9	(*)	(*)	(*)	(*)	HEATING ELEMENT, electrical; strip type; 115 v, 1,000 w; 17⅞″ lg x 1½″ wd x ⅜″ thk o/a; Wiegand #S–18X19.	Reduces primary voltage of high-voltage transformer during tuning.	2Z5015–80.
O 20, O 21	------	------	------	(*)	IMPELLER, centrifugal; 1⅞″ lg x 3⅝″ OD x 2 11/16″ ID; Redmond #11932.	Part of blower B3	3H2565–20.
E16, E34	(*)	(*)	(*)	(*)	INSULATOR, bowl, round; steatite, grade LAB; JAN type NS4W4203.	Passes high voltage through chassis.	3G3542–03.1.
	(*)	(*)	(*)	------	INSULATOR, bushing: shoulder shape; natural finish Mycalex; ¾″ lg; 1½″ dia shoulder, 11/16″ dia x ¼″ lg body, ¼″ dia through hole; B&W dwg #WN–A–1004–5.	For wire-wound resistors.	3G1250–12.22.
E12, E51 through E56.	------	(*)	(*)	(*)	INSULATOR, bushing: round; steatite, grade L4B; 1″ lg; 1½″ dia w/boss ¼″ h x 11/16″ dia, 17/64″ dia through hole; B&W dwg #WN–A–1004–6.	For wire-round resistors.	3G1250–16.48.
	(*)	------	------	------	INSULATOR, bushing: round; white Mycalex; 1¼″ lg; 1½″ OD x ¼″ ID; B&W part #WN170.	For wire-round resistors.	3G1250–16.47.
	(*)	------	------	------	INSULATOR, feedthrough; bowl shape por, brown, glazed; JAN type NS2B4601.	Antenna feedthrough insulators.	3G290–10.
E17, E37	(*)	(*)	(*)	------	INSULATOR, feedthrough: bowl shape por, white, glazed; JAN type NS4W4601.	Antenna feedthrough insulators.	3G1350–46.
E20	------	(*)	(*)	(*)	INSULATOR, plate: rectangular; Mycalex, grade L4B; 2 23/32″ lg x 1¼″ wd x ¼″ thk; B&W dwg #WN–A–1030–2.	Mounts coaxial connector Socket SO–239.	3G1550–20.2.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779-Phila-48	Models 3: Amplifier AM–141A/MRC, Order No. 19624-Phila-50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
E22, E38	------	------	------	(*)	INSULATOR, plate: rectangular; bakelite, type PBE; 3″ lg x 1¾″ wd x ⅛″ thk; Espey #A21.1363 modified.	Cushion ceramic sockets for 833A type tubes.	3G320–275.
	(*)	------	------	------	INSULATOR, plate: flat rectangular; gray glass bonded mica; 5¾″ lg x 2 1⁄32″ wd x 3⁄16″ thk w/slot in ctr; B&W part #WN–149.	Insulator mounting band-switch contacts.	3G1100–92.
E21	------	(*)	(*)	(*)	INSULATOR, plate: rectangular; Mycalex, grade L4B; 6¾″ lg x 1⅜″ wd x ¼″ thk; B&W dwg #WN–A–1030–22.	Used for mounting grid circuit components.	3G1838–108.5.
		(*)	(*)	------	INSULATOR, plate: rectangular; Mycalex, grade L4B; 7¼″ lg x 2 1⁄32″ wd x 3⁄16″ thk; B&W dwg #WN–B–932–1.	Supports plate band-switch contacts.	3G1838–116.4.
	(*)	------	------	------	INSULATOR, plate; rectangular; bakelite; 7 7⁄16″ lg x 3⅜″ wd x ¼″ thk; B&W part WWN236.	Insulates V5 and V6 from metal base.	3G1838–119.
	(*)	------	------	------	INSULATOR, plate: rectangular; Mycalex; 7¾″ lg x 4″ wd x 3⁄16″ thk; B&W part #WN153.	Tuning capacitor spacer.	3G1100–124.3.
	(*)	(*)	(*)	------	INSULATOR, plate: rectangular; ceramic, grade G, steatite white, unglazed; 8⅛″ lg x ⅝″ wd x 5⁄16″ thk; AlSiMag part #3816.	Coil support	2Z9403.181.
	(*)	(*)	(*)	------	INSULATOR, plate: rectangular; Mycalex, grade L4; 9″ lg x ¾″ wd x ⅜″ thk o/a; B&W part #L116.	Coil support	2Z9405.118.
	(*)	------	------	------	INSULATOR, plate: rectangular; Mycalex, 9½″ lg x 4″ wd x 3⁄16″ thk; B&W part #WN–152.	Tuning capacitor spacer and band-switch mounting.	3G1100–152.1.
	(*)	------	------	------	INSULATOR, plate: rectangular; Mycalex, 11⅜″ lg x 1¼″ wd x ⅜″ thk o/a; B&W part #WN–493–7.	Power-amplifier grid coil insulator.	3G1100–182.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 1179-Phila-48	Models 3: Amplifier AM–141A/MRC, Order No. 1924-Phila-50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
	(*)	------	------	------	INSULATOR, plate: rectangular; Mycalex, 11 29/32" lg x 1" wd x 3/4" thk; B&W part #WN–154.	Front support for grid capacitor.	3G1550–11.
	(*)				INSULATOR, plate: rectangular; Mycalex, grade L4B; 12" lg x 1 1/4" wd x 3/8" thk; B&W dwg #WN–B–148–1.	Mounts and insulates neutralizing capacitors.	3G1838–216.4.
E18		(*)	(*)	(*)			
	(*)	(*)	(*)		INSULATOR, plate: rectangular; Mycalex, grade L4B; 12" lg x 7 3/4" wd x 3/8" thk; B&W dwg #WN–C–1030–27.	Mounts and insulates grid circuit components.	3G1838–192.1.
E19				(*)			
		(*)	(*)	------	INSULATOR, plate: rectangular; Mycalex, grade L4B; 18" lg x 9 5/8" h x 3/8" thk; B&W dwg #WN–D–922.	Rear insulator plate for tuning capacitor.	3G1838–216.2.
		(*)	(*)	------	INSULATOR, plate: rectangular; Mycalex, grade L4B; 18" lg x 9 5/8" h x 3/8" thk; B&W dwg #WN–D–930–1.	Front insulator plate for tuning capacitor.	3G1838–216.3.
	(*)	------	------	------	INSULATOR, standoff: cylindrical white glaze steatite, grade L4A; JAN type NS4W0212.	------	3G3502–12.1.
E14, E47	------	(*)	(*)	(*)	INSULATOR, standoff: cir; bakelite; 2 5/8" dia x 1/8" thk; B&W dwg #WN–A–1027–2.	Mounts sockets of type 3B28 tubes above chassis.	3G1838–02.
	------	(*)	(*)				
E15, E46				(*)	INSULATOR, standoff: cir; bakelite; type PBE; 3 3/8" OD x 1 5/16" ID x 3/8" thk; B&W dwg #WN–B–1013.	Mounts sockets of type 4B32 tubes above chassis.	3G1838–10.31.
	(*)						
		(*)	(*)		INSULATOR, standoff: conical; steatite, glazed, grade L4A; JAN type NS4W2016.	Insulates high-voltage bus from chassis.	3G3520–16.1.
E25				(*)			
	------	(*)	(*)		INSULATOR, standoff: conical; white glazed steatite, grade L4A; JAN type NS4W2024.	Supports high-voltage lead.	3G3520–24.
E28				(*)			

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
	(*)	------	------	------	INSULATOR, standoff: cylindrical; white ceramic, glazed; 1″ lg x ½″ dia body x 1⅛″ dia base; Natl Co. part #GS–1.	Standoff	3GK1000–8.5.
	(*)	------	------	------	INSULATOR, standoff: cylindrical; white glazed steatite, grade L4; JAN type NS4W0320.	Standoff	3G3503–20.
E24, E40	(*)	(*)	(*)	(*)	INSULATOR, standoff: cylindrical; ceramic, grade L4B; 2⅞″ h x ¾″ dia body x 1⅝″ dia fl; Natl Co. part #GS–3.	Holds high-voltage bus off chassis.	3G1250–46.
	(*)	------	------	------	INSULATOR, standoff: irregular shape; Mycalex; 4¼″ lg x 1¾″ wd x 1″ thk; B&W dwg #WN147.	Supports tuning capacitor assembly.	3G1350–129.
E27, E35	(*)	(*)	------	(*)	INSULATOR, standoff: rectangular; bakelite, type PBE; 1¼″ lg x ¾″ wd x 1⅜″ d; B&W dwg #WN–A–930–2.	Insulator blocks for tank coil L2.	3G3502–20.2.
E23, E39	------	(*)	(*)	(*)	INSULATOR, standoff: rectangular; bakelite, type PBE, 1⅜″ lg x ¾″ wd x 1¼″ h; B&W dwg #WN–A–1030–12.	Insulation blocks	3G1450–20.16.
	(*)	------	------	------	INSULATOR, standoff: rectangular; Mycalex, grade L4; 1½″ lg x ½″ wd x ½″ thk; B&W dwg #WN160.	Rear grid capacitor support.	3G1100–24.4.
	(*)	------	------	------	INSULATOR, standoff: rectangular; Mycalex, grade L4; 2¼″ lg x $^{13}/_{16}$″ wd x $^{3}/_{16}$″ thk; B&W dwg #WN151.	Guide for band switch.	3G1100–36.1.
	(*)	------	------	------	INSULATOR, standoff: rectangular; Mycalex, grade L4; 2$^{23}/_{32}$″ lg x 1″ wd x ¼″ thk; B&W dwg #WN162.	Mounts coaxial socket to frame.	3G1100–44.1.
	(*)	------	------	------	INSULATOR, standoff: rectangular; ceramic, grade L4; 4″ lg x $^{13}/_{16}$″ wd x $^{3}/_{16}$″ thk; B&W dwg #WN150.	Guide for band switch.	3G1100–64.2.

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2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
E26, E36	------	(*)	(*)	(*)	INSULATOR, standoff: rectangular; bakelite, type PBE; 4″ lg x 2 3/16″ wd x 1″ thk; B&W dwg #WN–A–1025–5.	Tube channel supports and insulation blocks.	3G1450–64.1.
	(*)	------	------	------	INSULATOR, standoff: rectangular; ceramic, grade L4; 4¼″ lg x 1⅜″ wd x 1″ thk; B&W dwg #WN146.	Standoff	3G1100–68.5.
		(*)	(*)	------	INSULATOR, standoff: rectangular; Mycalex, grade L4; 8″ lg x ¾″ wd x 3/16″ thk; B&W dwg #WN–B–930–7.	Standoff	3G3502–124.
	(*)	------	------	------	INSULATOR, standoff: round; glass; 3 3/32″ lg; ½″ dia tube w/metal cap 9/16″ dia x ⅝″ lg; B&W dwg #WN215.	Insulates band switch from operating knob.	3G1828–52.
E32, E41	(*)	(*)	(*)	(*)	KNOB: round; black bakelite; for ¼″ dia shaft; unmarked; 1⅝″ dia x ¾″ thk; Kurz-Kasch #S–309–1–B–BB.	For adjusting grid and plate tuning capacitors.	2Z5822–605
E29	(*)	(*)	(*)	(*)	KNOB: round; black bakelite; for ¼″ dia shaft; marked w/straight arrow 1″ lg; 2⅜″ OD x 29/32″ thk; Kurz-Kash #S–310–1–B–BB–L.	Knob on plate capacitor switch S17.	2Z5822–604.
E30	(*)	(*)	(*)	(*)	KNOB: round; black bakelite; for ⅜″ dia shaft; marked EXCITATION w/ arrow showing direction; 2⅜″ x 29/32″ thk; Kurz-Kasch #S–310–1–B–BB–EE–L.	Knob for variac T8	2Z5822–602.
E31	(*)	(*)	(*)	(*)	KNOB: round; black bakelite; for ⅜″ dia shaft; marked FILAMENT w/ arrow showing direction; 2⅜″ dia x 29/32″ thk; Kurz-Kasch #S–310–1–B–BB–EE–L.	Knob for variac T5	2Z5822–603.
	(*)	(*)	(*)	(*)	LAMP, incandescent: 2.0 v, .06 amp; approx 1 3/16″ lg o/a; miniature screw base; Mazda #48.	Indicates presence of r–f current in neutralizing loop.	2Z5879–2.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1 Amplifier AM–141/MRC	Models 2 Amplifier AM–141A/MRC, Order No. 11779–Phila-48	Models 3 Amplifier AM–141A/MRC, Order No. 19624–Phila-50	Models 4 Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
p/o E5, p/o E6	(*)	(*)	(*)	(*)	LAMP, LM–41: 110 v, 6 w, 0.05 amp; 1⅞″ lg; candelabra screw base; GE part #6S6.	Used in indicator lamps E5 and E6.	2Z5941.
	(*)	(*)	(*)		LAMPHOLDER: miniature screw base; ½″ lg x $^{23}/_{32}$″ dia; Drake Mfg #317–H.	Connects lamp in neutralizing loop.	2Z5882–41.
J5				(*)			
E5	(*)	(*)	(*)	(*)	LIGHT, indicator: w/green lens; for candelabra screw base for type S–6 bulb; 2$^{11}/_{16}$″ lg x 1¼″ dia; Drake Mfg type #75.	Indicates when filament power is applied.	2Z5884–10.
E6	(*)	(*)	(*)	(*)	LIGHT, indicator: w/red lens; candelabra screw base for type S–6 bulb; 2$^{11}/_{16}$″ lg x 1¼″ dia; Drake Mfg type #75.	Indicates when high voltage is applied.	2Z5884–9.
B6	(*)	(*)	(*)	(*)	MOTOR, AC: repulsion-induction; 115 v ac, 60 cyc, single ph; $^{1}/_{16}$″ hp, 3,200 rpm; ccw; 3⅞″ lg x 3¼″ dia; Dynamic Air type #2424B.	Provides motive force for blower B3.	3H3000A04–7.
	(*)	------	------	------	MOTOR, AC: split ph induction; 115 v ac, 50/60/70 cyc, single ph; $^{1}/_{20}$ hp, 3,500 rpm; cw; 4 $^{31}/_{32}$″ lg x 4″ wd x 4⅜″ h; Rob & Myr type #KP, dwg #992D.	Provides motive force for blower B3.	3H3000A05–36.
B4, B5	------	(*)	(*)	(*)	MOTOR, AC: shaded pole induction; 115 v ac, 60 cyc, single ph; $^{1}/_{250}$ hp, 1,550 rpm; ccw; 3 $^{17}/_{64}$″ lg x 2 $^{27}/_{32}$″ dia; Reamond AG part #L3625.	Provides motive force for blowers B1 and B2.	3H3000A04–10.
E3 through E7	(*)	(*)	(*)	(*)	MOUNT, vibration: diamond mtg; 4 $^{5}/_{16}$″ lg x 3 $^{1}/_{8}$″ wd x 1½″ thk; Lord #279PD–185.	Cushions equipment from road shock.	2Z8407–22.
	(*)	------	------	------	MOUNT, vibration; round mtg; 1¾″ lg x 1″ dia o/a; U S Rubber part/dwg #A–300AJ.	Cushions equipment from road shock.	2Z8404–35
A1, A2	(*)	(*)	(*)	(*)	MOUNT, vibration; sq mtg, 3″sq x 1½″ thk o/a; Lord #204PH–25.	Cushions equipment from road shock.	2Z8404–47.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1 Amplifier AM–141/MRC	Models 2 Amplifier AM–141A/MRC, Order No. 1179-Phila-48	Models 3 Amplifier AM–141A/MRC, Order No. 1902-Phila-50	Models 4 Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
p/o C8, p/o C9	------	(*)	(*)	(*)	PLATE, rotor; p/o neutralizing capacitor; 3¾''dia x 1¾'' lg; B&W part #129–375.	Movable plate of neutralizing capacitor.	2Z7091–555.
O 22	------	------	------	(*)	PLATE, retainer; p/o air cleaner; 10¼'' lg x 10¼'' wd x 0.0897'' thk less mtg ears; Espey part #22–529.	Retains air cleaner in housing.	2Z7091–554.
p/o C8, p/o C9	------	(*)	(*)	(*)	PLATE, stator: p/o neutralizing capacitor; 3¾'' dia x 1'' lg; B&W part #129–376.	Fixed plate of neutralizing capacitor.	2Z7091–638.
E33, E42, E43, E44.	------	(*)	(*)	(*)	POST, binding: spring post type; 2$^{1}/_{32}$'' lg x 2$^{7}/_{64}$'' dia; Eby part #6697.	Wrench holders	2Z7259–140.
O 19	------	(*)	(*)	(*)	PULLEY: tuning capacitor drive; 1$^{7}/_{16}$'' x $^{5}/_{16}$'' thk; Espey part/dwg #27–2613.	Drives belt for plate tuning capacitor.	2Z7334–12.
O 5	(*)	(*)	(*)	(*)	PULLEY: tuning capacitor drive; flat; 2⅞'' dia x ½'' thk; B&W dwg #WN–184.	Drive pulley for plate tank capacitors C11 and C16.	2Z7334–2.
O 4	(*)	(*)	(*)	(*)	PULLEY: tuning capacitor drive; flat; 2⅞'' dia x 1'' thk; B&W dwg #WN–183.	Drive pulley for plate tank capacitors C11 and C16.	2Z7334–3.
L8	(*)	------	------	------	REACTOR: filter choke; 20 hy, 1 amp; approx 31 ohms dc resistance; HS metal case; 15¾'' lg x 11¾'' wd x 9½'' h; UTC type #LS–99 modified.	High-voltage filter choke.	3C573–32.
L8	------	(*)	(*)	(*)	REACTOR: filter choke; 20 hy ±10% at 1 amp dc, 120 v, 60 cps; 50 ohms max dc resistance; HS metal case; 15¾'' lg x 8¼'' wd x 11½'' h; UTC type #D5535.	High-voltage filter choke.	3C1087–13.
L7	(*)	(*)	(*)	(*)	REACTOR: filter choke; dual sect.; 26 hy, 200 amp, 120 ohms dc resistance; HS metal case; 6½'' lg x 6'' wd x 6¼'' h o/a; ADC part #A5284.	Bias supply filter choke.	3C325–14.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC/Continued

Ref Symbol	Models 1: Amplifier AM-141/MRC	Models 2: Amplifier AM-141A/MRC, Order No. 11779-Phila-48	Models 3: Amplifier AM-141A/MRC, Order No. 19624-Phila-50	Models 4: Amplifier AM-141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
K4	(*)	(*)	------	------	RELAY, armature: DPST normally open, double break; single wdg 115 v ac, 50/60 cyc, 97 ohms dc resistance; 6⅛″ lg x 4$^{9}/_{16}$″ wd x 3$^{9}/_{16}$″ d; Hallicrafters part #21D056–D.	Control relay: closes primary circuits of high-voltage transformers in radio transmitter and in the amplifier.	2Z7587–152.
K2	(*)	(*)	(*)	(*)	RELAY, armature: SPST normally open; single wdg; 115 v ac, 60 cyc, 30 amp; 4¼″ lg x 3″ wd x 1¾″ h; Dunco #8HXX–159.	Bias underload relay	2Z7587–152.
K3	(*)	(*)	(*)	(*)	RELAY, armature: SPST normally closed; dual wdg; lower coil, 110 v ac, 60 cyc, 105 ohms dc resistance; upper coil 1.2 to 1.3 amp, 60 cyc, 4 ohms dc resistance; 4½″ lg x 3¼″ wd x 3″ h; Dunco #55HXX102.	High-voltage supply overload relay.	2Z7587–168.
K1	------	(*)	(*)	(*)	RELAY, motor driven: SPST normally open; 125 v ac, 10 amp; 4″ lg x 4½″ wd x 3$^{11}/_{16}$″ h; B&W part #129–114.	Prevents application of high-voltage until tubes have reached operating temperature.	2Z7587–176.
K4	------	------	(*)	(*)	RELAY, solenoid: DPST normally open: single wdg; 115 v ac, 50 amp, 10 ohms dc resistance; 9¾″ lg x 4⅜″ wd x 4½″ d; AB type #702.	Control relay: closes primary circuits of high-voltage transformers in radio transmitter and in the amplifier.	2Z7590–248.
K1	(*)	------	------	------	RELAY, thermal: SPST, normally open; ac-dc, 115 v, 230 v; 7⅝″ lg x 5¼″ wd x 3¾″ d; Dunco #PBGA1.	Prevents application of high-voltage until tubes have reached operating temperature.	2Z7663–7.
R2, R3	(*)	(*)	(*)	(*)	RESISTOR, fixed: comp; 20 ohms ±10%; 25 w; 5″ lg x 1″ dia; Globar type #CX.	Parts of plate parasitic suppressors.	3Z6002–59.
R1	(*)	(*)	(*)	(*)	RESISTOR, fixed ww; 500 ohms ±5%; 32 w; JAN type RW41G501.	Swamping resistor for L3.	3RW22512.
R4	------	(*)	(*)	(*)	RESISTOR, fixed ww; 500 ohms ±5%; 100 w; JAN type RW44G501.	V1 and V2 grid return resistor.	3RW22560.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1 Amplifier AM–141/MRC	2 Amplifier AM–141A/MRC, Order No. 11779-Phila-48	3 Amplifier AM–141A/MRC, Order No. 19624-Phila-50	4 Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
R4, R5	(*)				RESISTOR, fixed: ww; 1,000 ohms ±5%; 100 w; JAN type RW44G102.	R4: V1 and V2 grid. R5: Limits current through K2.	3RW24314.
R5		(*)	(*)	(*)	RESISTOR, fixed: ww; 1,000 ohms; 160 w; JAN type RW45G102.	Current limiting resistor for K2 coil.	3RW24367.
R6, R7	(*)				RESISTOR, fixed: ww; 31,000 ohms ±5%; 145 w; JAN type RW47G313.	High-voltage power supply bleeder resistors.	3RW33310.
R6, R7		(*)	(*)	(*)	RESISTOR, fixed: ww; 31,000 ohms ±5%; 160 w; JAN type RW4G313.	do	3RW33311.
O10, O11				(*)	RETAINER, spring: plug-in grid coil retainer; U-shaped, 2 3/32" lg x 3/4" wd x 1/2" h; Espey #A32.964.	Assist in retaining grid coil in seated position.	2Z7780–149.
		(*)	(*)		SHAFT ASSEMBLY: 11 9/32" lg x 1 1/4" dia; B&W part #WN–A–1047–1.	Band-change switch shaft assembly.	2Z8201.82.
H9	(*)	(*)	(*)	(*)	SHELL CONNECTOR: hood UG–106/U; Navy type #49194; 1" sq x 3/4" lg; Amphenol part #83–1H.	For Socket SO–239	2Z7390–106.
X3, X4	(*)	(*)	(*)	(*)	SOCKET, electron tube: Navy type #49359; 4 cont; above chassis base mtg; 2 5/8" dia x 1 15/16" h; Natl Co. #XM–10.	For type 4B32 tubes.	2Z8711–4.
X1, X2	(*)	(*)	(*)	(*)	SOCKET, electron tube: 4 cont Jumbo; 1 piece chassis or bracket mtg; 3 1/4" lg x 1 3/4" wd x 7/8" thk; RCA part #UT–103.	For type 3B28 tubes.	2Z8672.40.
X5, X6	(*)	(*)	(*)	(*)	SOCKET, electron tube: 4 cont above chassis mtg; 3 3/8" dia x 2 1/2" h; Johnson EF part #211SB.	For type 833A tubes.	2ZK8759.9.
O14				(*)	SPRING: helical extension: 1 1/4" lg x 1/4" OD, 5/32" ID; 18 turns; Espey #A27.3058B.	Provides detent action for band switch.	2Z8634–51.
H10, H11				(*)	STUD: 2 7/8" lg o/a; 2 ends threaded 1 1/4" lg w/8–32 thd; Espey #35.1427.		2Z8634.51.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1 Amplifier AM–141/MRC	Models 2 Amplifier AM–141A/MRC, Order No. 11779–Phila-48	Models 3 Amplifier AM–141A/MRC, Order No. 19624–Phila-50	Models 4 Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
S12	(*)	(*)	(*)	(*)	SWITCH, push: SPST; locking action, normally closed; 1¼″ lg x 1¼″ h x ⅞″ wd o/a; Espey #A27.053.	Interlock	3Z9824.16.
S15	(*)	(*)	(*)	(*)	SWITCH, push: SPST; 1 5/32″ lg x 1 17/32″ h x ½″ wd o/a; momentary action, normally open; AH & H type #3592.	Energizes set coil on relay K3.	3Z9559.
S5 through S11, S13.	(*)	(*)	(*)	(*)	SWITCH, push: SPST; 2 5/16″ lg x 1 1/16″ wd x 15/16″ d; momentary action, normally open; GE part/dwg #7460330K4.	Interlock switches	3Z9560–7.
S3	(*)	(*)	------	------	SWITCH, thermostatic: SPST, normally closed; on 70° F, off 80° F; 1 13/16″ lg x 1½″ wd x 1⅝″ h o/a; Spencer Thermo part #C–4351–18–04.	Thermal switch for rectifier tube heaters.	3H4674B.1.T2.
S4	(*)	(*)	------	------	SWITCH, thermostatic: SPST; normally open; open at 55° F, closed at 65° F; 1 11/16″ lg x 1⅝″ wd x 23/32″ d; Spencer Thermo part #C–4351–18–02.	Interlock	3H4674B.1/T3.
S14	(*)	(*)	(*)	(*)	SWITCH, toggle: DPDT: JAN type ST55N.	NEUT. SWITCH	3Z9863–55N.
S1, S2	(*)	------	------	------	SWITCH, toggle: SPST: snap action, normally open; 2⅜″ lg x 1¾″ lg x 4⅛″ h; GE part #2923–T.	S1: PLATE POWER. S2: NORMAL-TUNE UP.	3Z9847–4.22.
S1, S2	------	(*)	(*)	(*)	SWITCH, toggle: SPST: locking action, normally open; 3¼″ lg x 2″ wd x 2 3/16″ d; C–H #8781K–8.	S1: PLATE POWER. S2: NORMAL-TUNE UP.	3Z9849.214.
E8, E61	------	------	------	(*)	TERMINAL BOARD: general purpose term. strip; 2 brass nickel pl term. w/4 brass nickel pl Bind H screws; 1⅝″ lg x ⅞″ wd x 13/32″ thk; Jones HB part #2–140.	Blower connector boards.	2Z9402.10.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1 Amplifier AM–141/MRC	2 Amplifier AM–141A/MRC, Order No. 11779–Phila–48	3 Amplifier AM–141A/MRC, Order No. 19624–Phila–50	4 Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
		(*)	(*)	------	TERMINAL BOARD: general purpose connecting block; 2 double screw term.; 1⅝″ lg x 1⅛″ wd x ½″ thk o/a; Jones HB part #2–141.	Mounts fuses F1 and F2.	2Z9402.44.
	(*)	(*)	(*)	------	TERMINAL BOARD: general purpose; 2 dual #8–32 brass, nickel pl screw term.; 2 1/16″ lg x 1 5/16″ wd x ⅝″ d o/a; Jones HB type #2–142.	For connections-----	2ZK9402.29.
E8, E 60------	------	(*)	(*)	------	TERMINAL BOARD: used for termination of relay wiring; 7 term. ea w/2 #10–32 thd washer head screw connections; 6 3/32″ lg x 2″ wd x 1¼″ d; Curtis Devel #BT–7.	For relay wiring----	3Z12531–46.
E10------	------	------	------	(*)	TERMINAL BOARD: mtg strip for xmtr tank coil; 5 term., banana jack type; 12″ lg x 1¼″ wd x ¼″ thk; Electron Mechanics part #33262A.	Mounting jack strip for amplifier tank coil.	3Z770–5.53.
	(*)	(*)	(*)	(*)	TOOL, alinement: 12″ lg x ¾″ dia; ¾″ rubber ball mtd on 12″ polystyrene rod; B&W part #WN–99.	Neutralizing adjustment tool.	6R38464.
T2------	(*)	(*)	(*)	(*)	TRANSFORMER, power: stepdown; filament type; input 115 v, 50/60 cyc, single ph; secd 2.5 v at 10 amp ct; HS metal case; 4⅛″ lg x 3½″ wd x 3⅛″ h; ADC part #A5286.	Filament transformer for tubes V3 and V4.	2Z9611.426.
T3, T4------	(*)	(*)	(*)	(*)	TRANSFORMER, power: stepdown; filament type; input 115 v, 60 cyc, single ph; secd 5 v at 5 amp ct; HS metal case; 5½″ lg x 4⅛″ wd x 6¼″ h; ADC part #A5287C.	Filament transformers for tubes V1 and V2.	2Z9611.427.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
T6	(*)	(*)	(*)	(*)	TRANSFORMER, power: stepdown; filament type; input 115 v, 50/60 cyc, single ph; secd 5 v at 22 amp ct; HS metal case; 7″ lg x 6″ h x 4⅜″ wd; ADC part #5288.	Filament transformers for V5 and V6.	2Z9611.428.
T1	(*)	(*)	(*)	(*)	TRANSFORMER, power: step-up; plate type; input 115 v, 50/60 cyc, single ph; secd 650 v when using term. #3 of pri, 700 v when using term. #2 of pri, 750 v when using term. #1 of pri; 6½″ lg x 6″ wd x 6¼″ h; ADC part #A5285.	Supplies high voltage for bias power supply.	2Z9612.213.
T7	(*)	(*)	(*)	(*)	TRANSFORMER, power: step-up; pl type, input 115 v, 50/60 cyc, single ph; secd 7500 v at 1.20 amp ct; HS metal case; 19⅛″ lg x 12″ wd x 11½″ h; American part #33205.	Supplies high voltage for plate power supply.	2Z9612.214.
L1	------	(*)	(*)	(*)	TRANSFORMER, RF: plug-in type: unshielded; 2.0 to 3.5 mc; 5½″ lg x 6⅛″ h x 4¼″ wd; B&W part #2353.	Grid coil	3C1087–14.
L1	(*)	------	------	------	TRANSFORMER, RF: Coil Unit C–387–A; plug-in type; unshielded; 2.0 to 3.5 mc; 5½″ lg x 6″ h x 4¼″ wd; Hallicrafters #51C538.	Grid coil	3C280–387A.
L1	------	(*)	(*)	(*)	TRANSFORMER, RF: plug-in type; unshielded; 3.5 to 4.5 mc; 5½″ lg x 6⅛″ h x 4¼″ wd; B&W part #2354.	Grid coil	3C1087–15.
L1	(*)	------	------	------	TRANSFORMER, RF: Coil Unit C–388–A; plug-in type; unshielded; 3.5 to 4.5 mc; 5½″ lg x 6″ h x 4¼″ wd; Hallicrafters #51C539.	Grid coil	3C280–388A.

2. Identification Table of Parts for Amplifiers AM-141/MRC, AM-141A/MRC, and AM-141B/MRC—Continued

Ref Symbol	Models 1 Amplifier AM-141/MRC	Models 2 Amplifier AM-141A/MRC, Order No. 11779 Philа-48	Models 3 Amplifier AM-141A/MRC, Order No. 19624 Philа-50	Models 4 Amplifier AM-141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
L1	------	(*)	(*)	(*)	TRANSFORMER, RF: plug-in type, unshielded; 4.5 to 5.7 mc; 5½" lg x 5" h x 3⁵⁄₁₆" wd; B&W part #2355.	Grid coil	3C1087-16.
L1	(*)	------	------	------	TRANSFORMER, RF: Coil Unit C-389-A; plug-in type; unshielded; 4.5 to 5.7 mc; 5½" lg x 5" h x 3⁵⁄₁₆" wd, Hallicrafters #51C540.	Grid coil	3C280-389A.
L1	------	(*)	(*)	(*)	TRANSFORMER, RF: plug-in type; unshielded; 5.7 to 7.2 mc; 5½" lg x 5" h x 3⁵⁄₁₆" wd; B&W part #2356.	Grid coil	3C1087-17.
L1	(*)	------	------	------	TRANSFORMER, RF: Coil Unit C-390-A; plug-in type; unshielded; 5.7 to 8.0 mc; 5½" lg x 5" h x 3⁵⁄₁₆" wd; Hallicrafters #51C540.	Grid coil	3C280-390A.
L1	------	(*)	(*)	(*)	TRANSFORMER, RF: plug-in type; unshielded; 7.2 to 11 mc; 5½" lg x 5" h x 3⁵⁄₁₆" wd; B&W part #2357.	Grid coil	3C1087-18.
L1	(*)	------	------	------	TRANSFORMER, RF: Coil Unit C-447; plug-in type; unshielded; 8.0 to 11.0 mc; 5½" lg x 5" h x 3⁵⁄₁₆" wd; Hallicrafters #51C542.	Grid coil	3C2510-4.
L1	------	(*)	(*)	(*)	TRANSFORMER, RF: plug-in type; unshielded; 2.6 to 3.6 mc; approx 9" lg x 7" wd x 8⅜" h o/a; B&W #1685-1.	Grid coil	3C1087-19.
T5, T8	(*)	(*)	(*)	(*)	TRANSFORMER, variable power: input 115 v, 60 cyc, single ph; output 0/135 v, varied by knob; air coolant; 4¹³⁄₁₆" x 5⅞" x 4¹¹⁄₁₆" o/a; Superior Elec No. 116U.	T5: FILAMENT control. T8: EXCITATION control.	2Z9613.541.

2. Identification Table of Parts for Amplifiers AM–141/MRC, AM–141A/MRC, and AM–141B/MRC—Continued

Ref Symbol	Models 1: Amplifier AM–141/MRC	Models 2: Amplifier AM–141A/MRC, Order No. 11779–Phila–48	Models 3: Amplifier AM–141A/MRC, Order No. 19624–Phila–50	Models 4: Amplifier AM–141B/MRC	Name of Part and Description	Function of Part	Signal Corps Stock No.
L2	(*)	(*)	(*)	(*)	TRANSFORMER, variable RF: plug-in type; unshielded; 3.6 to 5.0 mc; approx 8⅛″ x 6″ wd x 7⅜″ h; B&W #1686–1.	Plate tank coil	3C1087–6.
L2	(*)	(*)	(*)	(*)	TRANSFORMER, variable RF: plug-in type; unshielded; 5.0 to 7.0 mc; approx 8½″ lg x 6″ wd x 7½″ h o/a; B&W part #1687–1.	Plate tank coil	3C1087–8.
L2	(*)	(*)	(*)	(*)	TRANSFORMER, variable RF: plug-in type; unshielded; 7.0 to 9.0 mc; approx 8½″ lg x 6″ wd x 7½″ h o/a; B&W part #1688–1.	Plate tank coil	3C1087–9.
L2	(*)	(*)	(*)	(*)	TRANSFORMER, variable RF: plug-in type; unshielded; 9.0 to 12.0 mc; approx 8⅛″ lg x 6″ wd x 7⅜″ h o/a; B&W part #1689–1.	Plate tank coil	3C1087–10.
L2	(*)	(*)	(*)	(*)	TRANSFORMER, variable RF: plug-in type; unshielded; 12.0 to 18.0 mc; 8″ lg x 8 5/16″ h x 7″ wd; B&W part #1909.	Plate tank coil	3C1087–12.
V3	(*)	(*)	(*)	(*)	TUBE, electron: JAN type 3B28.	Bias supply rectifiers	2J3B28.
V5, V6	(*)	(*)	(*)	(*)	TUBE, electron: JAN type 4B32.	High-voltage power supply rectifiers.	2J4B32.
V1, V2	(*)	(*)	(*)	(*)	TUBE, electron: JAN type 833A.	R-f amplifier tubes	2J833A.
M2	------	------	------	------	VOLTMETER: ac; 0–15 v; JAN type MR 34WO15-ACVV.	Measures filament voltage.	3F8015–28.
M2	------	(*)	(*)	(*)	VOLTMETER: ac; 0–15 v; 2½″ body dia x 1.063″ d x 2.695″ dia fl; Marion Elec Instr #HM–2–2½ modified per B&W #129–34.	Measures filament voltage.	3F8015–34.
H12, H13	------	------	------	(*)	WASHER, flat: round 7/16″ OD x 0.180″ ID x 1/16″ thk; Espey part #35.1428.	Washers for studs H10 and H11.	6L51703.

3. Identification Table of Parts for Antenna Kit MX–852/MRC–2

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	ANTENNA KIT MX–852/MRC–2: rhombic type; for transmitting; copper-weld wire ant.; incl mat for 4 legs of ant., transmission line, and terminating resistor kit (masts not incl); physical dimen vary depending on distance range; fixed; freq range 6–18 mc; open wire transmission line (6″ spacing).	Provides material for construction of rhombic transmitting antenna.	2A278A.
	CLIP: fuse clip; 1 7/32″ lg x 7/8″ wd x 0.750″ h o/a; 13/16″ jaw opening.	For joining terminating resistor	3Z1013.8.
	INSULATOR, bowl: cup shape; white glazed steatite; 1⅝″ lg; ¼″ thk x 2½″ OD x 1 9/16″ ID; JAN type NS4W4601.	Transmission line feedthrough	3G3564–01.2.
	INSULATOR, spreader: cylindrical shape; white steatite 6″ lg x ¾″ dia; JAN type NS4W5240.	Transmission line spreader	3G3552–40.1.
	PLATE, mounting: panel for resistor assy	For mounting 12 terminating resistors.	2Z7093–113.
	RESISTOR, fixed: comp; 250 ohms ±5%; 86 w.	Antenna terminating resistor	3Z6025–120.
	WIRE W–128: single #14 AWG cond	Connects terminating resistor bank to antenna.	1B128.
	WIRE, electrical: bare; single #16 AWG cond.	For rhombic antenna curtain	1A816.14.
	WIRE, electrical: bare; singel #18 AWG	For spreader insulator tie wires on transmission line.	1A818.

4. Identification Table of Parts for Control Boxes C–345/MRC–2 and C–345A/MRC–2

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	CONTROL BOX C–345/MRC–2, C–345A/MRC–2: controls audio output of 2 Radio Receivers BC–342; steel, black wrinkle finish; rectangular box shape; 6″ lg x 3½″ wd x 2″ d o/a; mts by 4 holes 0.180″ dia on 4½″ x 1½″ ctr.	Controls receiver volume	2C666–345.
	Technical Manual 11–624		Order through TAGO.
	CABLE, special purpose: electrical; Cordage CO–144; 2 stranded copper cond #18 AWG.	For receiver output	3E2144.
	CLAMP, electrical: for ½″ dia cable; 0.954″ lg x 0.375″ wd x 0.564″ h; Tinnerman Prod type #A3049A–8.	Cable clamp	2Z2642.620.
	COVER, electrical control box: 6″ lg x 3½″ wd x 0.060″ thk; Hallicrafters part/dwg #66C752.	Mounts jacks and controls	2Z3351–401.
J3, J4	JACK JJ–033: tp; for 3-cond plug	For headset	2Z5533.
J1, J2	JACK JJ–034: tp; for 2-cond plug	For speakers	2Z5534.
	KNOB: pointer type bar; black bakelite: for ¼″ dia shaft; white line; ⅜″ d shaft hole; Mallory type #366–1.	For rotating variable resistors	2Z5822–599.
P1, P2	PLUG, telephone: 3 cond; JAN type PJ–068.	For speakers	2Z7168.
R1, R2	RESISTOR, variable: 5000 ohms ±10%; 4w; JAN type RA30A1SD502AK.	Volume controls	3RA6917.

5. Identification Table of Parts for Junction Box JB–70–A

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	JUNCTION BOX JB–70–A: outlet types, twist-out and jack; 19⅛″ lg x 12 11/16″ wd x 8 5/16″ h o/a; spec No. 71–1683.	Control center for transmission and reception.	2Z5652–70.
	Technical Manual 11–281		Order through TAGO.
C200, C201, C203, C204.	CAPACITOR, fixed: paper dielectric; 10,000 mmf ±20%; 600 vdcw; JAN type CP25A1EF103M.	Filter capacitors, part of relay surge filter network (for RY200).	3DA10–494.
C202	CAPACITOR, fixed: paper dielectric; 1 mf +20%−10%; 200 vdcw; JAN type CP53B1EC105V.	Coupling capacitor for remote telephone line.	3DB1–228.
CB200	CIRCUIT BREAKER: SPST; 115 v, 50 to 60 cyc, 50 amp; 3⅛″ lg x 1⅞″ wd x 1¾″ h; Spencer Thermo type PLM–50.	Protects Power Unit PE–95–G from overloads.	3H900–50–4.
SO201, SO202	CONNECTOR, receptacle: 2 female curved cont; straight type; 3⅝″ lg x 1 7/16″ wd x 1 3/32″ h; Hubbell part No. 7210.	SO 201: Receives Cord CD–763 from transmitter. SO 202: Receives cord from shelter heater.	6Z7808.
SO 203	CONNECTOR, receptacle: 4 female curved cont; straight type; 3⅝″ lg x 1.687″ wd x 1.187″ h; Hubbell part No. 7410 twistlock.	Connection for Rectifier RA–63–(*).	6Z7783–2.
SO 204, SO 205	CONNECTOR, receptacle: 4 rectangular female cont; straight type; 1⅜″ lg x 1¾″ dia; Amphenol type No. 92–C.	SO 204: Connection for Radio Receiver BC–312–( ). SO 205: Connection for Radio Receiver BC–342–( ).	2Z8674.34.
SO 210	CONNECTOR, receptacle: 4 rectangular female cont; straight type; 49/64″ lg x 7/16″ h o/a; Jones HB part No. S–304–AB.	Connections to Loudspeaker LS–3 and second audio phones in Radio Receiver BC–312–(*).	2Z8639–11.1.
SO 200	CONNECTOR, receptacle: 6 round male cont; straight type; 3 5/16″ lg x 5⅛″ dia; Appleton part No. 57350.	Provides connections for power lines from Power Unit PE–95–G; provides start-stop control connections for power unit.	2Z8687.40.
SO 206	CONNECTOR, receptacle: 6 curved female cont; accom 2 plugs; straight type; 3 9/16″ lg x 1 9/16″ wd x 1¼″ h o/a; Hubbell part No. 7580.	Receives Cord CD–659 for connection to auxiliary battery.	6Z7809–9.
SO 207, SO 208	CONNECTOR, receptacle: accom 2 plugs; 4 curved female cont; 4 1/16″ lg x 1.328″ wd x 1.187″ h o/a; Hubbell part No. 9200.	SO 207: Connection to blower SO 208: Connection to lamp in Chest CH–121 and to ceiling lamp.	6Z7809–5.
SO 209	CONNECTOR, receptacle: accom 2 plugs; 4 curved female cont; straight type; 3⅞″ lg x 1.328″ wd x 1.187″ h o/a; Hubbell part No. 7540.	Connection for radio receiver power cord.	6Z7809–8.
J200 through J205	JACK, telephone: for 2-cond plug, 0.250″ dia; JAN type JJ–034.	J200, J201: Provides connection for Key J–37. J203 through J205: Connections for headsets.	2Z5534.
	KNOB: round ¼″ dia shaft; 1⅛″ dia x ⅝″ thk; Hallicrafters part No. 15B004.	For rotating switches	2Z5849.8.
	MOUNTING: steel; holds speech ampl; Telectro part No. TAH–287.	For shock-mounting the speech amplifier.	2Z8500–2.
	POST, binding: TM–149; screw type ⅞″ h o/a x ½″ OD: Eby type Sergeant No. 14G.	For connecting remote telephone	3Z249.

5. Identification Table of Parts for Junction Box JB–70–A—Continued

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
RY200	RELAY, armature: normally open, single break; 100 ohms dc resistance; 3 15/16" lg x 1 3/16" wd x 2" h; Clare CP part No. A–54577 type C.	Keys c-w sidetone and radio transmitter.	2Z7585–31.1.
R200, R201, R202, R204.	RESISTOR, fixed: comp; 100 ohms ±10%; 1/2 w: JAN type RC20BF101K.	Surge-limiting resistors in relay filter network.	3RC20BF101K.
R203, R205	RESISTOR, fixed: comp; 5,100 ohms ±5%; 1/2 w; JAN type RC20BF512J.	Alternate a-f and c-w sidetone signals at headset jacks.	3RC20BF512J.
SW203	SWITCH, lever: pileup; 3 position, locking type; position 1, 2A1C, position 2, 1C, position 3, 1A; 3 11/16" lg x 7/8" wd x 1 9/32" h; Clare CP part No. 7697.	Turns transmitter on or off; connects either receiver to remote telephone line.	3Z9818–1.
SW205	SWITCH, rotary: 1 sect.; 2 pole, 3 position; 1 5/16" lg x 1 3/16" wd x 1 7/8" h o/a; Oak type No. H.	Turns c-w sidetone on or off; connects c-w sidetone to either receiver.	3Z9825–29.4.
SW202	SWITCH, rotary: 2 sect.; 3 pole, 5 position; 1 5/8" lg x 1 3/16" wd x 1 7/8" h o/a; Oak type No. H.	Connects the c-w and voice functions of receivers to the telephone line.	3Z9825–29.12.
SW206	SWITCH SW–199–A: SPST; 2 units; momentary action; 4 5/8" lg x 2 7/8" wd x 2 1/4" h; Sq D type No. BB6X1.	Remote start-stop operation of the power unit.	3Z8199A.
SW207	SWITCH, toggle: SPDT; JAN type ST42D.	Selects 12 volts dc from storage battery or power unit.	3Z9863–42D.
SW200, SW201, SW204.	SWITCH, toggle: DPDT; JAN type ST52N.	SW200: Disables Radio Receiver BC–312–( ). SW201: Disables Radio Receiver BC–342–( ). SW204: Transposes receiver outputs to headsets in use.	3Z9863–52N.
TS200	TERMINAL BOARD: 12 double screw term.; 5 11/64" lg x 1/16" wd x 13/32" h o/a; HB Jones part No. 12–140.	Provides connections for cable wiring between junction box and controlled units.	2Z9412.34.
	TERMINAL BOARD: 20 solder lug type term.; 4 1/2" lg x 2 5/16" wd x 1/17" thk; Hallicrafters part No. 88B805.	Mounts resistors and capacitors in junction box.	3Z770–20.53.

6. Identification Table of Parts for Junction Box J–199/MRC–2

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	JUNCTION BOX J–199/MRC–2: 10 outlet and binding post type, 1/2", 0.187" dia cable entrances; galv steel; black wrinkle E finish; rectangular shape; 7 1/2" lg x 3" wd x 3 1/4" d; Hallicrafters part/dwg #41X16521.	Provides connections to Telephone EE–8–( ) control and lightning arrestors.	2Z5600–199.
	BLOCK, telephone protector: 1 1/4" lg x 3/8" wd x 1/4" thk o/a; Cookeco #41–1907.	Protects equipment against lightning	4E4430–1.
	BLOCK, telephone protector: 1 1/4" lg x 3/8" wd x 1/4" thk; Cookeco #41–2001.	Protects equipment against lightning	4E683–1.
	BOX CONNECTOR, electrical: compression type; for use w/1/2" conduit; Appleton #96T050B.	Connects conduit to junction box	6Z3147–3.
	HOLDER, protector block: 2" lg x 1" wd x 1" thk, Cookeco #423–35.	Mounts lightning arrestors	4E2601.
	POST, binding: 15/16" lg above mtg surface, 1/2" OD: Eby #6604.	Provides connections to junction box	2Z7259–98.

Indentification Table of Parts for Junction Box J–199/MRC–2—Continued

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
1	TERMINAL BOARD: accom 9 term.; 7½″ lg x 3″ wd x 0.187″ thk; Hallicrafters part/dwg #8C1597.	Mounts binding posts and lightning arrestors.	3Z770–9.33.
	JACK BOX: one ⅞″ dia cable outlet; 7 1/16″ lg x 2¼″ wd x 3 1/16″ d; Hallicrafters part/dwg #66C746.	Houses connections to jacks and connectors.	2Z5599–7.

7. Identification Table of Parts for Junction Box J–204/MRC–2

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	JUNCTION BOX J–204/MRC–2; 10 jack type ¼″ dia cable entrances; galv steel; black wrinkle E finish; rectangular shape; 5½″ lg x 6″ wd x 5.548″ h; Hallicrafters part/dwg #41–16526.	Provides connections to teletypewriter and SEND and REC extensions.	2Z5600–204.
	COVER, terminal board: 5½″ lg x 6″ wd x 3.048″ h; Hallicrafters part/dwg #660738.	Covers terminal board and Jacks JJ–024.	2Z3351–318.
	FITTING, conduit: conduit coupling; compression type; 90° elbow for ½″ conduit; Appleton type #73T90.	Couples conduit to jackbox	6Z3858–60.
	JACK BOX: seven ½″ dia cable outlet; 3″ lg x 2″ wd x 2½″ d; Appleton type #222.	Houses cable for connection to jack terminals.	2Z5599–B.
J2 through J11	JACK JJ–024: for 2-cond plug, 0.250″ dia.	Send teletypewriter black cord connection.	2Z5524.
	TERMINAL BOARD: accom 10 jacks; 4⅞″ lg x 3″ wd x 2 1/32″ thk; Hallicrafters part/dwg #8D1536.	Mounts 10 telephone jacks	32770–10.77.

8. Identification Table of Parts for Junction Box J–207/MRC–2

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	JUNCTION BOX J–207/MRC–2: 6 outlet, jack and connector types ⅜″, ½″, and ¾″ dia cable entrances; galv steel; black wrinkle E finish; 7½″ lg x 3″ wd x 3½″ d; Hallicrafters part/dwg #41X16520.	Provides connections to telephone control keying, disabling, and FS exciter.	2Z5600–207.
	BOX CONNECTOR, electrical: compression type; for use w/½″ conduit: Appleton #96T050B.	Connects conduit to junction box	6Z3147–3.
P2	CONNECTOR, receptacle: 4 round male pol cont; straight type; 1 15/16″ lg x 1 3/16″ wd x 1 3/16″ h; AN–3102A–14S–2P.	BLUE connections to FS exciter	2Z8799–220.
	JACK BOX: one ⅞″ dia cable outlet 7 1/16″ lg x 2¼″ wd x 3 1/16″; Hallicrafters part/dwg #66C746.	Houses connections to jacks and connectors.	2Z5599–7.
J2	JACK JJ–033; tp; for 3-cond plug 0.2065″ dia.	Provides disabling connection	2Z5533.
J3	JACK JJ–034; for 2-cond plug ¼″ dia	Provides for connections to Junction Box J–199/MRC–2.	2Z5534.

8. Identification Table of Parts for Junction Box J–207/MRC–2—Continued

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
J4	JACK JJ–089: tp: for 2-cond plug 0.250″ dia.	Provides keying connection	2Z5598A–89.
J1	TERMINAL BOARD: accom 5 term.; 7½″ lg x 3″ wd x 0.187″ thk; Hallicrafters part/dwg #8C1540.	Mounts jacks and connectors	3Z770–5.52.

9. Identification Table of Parts for Shelter HO–17 and HO–17–A

SHELTERS HO–17, and HO–17–A: radio equipment; assembled; rectangular w/oval top, approx 12′ 1″ lg x 6′ 9½″ wd x 5′ 6½″ h o/a; wood framework, plywood lining, steel exterior panels, canvas roof covering; 2 doors, 1 rear approx 50½″ h x 34″ wd, 1 side approx 36″ h x 22⅜″ wd; 2 windows, 1 in ea door approx 14″ h x 12″ wd; incl ventilating blower and fire extinguisher; has blackout shutters.	Houses all components except power unit.	3Z7700–17.
Technical Manual 11–2737		Order through AGO.
BLOWER: motor; ⅙ hp, 1,725 rpm, 60 cyc, 115 v ac, single ph; 500 cfm at ¼″ static pressure, adj exhaust.	Ventilates shelter	3H399–1.
CATCH, fastener: tap plate for lever type latch.	Door latch	6Z6917.
CLEANER ELEMENT, air: steel wire cloth; approx 11½″ h x 12½″ wd x ⅝″ thk o/a.	For filtering air	6Z3856–24.
CONNECTOR, plug: 2 curved male twist-lock term.; straight.	For blower power cord	6Z3151–2.
COVER: for feedthrough hole in shelter	For covering feedthrough opening in shelter.	2Z3351–271.
DUCT: approx 7½″ lg x 3⅝″ wd x 5¼″ h	Exhaust duct of blower	6Z3660–5.
FASTENER, latch: air vent; 2″ lg x ¾″ wd x 1⅜″ h.	Fastens air vent	6Z3810–51.
GLASS ASSEMBLY: c/o double safety glass in sheet steel frame; 15¼″ h x 14¾″ w x 1⅛″ thk.	For windows	6Z4621.
GUARD	Covers circulating fan	3H2484–1.
HANDLE: 3¼″ lg x 1¼″ wd x 2¼″ d o/a	For door	6Z5012–4.
HANDLE: lever type; 4 11/16″ lg w/sq socket ¾″ d.	For door	6Z5012–2.
HANDLE: lever type; 5¼″ lg x ⅞″ wd x 1 3/4″ d o/a.	For door	6Z5012–5.
HANDLE: lever type; approx 6¼″ lg x 2⅛″ h x 2¼″d o/a.	For door	6Z5012–3.
IMPELLER, centrifugal: wheel type	For blower	3H2565–2.
LOCK	For door	6Z6956–1.
LOCK: 3 point rod type	For door	6Z6956.
LOUVER, metal: adj blade type	For ventilation	6Z659–1.
LOUVER, metal: stationary blade type	For ventilation	6Z6959.
MOTOR, AC: split-phase type; 115 v, 60 cyc, single ph, 2.9 amp, 61% pf; ⅙ hp, 1750 rpm, cw.	For blower	3H3000A16–12.
MOUNTING: fire extinguisher	For mounting fire extinguisher	2Z1250.153.
SCREEN, blackout: for shelter windows	Lightproof covering for shelter windows.	3Z795.

9. Identification Table of Parts for Shelter HO–17 and HO–17–A—Continued

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	TURNBUCKLE: ½″–13 NC thd ea end; approx 3″ take-up.	Holds down assembly of shelter to truck.	6Z8790.
	VENTILATOR: exhaust duct	For blower exhaust	6Z3660–4.

10. Identification Table of Parts for Mast AB–155A/U

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	MAST AB–155A/U: steel or aluminum mast, 40′ h assembled.	Doublet antenna support	2A2065–155.
	ANTENNA EQUIPMENT: Halyard MX–516/GRA–4.	For pulling antenna into position	2A2180.1–516.
	CARRYING DEVICE MX–387/GRA–4: carrying frame for Mast Section MS–44.	For packing Mast Sections MS–44	2A950–387.
	COVER CW–124/GRA–4: serves as protection and means for carrying assy.	Cover for Carrying Device MX–387/GRA–4.	2A790–124.
	GUY FASTENER MX–379/U: snap; 5″ lg x 1¼″ wd o/a.	Secures guys to stakes	2Z1050–379.
	GUY PLATE MX–378/U: fastening guys and halyard.	For fastening guys and halyard	2A2837–378.
	GUY MX–381/GRA–4: ctr guy	Set of center guys	2A1348–381.
	GUY MX–382/GRA–4: antenna guy	Set of lower guys	2Z1348–382.
	GUY MX–383/GRA–4: antenna guy	Set of upper guys	2Z1348–383.
	HAMMER HM–1: engineer's, double-faced; 2 lb.	For driving stakes	6Q49001.
	MAST BASE AB–154/U	Holds mast sections	2A324–154.
	MAST SECTIONS MS–44 AND MS–44–A.	Section of vertical antenna	2A2344.
	STAKE GP–101/U: aluminum; 15¾″ lg	Anchors guys to ground	2A3300–15.
	STAKE, guy: hickory; 30″ lg	For securing guys	2A3330–15.

11. Identification Table of Parts for Mast Base MP–47–A

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	MAST BASE MP–47–A: steatite and steel; provides for flexibility of ant.; 20″ lg x 8½″ dia o/a; incl coil spring and 2 bowl type ceramic ins; Sig C dwg #SC–D–11221.	Mast base for transmitting whip antenna.	2A2088–47.
	CABLE ASSEMBLY, RF: coax, flexible; 10″ lg; single cond #16 AWG stranded; Sig C dwg #SC–D–1121, items 19, 14, and 15.		3E7160–50.
	DISK, retainer: maleable iron; retains bowl ins: 2$\frac{7}{16}$″ OD x $\frac{21}{32}$″ ID x $\frac{5}{8}$″ thk; Sig C dwg #SC–D–11222, item 8.	Lower compression bush-supporting bowl insulators.	2A983–1.
	GASKET: cranite or equal; single hole; round, 2½″ OD x 1$\frac{13}{16}$″ ID x $\frac{3}{32}$″ thk; Sig C dwg #SC–D–11222, item 6.	Prevents abrasion	3G1640–40.
	GASKET: cranite or equal; single hole; round, 5⅛″ OD x 4″ ID x $\frac{3}{32}$″ thk; Sig C dwg #SC–D–11222, item 5.	Prevents abrasion	3G1640–82.
	GASKET: cranite or equal; 7 holes; round, 8½″ OD x 5⅞″ ID x $\frac{3}{32}$″ thk; Sig C dwg #SC–D–11222, item 7.	Prevents abrasion	2Z4868–1221.

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11. Identification Table of Parts for Mast Base MP–47–A—Continued

Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	INSULATOR, bowl: round; brown glazed steatite; 3 3/16" h o/a; 5 3/4" OD tapered to 2 7/16" OD; Sig C dwg #SC–D–11223, item 10.		3G1000–26.1.
	NUT, hexagon: jam; steel, parkerized; 5/8"–18 thd std: Sig C dwg #SC–D–1121, item 26.		6L3010–18JP.
	PIN, locking: cylindrical shape; 1/2" lg x 0.091" dia; Sig C dwg #SC–D–1121, item 18.	Provides mechanical locking between lower retainer and extension rod.	6L3943–8–3.
	POST, binding: TM–146; screw type; 1/2" OD x 5/16" lg above panel; Sig C dwg #SC–D–530.	Antenna lead-in connector	3Z246.
	RING, retainer: mast base mtg ring· 8 1/2" OD x 3 9/16" ID x 1 1/8" thk o/a; Sig C dwg #SC–D–11222, item 1.	Mounting ring for Mast Base MP–47–A.	2Z7858–274.
	RING, retainer: cylindrical shape; 1.180" ID x 1.544" OD x 0.20" thk; Sig C dwg #SC–D–11222, item 3.	Provides mechanical coupling between top inner and outer spring retainers.	2Z7858–275.
	RETAINER, spring: cylindrical shape; 2 1/4" lg x 2 7/16" OD max; Sig C dwg, #SC–D–11222, item 9.	Provides coupling between outer spring and top center retainer.	2Z7780–179.
	RETAINER, spring: cylindrical shape; 4 3/4" lg x 1.371" OD max; Sig C dwg #SC–D–11223, item 13.	Provides coupling between inner and outer springs, upper portion of base; also accepts mast section.	2Z7780–178.
	RETAINER, spring: cylindrical shape; 3 3/4" lg x 2 7/16" OD max; Sig C dwg #SC–D–11223, item 16.	Provides coupling between inner and outer springs, lower portion of base.	2Z7780–177.
	ROD, extension: 7 3/8" lg x 5/8" dia; Sig C dwg #SC–D–11223, item 11.	Provides mechanical and electrical connection through bowl insulators.	2A3188–3.
	SCREW, machine: slot drive; hex. head; 1/4"–20 thd; 1/2" lg; Sig C dwg #SC–D–11222, item 4.	Prevents removal of mast section from base.	6L18604–8.81P.
	SCREW, set: slot drive; headless; #10–32 thd; 1/8" lg; Sig C dwg #SC–D–71–699, item 20.	Mechanically locks center top retainer to inner spring.	6L7949–2.35P.
	SCREW, set: slot drive; headless; #10–32 thd; 3/8" lg; Sig C dwg #SC–D–71–699, item 21.	Mechanically locks center retainer to spring retainer, top of mast.	6L18510–6.89P.
	SCREW, set: slot drive; headless; #10–32 thd; 5/8" lg; Sig C dwg #SC–D–71–699, item 22.	Mechanically locks spring retainer to outer spring, top and bottom of mast.	6L7949–10.35P.
	SCREW, set: slot drive; headless; 5/16"–24 thd; 9/32" lg; Sig C dwg #SC–D–11221, item 23.	Mechanically locks spring retainer to outer spring, top and bottom of mast.	6L18605–4–1.31P.
	SCREW, set: slot drive; headless; #12–28 thd; 3/8" lg; Sig C dwg #SC–D–11221, item 24.	Mechanically locks center retainer to wire terminal, top of mast.	6L18512–6.31P.
	SCREW, set: slot drive; headless; #12–28 thd; 1" lg; Sig C dwg #SC–D–11221, item 25.	Mechanically locks center spring retainer to wire terminal bottom of mast.	6L18512–16.31P.
	SPRING: helical extension type; for mast base; 2.060" OD x 5 1/2" lg; 18 turns; Sig C dwg #SC–D–11222, item 2.	Permits flexing of mast base	2A3250.5.
	SPRING: helical extension type; for mast base; 1.045" OD x 4 1/4" lg; 29 turns; Sig C dwg #SC–D–11223, item 12.	Permits flexing of mast base	2A3250.5–1.

12. Identification Table of Parts for Rectifier Power Unit PP–79/UR

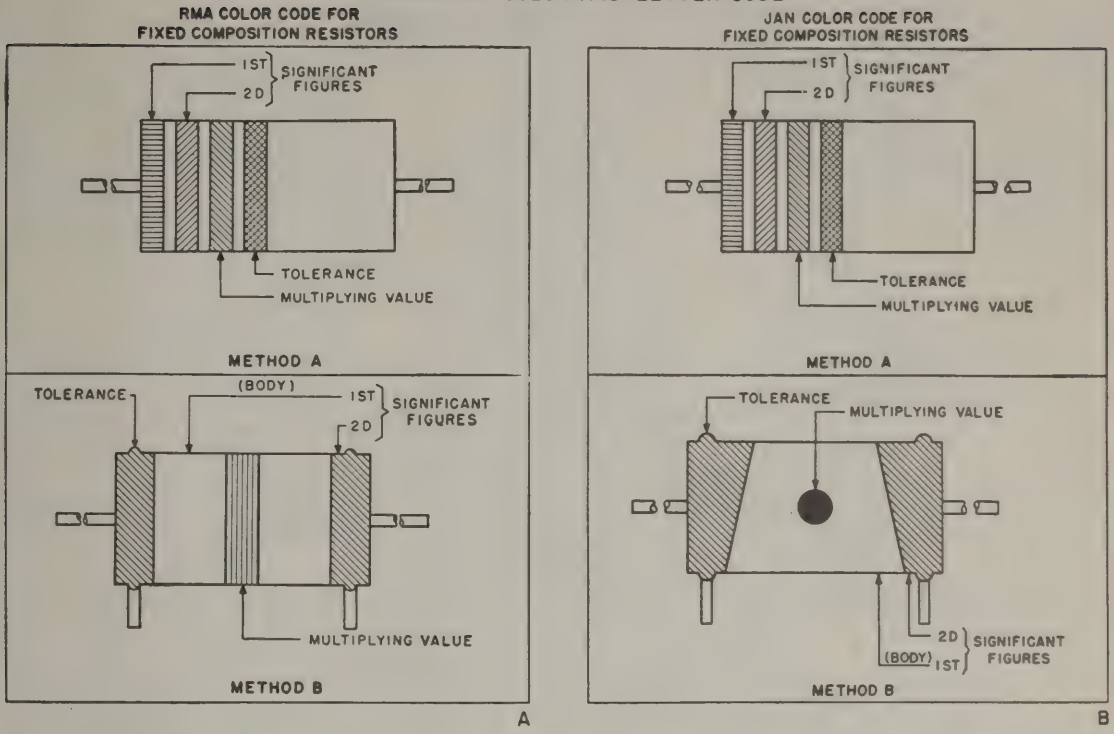
Ref. symbol	Name of part and description	Function of part	Signal Corps stock No.
	RECTIFIER POWER UNIT PP–79/UR: electronic type; output 135 v dc, 20 ma; 6.3 v ac, 1 amp; 6.3 v ac, 0.6 amp; input 115 v ac, 60 cyc, single ph.	Supply operating voltages for frequency meter.	3H4698–79.
	CABLE, special purpose: electrical; Cordage CO–144; Buna S ins; 2 cond No. 18 AWG ea comprising 65 or 41 strands No. 36 AWG or No. 34 AWG; no rated working voltage; 0.280″ to 0.300″ dia o/a.	A-c power cord	3E2144.
	CAPACITOR, fixed: paper dielectric; 3 sect.; 4–4–8 μf +50% −10%; 400 vdcw ea sect.; HS Electric Utilities #10953.	Filter capacitor	3DB8–198.
	CLAMP, electrical: electron tube; small shell octal base; Birtcher #926A.	Tube clamp	2Z2636–28.
	CONNECTOR, plug: 2 parallel blade male cont; straight type; Hubbell #7057.	Plug for a-c cord	6Z1727.
	FUSE FU–26: cartridge; 1 amp; 250 v	Protects transformer	3Z1926.
	FUSEHOLDER: block type; for single #3AG fuse; Littelfuse #357001.	Holds fuse	3Z3276.
	REACTOR: filter choke; 20 hy, 35 ma; 400 ohm dc resistance; HS metal case; Freed #12429.	Filter for power supply	3C323–6Z2.
	SOCKET SO–95: 8 cont, octal; below chassis mtg.	Mounts tubes	2Z8670.1.
	TRANSFORMER, power stepdown and step-up: fil and plate type; input 115 v, 60 cyc, single ph, 3 output wdg; secd #1, 350 v, 35 ma; secd #2, 6.3 v, 1 amp; secd #3, 6.3 v, 0.5 amp; HS metal case.	Power transformer for power supply	2Z9613.524.
	TUBE, electron: type OD3	Voltage regulator tube	2JOD3.
	TUBE, electron: type 6X5WGT	Rectifier tube	2J6X5WGt.

GLOSSARY

ABBREVIATIONS

[illegible] ..... [illegible]
Adj. ADJ ..... adjustment, adjust
AGC ..... automatic gain control
a-m ..... amplitude-modulated
amp. A ..... ampere
AMPLR ..... amplifier
ANT ..... antenna
ave. AVC ..... automatic volume control
[illegible] ..... [illegible]
CHAN ..... channel
CHK ..... check
COMP ..... compensator
cps ..... cycles per second
cyc ..... cycle
c-w ..... continuous-wave
db ..... decibel
d-c ..... direct-current
DOUB ..... doubler
DX ..... duplex
EMERG ..... emergency
EXT ..... extension
f-m ..... frequency-modulated
freq ..... frequency
FS ..... frequency shift
gnd ..... ground
h-f ..... high-frequency
h-v ..... high-voltage
i-f ..... intermediate-frequency
INT ..... intermediate
kc ..... kilocycle
kw ..... kilowatt
kva ..... kilovolt-ampere
(lambda) ..... wavelength in meters
LUF ..... lowest usable frequency
ma ..... milliampere
max ..... maximum
mc ..... megacycle
meg, MEG ..... megohm
MFP ..... moisture-fungusproof
MIC ..... microphone
MO ..... master oscillator
MUF ..... maximum usable frequency
MVC ..... manual volume control
NORM ..... normal
OSC ..... oscillator
PA ..... power amplifier
REC ..... receiver
r-f ..... radio-frequency
RTT ..... radioteletype
SIG ..... signal
TD ..... transmitter-distributor
term ..... terminal
TT ..... teletypewriter
μf, UF ..... microfarad
UHF ..... ultra high frequency
μμf, UUF ..... micromicrofarad
v, V ..... volt
vdcw ..... direct current working volt
VOL ..... volume
w, W ..... watt
wpm ..... words per minute
xmtr ..... transmitter
XTAL ..... crystal

RESISTOR COLOR AND LETTER CODE



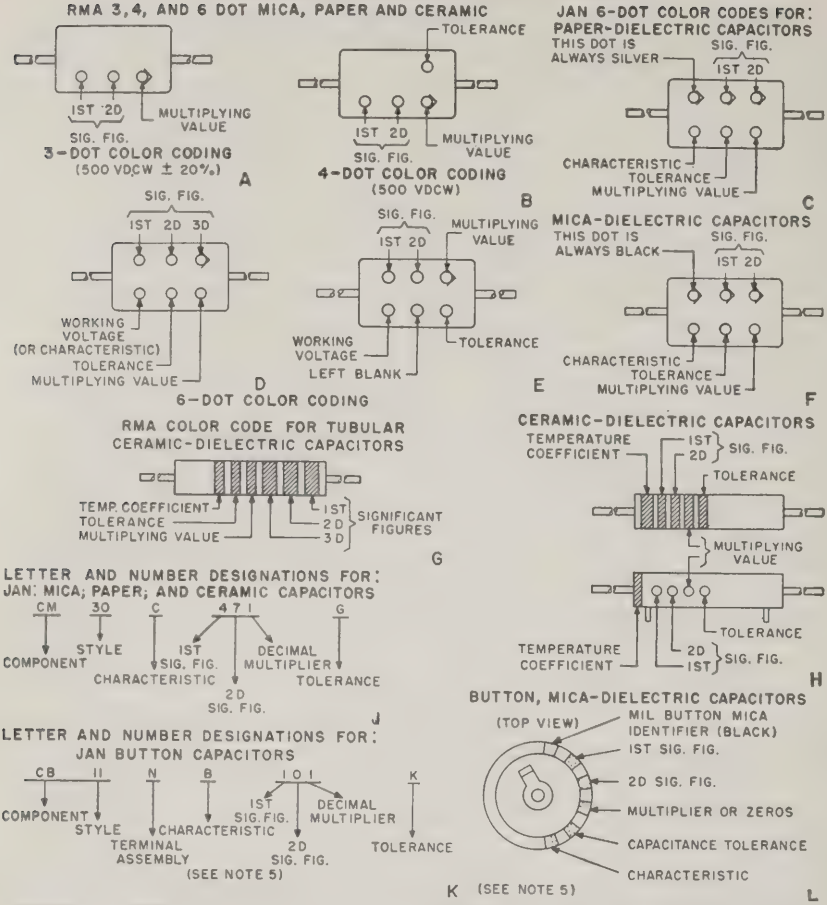
STANDARDS				
COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)	JAN LETTER TOLERANCE
BLACK	0	1	–	–
BROWN	1	10	± 1	F
RED	2	100	± 2	G
ORANGE	3	1,000	± 3	–
YELLOW	4	10,000	± 4	–
GREEN	5	100,000	± 5	–
BLUE	6	1,000,000	± 6	–
VIOLET	7	10,000,000	± 7	–
GRAY	8	100,000,000	± 8	–
WHITE	9	1,000,000,000	±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

NOTES:

1. RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.
2. RMA: RADIO MANUFACTURERS ASSOCIATION.
3. JAN: JOINT ARMY-NAVY.
4. THESE COLOR AND NUMBER CODES GIVE ALL RESISTANCE VALUES IN OHMS.
5. RESISTIVE COMPONENTS USED FOR LETTER TOLERANCES ARE: RC, RN, AND RU.
6. WATTAGE FOR RW TYPES IS FOUND IN THE JAN SPECIFICATIONS UNDER CHARACTERISTICS.

Figure 159. Resistor color codes.

CAPACITOR COLOR AND LETTER CODES



- STANDARDS -					JAN MICA-CM		JAN PAPER-CN		JAN CERAMIC-CC					
									CAP. TOL. FOR MORE THAN 10 UUF			CAP. TOL. FOR 10 UUF OR LESS		
COLOR	SIG. FIG.	DECIMAL MULTIPLIER	% TOL.	VDCW	LETTER TOL.	CHARAC-TERISTIC	LETTER TOL.	CHARAC-TERISTIC	DEC. MULT.	%	LETTER DESIG-NATION	UUF	LETTER DESIG-NATION	CHARAC-TERISTIC
BLACK	0	1	±20	500	M	A	M	A	1	±20	M	±2.0	G	C
BROWN	1	10	± 1	100	-	B	-	E	10	± 1	F	-	-	H
RED	2	100	± 2	200	G	C	-	H	100	± 2	G	-	-	L
ORANGE	3	1,000	± 3	300	-	D	N*	J	1,000	-	-	-	-	P
YELLOW	4	10,000	± 4	400	-	E	-	P	-	-	-	-	-	R
GREEN	5	100,000	± 5	500	-	F	-	R	-	± 5	J	±0.5	D	S
BLUE	6	1,000,000	± 6	600	-	G	-	S	-	-	-	-	-	T
VIOLET	7	10,000,000	± 7	700	-	-	-	T	-	-	-	-	-	U
GRAY	8	100,000,000	± 8	800	-	-	-	-	0.01	-	-	±0.25	C	B
WHITE	9	1,000,000,000	± 9	900	-	-	-	-	0.1	± 10	K	±1.0	F	SL
GOLD	-	0.1	± 5	1,000	J	-	-	-	-	-	-	-	-	A
SILVER	-	0.01	±10	2,000	K	-	K	-	-	-	-	-	-	-
NO COLOR	-	-	±20	500	-	-	-	-	-	-	-	-	-	-
* THE TOLERANCE OF THIS CAPACITOR IS ±30%, NOT ±3%														

NOTES

JAN: JOINT ARMY-NAVY
RMA: RADIO MANUFACTURERS ASSOCIATION

1. THESE COLOR AND LETTER CODES GIVE CAPACITANCES IN MICROMICROFARADS
2. THIS TABLE IS ADAPTED FOR JAN AND RMA COLOR AND JAN LETTER TYPE DESIGNATIONS
3. CERAMIC AND MICA CAPACITORS, BOTH JAN AND RMA, ARE GENERALLY 500 VDCW
4. BUTTON CAPACITORS ARE GENERALLY 300 VDCW
5. READ BUTTON CAPACITOR TOLERANCE UNDER CERAMICS OF MORE THAN 10 UUF
6. CHARACTERISTICS ARE AVAILABLE IN JAN CAPACITOR SPECIFICATION MANUALS
7. THE COMPONENTS USED ABOVE FOR JAN LETTER TYPE DESIGNATIONS ARE:
   CB MICA BUTTON: *CC* CERAMIC; *CM* MICA MOULDED: *CN* PAPER MOULDED

TM CC

Figure 160. Capacitor color codes.

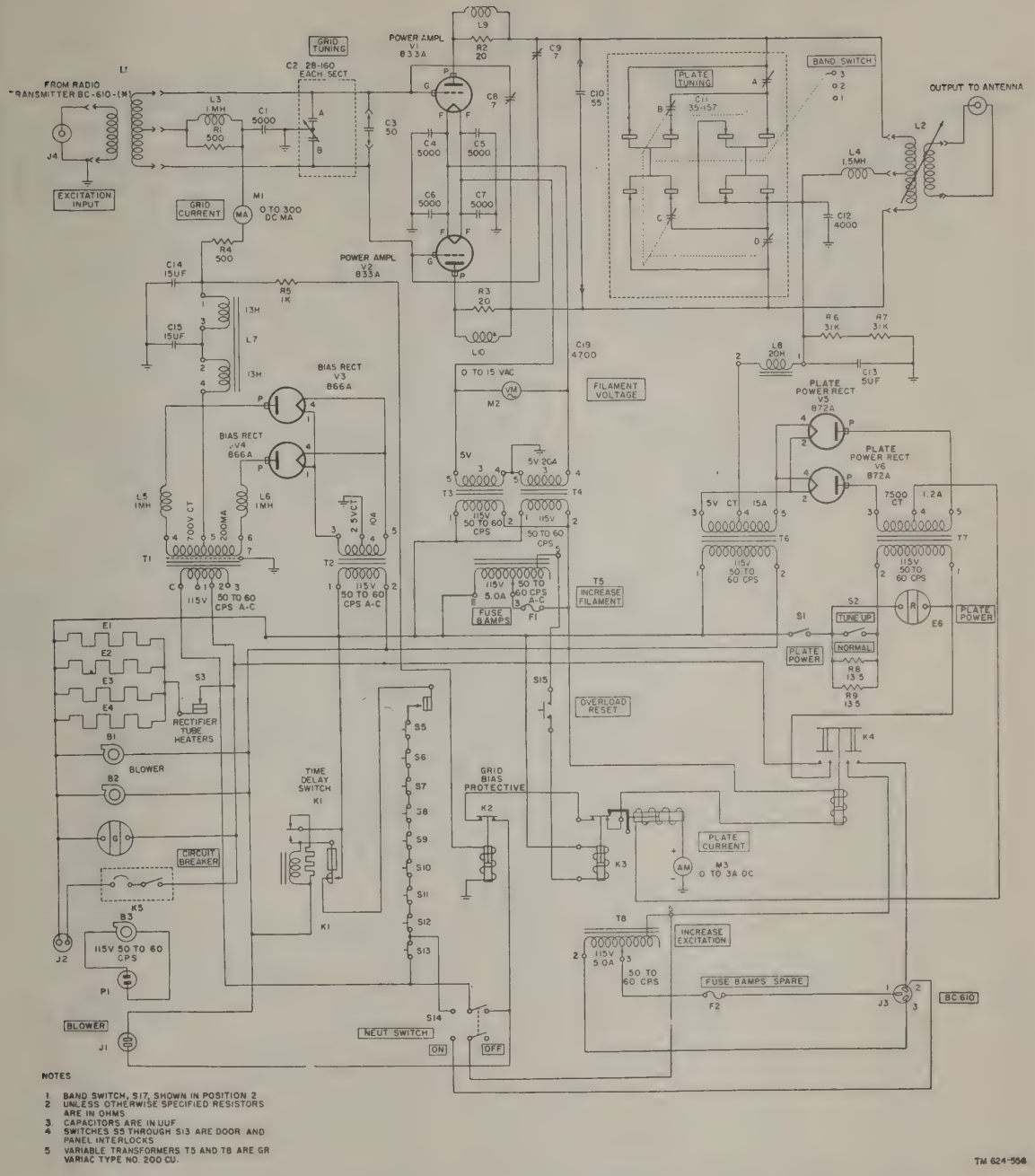


Figure 161. Amplifier AM–141/MRC and early model Amplifier AM–141A/MRC, schematic diagram.

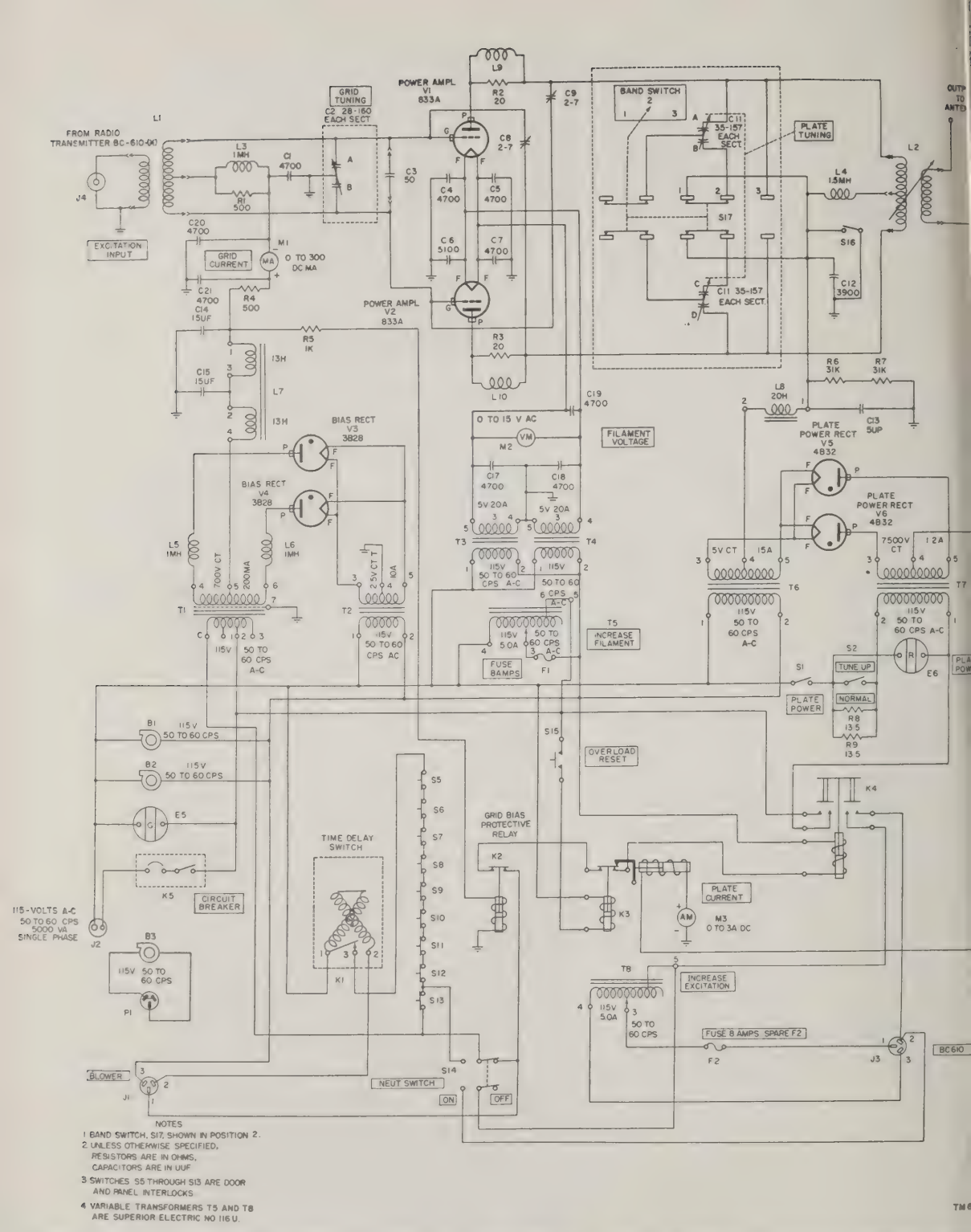
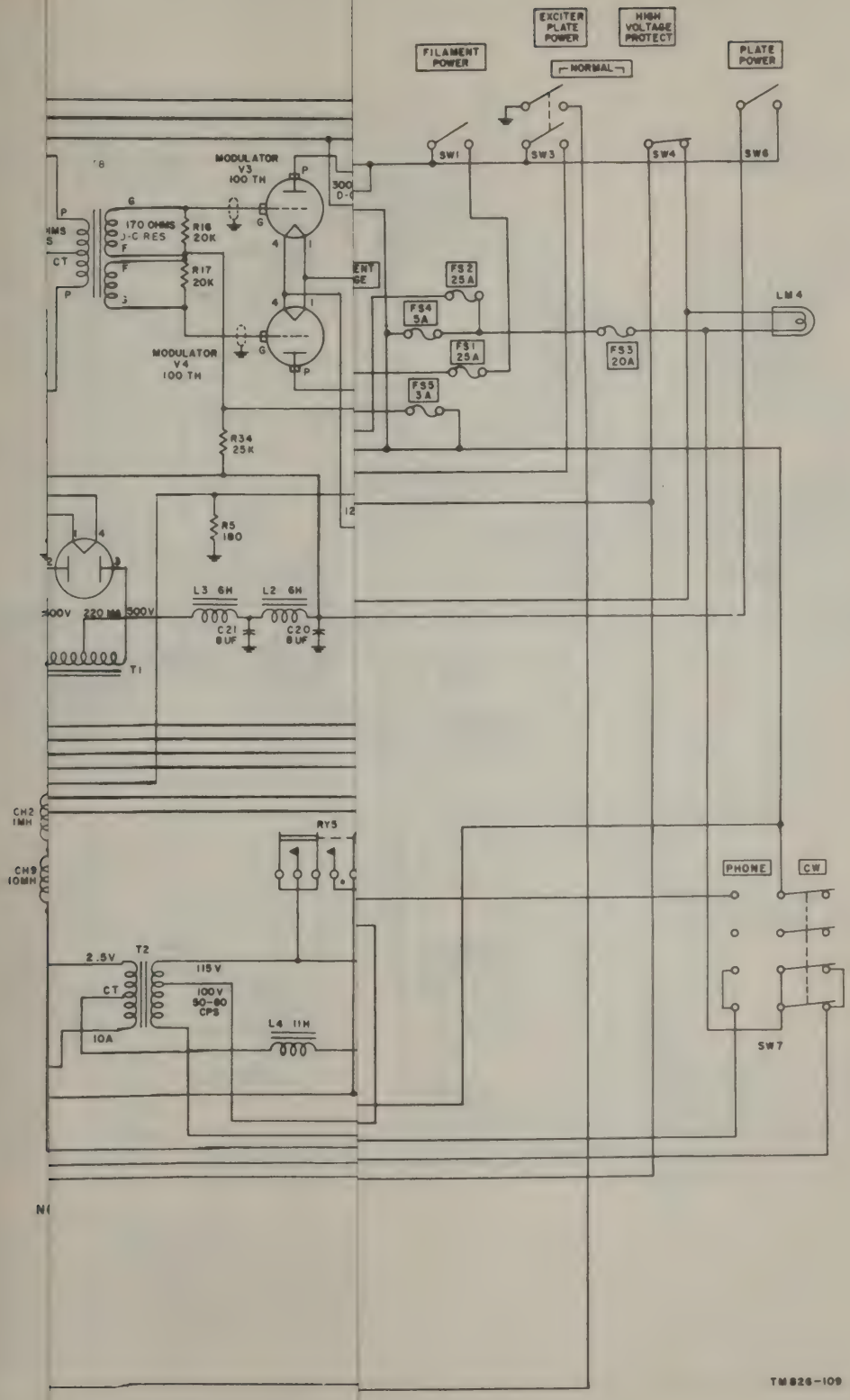


Figure 162. Amplifier AM-141A/MRC on Order No. 19624-Phila-50, and Amplifier AM-141B/MRC, schematic diagra



smitter BC–610–E, schematic diagra

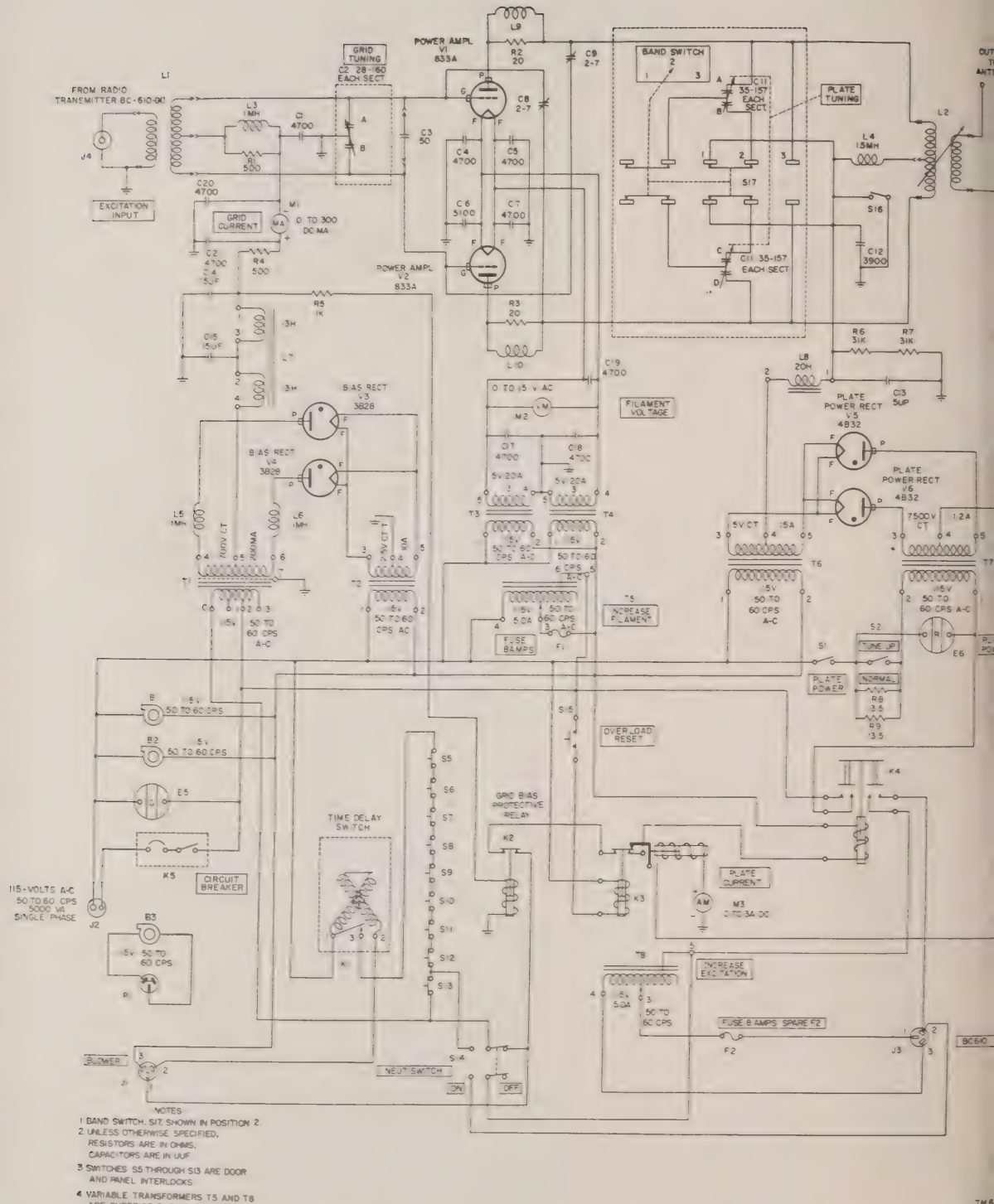


Figure 162. Amplifier AM-141A MRC on Order No. 19624-Phila-50, and Amplifier AM-141B MRC, schematic diagra

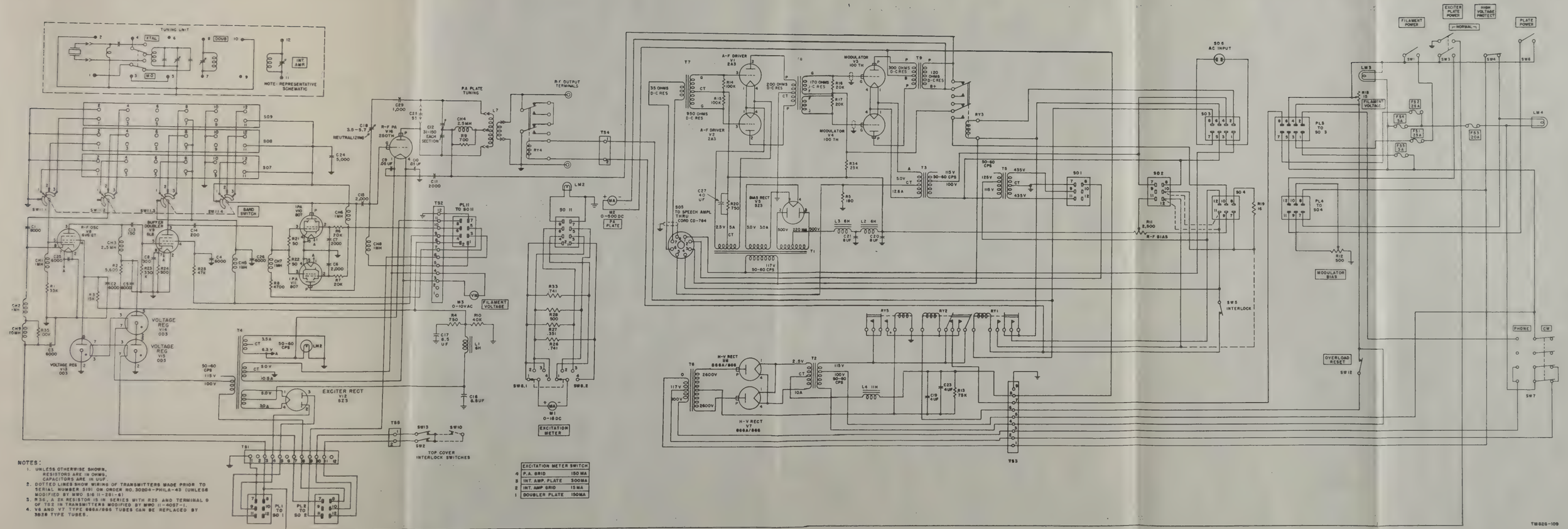


Figure 163.—Radio Transmitter BC-610-E, schematic diagram.





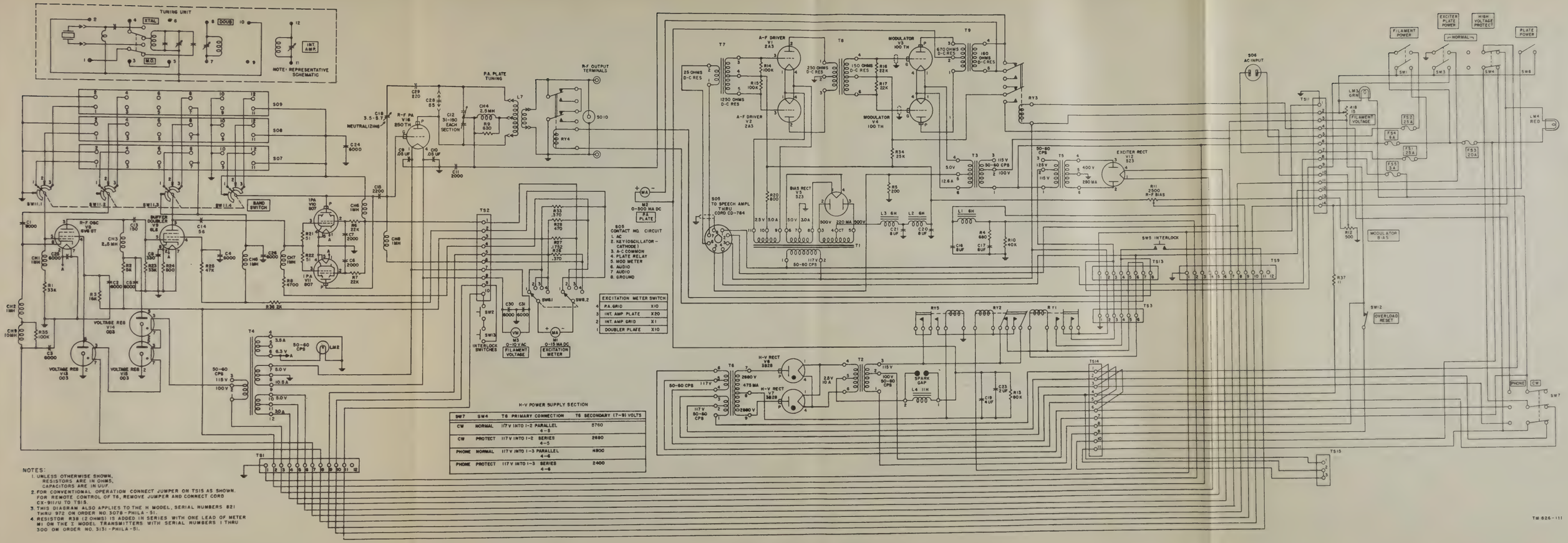


Figure 164.—Radio Transmitter BC-610-I, schematic diagram.

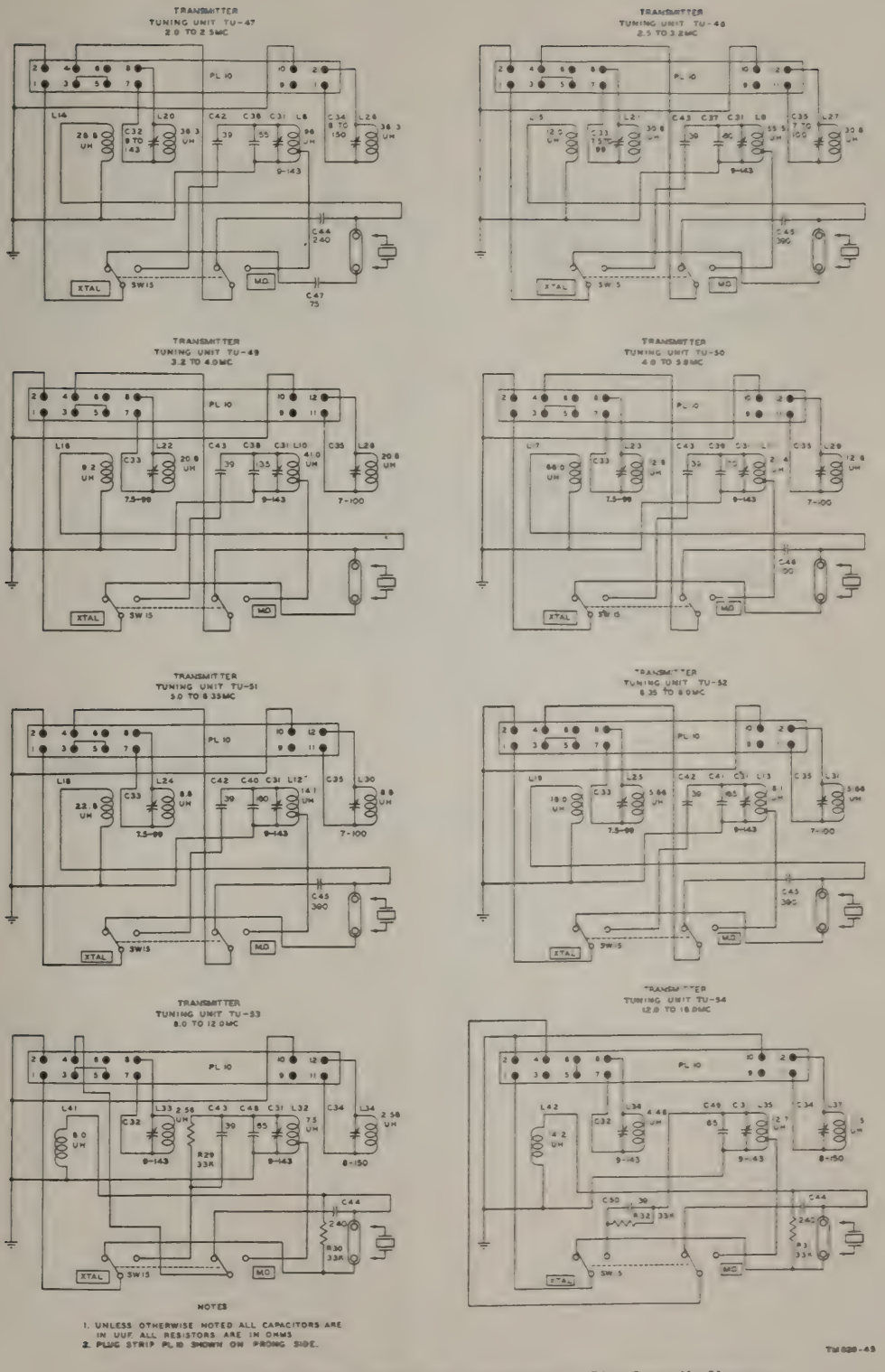


Figure 165. Transmitter Tuning Units TU–47 through TU–54, schematic diagram.

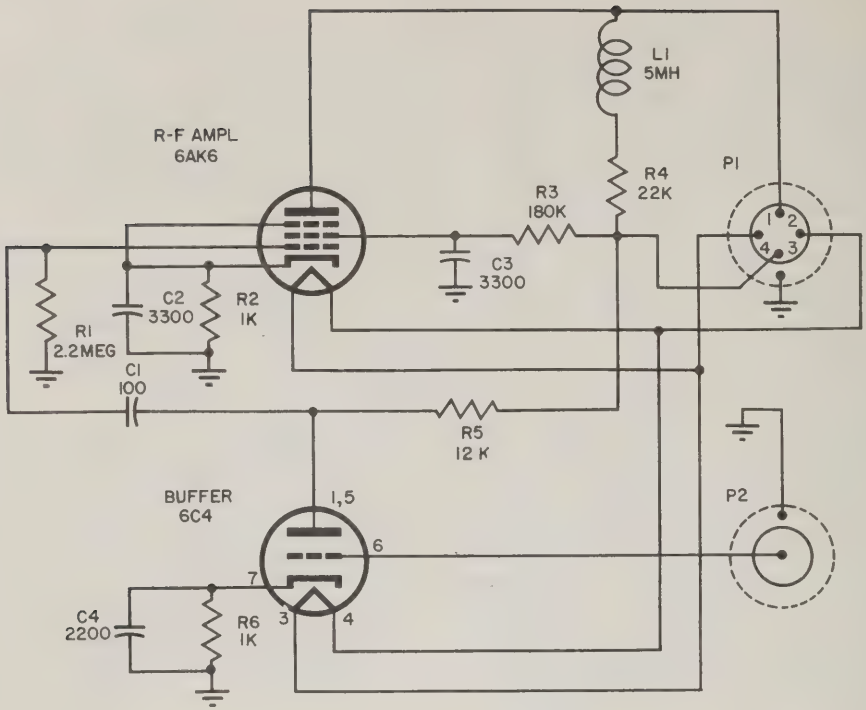
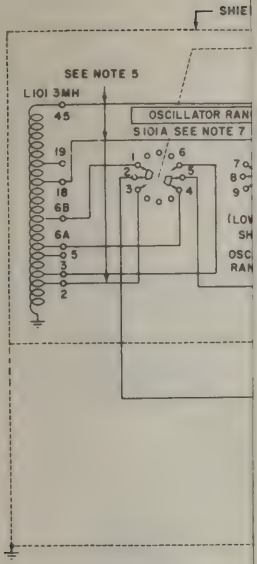
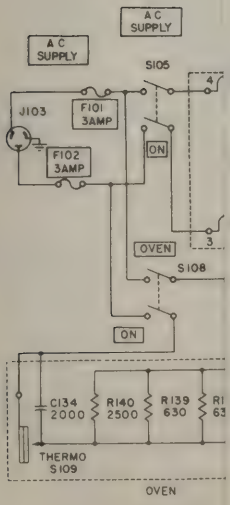


Figure 169. Oscillator-Amplifier O–59(*)/MRC, schematic diagram.


SHIE
SEE NOTE 5
L101 3MH
45
OSCILLATOR RAN
S101A SEE NOTE 7
19
18
6B
6A
5
3
2
1
6
2
3
4
7
8
9
(LOW
SH
OSC
RAN


A C SUPPLY
A C SUPPLY
S105
4
J103
F101 3AMP
F102 3AMP
ON
3
OVEN
S108
ON
C134 2000
R140 2500
R139 630
THERMO S109
OVEN

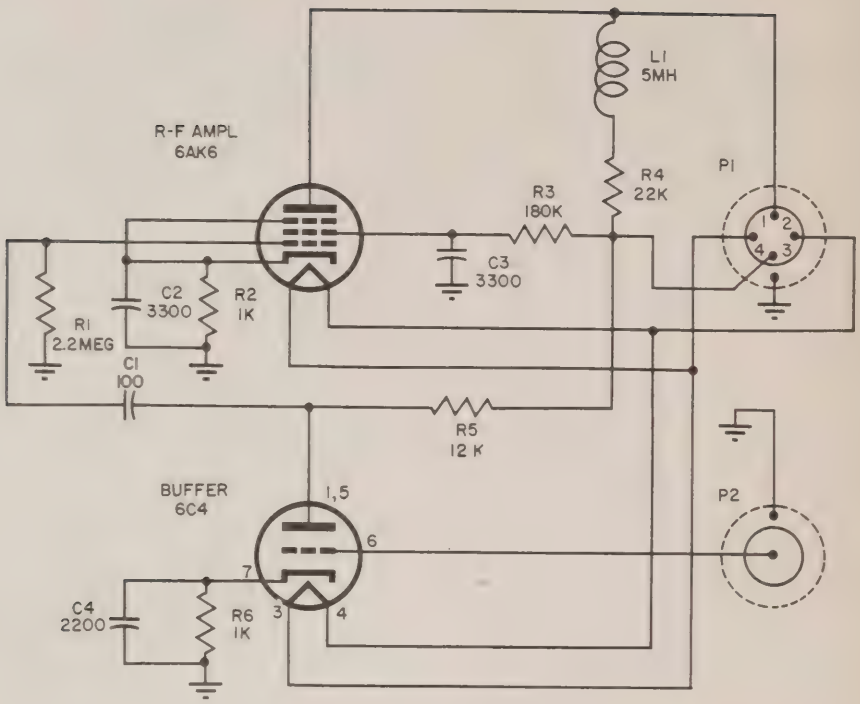
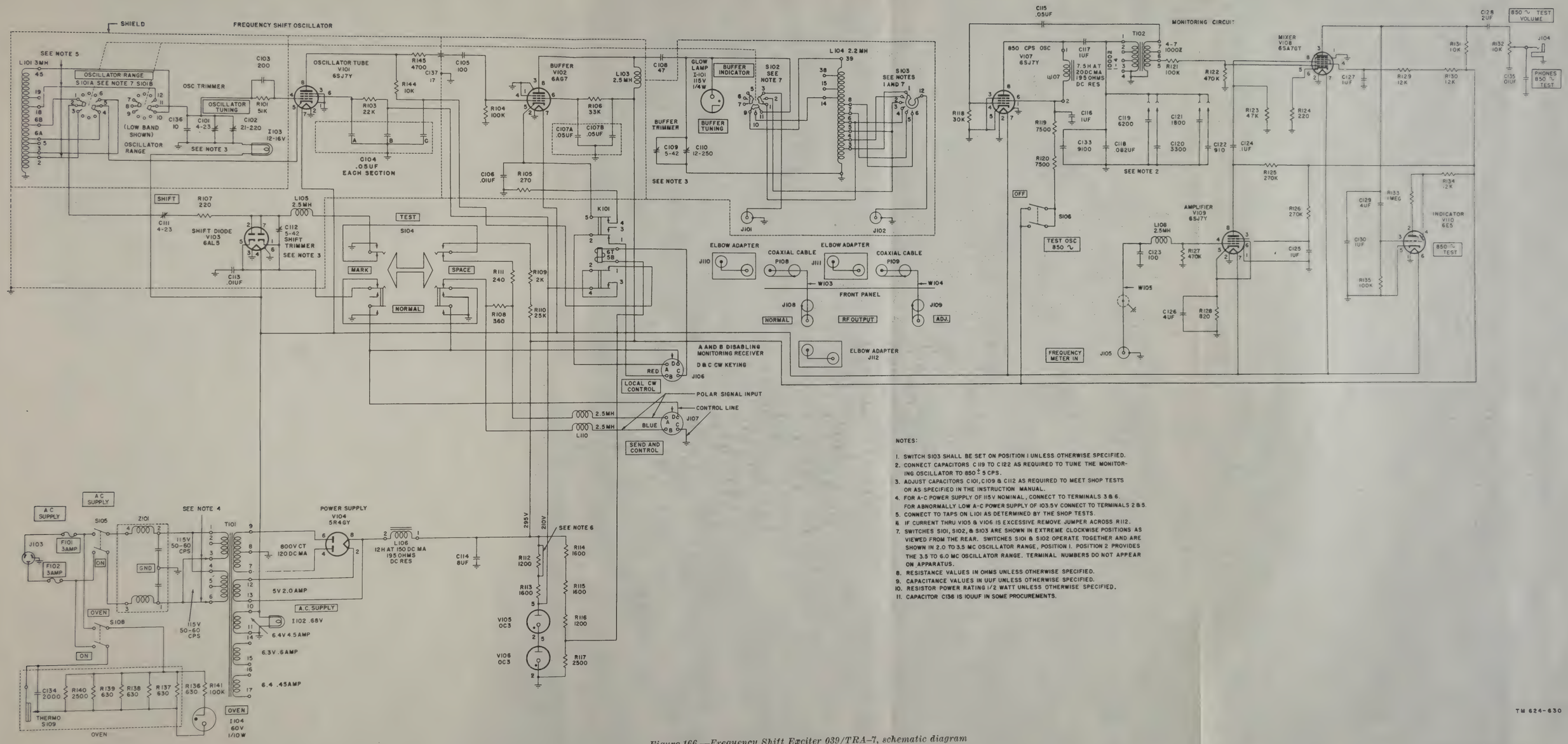


Figure 169. Oscillator-Amplifier O–59(*)/MRC, schematic diagram.



NOTES:

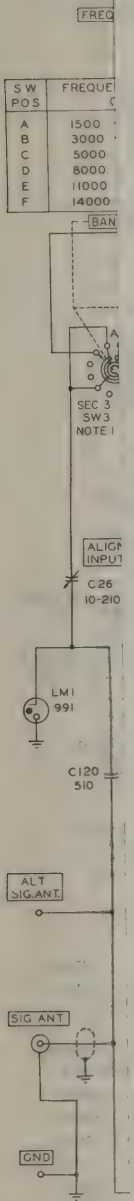
1. SWITCH S103 SHALL BE SET ON POSITION 1 UNLESS OTHERWISE SPECIFIED.
2. CONNECT CAPACITORS C119 TO C122 AS REQUIRED TO TUNE THE MONITORING OSCILLATOR TO 850 ± 5 CPS.
3. ADJUST CAPACITORS C101, C109 & C112 AS REQUIRED TO MEET SHOP TESTS OR AS SPECIFIED IN THE INSTRUCTION MANUAL.
4. FOR A-C POWER SUPPLY OF 115V NOMINAL, CONNECT TO TERMINALS 3 & 6. FOR ABNORMALLY LOW A-C POWER SUPPLY OF 103.5V CONNECT TO TERMINALS 2 & 5.
5. CONNECT TO TAPS ON L101 AS DETERMINED BY THE SHOP TESTS.
6. IF CURRENT THRU V105 & V106 IS EXCESSIVE REMOVE JUMPER ACROSS R112.
7. SWITCHES S101, S102, & S103 ARE SHOWN IN EXTREME CLOCKWISE POSITIONS AS VIEWED FROM THE REAR. SWITCHES S101 & S102 OPERATE TOGETHER AND ARE SHOWN IN 2.0 TO 3.5 MC OSCILLATOR RANGE, POSITION 1. POSITION 2 PROVIDES THE 3.5 TO 6.0 MC OSCILLATOR RANGE. TERMINAL NUMBERS DO NOT APPEAR ON APPARATUS.
8. RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
9. CAPACITANCE VALUES IN UUF UNLESS OTHERWISE SPECIFIED.
10. RESISTOR POWER RATING 1/2 WATT UNLESS OTHERWISE SPECIFIED.
11. CAPACITOR C136 IS 100UUF IN SOME PROCUREMENTS.

Figure 166 —Frequency Shift Exciter 039/TRA-7, schematic diagram








FREQ
SW POS
A
B
C
D
E
F
1500
3000
5000
8000
11000
14000
BAN
SEC 3
SW3
NOTE 1
ALIGN
INPUT
C26
10-210
LM1
991
C120
510
ALT
SIG.ANT.
SIG ANT
GND



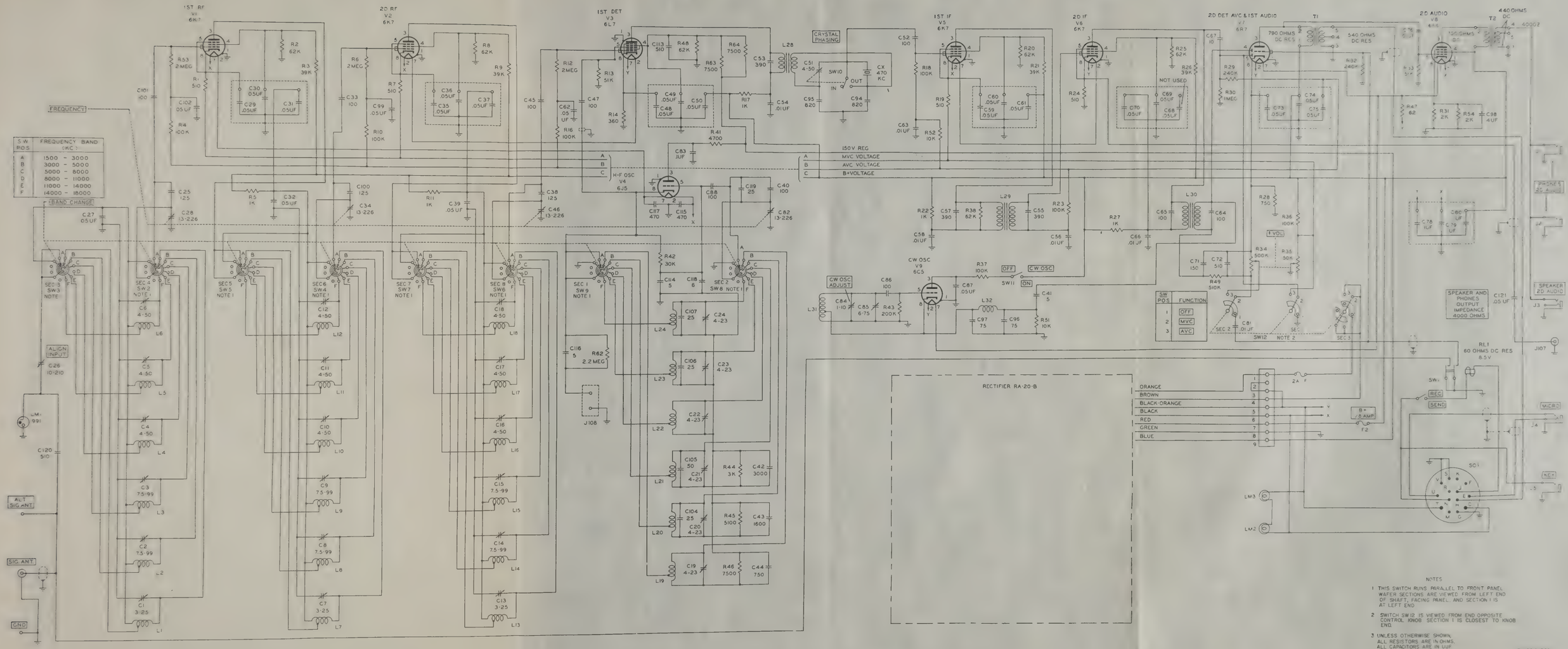
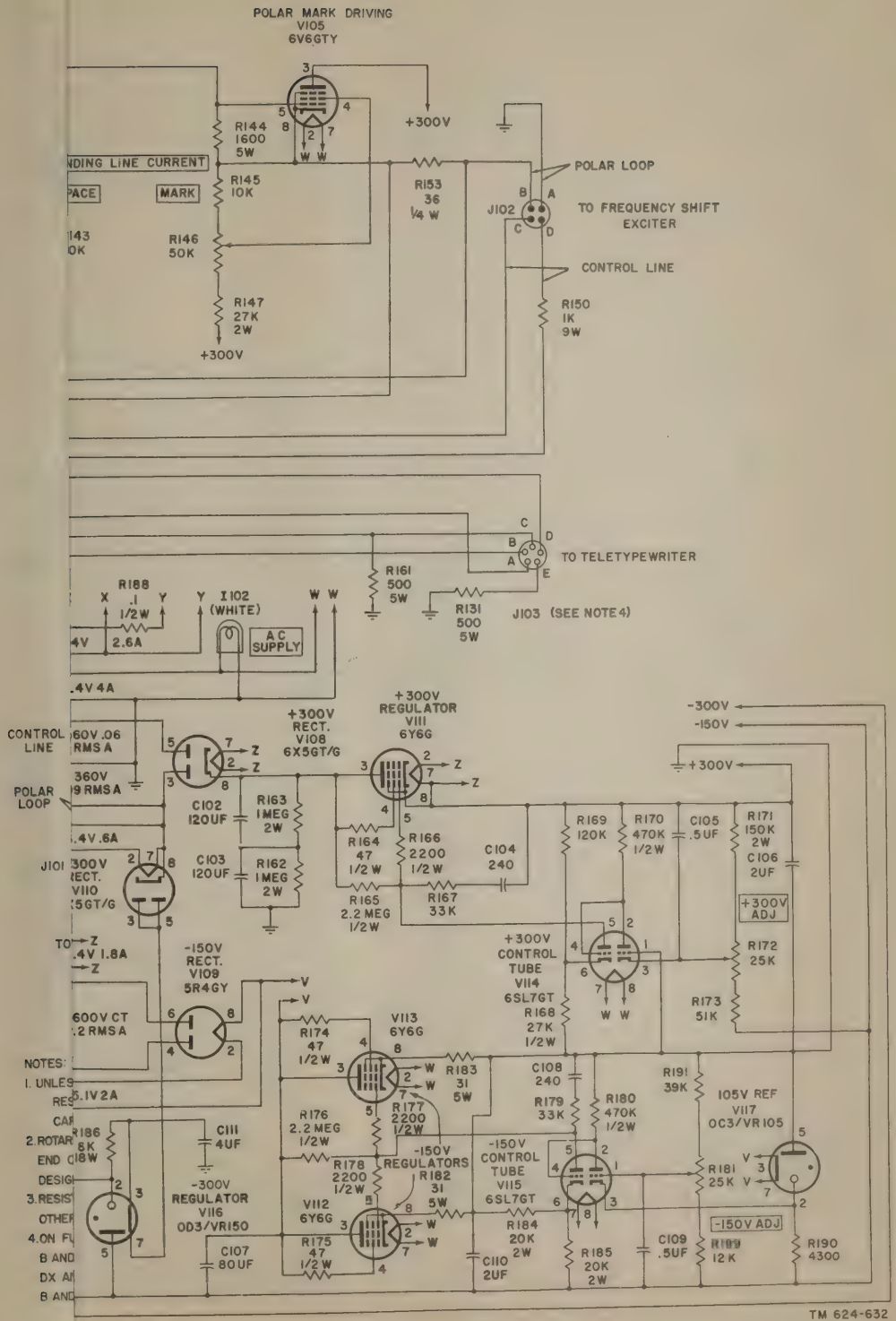


Figure 167—Radio Receiver Assembly OA-65A/MRC-2, Channel A receiver, schematic diagram.




POLAR MARK DRIVING
V105
6V6GTY
+300V
R144
1600
5W
R145
10K
R146
50K
R147
27K
2W
+300V
R153
36
¼ W
POLAR LOOP
J102
TO FREQUENCY SHIFT
EXCITER
CONTROL LINE
R150
1K
9W
MARK
R161
500
5W
R131
500
5W
J103 (SEE NOTE 4)
TO TELETYPEWRITER
R188
1/2W
I102
(WHITE)
AC
SUPPLY
2.6A
+300V
REGULATOR
V111
6Y6G
+300V
RECT.
V108
6X5GT/G
CONTROL
LINE
POLAR
LOOP
C102
120UF
C103
120UF
R163
1MEG
2W
R162
1MEG
2W
R164
47
1/2W
R165
2.2MEG
1/2W
R166
2200
1/2W
R167
33K
C104
240
R169
120K
R170
470K
1/2W
C105
.5UF
R171
150K
2W
C106
2UF
+300V
ADJ
R172
25K
R173
51K
+300V
CONTROL
TUBE
V114
6SL7GT
R168
27K
1/2W
-300V
-150V
+300V
-150V
RECT.
V109
5R4GY
V113
6Y6G
R174
47
1/2W
R183
31
5W
R177
2200
1/2W
R176
2.2MEG
1/2W
R178
2200
1/2W
-150V
REGULATORS
R182
31
5W
V112
6Y6G
R175
47
1/2W
-150V
CONTROL
TUBE
V115
6SL7GT
R184
20K
2W
C110
2UF
R185
20K
2W
C108
240
R179
33K
R180
470K
1/2W
R191
39K
105V REF
V117
0C3/VR105
R181
25K
-150V ADJ
R189
12K
C109
.5UF
R190
4300
C111
4UF
C107
80UF
-300V
REGULATOR
V116
0D3/VR150
R186
8K
18W
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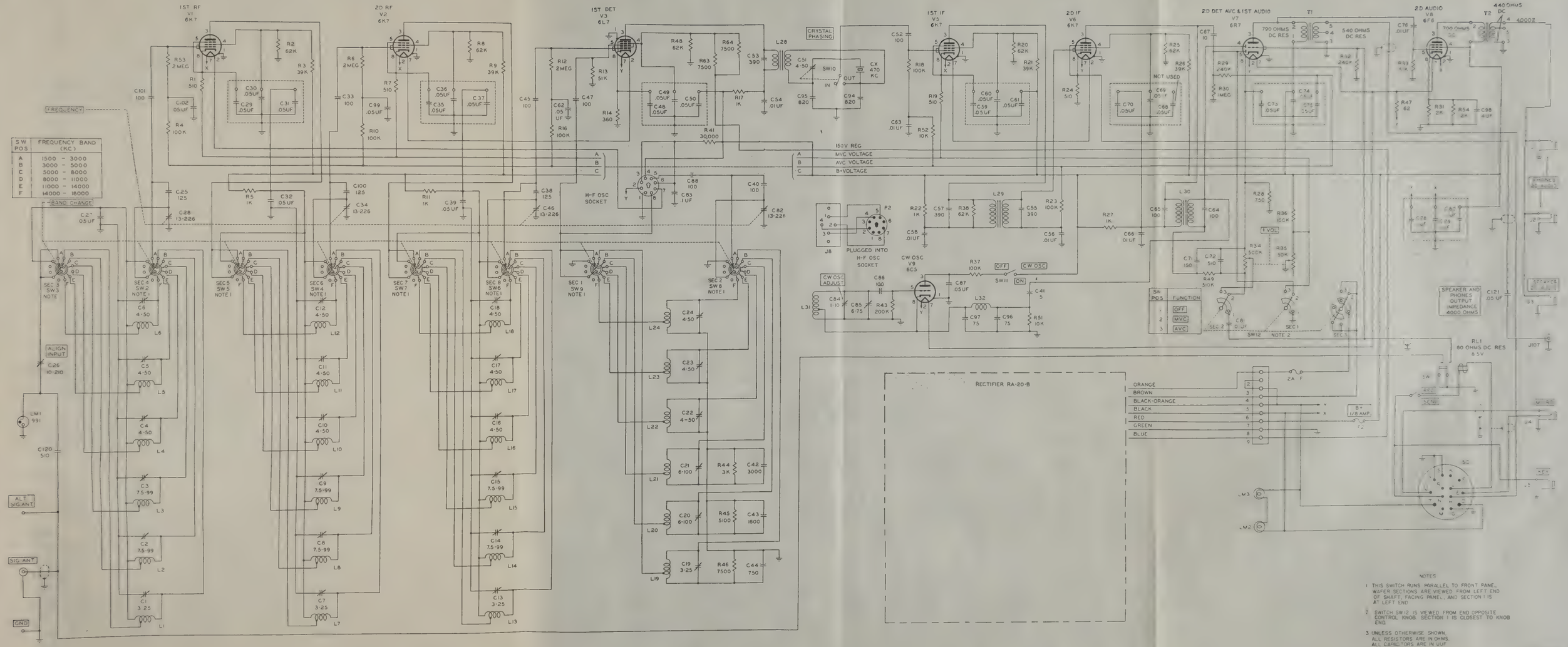
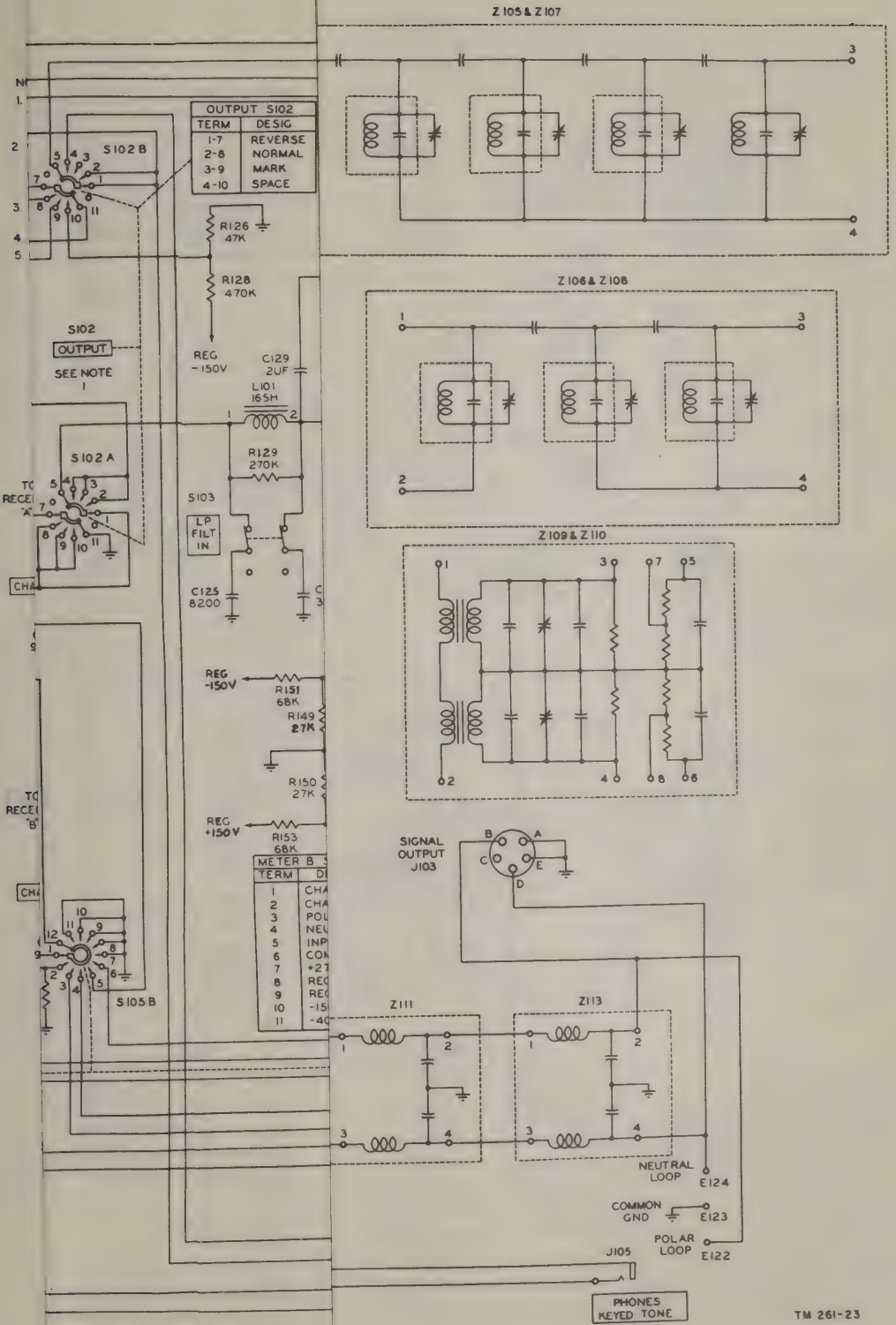
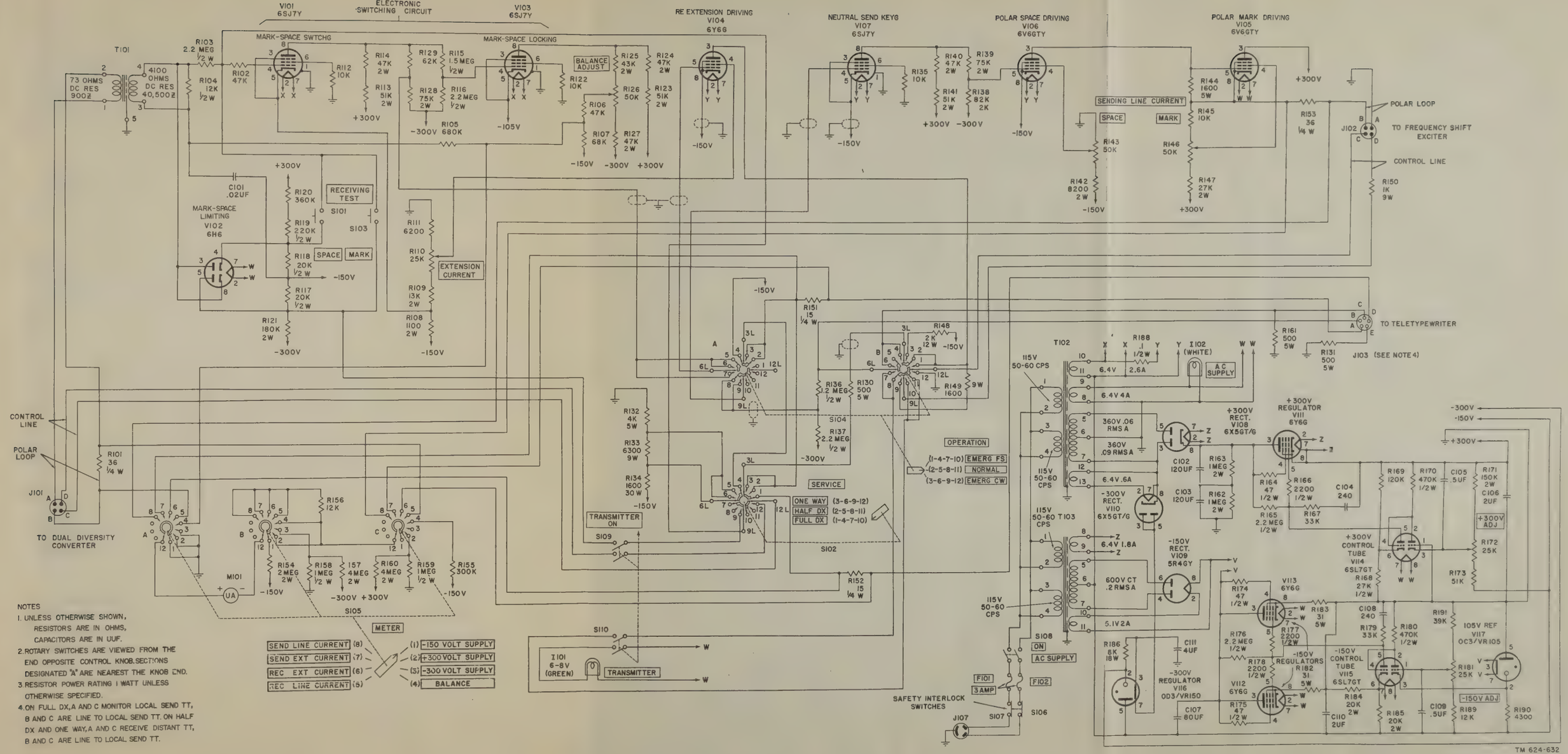


Figure 168 —Radio Receiver Assembly OA–65A/MRC–2, Channel B receiver, schematic diagram.



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nverters CV-31C/TRA-7 and C
diagram.

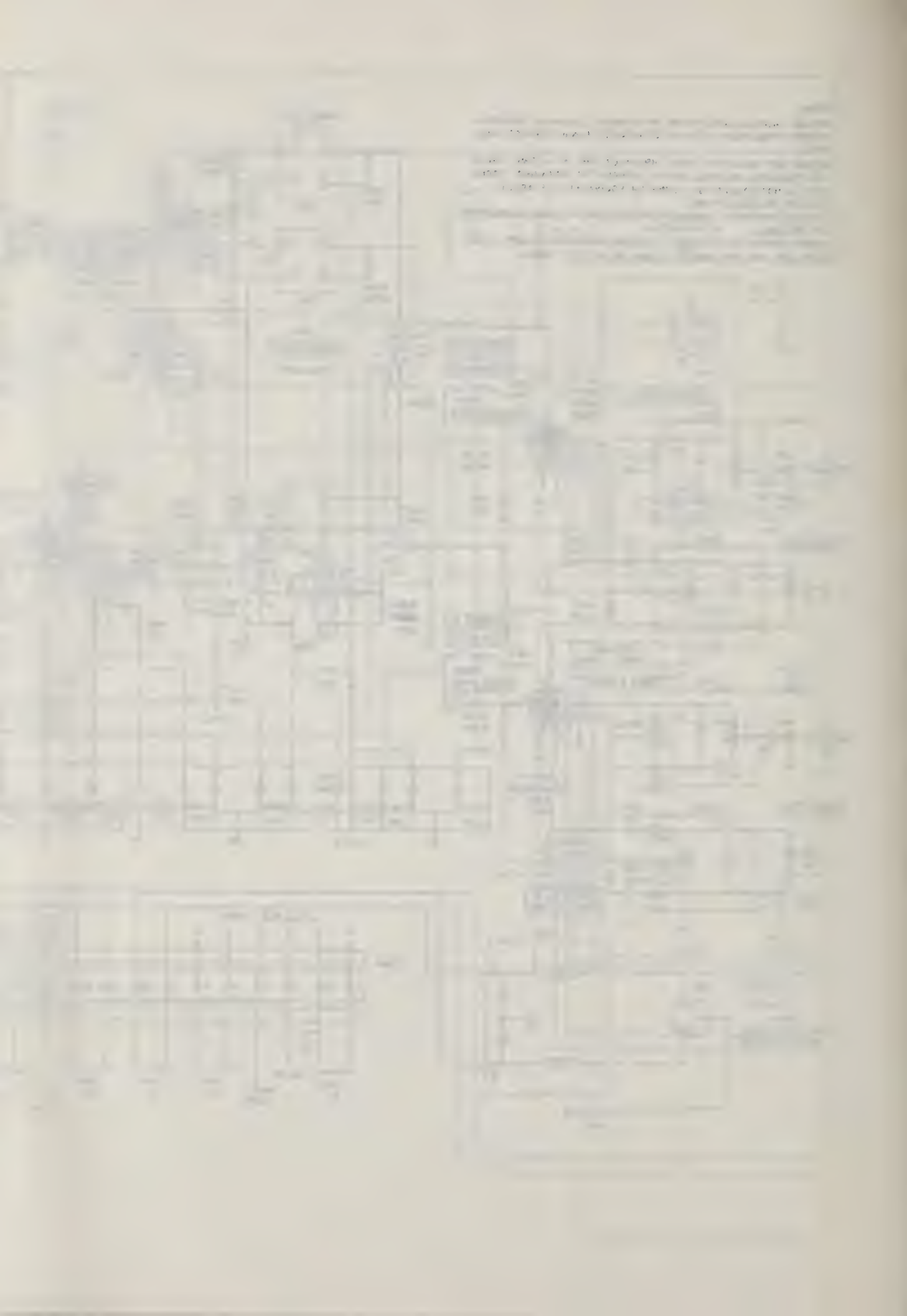


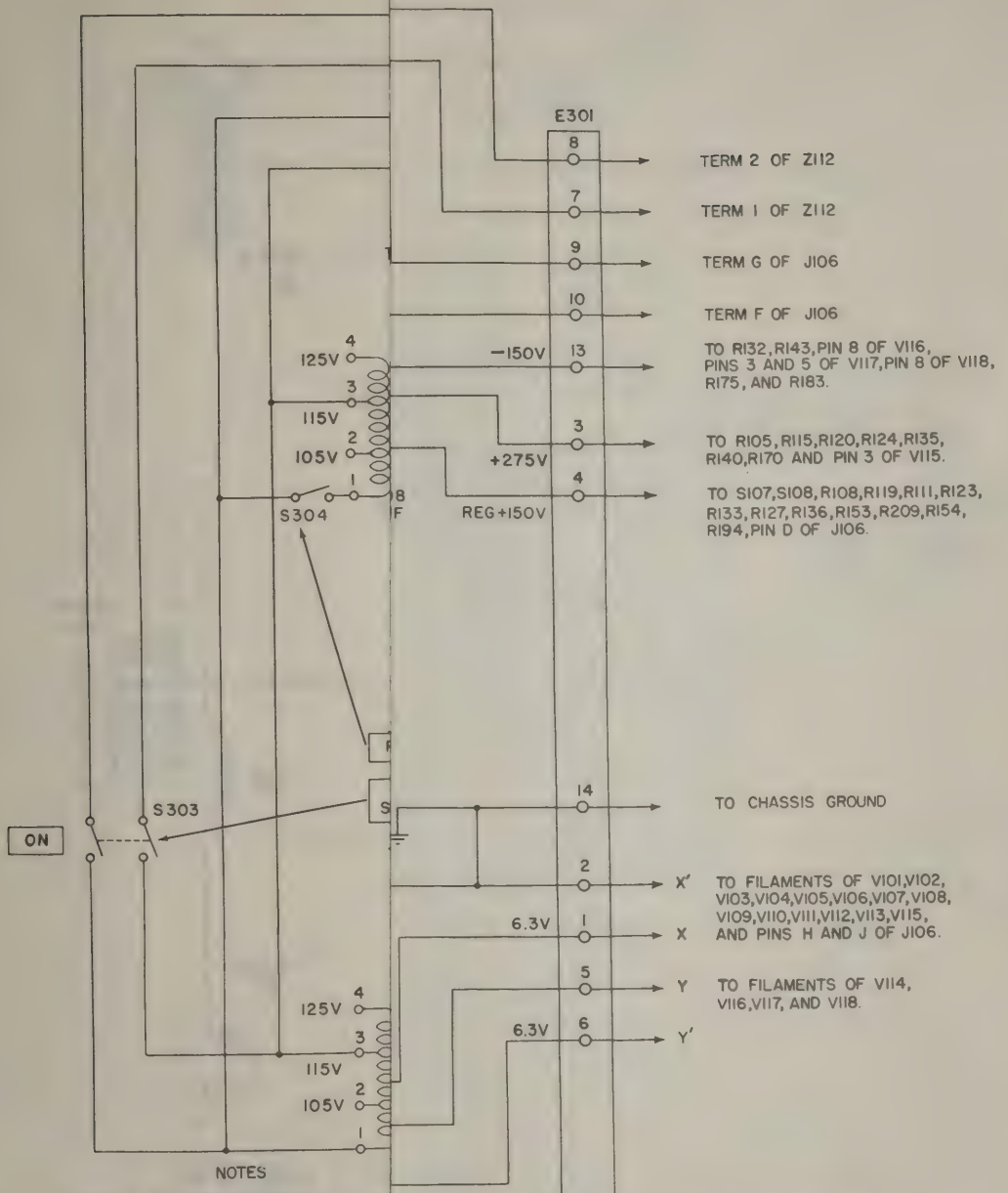
NOTES

1. UNLESS OTHERWISE SHOWN, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF.
2. ROTARY SWITCHES ARE VIEWED FROM THE END OPPOSITE CONTROL KNOB. SECTIONS DESIGNATED "A" ARE NEAREST THE KNOB END.
3. RESISTOR POWER RATING 1 WATT UNLESS OTHERWISE SPECIFIED.
4. ON FULL DX, A AND C MONITOR LOCAL SEND TT, B AND C ARE LINE TO LOCAL SEND TT. ON HALF DX AND ONE WAY, A AND C RECEIVE DISTANT TT, B AND C ARE LINE TO LOCAL SEND TT.

Figure 170—Control Unit C-292B/TRA-7, schematic diagram.

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NOTES

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE IN OHMS, ALL CAPACITORS ARE IN UUF.
2. IN THE BASIC MODEL S301 AND S302 ARE CONNECTED DIRECTLY TO J104.
3. CONNECTIONS FROM TERMINAL BOARD E301 TERMINATE IN DUAL DIVERSITY CONVERTER CV-31(X)/TRA-
4. *13H IN BASIC AND EARLY A MODELS.

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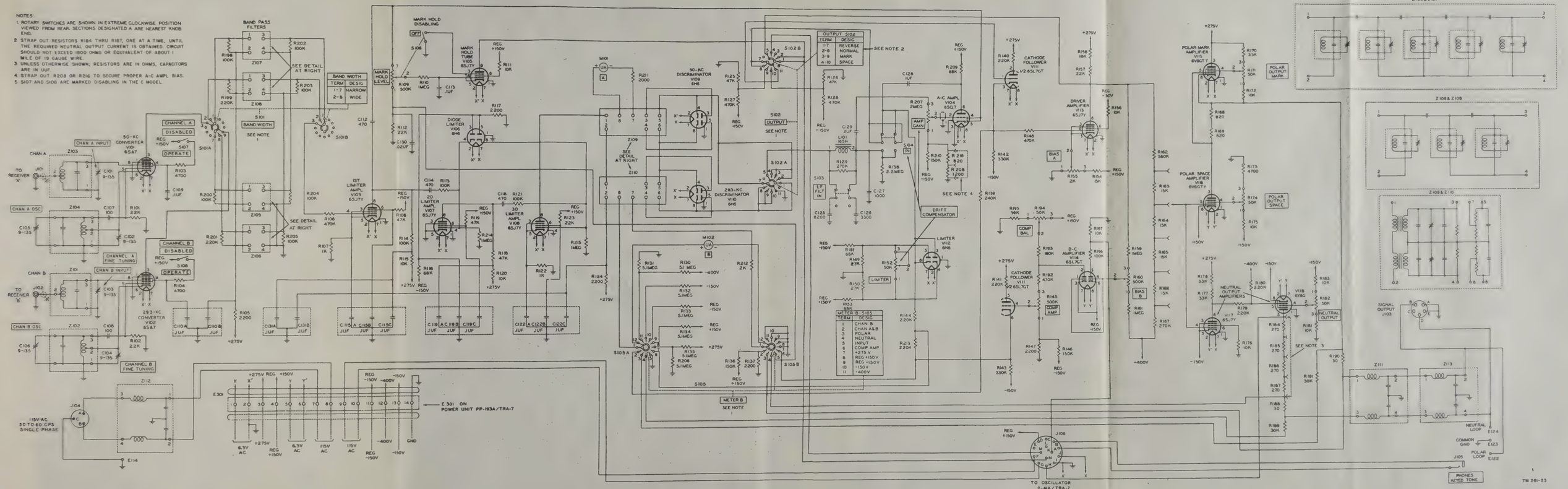
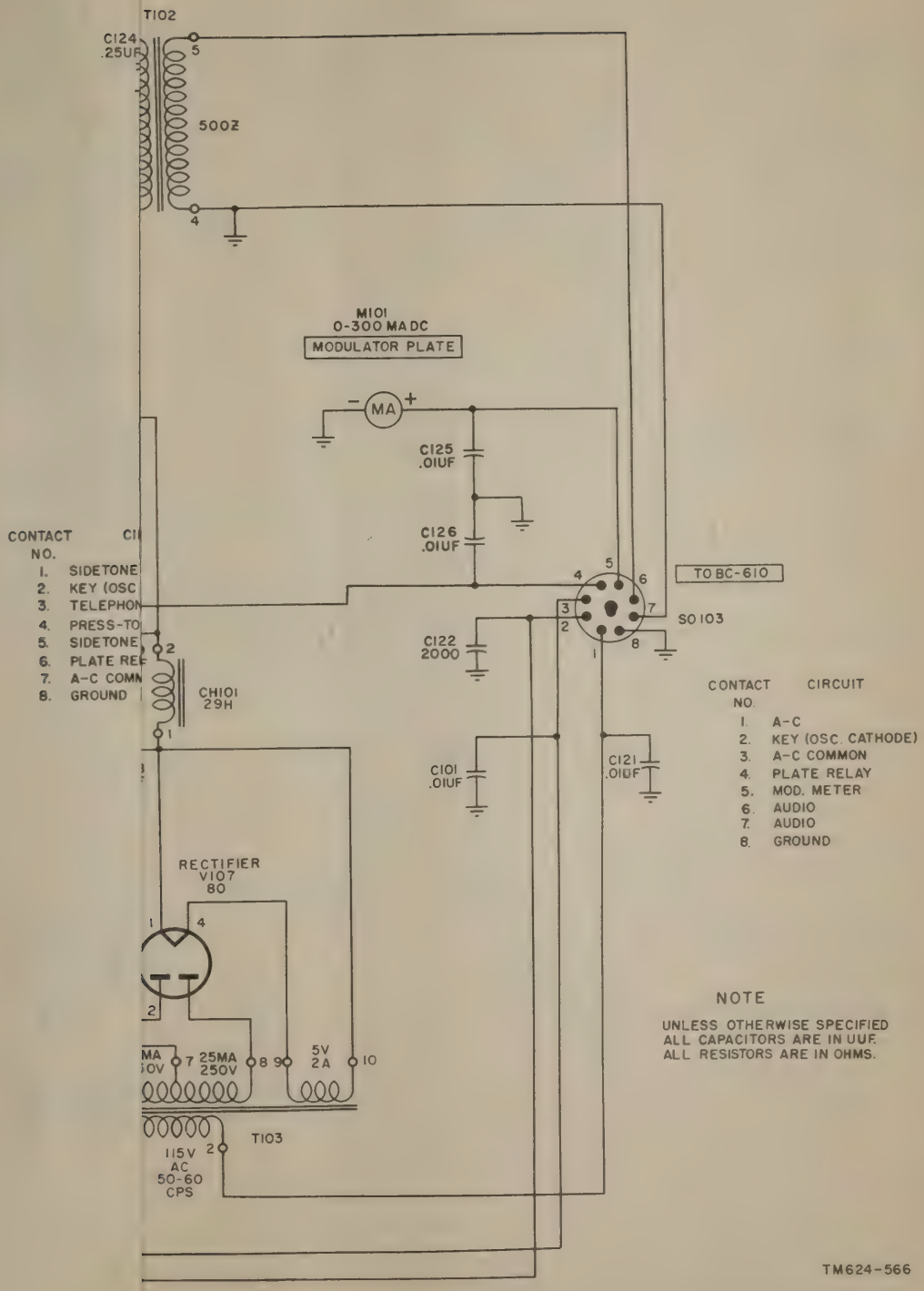


Figure 171.—Dual Diversity Converters CV-31C/TRA-7 and CV-31D/TRA-7, schematic diagram.




T102
C124
.25UF
500Z
M101
0-300 MA DC
MODULATOR PLATE
MA
C125
.01UF
C126
.01UF
TO BC-610
SO 103
C122
2000
CH101
29H
C101
.01UF
C121
.01UF
CONTACT NO.
1. SIDETONE
2. KEY (OSC
3. TELEPHON
4. PRESS-TO
5. SIDETONE
6. PLATE REF
7. A-C COMM
8. GROUND
CONTACT NO.
CIRCUIT
1. A-C
2. KEY (OSC. CATHODE)
3. A-C COMMON
4. PLATE RELAY
5. MOD. METER
6. AUDIO
7. AUDIO
8. GROUND
RECTIFIER
V107
80
MA
7 25MA
250V
8 9
5V
2A
10
T103
115V
AC
50-60
CPS
NOTE
UNLESS OTHERWISE SPECIFIED
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

TM624-566



F302 3AMP
F301 3AMP
S302
SAFETY SWITCHES
S301
106-125 V 50-60 CPS
E301
TERM 2 OF Z112
TERM 1 OF Z112
TERM G OF J106
TERM F OF J106
TO R132, R143, PIN 8 OF V116, PINS 3 AND 5 OF V117, PIN 8 OF V118, R175, AND R183.
TO R105, R115, R120, R124, R135, R140, R170 AND PIN 3 OF V115.
TO S107, S108, R108, R119, R111, R123, R133, R127, R136, R153, R209, R154, R194, PIN D OF J106.
TO CHASSIS GROUND
TO FILAMENTS OF V101, V102, V103, V104, V105, V106, V107, V108, V109, V110, V111, V112, V113, V115, AND PINS H AND J OF J106.
TO FILAMENTS OF V114, V116, V117, AND V118.
TO R116, R133, R128, R210, R151, AND R146.
TO R161, R167, AND R180.
L302 *
L301 *
T301
460VCT 60DC MA
-150V RECT V302 5Y3GT
12H 150 DC MA 195 OHMS DC RES
C303 8UF
C304 8UF
R307 33K
125V
115V
105V
S304
380V 75DCMA
380V 90DCMA
+275 VOLT RECT V301 5R4GY
6.3V 1A
I302 RED
C301 8UF
C302 8UF
R318 1200
R319 1200
R320 1200
R321 1200
+150V REG. V304 6V6GT
-150V
+275V
REG+150V
R311 47K
C308 2UF
R312 4700
R313 680
R314 1500
R315 2200
R316 4700
C307 .1UF
PLATE
AC SUPPLY
S303
ON
I301 WHITE
R309 27K
R308 100K
R310 22K
CONTROL TUBE V305 6SJ7Y
T302
5V 2A
5V 2A
6.3V 6A
6.3V 2.5A
5V 2A
-400V RECT V303 5Y3GT
C305 8UF
C306 8UF
-150V REGULATOR V306 0D3
R317 47K
R301 220
R302 2200
R303 3300
R304 3300
R305 3300
R306 2700
6.3V
6.3V
REG-150V
-400V

NOTES

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE IN OHMS, ALL CAPACITORS ARE IN UUF.
2. IN THE BASIC MODEL S301 AND S302 ARE CONNECTED DIRECTLY TO J104.
3. CONNECTIONS FROM TERMINAL BOARD E301 TERMINATE IN DUAL DIVERSITY CONVERTER CV-31(*)/TRA-7.
4. *13H IN BASIC AND EARLY A MODELS.

Figure 172 —Rectifier Power Units PP-193/TRA-7 and PP-193A/TRA-7, schematic diagram.

TM 261-17

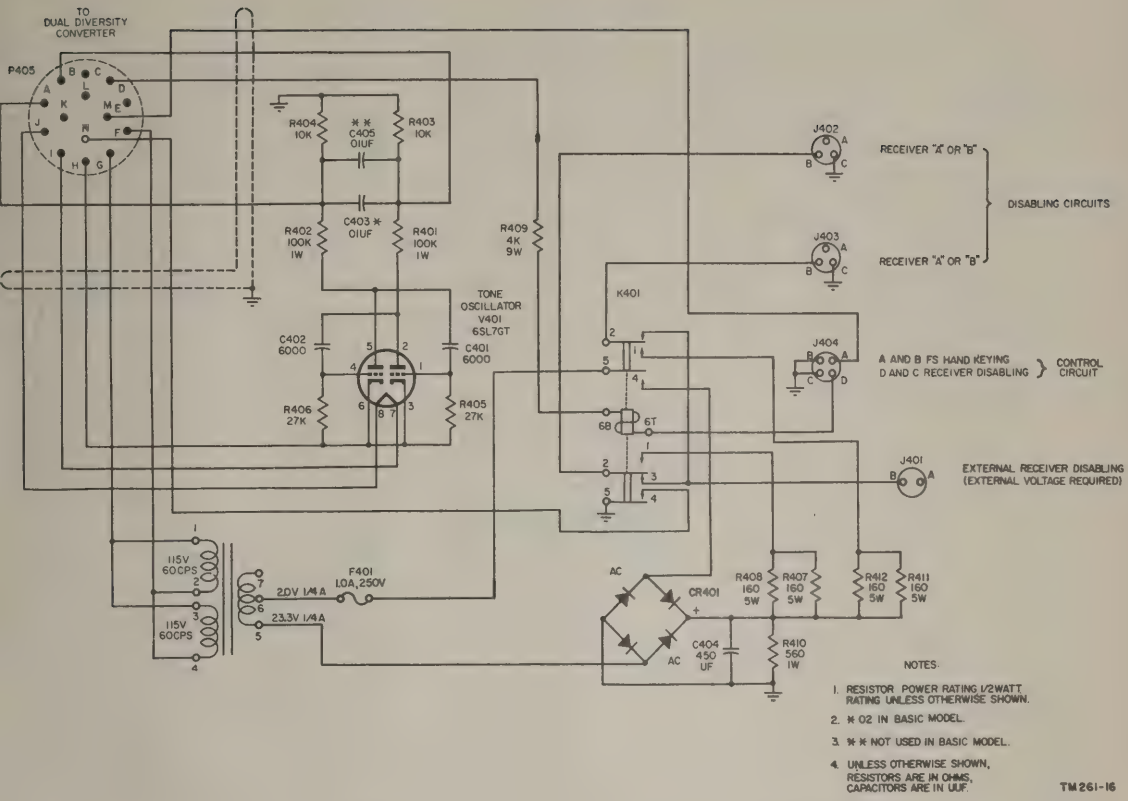


Figure 173. Oscillators O–41/TRA–7 and O–41A/TRA–7, schematic diagram.

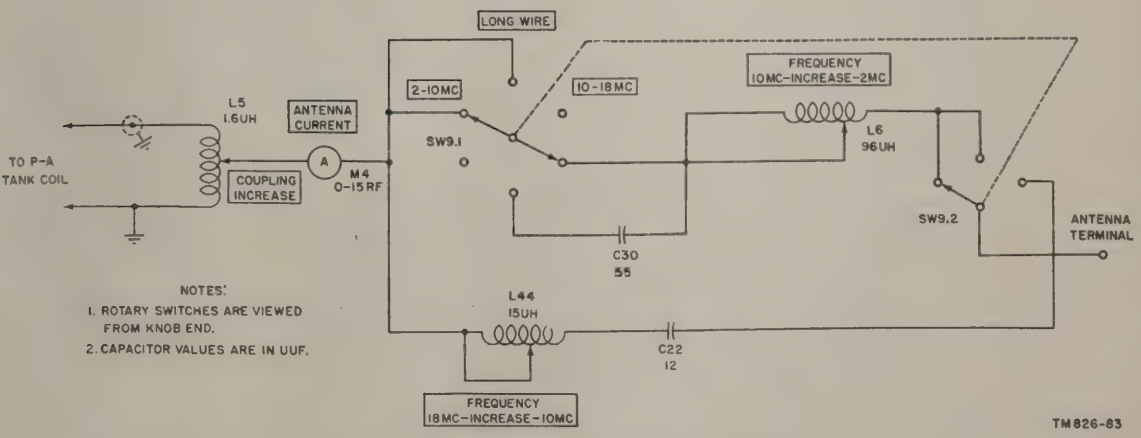


Figure 175. Antenna Tuning Units BD–939–A and BC–939–B, schematic diagram.

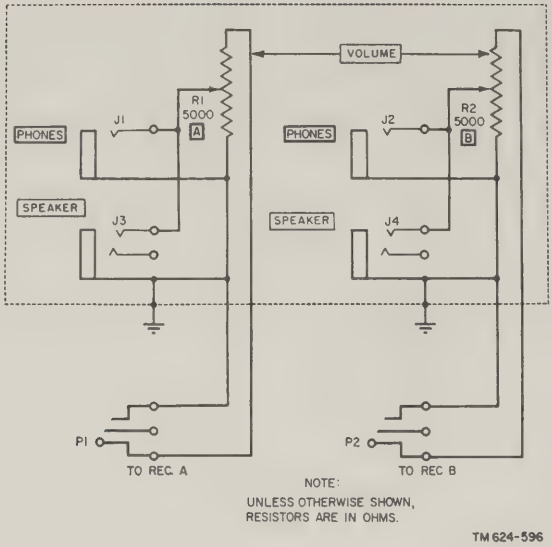
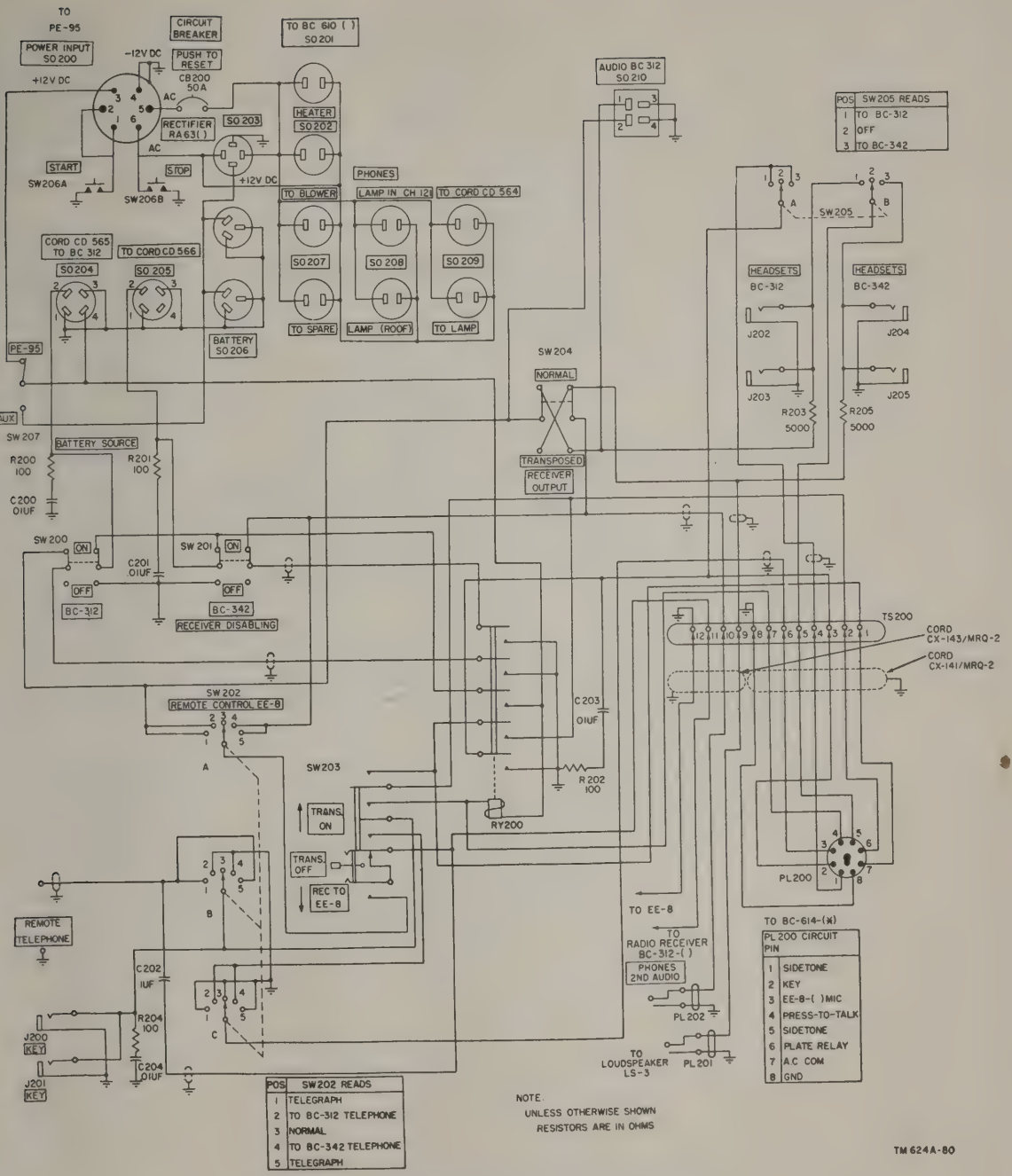


Figure 176. Control Box C-345(*)/MRC-2, schematic diagram.



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-( ) MIC
4	PRESS-TO-TALK
5	SIDETONE
6	PLATE RELAY
7	A.C COM
8	GND

Figure 177. Junction Box JB–70–A, schematic diagram.

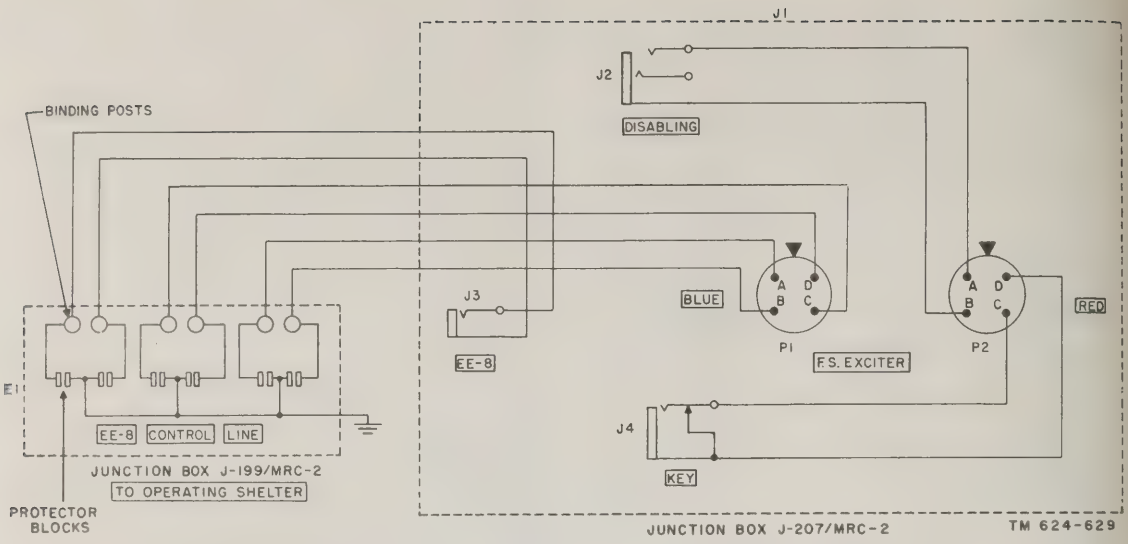


Figure 178. Junction Box J–207/MRC–2 and J–199/MRC–2, schematic diagram.

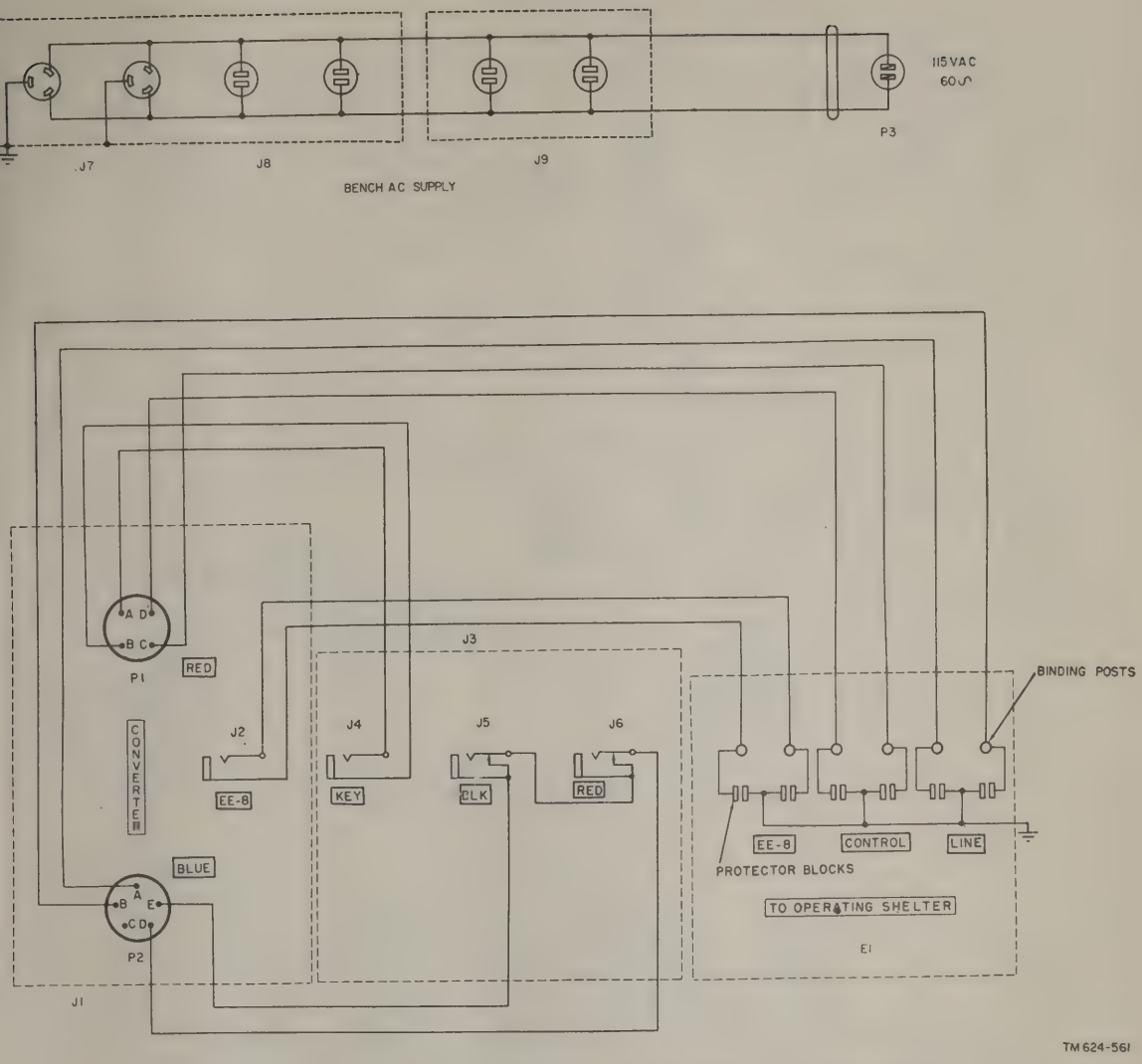


Figure 179. Operating Table FN–23/MRC–2, Receiving Shelter, schematic diagram.

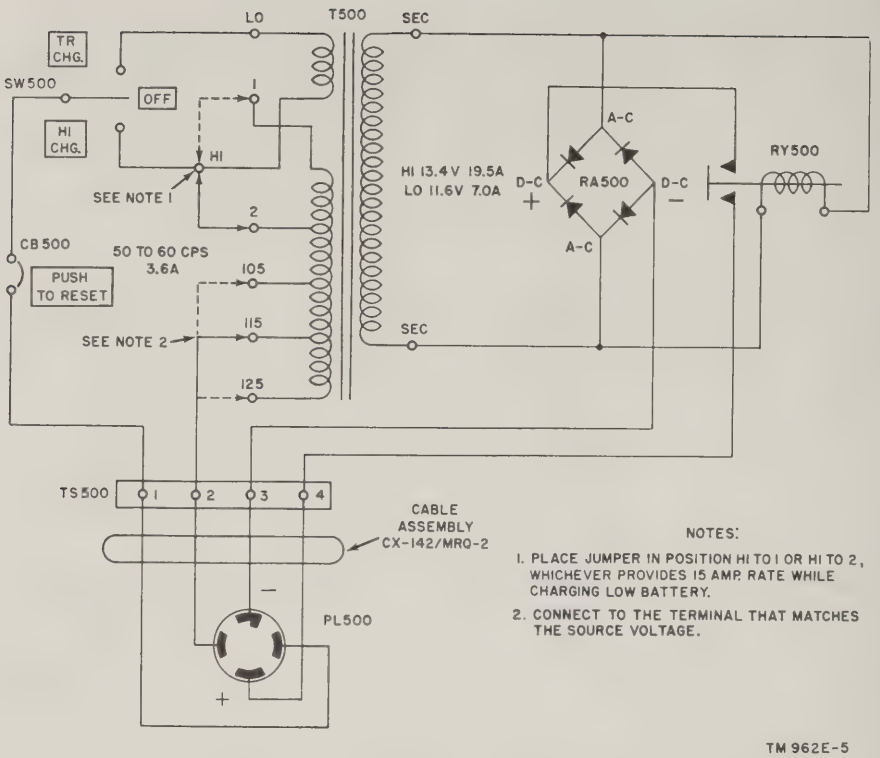


Figure 181. Rectifier RA–63–E, schematic diagram.

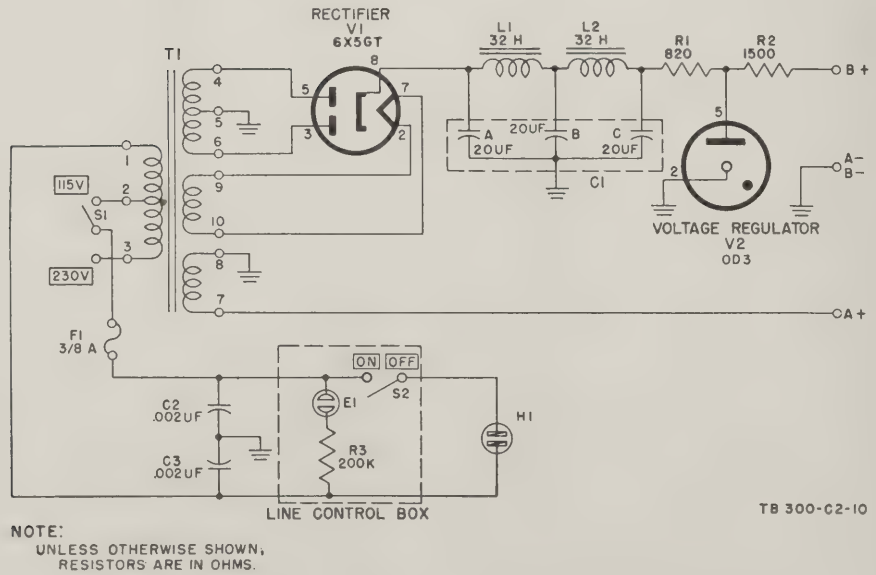
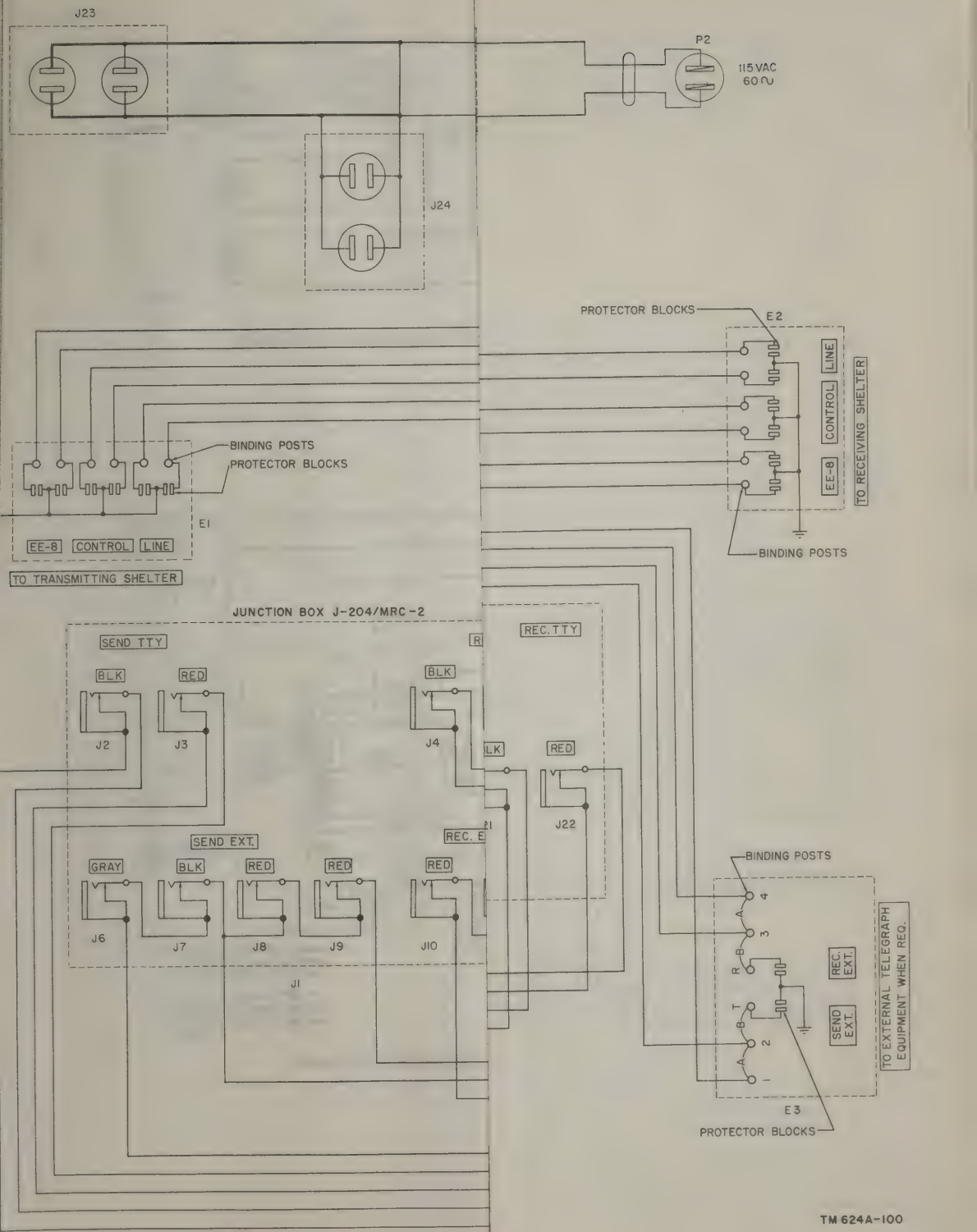


Figure 182. Rectifier Power Unit RA–133–A, schematic diagram.


J23
P2
115 VAC
60 ∩
J24
PROTECTOR BLOCKS
E2
LINE
CONTROL
EE-8
TO RECEIVING SHELTER
BINDING POSTS
PROTECTOR BLOCKS
E1
EE-8
CONTROL
LINE
TO TRANSMITTING SHELTER
BINDING POSTS
JUNCTION BOX J-204/MRC-2
SEND TTY
REC. TTY
BLK
RED
J2
J3
J4
J22
SEND EXT.
REC. E
GRAY
J6
J7
J8
J9
J10
J1
BINDING POSTS
R
T
REC. EXT.
SEND EXT.
TO EXTERNAL TELEGRAPH EQUIPMENT WHEN REQ.
E3
PROTECTOR BLOCKS

TM 624A-100

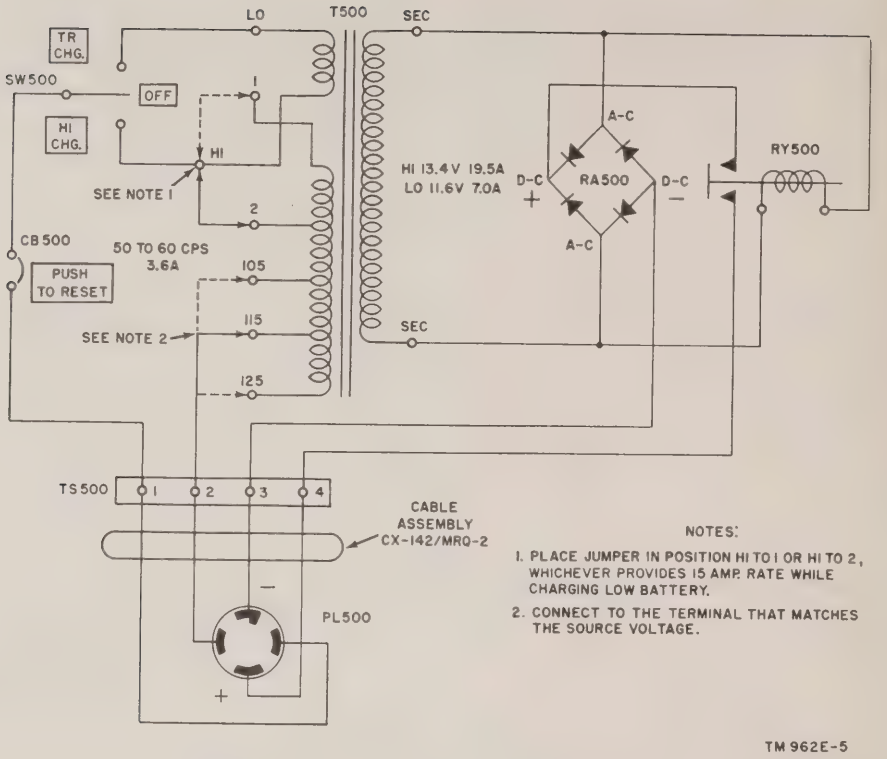


Figure 181. Rectifier RA–63–E, schematic diagram.

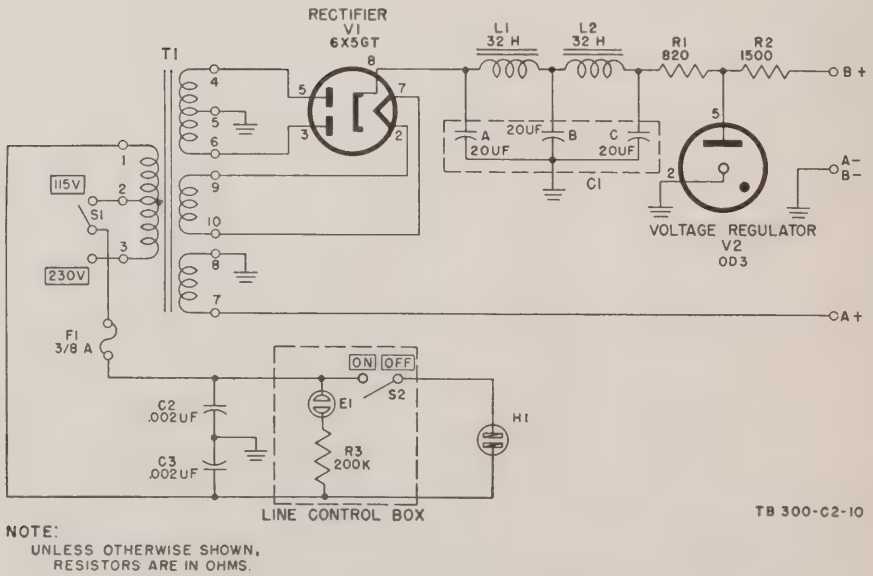
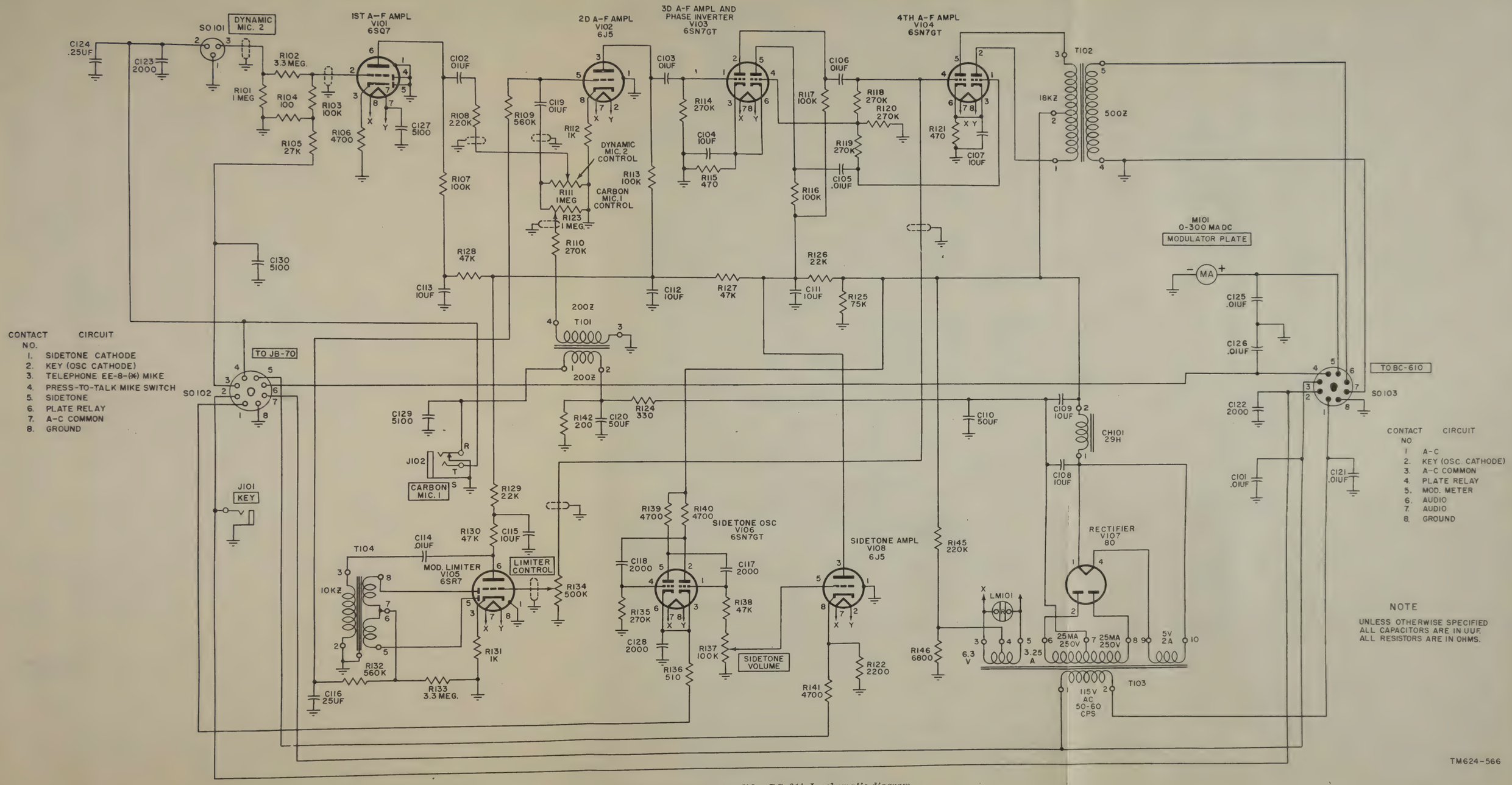


Figure 182. Rectifier Power Unit RA–133–A, schematic diagram.



CONTACT NO. — CIRCUIT

1. SIDETONE CATHODE
2. KEY (OSC CATHODE)
3. TELEPHONE EE-8-(*) MIKE
4. PRESS-TO-TALK MIKE SWITCH
5. SIDETONE
6. PLATE RELAY
7. A-C COMMON
8. GROUND

CONTACT NO. — CIRCUIT

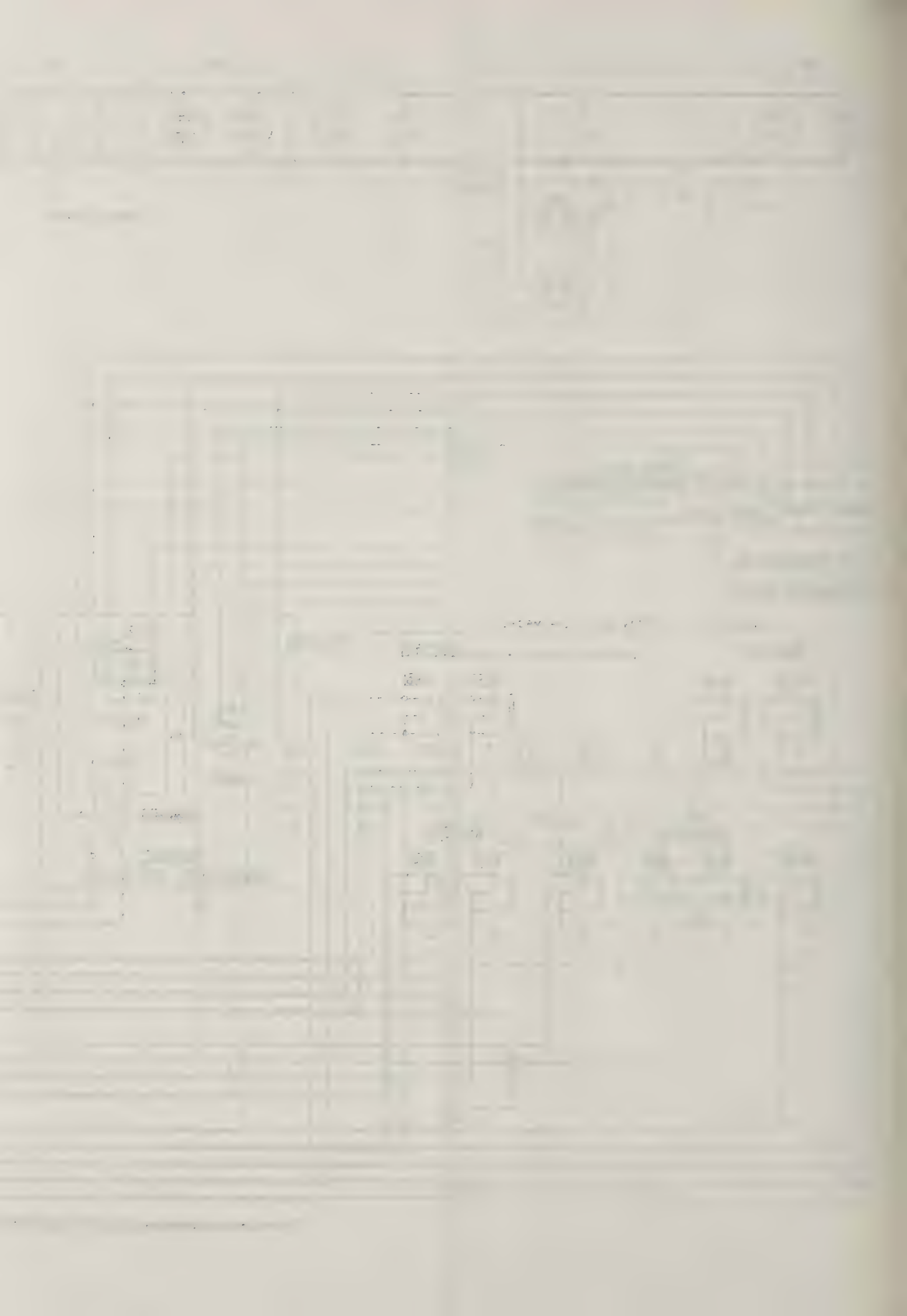
1. A-C
2. KEY (OSC. CATHODE)
3. A-C COMMON
4. PLATE RELAY
5. MOD. METER
6. AUDIO
7. AUDIO
8. GROUND

NOTE

UNLESS OTHERWISE SPECIFIED
ALL CAPACITORS ARE IN UUF.
ALL RESISTORS ARE IN OHMS.

TM624-566

Figure 174.—Speech Amplifier BC-614-I, schematic diagram.



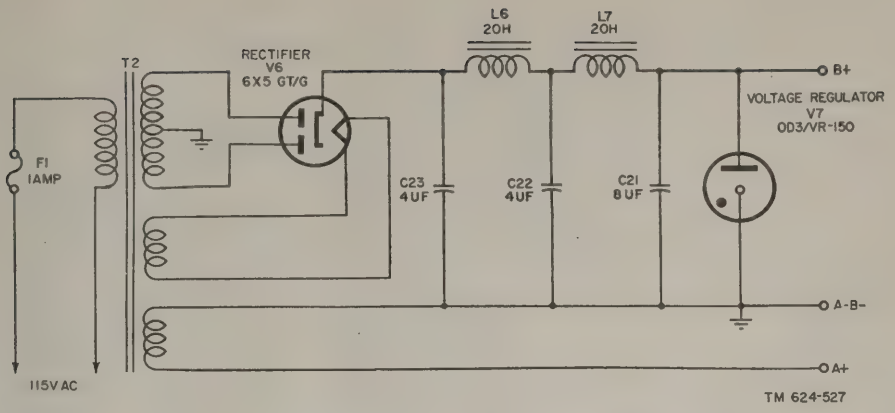


Figure 183. Power Supply Unit PP-79/U, schematic diagram.

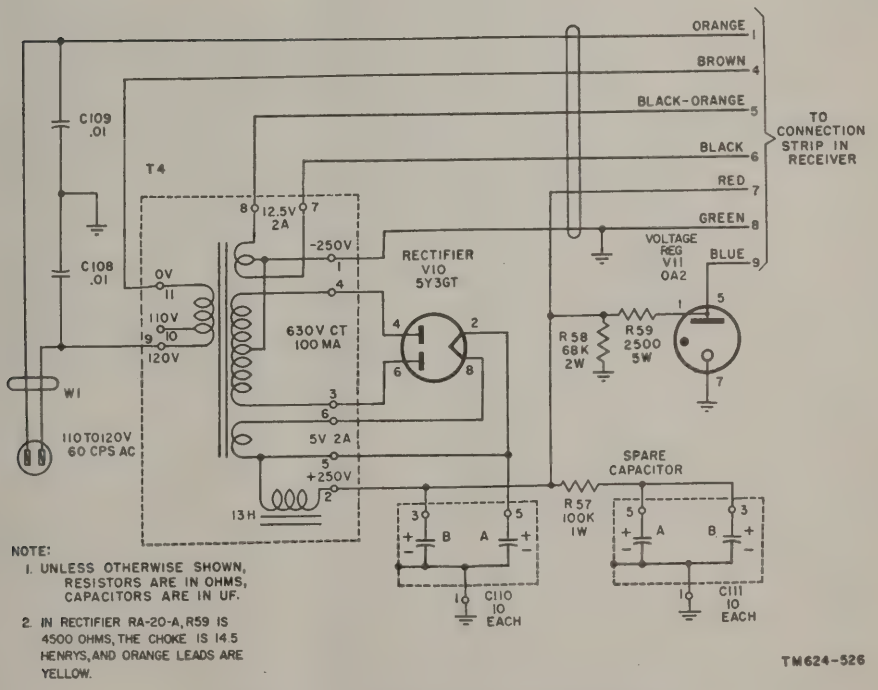


Figure 184. Rectifier RA-20-B, schematic diagram.

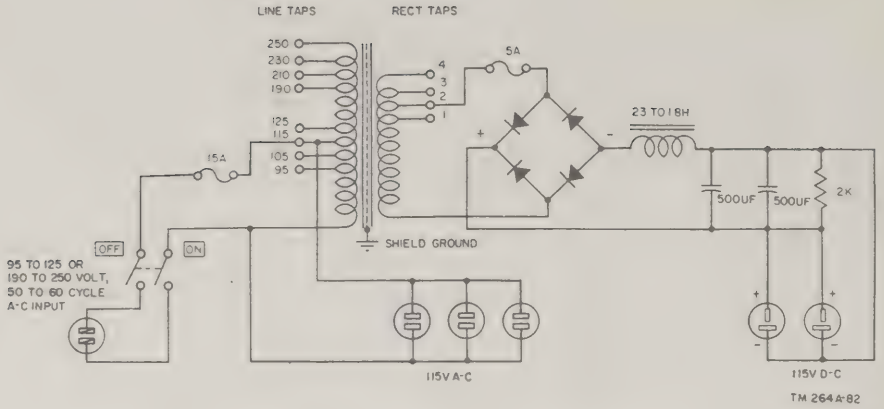


Figure 185. Rectifier RA–87, schematic diagram.

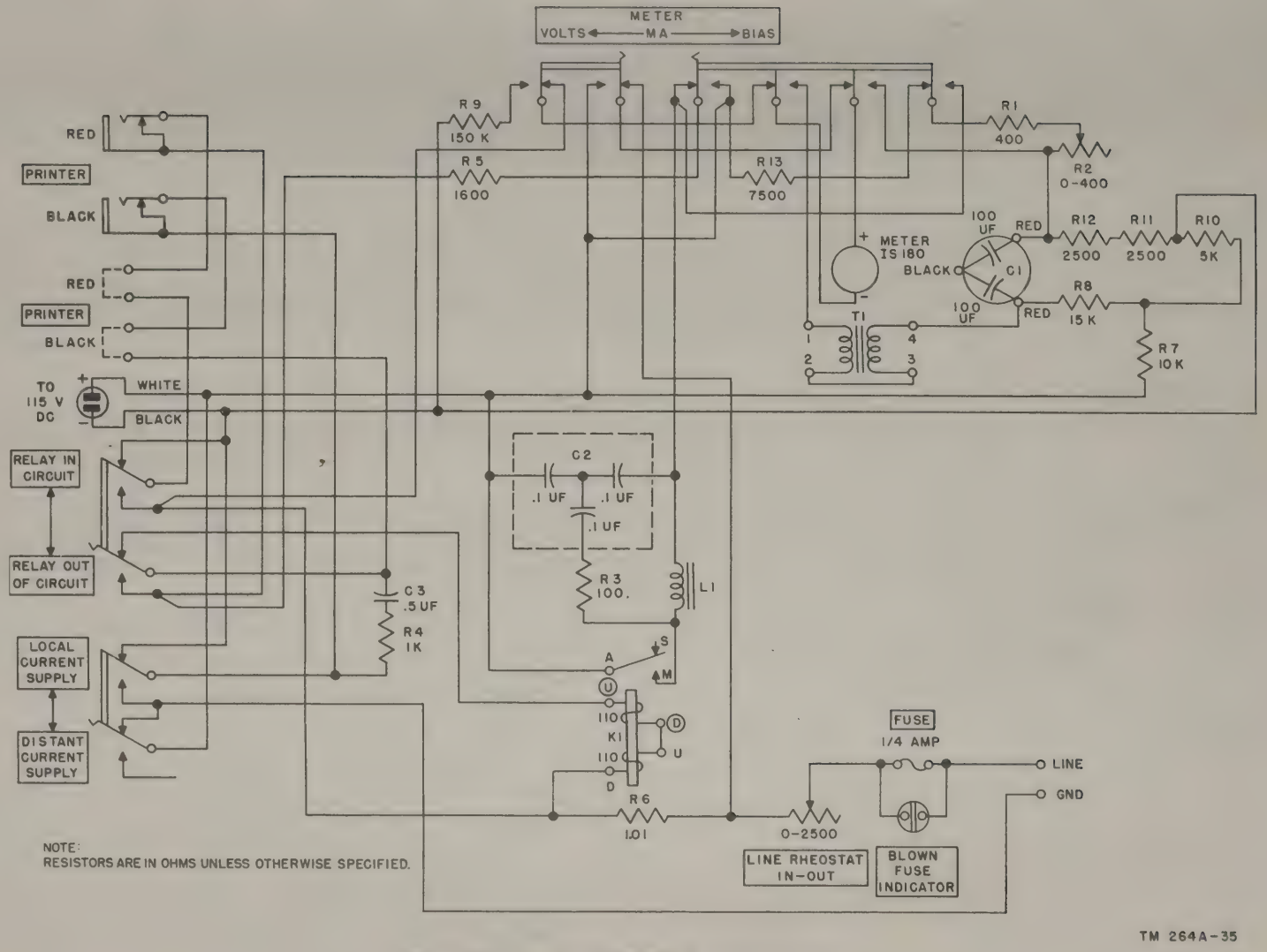


Figure 186. Line Unit BE-77-( ), schematic diagram.

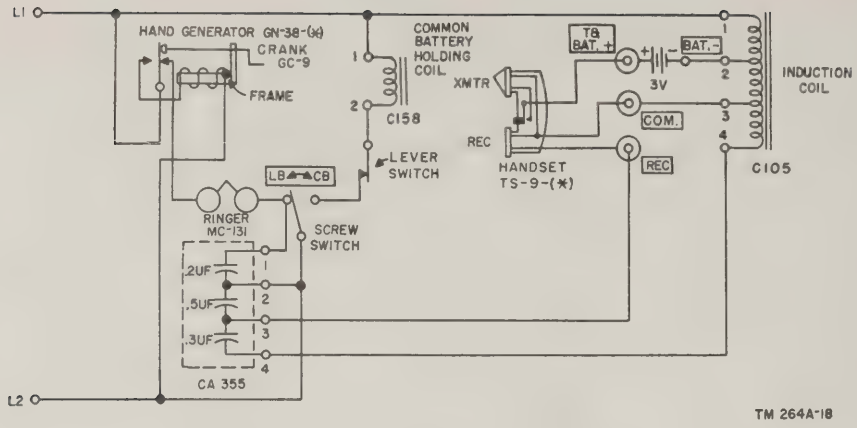


Figure 187. Telephone EE–8–( ), schematic diagram.

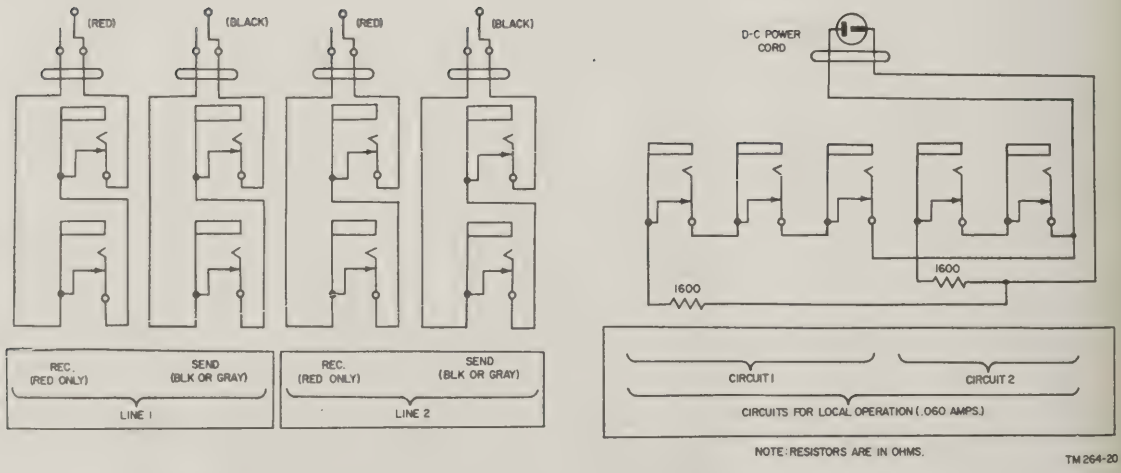


Figure 189. Perforator-Transmitter TT–56/MGC, connection box, schematic diagram.



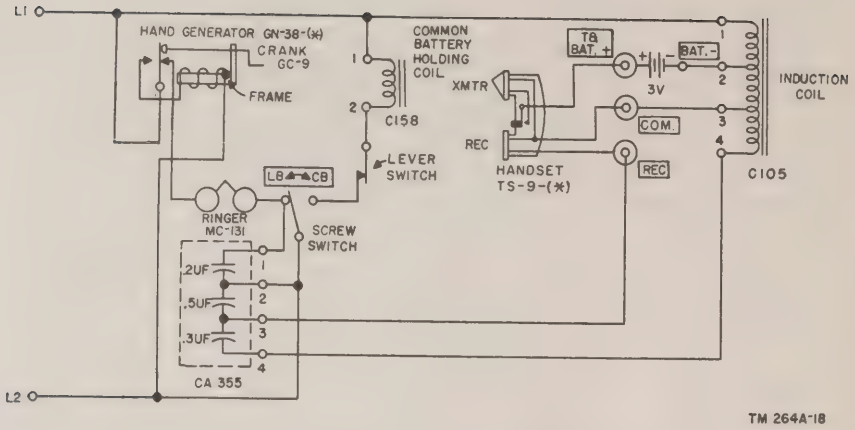


Figure 187. Telephone EE–8–( ), schematic diagram.

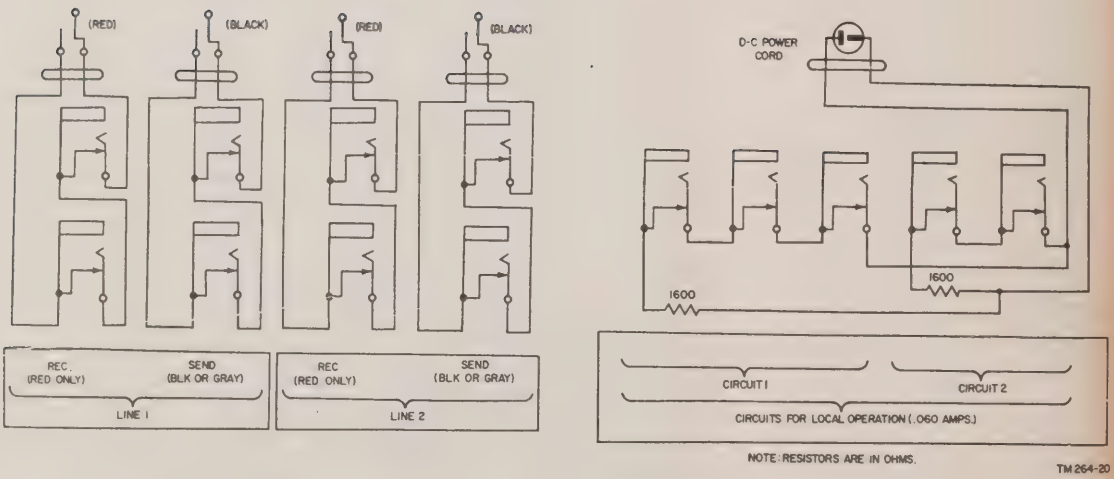


Figure 189. Perforator-Transmitter TT–56/MGC, connection box, schematic diagram.

J23
J25
J26
J27
P2
115 VAC
60 ~
J24
BENCH A.C. SUPPLY
BINDING POSTS
PROTECTOR BLOCKS
E1
EE-8
CONTROL
LINE
TO TRANSMITTING SHELTER
PROTECTOR BLOCKS
E2
EE-8
CONTROL
LINE
TO RECEIVING SHELTER
BINDING POSTS
JUNCTION BOX J-204/MRC-2
SEND TTY
REC. TTY
BLK
RED
J2
J3
J4
J5
SEND EXT.
REC. EXT.
GRAY
BLK
RED
RED
RED
RED
J6
J7
J8
J9
J10
J11
J1
EE-8
J13
J14
GREEN
COMBINED
INDIVIDUAL
S1
CONTROL UNIT
J12
EE-8
J16
P1
YELLOW
BLACK
J17
CONTROL UNIT
J15
SEND TTY
REC. TTY
BLK
RED
BLK
RED
J19
J20
J21
J22
J18
BINDING POSTS
REC. EXT.
SEND EXT.
TO EXTERNAL TELEGRAPH EQUIPMENT WHEN REQ.
E3
PROTECTOR BLOCKS
TM 624A-100

Figure 180 —Operating Table FN-22/MRC-2, Operating Shelter, schematic diagram.



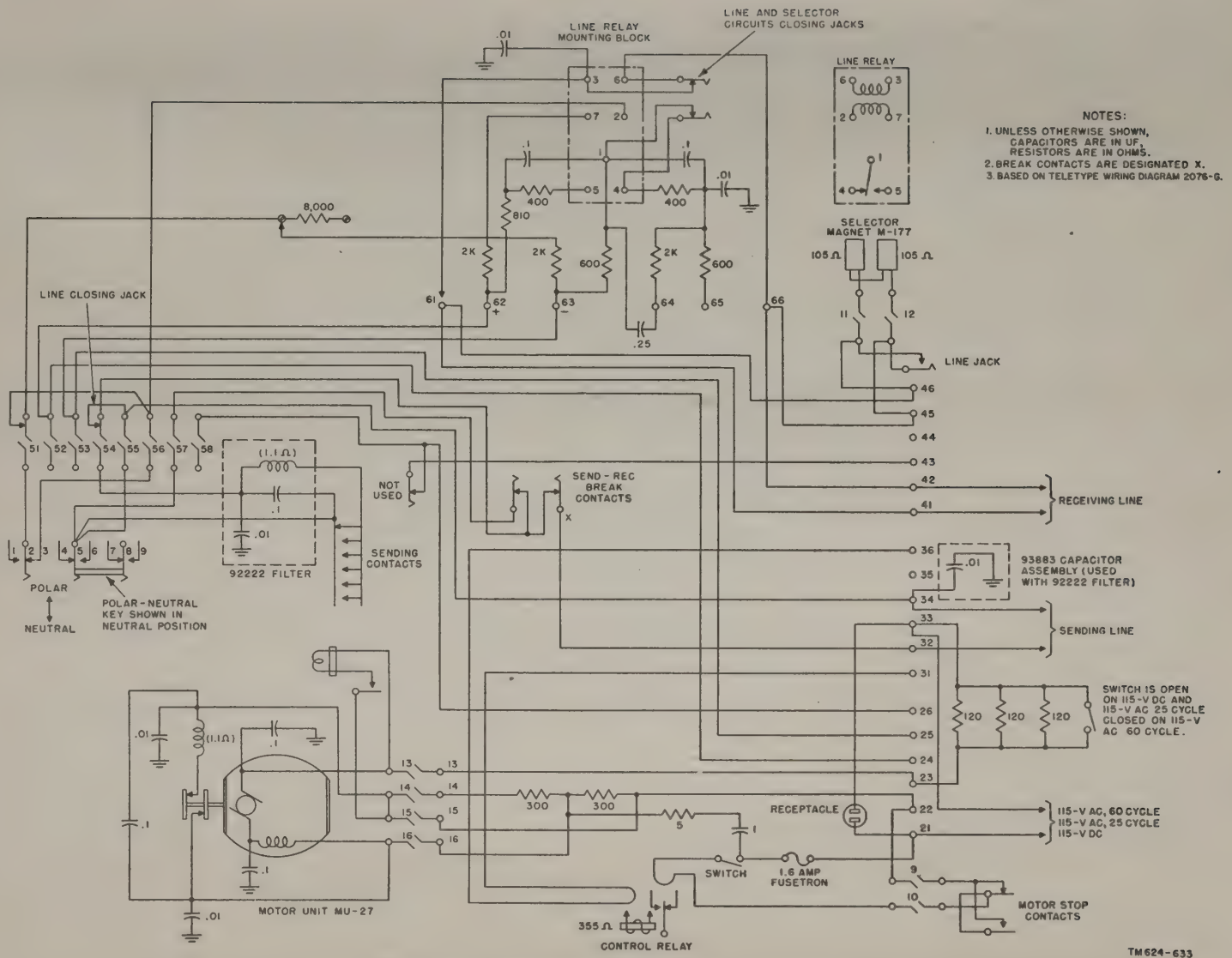
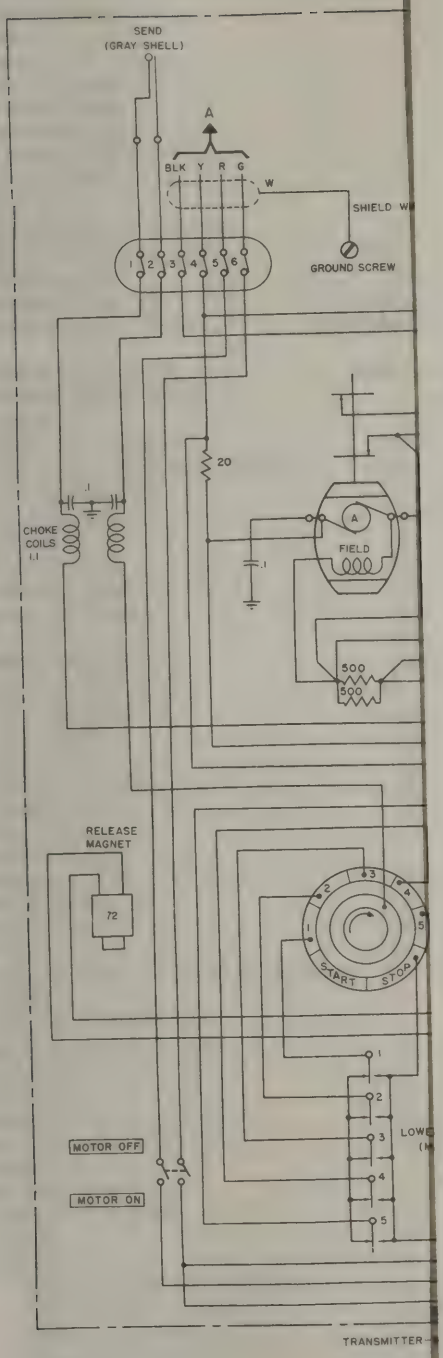
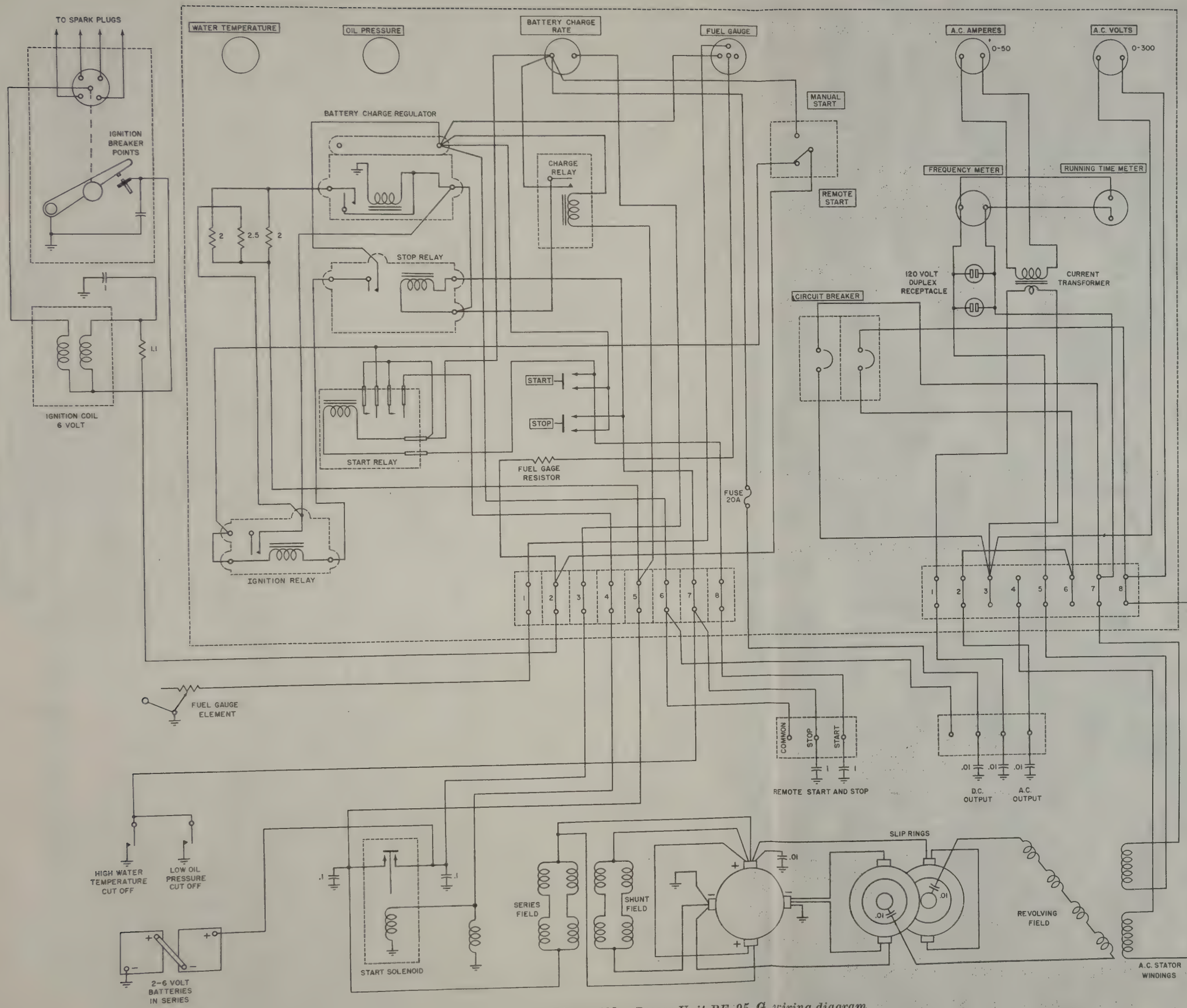


Figure 190. Teletypewriter TG-7-B, schematic diagram.


SEND
(GRAY SHELL)
A
BLK Y R G
W
SHIELD W
GROUND SCREW
1 2 3 4 5 6
20
.1
CHOKE
COILS
1.1
A
FIELD
.1
500
500
RELEASE
MAGNET
72
1 2 3 4 5
START
STOP
1
2
3
4
5
MOTOR OFF
MOTOR ON
TRANSMITTER



NOTES:

1. UNLESS OTHERWISE SHOWN: ALL RESISTORS ARE IN OHMS, ALL CAPACITORS ARE IN UUF.
2. FOR 120 VOLT OUTPUT PLACE JUMPER BETWEEN 3 AND 4, 5 AND 6 ON A-C TERMINAL BLOCK
3. FOR 240 VOLT OUTPUT PLACE JUMPER BETWEEN 4 AND 5 ON A-C TERMINAL BLOCK.

Figure 188 —Power Unit PE–95–G, wiring diagram.

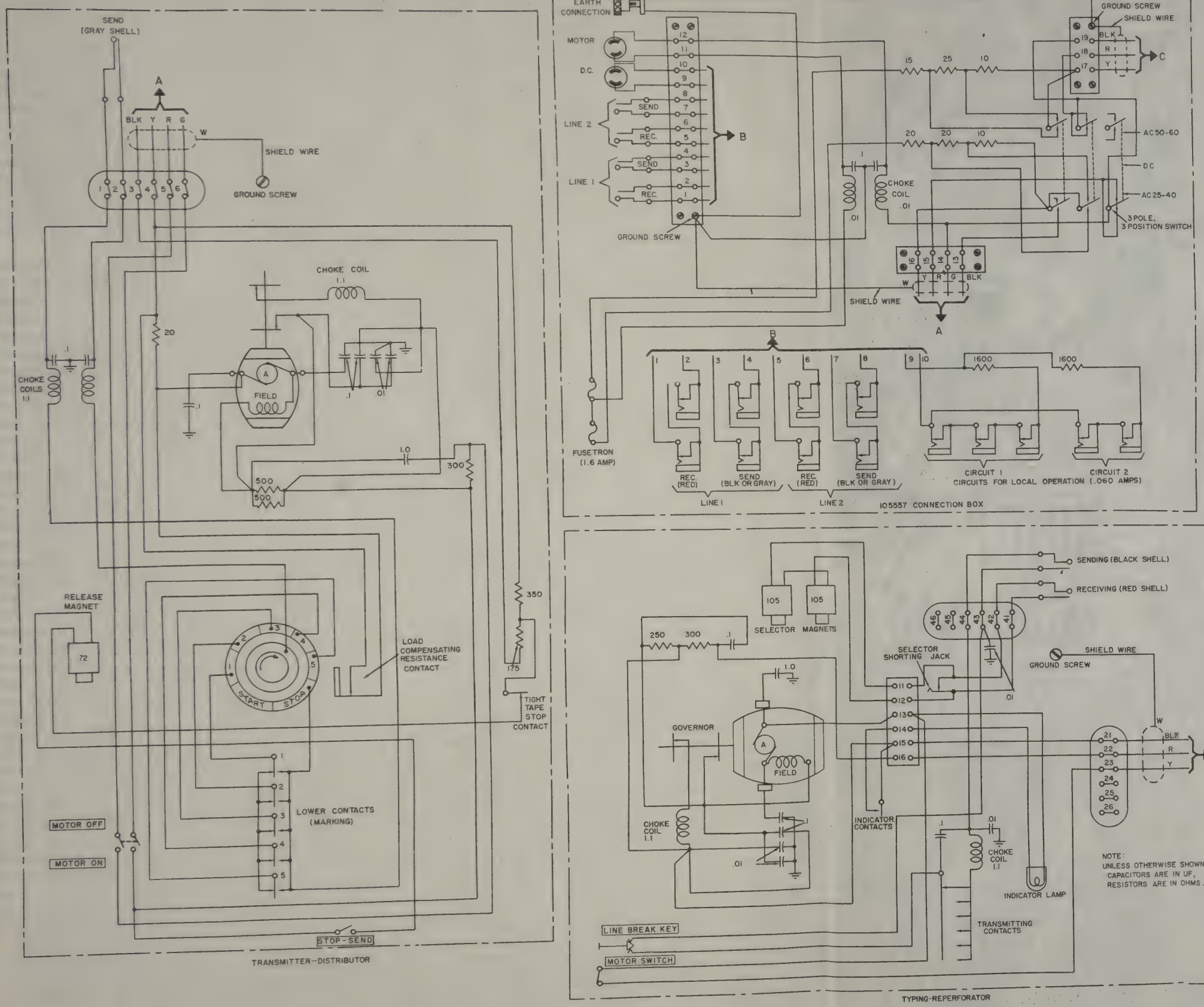


Figure 191 —Perforator-Transmitter TT–56/MGC, schematic diagram.



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