

TECHNICAL MANUAL

POWER SUPPLIES
PP-281/GRC, PP-282/GRC
AND PP-448/GR

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 12 December 1951

CHANGES }
No. 1 }

TM 11-5040, 29 November 1950, is changed as follows:

9. Power Supply PP-281/GRC
(fig. 9)

* * * * *

d. The values of * * * associated radio set. The straps are connected between pins 2, 3, and 5 of X-1; the battery input is also made available to the radio set from pins 2 and 5 of X-1.

19. Resistance Measurements

These checks are * * * the correct polarity.

Point of measurement	Normal reading (ohms)			Probable trouble
	PP-281/GRC	PP-282/GRC	PP-448/GR	
Term. 3 to 7 on X-1. *	Infinity	Infinity	Infinity	Defective C-1. *
Term. 7 on X-1 to term. 3 on X-2.	15K to 30K	15K to 30K	15K to 30K	Defective C-3 or C-2.
Term. 8 on X-1 to term. 3 on X-2. *	155	155	155	Defective L-2 or L-3. *

[AG 412.42 (5 Dec 51)]

20. Voltage Measurements

The voltage checks * * * an equivalent meter.

Point of measurement	Normal reading (volts)			Probable trouble
	PP-281/GRC	PP-282/GRC	PP-448/GR	
From term. 3 to 7 on X-1. *	12.6	25.2	6.3	Defective C-1. *
From term. 3 of X-2 to term. 7 of X-1.	155	155	155	Defective T-1, R-1, or C-4.

On figures 8, 9, and 10, so much as reads "(X-2)"
2
is changed to read "(X-2)" and so much as reads
3
"(X-2)" is changed to read "(X-2)."
1 5

TECHNICAL MANUAL

OFFICIAL:

WM. E. BERGIN
Major General, USA
The Adjutant General

J. LAWTON COLLINS
Chief of Staff, United States Army

POWER SUPPLIES
PT-281/GRC, PT-282/GRC
AND PT-448/GC

DEPARTMENT OF THE ARMY

DISTRIBUTION: WASHINGTON 25, D. C., 18 Dec 51

CHANGES
No. 1

Active Army:

Tech Svc (1); Arm & Svc Bd (1); AFF Bd (ea Svc Test Sec) (1); AFF (5); AA Comd (2); OS Maj Comd (5); Base Comd (5); MDW (5); Log Comd (2); A (20); CHQ (2); FC (2); Sch (2) except 11 (25); Gen Dep (2); Dep 11 (20) except Sig Sec, Gen Dep (10); Tng Div (2); PE (10), OSD (2); Lab 11 (5); Mil Dist (3); 4th & 5th Ech Maint Shops 11 (3); Two (2) copies to each of the following T/O & E's: 11-107; 11-127; 11-500 CA, CB, CC, CD; 11-587; 11-592; 11-597.

NG: Same as Active Army.

ORC: Same as Active Army.

For explanation of distribution formula, see SR 310-90-1.

Point of measurement	PT-281/GRC	PT-282/GRC	PT-448/GC
From term 3 to 7 on X-1	*	*	*
From term 3 of 155 X-2 to term 7 of X-1	155	155	155
Defective T-1, R-1, or C-4	*	*	*
Defective C-1	3	3	3

19. Resistance Measurements

These checks are * * * the correct polarity.

5. The values of * * * associated radio set. The straps are connected between and 5 of X-1; the battery input is also made available to the radio set from pins 3 and 5 of X-1.

On figures 8, 9, and 10, so much as reads "(X-2)" is changed to read "(X-1)" and so much as reads "(X-2)" is changed to read "(X-1)".

Point of measurement	Normal reading (ohms)		
	PT-281/GRC	PT-282/GRC	PT-448/GC
Term 3 to 7 on X-1	Infinity	Infinity	Infinity
Term 7 on X-1 to term 3 on X-2	15K to 30K	15K to 30K	15K to 30K
Term 8 on X-1 to term 3 on X-2	155	155	155
X-2	*	*	*
X-1	*	*	*

[AG 412.12 (5 Dec 51)]

TECHNICAL MANUAL

POWER SUPPLIES PP-281/GRC, PP-281A/GRC, PP-282/GRC, PP-282A/GRC, AND PP-448/GR

TM 11-5040
CHANGES No. 2

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 19 February 1958

TM 11-5040, 29 November 1950, is changed as indicated so that the manual also applies to—

Nomenclature	Order No.	Serial No.
Power Supply PP-281A/GRC	42913-Phila-57	1-633
Power Supply PP-282A/GRC	42913-Phila-57	1-8380

Change the title of the manual to: POWER SUPPLIES PP-281/GRC, **PP-281A/GRC**, PP-282/GRC, **PP-282A/GRC**, AND PP-448/GR.

Page 1. Add the following note below the title of Chapter 1:

Note. Power Supplies PP-281A/GRC and PP-282A/GRC are similar to Power Supplies PP-281/GRC and PP-282/GRC. Information in this manual applies to all these sets, unless otherwise specified.

Page 1, paragraph 2.

b. (Superseded) Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to Commanding Officer, United States Army Signal Equipment Support Agency, Fort Monmouth, N. J., as prescribed in AR 700-38.

Page 2, paragraph 7. Designate the existing paragraph as a.

Add the following subparagraph:

b. Design differences exist between Power Supply PP-281/GRC and Power Supply PP-281A/GRC; also between Power Supply PP-282/GRC and Power Supply PP-282A/GRC. The chart below lists the differences.

Component	Power Supply PP-281/GRC	Power Supply PP-281A/GRC	Power Supply PP-282/GRC	Power Supply PP-282A/GRC
C1	5,000 $\mu\mu\text{f}$	10,000 $\mu\mu\text{f}$	5,000 $\mu\mu\text{f}$	10,000 $\mu\mu\text{f}$
C5	Not present	1 μf	1 μf	1 μf
C6	Not present	39 μf	Not present	39 μf
R4	20 ohms	Not present	Not present	Not present
Wire to term. 4 of X-3	Yes	Not present	Yes	Not present

Page 4, paragraph 8. Delete the note under the paragraph heading and substitute:

Note. Shunt-drive vibrators have now become standard military types and are preferred to the series-drive vibrators. Shunt-drive vibrators should be requisitioned instead of series-drive vibrators, if replacement is required in any of the three power supplies described in this manual.

Page 5, paragraph 8c. Add the following note after subparagraph (2):

Note. In power supplies procured on Order No. 42913-Phila-57, the battery input circuit is filtered by rf choke L1 and capacitors C1 and C6 to prevent electrical interference from reaching the radio set being operated.

Page 5, paragraph 8. Add the following note to subparagraph d:

Note. Information in this subparagraph is not applicable to power supplies procured on Order No. 42913-Phila-57.

Page 5, paragraph 9. Add the following note after subparagraph a:

Note. Resistor R4 is not included in power supplies procured on Order No. 42913-Phila-57.

Add the following note to subparagraph c:

Note. Information in this subparagraph is not applicable to power supplies procured on Order No. 42913-Phila-57.

Add the following note after subparagraph d:

Note. Capacitor C5 is used in power supplies procured on Order No. 42913-Phila-57; accordingly, the second sentence in the above paragraph does not apply.

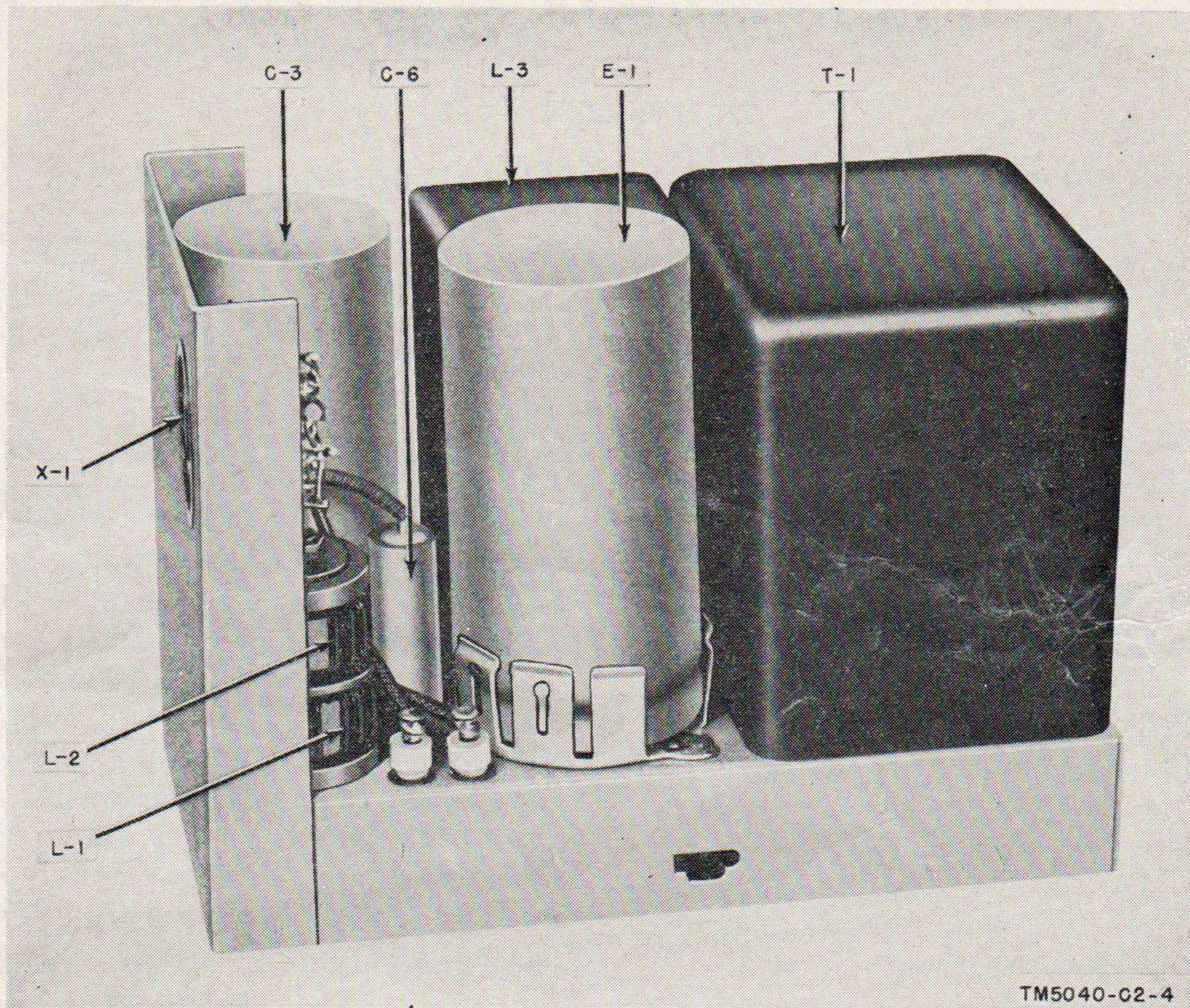


Figure 3.1 (Added) Power Supplies PP-281A/GRC and PP-282A/GRC, top of chassis.

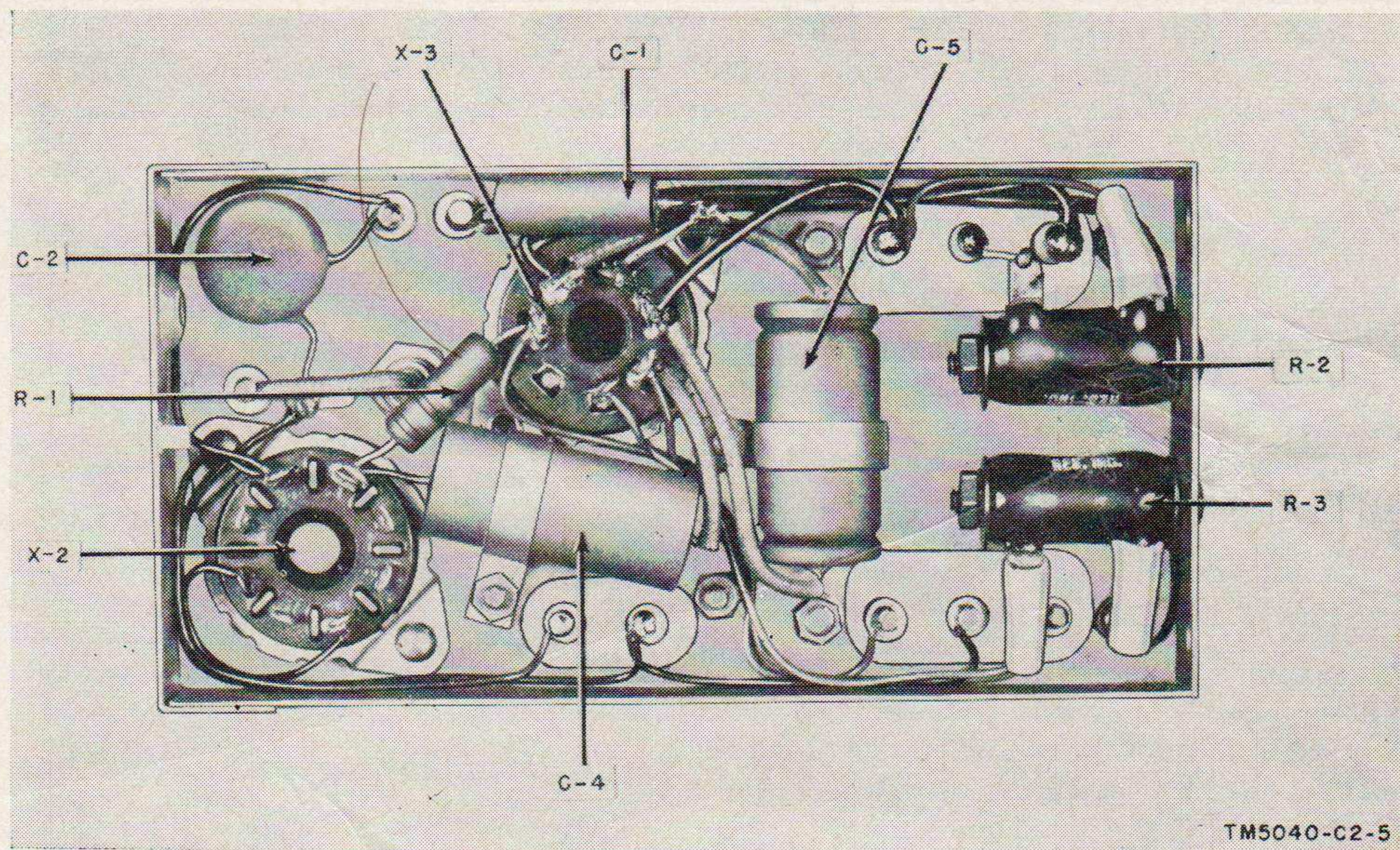


Figure 4.1 (Added) Power Supplies PP-281A/GRC, under chassis.

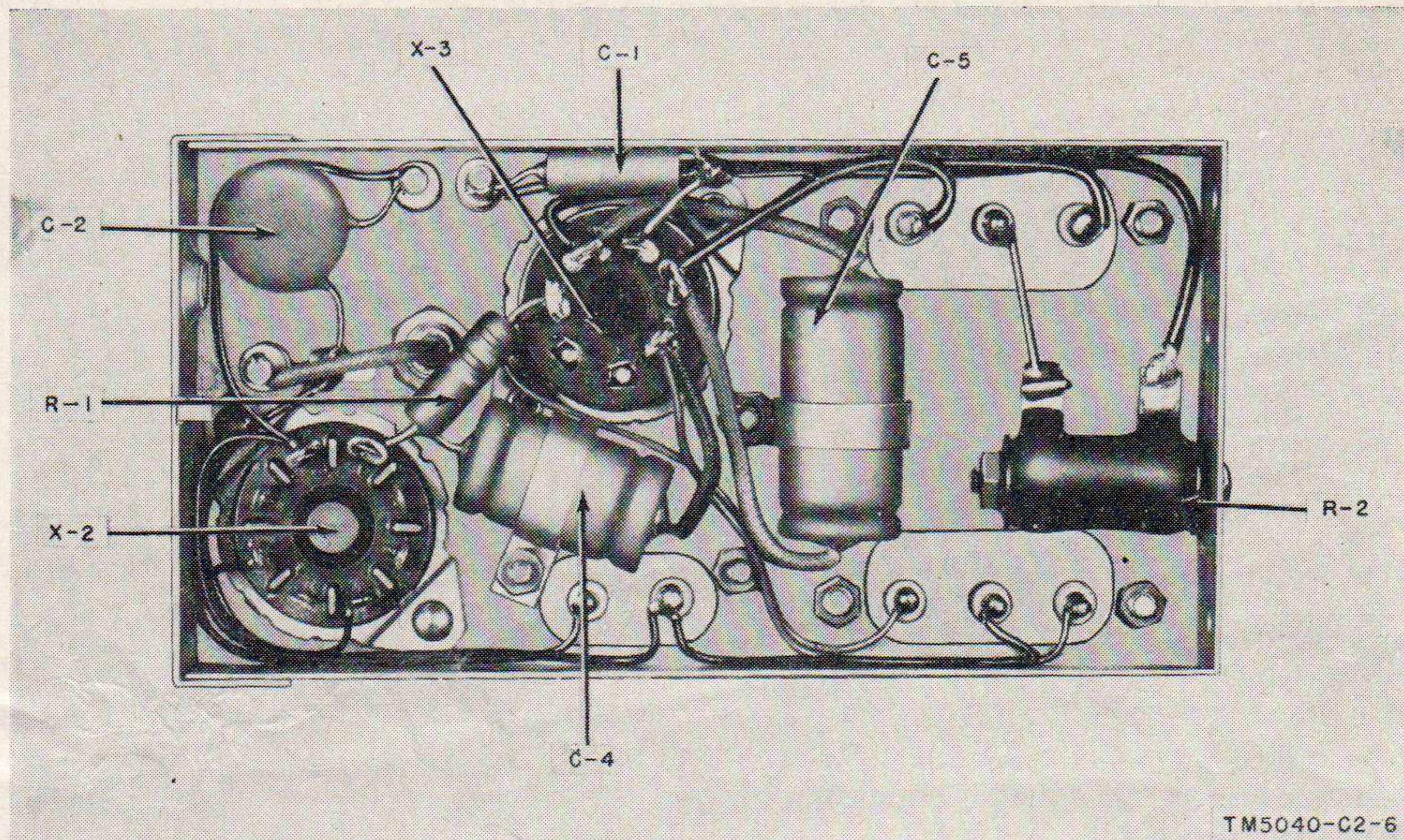


Figure 4.2 (Added) Power Supply PP-282A/GRC, under chassis.

Page 8, paragraph 13d, chart. Change "series-drive" to read: **series-drive***.

Add the following footnote below the chart:

*Not used in Power Supplies PP-281A/GRC and PP-282A/GRC.

Page 11, paragraph 19, resistance measurements chart. Change "Term. 3 on X-1 to term. 4 on X-3" to read: **Term. 3 on X-1 to term. 4 on X-3.****

Add the following footnote:

**Not applicable in power supplies PP-281 A/GRC and PP-282A/GRC.

Page 17. Delete appendix II.

Page 23, figure 8. Number the existing note: 1.

Add the following:

2. FOR POWER SUPPLIES PROCURED ON ORDER NO. 42913-PHILA-57, THE WIRE CONNECTING TO TERMINAL 4 OF X3 IS DELETED; THE SERIES-DRIVE VIBRATOR SYMBOL IS DELETED; FEED-

THROUGH CAPACITOR C6, .39 UF, IS ADDED BETWEEN TERMINAL 6 OF X1 AND L1 TO GROUND; AND CAPACITOR C1 IS CHANGED FROM 5,000 TO 10,000.

Page 23, figure 9. Number the existing note: 1.
Add the following:

2. FOR POWER SUPPLIES PROCURED ON ORDER NO. 42913-PHILA-57, RESISTOR R4 IS DELETED; THE WIRE CONNECTING TO TERMINAL 4 OF X3 IS DELETED; THE SERIES-DRIVE VIBRATOR SYMBOL IS DELETED; FEED-THROUGH CAPACITOR C6, .39 UF, IS ADDED BETWEEN TERMINAL 5 OF X1 AND L1 TO GROUND; CAPACITOR C1 IS CHANGED FROM 5,000 TO 10,000, AND CAPACITOR C5, 1 UF, IS ADDED BETWEEN TERMINALS 1 AND 3 OF T1.

[AG 412.42 (6 Feb 58)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

HERBERT M. JONES,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

ASA	TASSA	6-536	17-27
CNGB	USA Sig Comm Engr	6-537	17-32
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USCONARC	Agcy	6-575	17-37
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USA Air Def Bd Test	Engr Maint Cen	7-14	17-55
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Gen Depots	6-316	11-16	44-75
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Trans Terminal Comd	6-415	11-500 (AA-AE)	44-276
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USA Arty & Msl Cen,	6-435	11-592	51-2
Ft Sill, Okla	6-437	11-597	52-2
Sig Fld Maint Shops	6-447	17-2	55-27
Sig Lab	6-501	17-17	55-500 (AA-AE)
Redstone Arsenal	6-515	17-22	57-2
USA Sig Pub Agcy	6-525	17-25	57-57
Army Pictorial Cen	6-535	17-26	

NG: State AG; units—same as Active Army.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

TECHNICAL MANUAL

POWER SUPPLIES PP-281/GRC, PP-281A/GRC, PP-282/GRC, PP-282A/GRC, AND PP-448/GR

TM 11-5040

CHANGES No. 3

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D C., 14 April 1959

TM 11-5040, 29 November 1950, is changed as follows:

Section III.1. FOURTH ECHELON TESTING PROCEDURES
(Added)

22. 1. General

Testing procedures are prepared for use by Signal field maintenance shops and Signal service organizations responsible for fourth echelon maintenance of signal equipment to determine the acceptability of repaired signal equipment. These procedures set forth specific requirements which repaired signal equipment must meet before it is returned to the using organization. The testing procedures can also be used as a guide for testing equipment repaired at third echelon if the proper tools and test equipments are available.

22.2. Test Equipment and Materials

All test equipment and materials required to perform the tests are authorized under TA 11-17, Signal Field Maintenance Shops, and TA 11-100(11-17), Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shop, Continental United States. These items, along with their Federal stock numbers, are listed in paragraphs 22.8 and 22.9. The test equipment and materials required for each test are listed in the heading of each test.

22.3. Test Procedure

a. The instructions in the heading of the test are to be complied with before proceeding with the test. The test is divided into steps, each of

which must be completed before proceeding to the next step.

b. Each step is to be performed by completing the procedure in each column in turn, starting with the left column (control settings, test equipment) and proceeding toward the right-hand side of the page.

22.4. Test Facilities

a. Dc power is required for operation of each of the three power supplies covered by these testing procedures. Requirements are 6 volts for PP-448/GR, 12 volts for PP-281/GRC and 24 volts for PP-282/GRC. It is of the utmost importance to be sure that the correct voltage is applied to each of the power supplies.

Caution: Never operate any of the three power supplies without a load.

b. Since any of the three power supplies may be submitted for repair without associated equipment, dummy load resistances must be used for testing purposes. In these testing procedures, Test Set I-199 or I-199A is to be used for this purpose. Connection of the test set is shown in the figure associated with each individual test.

22.5. Modification Work Orders

The following modification work orders are pertinent to this equipment. A full listing of modification work orders will be found in DA FORM 104. VERBINDUNGSDIENST

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MWO	Date	Priority	Echelon	Marking	Remarks
11-5040-1	18 Jan 54	Normal	2	Near name plate on panel.	
11-5040-1 C 1	4 May 55	Normal	2	Near name plate on panel.	Using organizations in shop for repair. Depot stock when unpacked.

22.6. Moistureproofing and Fungiproofing

Areas, parts, and connections disturbed by repairs and/or testing will be checked for proper moistureproofing and fungiproofing.

22.7. Time Required to Perform Testing Procedures

Approximately 30 minutes per equipment is required.

22.3. Test Equipment Required

Nomenclature	FSN	Technical references
Test Set I-199(*) ^a	6625-229-1065	TM 11-2604
Power Supply PP-1097A/G	6130-669-6640	TM 11-5111

^a Official nomenclature followed by (*) indicates I-199 or I-199A.

22.9. Test Materials Required

Nomenclature	FSN
Test lead set, CX-1331/U (p/o TS-352A/U or TS-352B/U), 3 ea	6625-395-9313
or	
Test lead, CX-529/U, (p/o TS-352/U), 6 ea	6625-356-0214

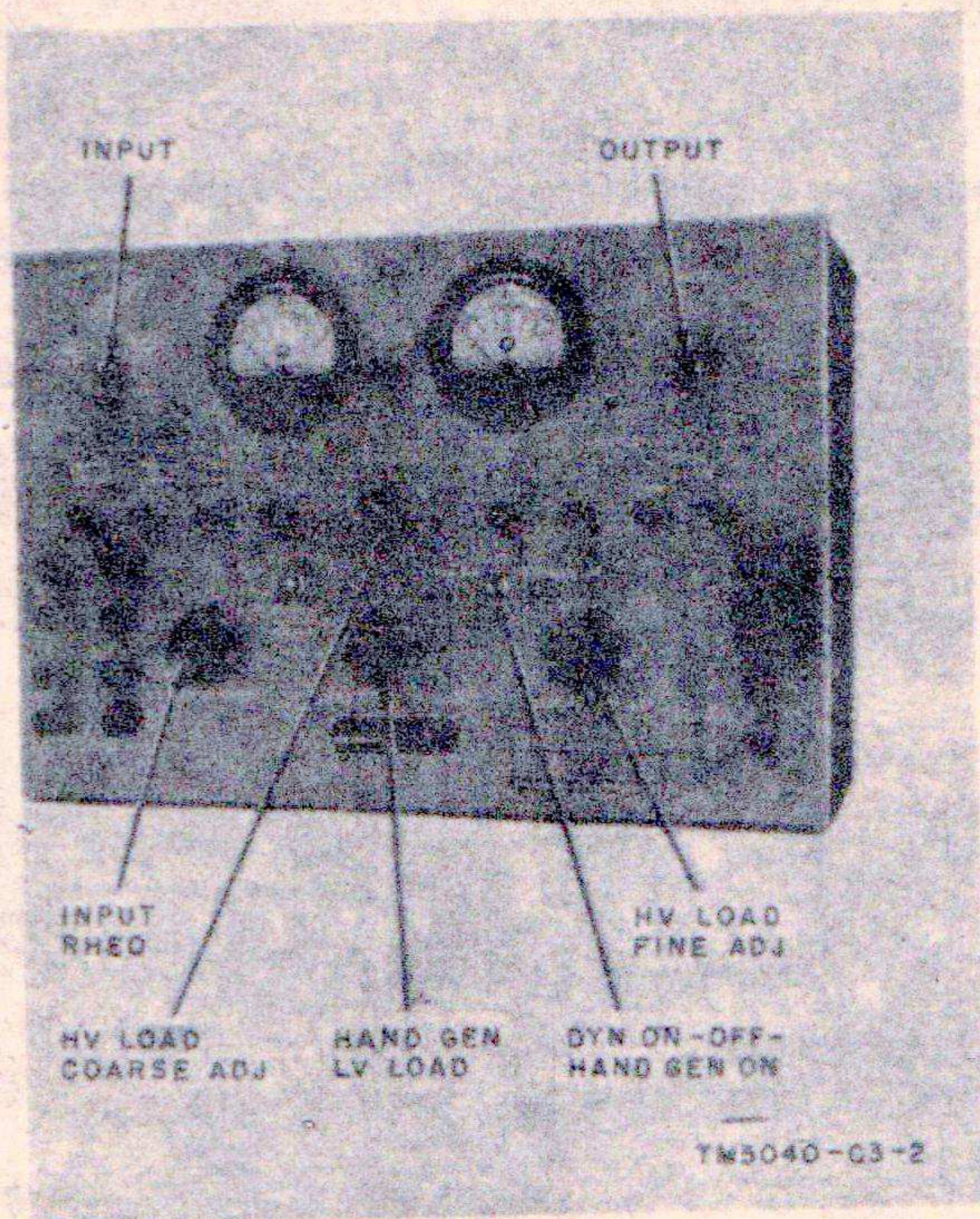


Figure 5.1. (Added) Test equipment.

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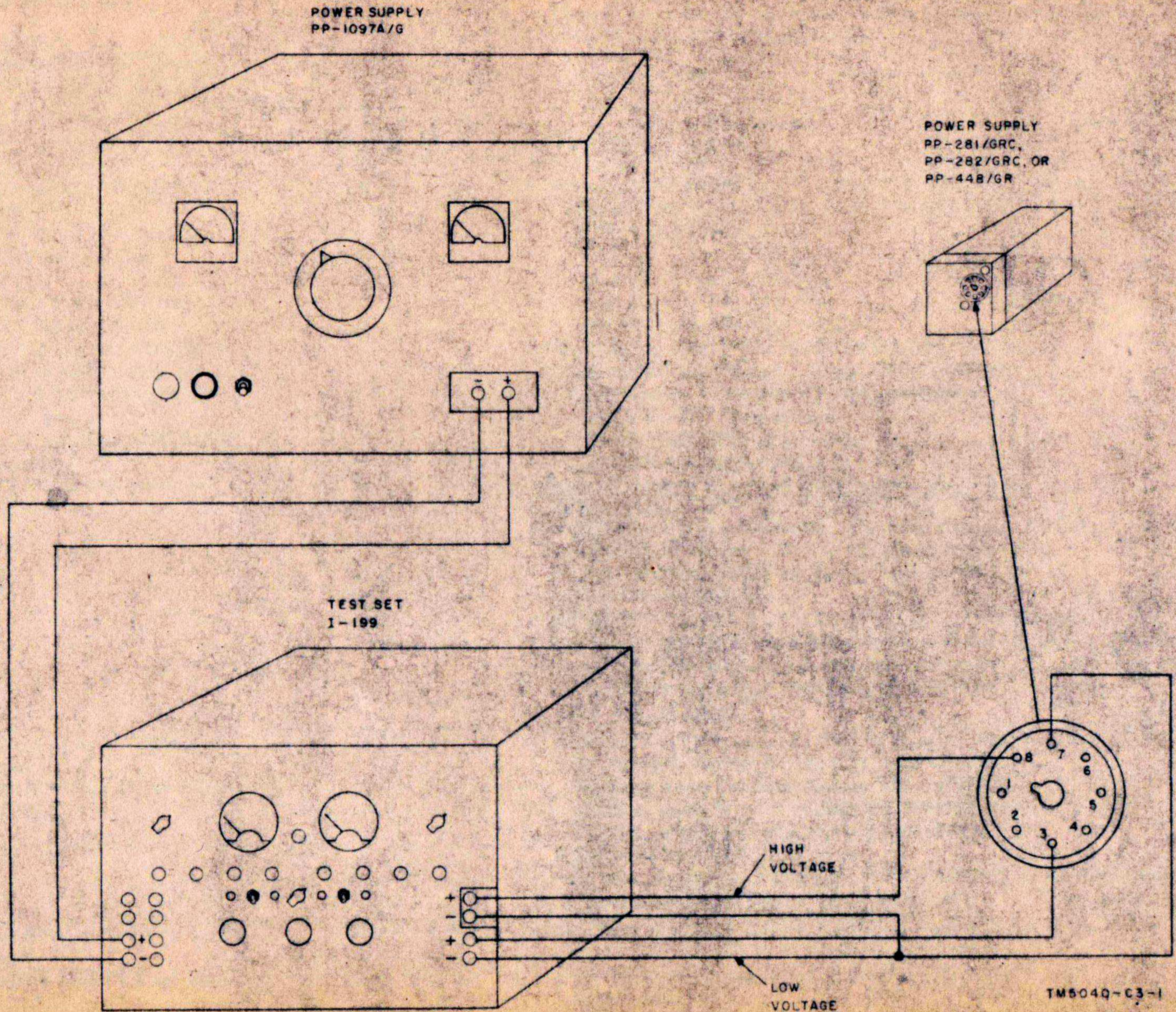


Figure 5.2. (Added) Operation test.

22.10. Operation Test

Test Equipment and Materials Required

PP-1097A/G

I-199(*)

Test leads (See par. 22.9)

Test Connections and Conditions

Connect as shown in figure 5.2. Leave all power turned off until instructed to apply power while performing tests.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equip. under test		
1	PP-1097A/G POWER switch: OFF. OUTPUT VOLTAGE ADJUST: See step 1a. I-199(*) DYN ON-OFF-HAND GEN ON switch: OFF. INPUT switch: VOLTS INPUT RHEO: max ccw H. V. LOAD COARSE ADJ: max cw H. V. LOAD FINE ADJ: max ccw OUTPUT switch: M.A.	N/A	a. Turn POWER switch on PP-1097A/G to ON. Adjust OUTPUT VOLTAGE ADJ. for indication on DC VOLTS meter as follows: For PP-448/GR—7.5 volts. For PP-281/GR—14.0 volts For PP-282/GR—28.0 volts. b. Set Test Set I-199(*) DYN ON-OFF-HAND GEN ON switch to DYN ON. Adjust INPUT RHEO for indication on the INPUT meter as follows: For PP-448/GR—6.3 volts. For PP-281/GRC—12.6 volts. For PP-282/GRC—25.2 volts. <i>Note.</i> For increased accuracy in this adjustment, depress the INPUT 60-30 VOLTS switch and use the bottom center scale on the INPUT meter. c. Depress OUTPUT 600-120MA switch and adjust H.V. LOAD FINE ADJ. for 120-ma indication (full scale) on OUTPUT meter. Release OUTPUT 600-120MA switch. d. Set OUTPUT switch to VOLTS e. Depress the OUTPUT 1200-300 volts switch. Read and record the indication on the OUTPUT meter (bottom center scale). Release OUTPUT 1200-300 VOLTS switch.	a. None. b. None. c. None. d. None. e. OUTPUT meter must indicate between 125-145 volts.
2	Same as at end of step 1 except: I-199(*) OUTPUT switch: RIPPLE.	N/A	a. Depress FILTER switch. If OUTPUT meter does not indicate, depress RIPPLE 12 volts switch at the same time. If indication on the OUTPUT meter is below 3 volts, release the RIPPLE 12 VOLTS switch and depress both the FILTER and RIPPLE 3 VOLTS switches. b. Read and record the indication of the OUTPUT meter. (Use top scale 3 VOLT RIPPLE.)	a. None. b. OUTPUT meter must read not more than .5 volt.
3	Same as at end of step 1 except: I-199(*) OUTPUT switch: VOLTS.	N/A	a. Set DYN ON-OFF-HAND GEN ON switch to OFF. Set OUTPUT VOLTAGE ADJUST on PP-1097A/G for indication on DC VOLTS meter as follows:	a. None.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equip. under test		
			<p>For PP-448/GR—6 volts. For PP-281/GR—12 volts. For PP-282/GR—24 volts.</p> <p>b. Set DYN ON-OFF-HAND GEN ON switch to DYN ON. Adjust INPUT RHEO for indication on INPUT meter as follows: For PP-448/GR—5.0 volts. For PP-281/GRC—10.0 volts. For PP-282/GRC—20.0 volts.</p> <p>c. Depress OUTPUT 1,200-300 volts switch. Read and record the indication on the OUTPUT meter. (Use bottom center scale.)</p> <p>d. Turn DYN ON-OFF-HAND GEN ON switch to OFF. Wait 10 seconds. Turn switch back to DYN ON. Repeat 3c above.</p> <p>e. Repeat 3d above five times.</p>	<p>b. None.</p> <p>c. None.</p> <p>d. None.</p> <p>e. OUTPUT meter must indicate not less than 90 volts each time switch is turned to DYN ON.</p>
4	Same as at end of step 3.	N/A	<p>a. Set DYN ON-OFF-HAND GEN ON switch to OFF. Adjust OUTPUT VOLTAGE ADJ on PP-1097A/G for indication on DC VOLTS meter as follows: For PP-448/GR—12 volts. For PP-281/GRC—20 volts. For PP-282/GRC—32 volts.</p> <p>b. Set DYN ON-OFF-HAND GEN ON switch to DYN-ON. Adjust INPUT RHEO for indication on INPUT meter as follows: For PP-448/GR—8.0 volts. For PP-282/GRC—16.0 volts. For PP-282/GRC—32.0 volts.</p> <p><i>Note.</i> If necessary, adjust PP-1097A/G OUTPUT VOLTAGE ADJ for more voltage in order to obtain the above voltages.</p> <p>c. Depress OUTPUT, 1,200-300 VOLTS switch. Read and record indication of OUTPUT meter. Release OUTPUT 1,200-300 VOLTS switch and turn DYN ON-OFF-HAND GEN ON switch to OFF. Turn PP-1097A/G POWER switch to OFF.</p>	<p>a. None.</p> <p>b. None.</p> <p>c. OUTPUT meter must not indicate more than 235 volts.</p>

22.11. Test Data

Personnel may find it convenient to arrange test data in a manner similar to that shown below:

TEST DATA

Power Supplies PP-281/GRC, PP-281A/GRC, PP-282/GRC, PP-282A/GRC, and PP-448 GR

Serial No. _____
Work Order No. _____
Date _____

Technician _____
Inspector _____

	Test data	Performance standard
1. Normal input	_____	125-145 volts
2. Ripple test	_____	.5 volt max
3. Low-input test	_____	90 volts min
4. High-input test	_____	235 volts max

[AG 413.44 (25 Mar 59)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

10 APR. 1963

TM 11-5040

*C 4

TECHNICAL MANUAL

POWER SUPPLIES PP-281/GRC, PP-281A/GRC, PP-282/GRC, PP-282A/GRC, PP-448/GR, AND PP-448A/GR

TM 11-5040 }
CHANGE No. 4 }

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., 11 February 1960

TM 11-5040, 29 November 1950, is changed as indicated so that the manual also applies to the following equipment:

Nomenclature	Order No.	Serial No.
Power Supply PP-448A/GR...	39170-PP-58	1-55

Change the title of the manual to: **POWER SUPPLIES PP-281/GRC, PP-281A/GRC, PP-282/GRC, PP-282A/GRC, PP-448/GR, AND PP-448A/GR.**

Page 1, chapter 1, note (page 1 of C 2). Add the following to the note: Power Supply PP-448A/GR is similar to Power Supply PP-448/GR. Information in this manual applies to both power supplies unless otherwise specified.

Add "and PP-448A/GR" after "Power Supply PP-448/GR" in the following places:

Page 1, paragraph 1a, line 4.

Paragraph 3a, line 2.

Paragraph 4, line 6.

Paragraph 4, line 10.

Page 2, paragraph 6, line 5.

Paragraph 7, line 2.

Page 3, figure 2, caption.

Page 4, title of chapter 2.

Page 5, paragraph 10, title.

Page 6, paragraph 11, line 8.

Page 7, figure 4, caption.

Page 9, paragraph 18, line 6.

Page 10, figure 5, caption.

Page 11, paragraph 21, line 2.

Page 1, paragraph 3. Add the following after subparagraph b.

c. Power Supply PP-448A/GR has 175-volt B+ output and is designed primarily for use with Field Strength Meter AN/URM-89. It should never be used as an interchangeable power supply

with the PP-448/GR for use in the standardized series (Radio Receivers R-108/GRC, R-109/GRC, and R-110/GRC).

Page 1, paragraph 4, line 14. Add the following:
Power Supply PP-448A..... 4.9 amperes max.

Page 5, paragraph 9. Subparagraph d is superseded.

d. The values of current-limiting resistor R-2 and buffer capacitor C-4 differ from those of the corresponding parts in Power Supply PP-282/GRC. Capacitor C-5 is not needed in this unit because of the lower input voltage used. Connector X-1 is wired differently to apply the proper operating voltage to an associated radio set. The straps are connected between pins 2, 3, and 5 of X-1; the battery input is also made available to the radio set from pins 2 and 5 of X-1.

Note. Capacitor C-5 is used in power supplies procured on Order No. 42913-Phila-57; accordingly, the second sentence in the above paragraph does not apply.

Page 10, paragraph 18b, chart. Add the following:

Power supply	M-1 Input (volts)		M-2 Input (amperes)		M-3 Output (volts)	
	Min	Max	Min	Max	Min	Max
PP-448A/GR	6.2	6.4	3.9	4.8	165	180

Figure 5, chart. Add the following:

Power supply	Nominal batt. voltage	Meter range M-1	Meter range M-2
PP-448A/GR.....	6 V	0-10 V	0-10 A

*These changes supersede C 1, 12 December 1951.

Page 11, paragraph 19, chart is superseded.

Point of measurement	Normal reading (ohms)			Probable trouble
	PP-281/GRC	PP-282/GRC	PP-448/GR	
Term. 3 to 7 on X-1	Infinity	Infinity	Infinity	Defective C-1.
Term. 3 on X-1 to term. 1 on X-3	1 (approx.)	2 (approx.)	Zero*	Defective L-1, R-2, or T-1.
Term. 3 on X-1 to term. 6 on X-3	1 (approx.)	2 (approx.)	do	Defective L-1, R-2, or T-1.
Term. 3 on X-1 to term. 4 on X-3**	20	Zero*	do	Defective R-4.
Term. 3 on X-1 to term. 3 on X-3	50	Infinity	do	Defective R-3.
Term. 7 on X-1 to term. 3 on X-2	15K to 30K	15K to 30K	15K to 30K	Defective C-3 or C-2.
Term. 8 on X-1 to term. 3 on X-2	155	155	155	Defective L-2 or L-3.
Term. 2 to 5 on X-3	76	62	68 *	Defective T-1.
Across R-1	1,800	1,800	1,800	Defective R-1.

*Reading too small to be discernible.

**Not applicable in power supplies PP-281A/GRC and PP-282A/GRC.

* 95 ohms in PP-448A/GR.

Paragraph 20, chart is superseded.

Point of measurement	Normal reading (volts)				Probable trouble
	PP-281/GRC	PP-282/GRC	PP-448/GR	PP-448A/GR	
From term. 3 to 7 on X-1	12.6	25.2	6.3	6.3	Defective C-1.
From term. 8 to 7 on X-1	135	135	135	175	Defective C-2, C-3, L-2, or L-3.
From term. 3 of X-2 to term. 7 of X-1	155	155	155	195	Defective T-1, R-1, or C-4.

Page 13, table I. Add the following:

Power supply	Battery (volts)	Load (ohms)	Output (volts)	Battery current (amperes)
PP-448A/GR	6.3	1, 150	175 ± 5	4.9

Table II. Add the following:

Power supply	Battery (volts)	Output load* (ohms)	Output voltages (volts)
PP-448A/GR	6.3	1, 150	175 ± 5

Pages 15 and 16. Delete appendix I.

Pages 23 and 24. On figures 8, 9, and 10, so much as reads "(X-2)" is changed to read "(X-2)"
₂ ₃
 and so much as reads "(X-2)" is changed to read "(X-2)".
₁
₅

By Order of *Wilber M. Brucker*, Secretary of the Army:

L. L. LEMNITZER,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

USASA (2)	USAINTC (2)	7-25 (2)	17-37 (2)
Def Atomic Spt Agcy (5)	USAAMC (Ft Sill) (300)	7-26 (2)	17-45 (2)
CNGB (1)	USA Ord Msl Comd (3)	7-27 (2)	17-46 (2)
Tech Stf, DA (1) except CSigO (18)	USASSA (15)	7-31 (2)	17-51 (2)
Tech Stf Bd (1)	USASSAMRO (1)	7-32 (2)	17-52 (2)
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USA Avn Bd (1)	WRAMC (1)	9-67 (2)	17-66 (2)
USA ATB (1)	AFIP (1)	11-7 (2)	17-67 (2)
USCONARC (5)	AMS (1)	11-16 (2)	17-85 (2)
US ARADCOM (2)	Ports of Emb (OS) (2)	11-32 (2)	17-86 (2)
US ARADCOM Rgn (2)	Trans Terminal Comd (2)	11-55 (2)	17-87 (2)
OS Maj Comd (5)	Army Terminals (2)	11-57 (2)	17-115 (2)
OS Base Comd (5)	OS Sup Agcy (1)	11-68 (2)	17-116 (2)
Log Comd (5)	Yuma Test Sta (2)	11-85 (2)	17-117 (2)
MDW (1)	USA Elet PG (1)	11-86 (2)	17-125 (2)
Armies (5) except First US Army (7)	Sig Lab (5)	11-98 (2)	17-126 (2)
Corps (2)	Sig Fld Maint Shops (3)	11-117 (2)	17-127 (2)
Div (2)	USA Corps (Res) (1)	11-155 (2)	39-61 (2)
Ft Detrick (2)	JBUSMC (2)	11-500 (AA- AE) (2)	39-71 (2)
Ft Belvoir (5)	Units organized under following TOE's:	6-315 (2)	44-35 (2)
USATC (2)	5-15 (2)	6-316 (2)	44-36 (2)
Svc Colleges (5)	5-16 (2)	6-325 (2)	44-37 (2)
Br Svc Sch (5) except USASCS (25), USAIS (245)	5-215 (2)	6-326 (2)	44-446 (2)
USMA (5)	5-217 (2)	6-535 (2)	51-2 (2)
Gen Dep (2) except Atlanta Gen Dep (none)	5-218 (2)	6-537 (2)	52-2 (2)
Sig Sec, Gen Dep (10)	5-600 (2)	6-545 (2)	55-27 (2)
Sig Dep (17)	5-605 (2)	6-558 (2)	55-47 (2)
Army Pictorial Cen (2)	5-617 (2)	7-2 (2)	55-75 (2)
Engr Maint Cen (1)	6-100 (2)	7-11 (2)	55-76 (2)
	6-125 (2)	7-12 (2)	55-77 (2)
	6-126 (2)	7-14 (2)	55-78 (2)
	6-200 (2)	7-15 (2)	55-500 (AA- AE) (2)
	6-300 (2)	7-16 (2)	57-5 (2)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

K GEREESTREED
IDO Sectie B G

Changes in force: C 2, C 3, C 4, and C 5

TM 11-5040
C 5

POWER SUPPLIES PP-281/GRC, PP-281/GRC, PP-282/GRC, PP-282A/GRC,
PP-448/GR, AND PP-448A/GR

CHANGE }
No. 5 }

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., 7 October 1963

TM 11-5040, 29 November 1950, is changed as follows:

Page 1. After paragraph 1, add:

1.1. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. Department of the Army Pamphlet No. 310-4 is a current index of technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

Delete paragraph 2 (page 1 of C 2) and substitute:

2. Forms and Records

a. *Reports of Maintenance and Unsatisfactory Equipment.* Use equipment forms and records in accordance with instructions in TM 38-750.

Page 2. Add the following after chapter 1:

CHAPTER 1.1

PREVENTIVE MAINTENANCE

Section I. OPERATOR'S PREVENTIVE MAINTENANCE

7.1. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

b. *Report of Damaged or Improper Shipment.* Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. *Reporting of Equipment Manual Improvements.* The direct reporting by the individual user of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended changes to DA technical manual parts lists or supply manual 7, 8, or 9) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to: Commanding Officer, U. S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N. J. 07703. One information copy will be furnished to the individual's immediate supervisor, officer, noncommissioned officer, supervisor, etc.).

services chart (par. 7.3) outlines functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check and what the normal conditions are; the *References* column lists the paragraphs that contain supplementary information. If a defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

7.2. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the equipment are required on a weekly basis.

a. Paragraph 7.3 specifies checks and services that must be accomplished weekly and under the special conditions listed below.

(1) Vehicular installations.

- (a) Before the vehicle starts on a mission.
- (b) When the equipment is initially installed.
- (c) When the equipment is reinstalled after removal for any reason.
- (d) At least once each month if the equipment is maintained in standby condition.

(2) Transportable and mobile installations.

- (a) When the equipment is initially installed.
- (b) When the equipment is reinstalled after removal for any reason.
- (c) At least once each week if the equipment is maintained in standby condition.

b. Paragraph 7.4 specifies *additional* checks and services that must be performed *once* each week.

7.3. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Exterior surfaces-----	Remove dirt, dust, and grease. Check for chipped paint and scratches.	Paragraph 7.4.
2	Screws -----	See that all screws are tight-----	Paragraph 12a.
3	Operation -----	Check for normal operation-----	TM 11-898.

7.4. Cleaning

Inspect the exterior of the equipment. The surfaces should be clean and free of dust, dirt, grease, and fungus.

a. Remove loose dirt and dust with a clean soft cloth.

Warning: Cleaning compound is flammable and

its fumes toxic. Provide adequate ventilation. Do not use near a flame.

b. Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with cleaning compound.

c. Remove dust or dirt from the octal socket with a brush.

Section II. ORGANIZATIONAL PREVENTIVE MAINTENANCE

7.5. Organizational Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all echelons concerned with the

equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the equipment at the

second echelon level are made at monthly intervals unless otherwise directed by the commanding officer. The preventive maintenance checks and services should be scheduled concurrently with the periodic service schedule of

the carrying vehicle for all vehicular installations.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

7.6. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness -----	See that the equipment is complete-----	TM 11-5820-210-10P.
2	Installation -----	See that the equipment is properly installed-----	Paragraph 3.
3	Cleanliness -----	See that the equipment is clean-----	Paragraphs 7.4 and 14.
4	Publications -----	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
5	Preservation -----	Check all surfaces for evidence of fungus. Remove rust and corrosion and spot-paint bare spots.	TM 9-213.
6	Modifications -----	Check DA Pam 310-4 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	DA Pam 310-4 and TM 38-750.
7	Pluckout items-----	Inspect seating of pluckout items. Check for wrong, bent, or broken parts.	Paragraph 13.
8	Overheating -----	Check for discoloration, bulging, corrosion, and burned spots.	Paragraph 12b.
9	Connections -----	See that all wiring connections are tight-----	Paragraph 12b.
10	Screws -----	Check for looseness-----	Paragraph 12a.
11	Operation -----	Check for normal operation-----	Paragraph 18.

Page 15. Add the following Appendix:

APPENDIX

REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrications Orders, and Modification Work Orders.
TM 9-213	Painting Instructions for Field Use.
TM 11-898	Radio Receivers R-108/GRC, R-109/GRC, and R-110/GRC.
TM 11-5820-210-10P	Basic Issue Items List: Power Supplies PP-281/GRC, PP-281A/GRC, PP-282/GRC, and PP-282A/GRC.
TM 38-750	The Army Equipment Record System and Procedures.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

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CofSptS (1)	AMS (1)
USA CD Agcy (1)	AFIP (1)
USCONARC (5)	Army Pic Cen (2)
USAMC (5)	USA Mbl Spt Cen (1)
ARADCOM (2)	USA Elct Mat Agcy (12)
ARADCOM Rgn (2)	Chicago Proc Dist (1)
OS Maj Comd (3)	USA Elct RD Actv, White Sands (13)
OS Base Comd (2)	USA Elct RD Actv, Ft Huachuca (2)
LOGCOMD (2)	USARSOUTHCOM Sig Agcy (1)
USAECOM (5)	Sig Fld Maint Shop (3)
USAMICOM (4)	MAAG Korea (5)
USASCC (4)	USAINTC (5)
MDW (1)	USMA (5)
Armies (2)	Units org under fol TOE: (2 copies
Corps (2)	each except as indicated)
USA Corps (3)	3-47
USATC AD (2)	3-147
USATC Engr (2)	3-217
USATC Inf (2)	3-266
USATC Armor (2)	3-267
USASTC (5)	5-5
Instl (2) except	5-7
Ft Monmouth (65)	5-8
Svc Colleges (2)	5-15
Br Svc Sch (2) except USAIS (245)	5-16
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Sig Sec, GENDEP (5)	5-26
Army Dep (2) except	5-27
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29-57	

NG: State AG (3); units—same as active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1963-700504

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TM 11-5040



DEPARTMENT OF THE ARMY TECHNICAL MANUAL

W 1-2-3-4-5

17-362

POWER SUPPLIES PP-281/GRC, PP-282/GRC AND PP-448/GR

TM 11-5040

POWER SUPPLIES
PP-281 / GRC, PP-282 / GRC
AND PP-448 / GR



DEPARTMENT OF THE ARMY

NOVEMBER 1950

WARNING

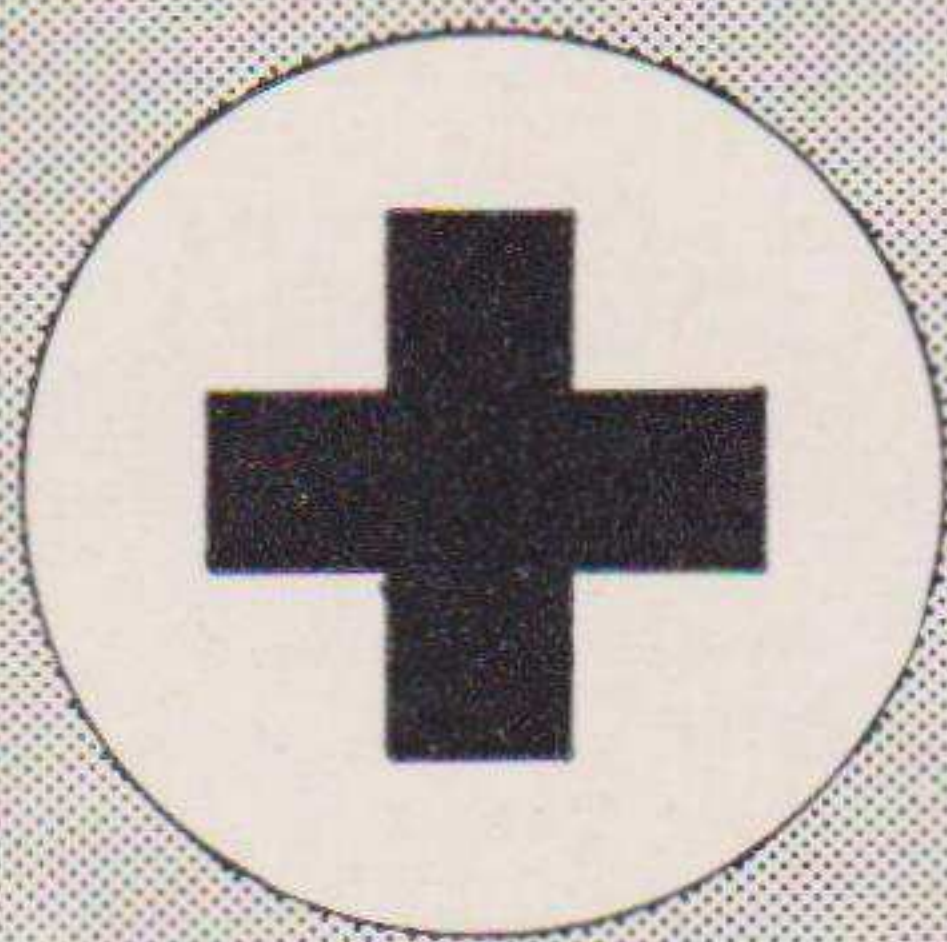
HIGH VOLTAGE

is developed during

the operation of this equipment.



First Aid for
Electric Shock



First Aid for Electric Shock

RESCUE.

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

SYMPTOMS.

a. Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

b. The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

TREATMENT.

a. Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only*, remove the victim to another location, but no farther than

is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

b. Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

c. Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

d. If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

e. The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(1) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(2) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib;

(3) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim;

(4) the operator's elbows are straight and locked.

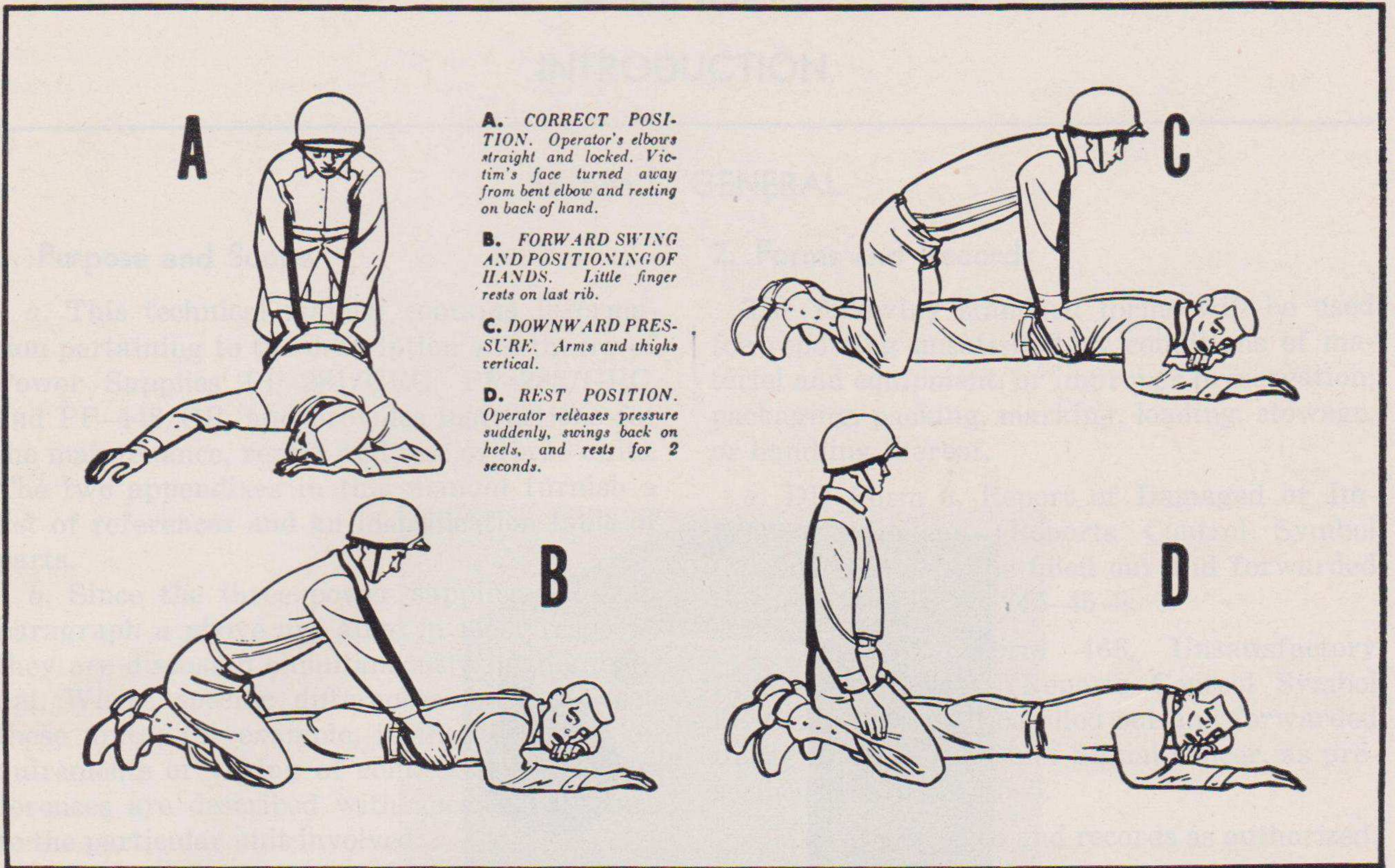
f. The resuscitation procedure is as follows:

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

(2) Swing back, suddenly releasing pressure, and sit on the heels.

(3) After 2 seconds rest, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

g. The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4



seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.

h. Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

RELIEVING OPERATOR.

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

STIMULANTS.

a. If an inhalant stimulant is used, such as aro-

matic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

b. After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing $\frac{1}{2}$ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

CAUTIONS.

a. After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

b. Keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

c. A resuscitated victim must be watched carefully as he may suddenly stop breathing. *Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.*



TM 5040-1

Figure 1.—Power supply PP-282/GRC, front view.

CHAPTER I

INTRODUCTION

Section I. GENERAL

1. Purpose and Scope

a. This technical manual contains information pertaining to the description and theory of Power Supplies PP-281/GRC, PP-282/GRC, and PP-448/GR, and provides instructions for the maintenance, repair and test of these units. The two appendixes in this manual furnish a list of references and an identification table of parts.

b. Since the three power supplies listed in paragraph *a* above are alike in most respects, they are discussed simultaneously in this manual. Where specific differences exist between these units; for example, in input voltage requirements or wiring of connectors, these differences are described with specific reference to the particular unit involved.

2. Forms and Records

The following standard forms will be used for reporting unsatisfactory conditions of matériel and equipment, or improper preservation, packaging, packing, marking, loading, stowage, or handling thereof.

a. DD Form 6, Report of Damaged or Improper Shipment (Reports Control Symbol CS GLD-66), will be filled out and forwarded as prescribed in SR 745-45-5.

b. DA AGO Form 468, Unsatisfactory Equipment Report (Reports Control Symbol CS GLD-247), will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in SR 700-45-5.

c. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use (fig. 1)

a. Power Supplies PP-281/GRC, PP-282/GRC, and PP-448/GR are small, light, vibrator type plug-in units. The units derive power from 12-, 24-, or 6-volt vehicular storage batteries, respectively, to supply a voltage of +135 volts dc (direct current) at current drains up to 118 milliamperes.

b. These units are designed for plugging into the power supply compartment of equipment such as Radio Receivers R-108/GRC, R-109/GRC, R-110/GRC, and AF amplifier AM-65/GRC. When the power supplies are used in the amplifier, they may also furnish operating voltages for an associated unit, Receiver-Transmitter RT-70/GRC.

4. Technical Characteristics

Rated output voltage..... 135 volts dc.
Rated output current..... .118 ampere.
Rated battery voltages—
Power Supply PP-281/GRC..... 12.6 volts.

Power Supply PP-282/GRC..... 25.2 volts.
Power Supply PP-448/GR..... 6.3 volts
Permissible input voltage ranges—
Power Supply PP-281/GRC..... 10 to 16 volts.
Power Supply PP-282/GRC..... 20 to 32 volts.
Power Supply PP-448/GR..... 5 to 8 volts.
Input current—
Power Supply PP-281/GRC..... 2.25 amperes max.
Power Supply PP-282/GRC..... 1.23 amperes max.
Power Supply PP-448/GR..... 4.1 amperes max.
Regulation.....(1) For changes in input voltage between the limits listed under "Permissible input voltage ranges" above, the output voltage will vary between 105 and 185 volts, provided that the load is kept constant.
(2) For changes in load current between .120 and .030 ampere, the output voltage will vary between 135 and 180 volts, provided that the input voltage is kept constant at the nominal value.
Ripple voltage..... .05 percent maximum
Normal operating temperature.....from -40°C (-40°F.)
to +65°C (149°F.).

5. Description

(figs. 1 and 2)

a. The unit shown in figure 1 consists of a metal panel and chassis assembly inclosed on top by a four-sided metal cover and at the bottom by a metal plate which covers the underchassis. Disassembly instructions are included in paragraph 12a. A handle is provided on the back of the top cover to aid in the handling of the unit while it is being inserted into or removed from a set. The metal panel at the front of the unit is provided with an octal socket. All the electrical connections between the storage battery, the power supply, and the circuits of the set to be operated are made through this socket connector.

b. A disassembled unit is shown in figure 2. The top of the chassis (fig. 3) mounts the larger components such as a vibrator transformer, a power filter choke, a plug-in vibrator, a plug-in filter capacitor, and two r-f (radio-frequency) chokes. The underchassis (fig. 4) contains the smaller components and most of the wiring. The

inside of the bottom cover contains the circuit label.

c. The power supply unit is approximately $4\frac{1}{4}$ inches high by $5\frac{3}{4}$ inches deep by $2\frac{1}{8}$ inches wide and weighs about 5 pound 9 ounces.

6. Spare Parts Supplied

The spare parts supplied with each power supply are—

For Power Supply PP-281/GRC—2 vibrators; plug-in type; 6-volt input.

For Power Supply PP-448/GR—2 vibrators; plug-in type; 6-volt input.

For Power Supply PP-282/GRC—2 vibrators; plug-in type; 24-volt input.

7. Unit Differences

Power Supplies PP-281/GRC, PP-282/GRC, and PP-448/GR differ only in those components which adapt the input circuits for use with 12-, 24-, and 6-volt storage batteries, respectively. All other components are identical. Specific differences are described in paragraphs 9 and 10.

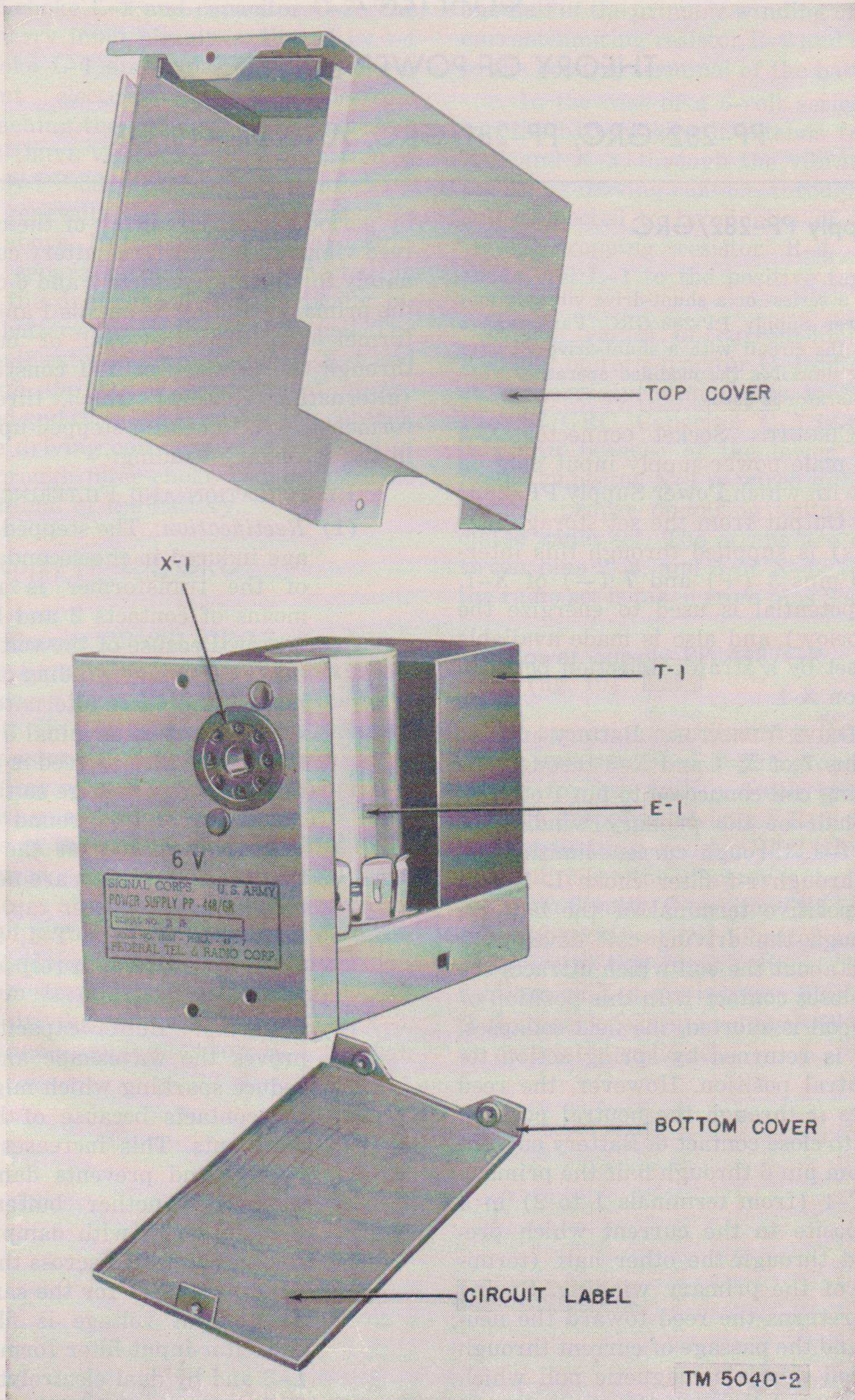


Figure 2.—Power supply PP-448/GR, disassembled unit.

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CHAPTER 2

THEORY OF POWER SUPPLIES

PP-282/GRC, PP-281/GRC, AND PP-448/GR

8. Power Supply PP-282/GRC

(fig. 8)

Note. Either a series- or a shunt-drive vibrator may be used in Power Supply PP-282/GRC. Paragraph *b* below describes the circuit with a shunt-drive vibrator in use; *d* below describes the modified operation when a series-drive vibrator is used.

a. INPUT CIRCUIT. Socket connector X-1 mates with a male power-supply input plug on the radio set with which Power Supply PP-282/GRC is used. Output from the set storage battery (24 volts) is supplied through this interconnection to pins 3 (+) and 7 (-) of X-1. The 24-volt potential is used to energize the vibrator (*b* below) and also is made available to the radio set by a strap connection between pins 3 and 6 on X-1.

b. SHUNT-DRIVE VIBRATOR. Battery current flows from pins 7 of X-1 and X-3 through the vibrator driving coil connected to pin 1 of X-3, through one-half of the primary winding of transformer T-1, through current-limiting resistor R-2, through r-f filter choke L-1, and back to the positive terminal of the battery. Current through the driving coil develops a magnetic field about the coil which attracts the reed until it closes contact 1. In this position of the reed, the coil is shorted, the field collapses, and the reed is returned by spring action toward the neutral position. However, the reed inertia carries it through the neutral position and causes it to close contact 6. Battery current then flows from pin 6 through half the primary winding of T-1 (from terminals 1 to 2) in a direction opposite to the current which previously flowed through the other half (terminals 3 to 2) of the primary winding. Spring action again returns the reed toward the neutral position and the passage of current through the driving coil causes a magnetic pull which accelerates the reed through the neutral position. The reed then closes contact 1 and again short-circuits the driving coil. Thus the flow of current through the driving coil is interrupted

by periodic short-circuiting of the coil. As the reed vibrates, it transfers battery current alternately to vibrator contacts 1 and 6 connected to the primary winding terminals 1 and 3 of transformer T-1. The reversal of current flow through the primary of T-1 constitutes an ac (alternating current) which, through transformer action, induces a stepped-up a-c voltage in the secondary winding.

c. RECTIFICATION AND FILTERING.

(1) *Rectification.* The stepped-up a-c voltage induced in the secondary winding of the transformer is rectified by means of contacts 2 and 5 of the vibrator. Because of the voltage induced in the secondary winding of T-1, terminals 4 and 6 are alternately negative with respect to terminal 5 (the center tap). The vibrator reed is phased with the secondary voltage so that vibrator contacts 2 and 5 ground terminals 6 and 4 alternately at the same time that those terminals are negative with respect to the center tap. The center tap, terminal 5 of T-1, is therefore always positive with respect to chassis ground.

(2) *Filtering.* Buffer capacitor C-5 improves the waveshape and serves to reduce sparking which might occur at the contacts because of high-voltage transients. This increases the output voltage and prevents damage to the contacts. Another buffer capacitor C-4, in series with damping resistor R-1, is connected across the secondary winding of T-1 for the same purpose. The output voltage is filtered by a capacitor-input filter formed by choke L-3 and by dual electrolytic capacitor C-3. A nominal output voltage of 135 volts is available at pin 8 of X-1. High-frequency electrical interference is filtered from the rectified output by

r-f choke L-2 and capacitor C-2. The battery input circuit is filtered by r-f choke L-1 and capacitor C-1 to prevent electrical interference from reaching the radio set being operated.

d. **SERIES-DRIVE VIBRATOR.** The operation of Power Supply PP-282/GRC using a series-drive vibrator is generally the same as described in *a*, *b*, and *c* above. In the series-drive vibrator, however, a separate contact is connected in series with the driving coil to periodically interrupt the battery circuit through the coil. The battery circuit extends from pins 7 of X-1 and X-3, through the series arrangement of the vibrator reed and the additional driving contact, through the driving coil connected to pin 4 of X-3, and through filter choke L-1 back to the positive terminal of the battery.

9. Power Supply PP-281/GRC (fig. 9)

a. Power Supply PP-281/GRC is very similar to Power Supply PP-282/GRC, but it is designed for use with a 12-volt storage battery. Since a 6-volt vibrator is used, however, voltage-dropping resistors R-3 and R-4 are used to drop the battery voltage to 6 volts. Resistor R-3 is effective when a shunt-drive vibrator is used, while R-4 is in the circuit when a series-drive vibrator is used.

b. In the case of the 6-volt shunt-drive vibrator, the driving coil is connected between terminals 7 and 3 of the vibrator. The battery circuit extends from terminals 7 of X-1 and X-3 through the driving coil and terminal 3 of X-3, through voltage-dropping resistor R-3, through

one-half of the primary winding of T-1, through current-limiting resistor R-2 and choke coil L-1 to the positive terminal of the battery.

c. In the case of a 6-volt series-drive vibrator, the battery circuit extends from pins 7 of X-1 and X-3, through the vibrating reed and the series-driving contact, through the vibrator coil connected to terminal 4 of X-3, through voltage-dropping resistor R-4, and through choke coil L-1 to the positive terminal of the battery.

d. The values of current-limiting resistor R-2 and buffer capacitor C-4 differ from those of the corresponding parts in Power Supply PP-282/GRC. Capacitor C-5 is not needed in this unit because of the lower input voltage used. Connector X-1 is wired differently to apply the proper operating voltage to an associated radio set. The straps are connected between pins 2, 3, and 5 of X-1; the output for the radio set is taken from pins 2 and 5.

10. Power Supply PP-448/GR (fig. 10)

The operation of this unit is the same as that of the unit described in paragraph 9, but is designed for use with a 6-volt storage battery. Voltage-dropping resistors R-3 and R-4 and current-limiting resistor R-2 are not used in this unit since the vibrator is designed to operate from 6 volts. Capacitor C-5 is not used because sparking at the vibrator contacts is not excessive at this input voltage. The strap connections on X-1 are between pins 1, 3, and 4 so that proper operating voltage will be supplied to an associated radio set.

CHAPTER 3

FIELD MAINTENANCE INSTRUCTIONS

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available, and by skill of the repairmen.

Section I. PREREPAIR PROCEDURES

II. Tools, Materials, and Test Equipment

Tools, materials, and test equipment needed for performing the prerespair procedures in this section are listed below:

Tool Equipment TE-113.

Cleaning fluid: Solvent, dry-cleaning (SD); Federal specification P-S-661a.

Storage battery: 6, 12, or 24 volts for Power Supplies PP-448/GR, PP-281/GRC, and PP-282/GRC, respectively.

Electronic Multimeter ME-6/U: a-c voltmeter.

Electronic Multimeter TS-505/U: d-c volt-ohmmeter.

Multimeter TS-352/U: d-c ammeter.

Dummy output load resistor: 1,150 ohms, 22 watts.

Resistor, composition: 5,100 ohms, ± 10 percent; 1 watt; JAN type RC20BF512J.

Fuse: 5 amperes.

Capacitor, paper dielectric: 2 uf (microfarad); 600 vdcw; JAN type CP53B1-DF205V.

Test Lead Set CX-1331/U.

Caution: Do not operate the power supply without a suitable load. The output voltage of the power supply, when operated without an output load, is considerably higher than normal because of the inherent regulation of the unit.

12. Disassembly and Visual Inspection (figs. 2, 3, and 4)

a. **DISASSEMBLY.** When a power supply is to be checked or repaired, turn off the power on

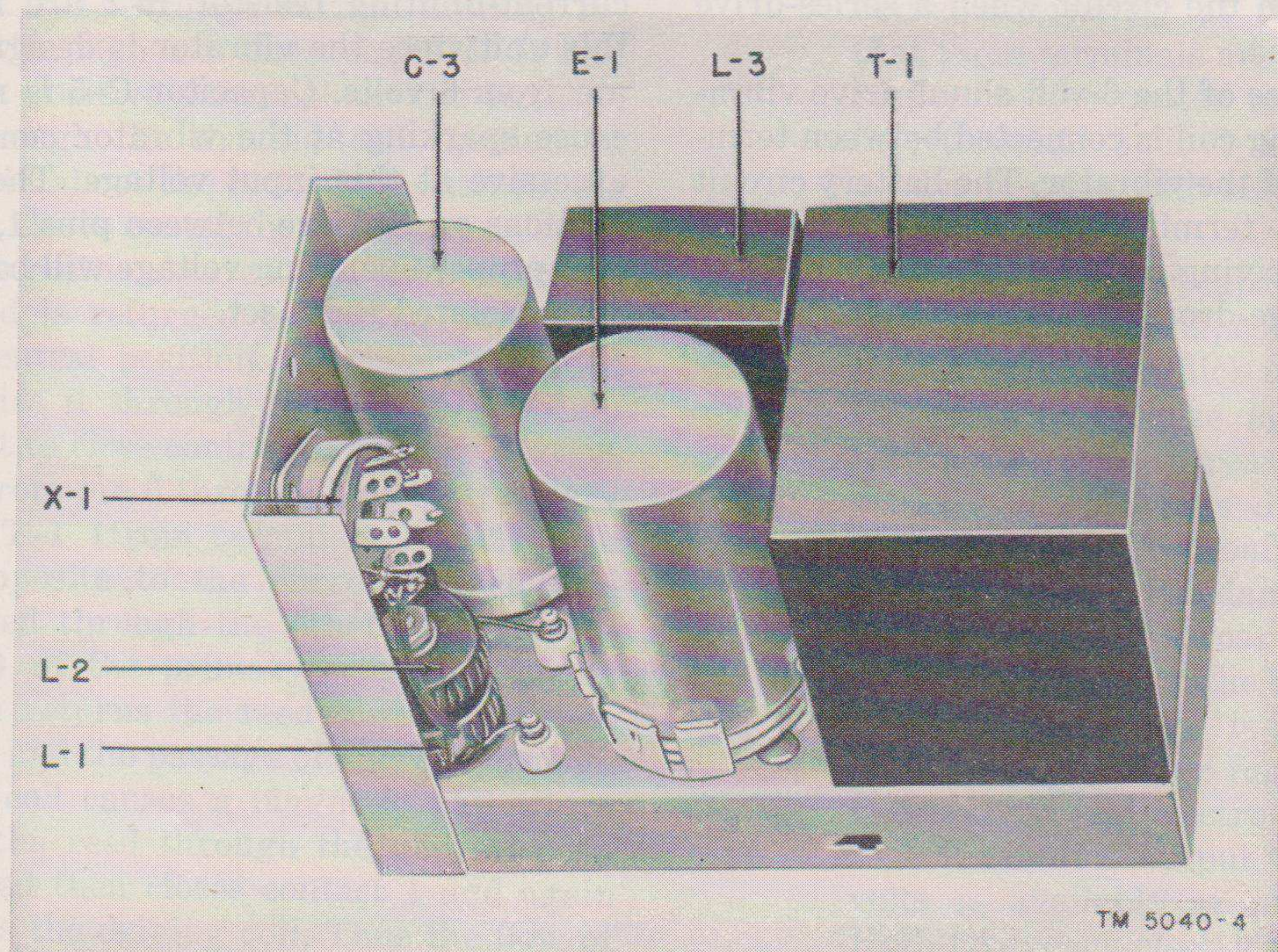
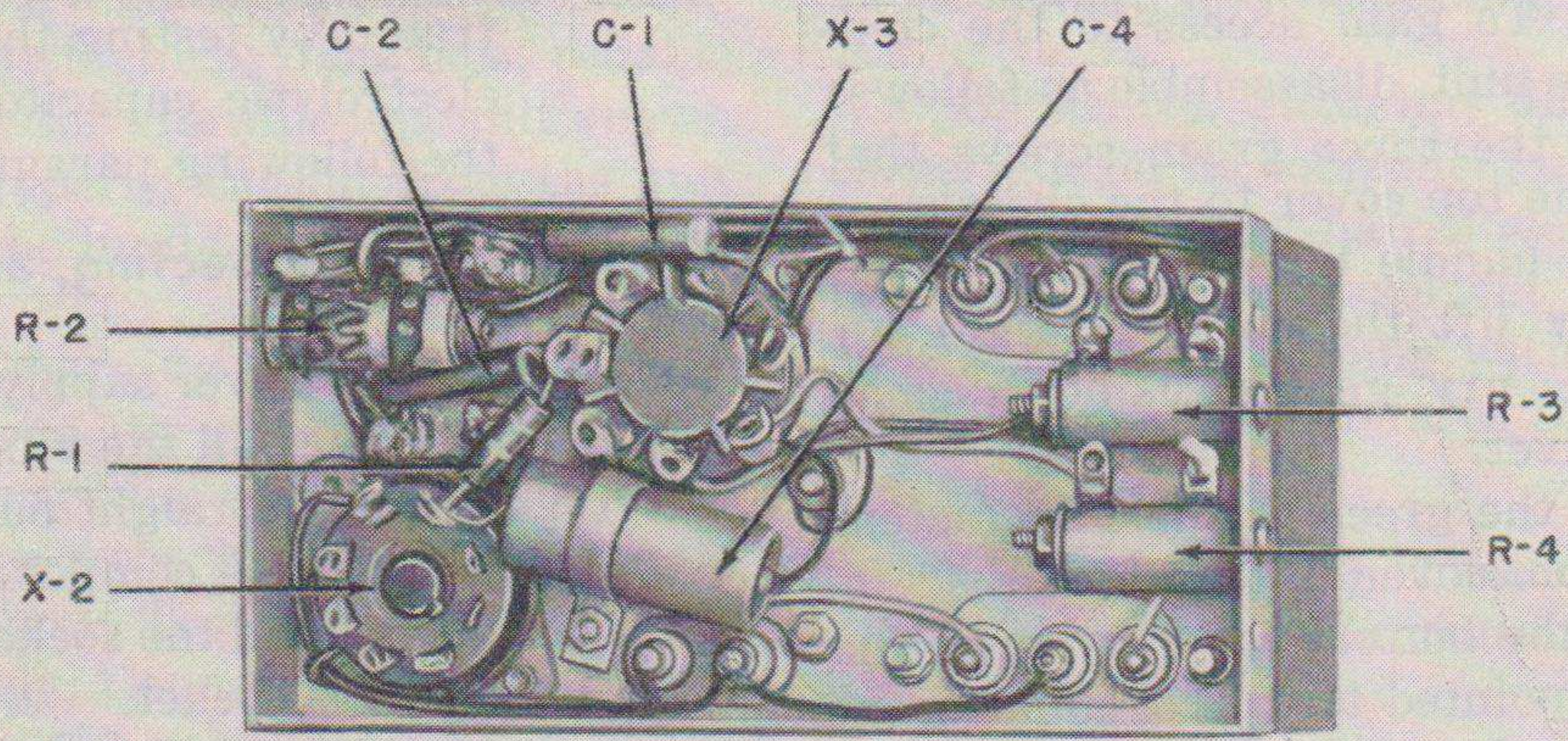
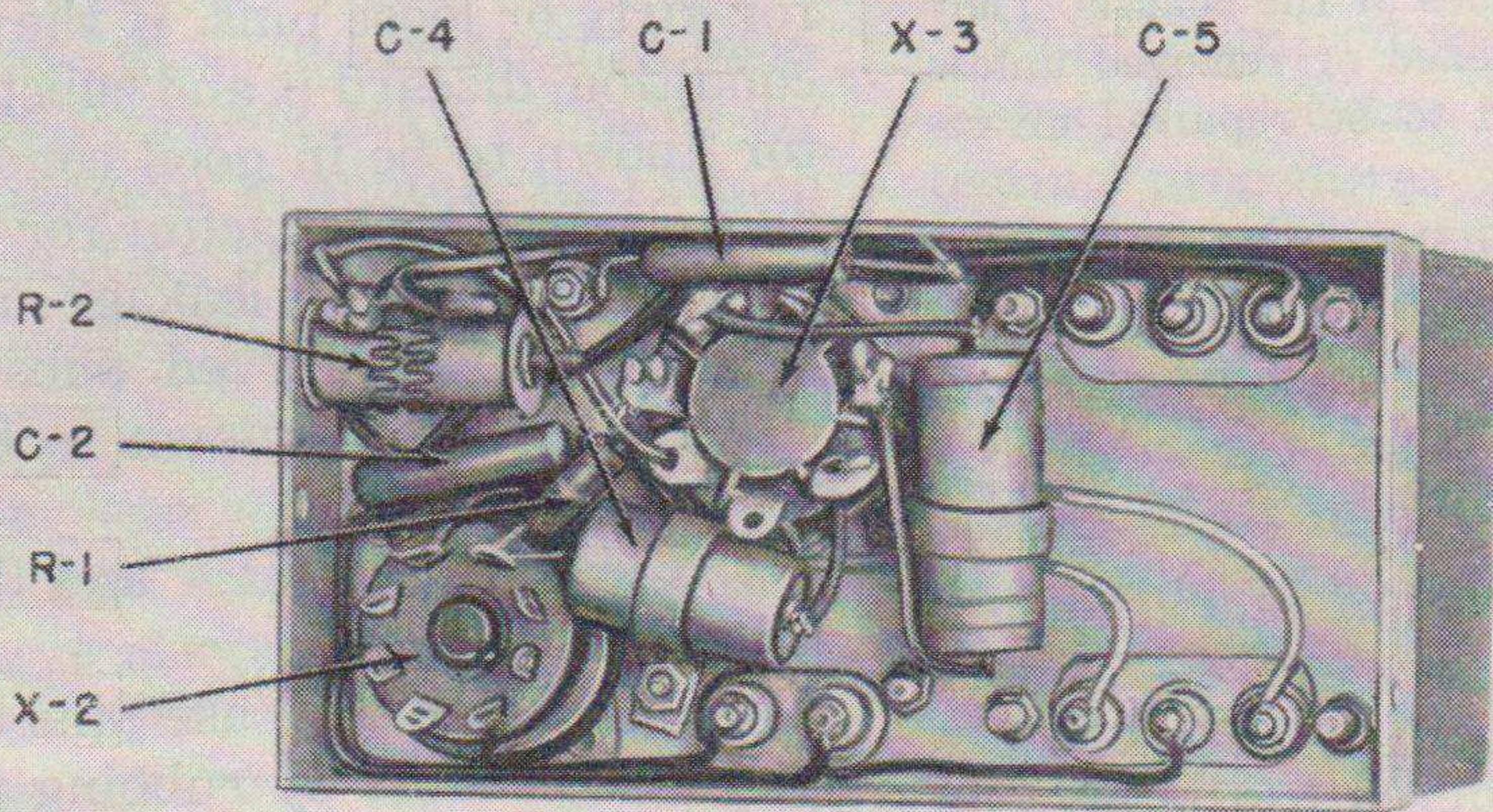


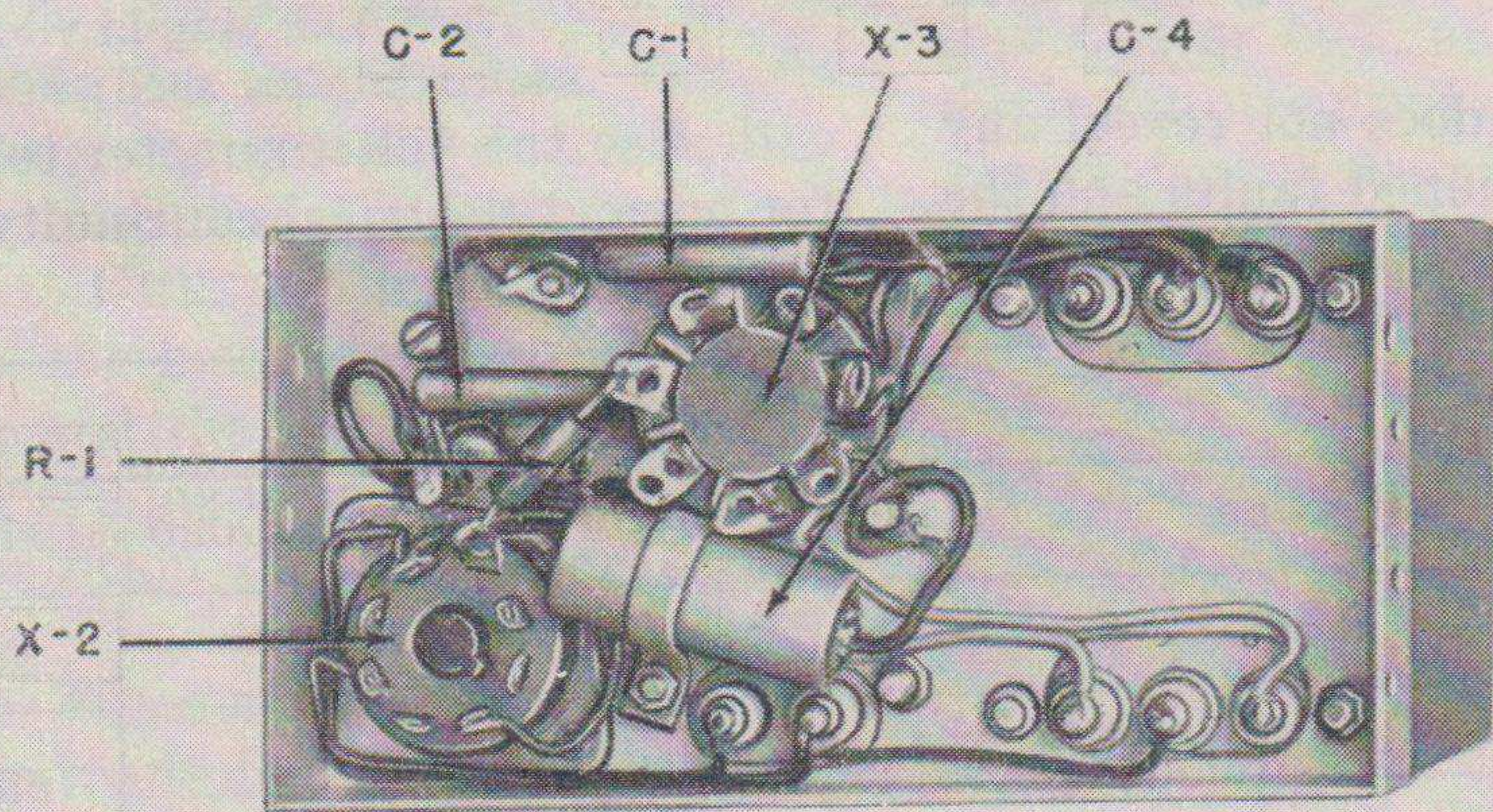
Figure 3.—Power supply PP-282/GRC, top of chassis.



POWER SUPPLY PP-281/GRC



POWER SUPPLY PP-282/GRC



POWER SUPPLY PP-448/GR

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Figure 4.—Power supplies PP-281/GRC, PP-282/GRC, and PP-448/GR, underchassis.

the equipment and pull the power supply out of its compartment. To gain access to the components within the unit, disassemble as follows:

- (1) Remove the three green screws that fasten the top cover to the chassis.
- (2) Pull the handle to remove the cover. Carefully lift the cover straight up. If stuck, pry gently, using a small screwdriver.
- (3) Remove the green screw that fastens the bottom cover to the chassis.
- (4) Pry up the bottom cover by inserting a sharp pointed tool, or a nail, in one of the small openings at the corners of the bottom cover.
- (5) Lift up the cover and lay it aside with the top cover.

Note. The red screws are used to fasten components to the sides of the chassis. They should never be loosened or removed unless the components need to be repaired or replaced.

b. VISUAL INSPECTION. Inspect the unit thoroughly for any abnormal conditions, such as:

- (1) Burned-out resistors or short circuits. Short circuits are usually traceable by signs of discoloration of parts caused by excessive heating or by burned insulation on wires.
- (2) Loose, defective, or broken connections of wires soldered to the lugs on the prongs of vibrator socket X-3, power socket X-1, or capacitor socket X-2.
- (3) Loose or dirty contact clips on X-1, X-2, and X-3.
- (4) Loose or missing mounting screws on the components.
- (5) If this inspection does not reveal any of the above mentioned faults and the unit is known to be operating unsatis-

factorily, sometimes the fault can be traced by testing the vibrator and the electrolytic capacitor as described in the following paragraphs.

13. Removing, Inspecting, and Testing Plug-in Parts

a. Return the power supply unit to its normal upright position. Pull the vibrator and the electrolytic capacitor straight out of their sockets. Avoid jiggling these components in their sockets; this may spread the socket prongs or otherwise damage this socket.

Note. It is usually necessary to pry out the vibrator by using a small screw driver. In doing so, take care not to enlarge the ring clip holding the vibrator base and not to damage the vibrator.

b. Inspect the vibrator shell for discoloration resulting from overheating and inspect its base for dirty or loose pins. If the vibrator is in bad condition, discard it and substitute a new vibrator known to be in good condition. Inspect the dual electrolytic capacitor for discoloration, corrosion, bulging, or leakage of liquid. If these conditions are observed, substitute a new electrolytic capacitor known to be in good condition.

c. Clean the vibrator and the electrolytic capacitor as follows:

- (1) Clean the base pins of these two components by rubbing them lightly with fine emery cloth. Dust them with a small, clean brush.
- (2) Clean the base, shell, and pins of these parts with a clean, lint-free cloth moistened with solvent (SD). Dry in air draft.

Note. The plug-in vibrator is hermetically sealed into its shell; never open it.

d. Use the voltohmmeter to test the vibrator for normal electrical continuity, as shown in the table below.

Vibrator pins	Resistance readings			
	PP-282/GRC		PP-281/GRC and PP-448/GR	
	Series-drive	Shunt-drive	Series-drive	Shunt-drive
4 and 7.....	480 to 540 ohms.....	Infinity.....	50 ohms.....	Infinity
3 and 7.....	Infinity.....	Infinity.....	Infinity.....	40 ohms
1 and 7.....	do.....	480 to 540 ohms.....	do.....	Infinity
2 and 7.....	do.....	Infinity.....	do.....	do.....
5 and 7.....	do.....	do.....	do.....	do.....
6 and 7.....	do.....	do.....	do.....	do.....

The above test is not a guarantee that the vibrator will operate satisfactorily. The most reliable test is to substitute the vibrator in a unit known to be operating properly. Output from the unit should be within the limits stated in paragraph 18b.

e. To test the charging action of capacitor C-3, connect one of its sections to the ohmmeter. Charge this section of the capacitor with the ohmmeter, using the high-resistance scale (at least 5 megohms). Test each section of the capacitor separately. Connect the positive lead of the ohmmeter to the positive terminal of the capacitor. Connect the negative lead of the meter to the negative terminal of the capacitor. The ohmmeter first should indicate a very low value of resistance. The pointer then should move toward the high-resistance reading on the scale. The final reading should be about 1 megohm. A more reliable check may be made by substituting the capacitor in another unit which is known to be operating properly.

Section II. TROUBLE SHOOTING

Warnings: Never operate the power supply without an output load (par. 18). Turn off the power and discharge electrolytic capacitor C-3 before repairing the unit.

16. Trouble-shooting Procedures (figs. 3 and 4)

The test procedures for locating trouble in the power supply are outlined in the following steps:

a. **SHORT-CIRCUIT CHECKS.** Resistance measurements are made to locate short circuits which might damage the battery or the equipment when power is applied (par. 17).

b. **OPERATIONAL CHECK.** Measurements of the input voltage, the battery current drain in the input circuit, and the voltage delivered in the output circuit are made as a rapid check of the operating condition of the power supply (par. 18).

c. **RESISTANCE MEASUREMENTS.** Resistance measurements are made to locate faults or defective components (par. 19).

d. **VOLTAGE MEASUREMENTS.** Voltage measurements at significant points of the circuit may disclose faults not observed during the previous tests (par. 20).

14. Cleaning and Inspecting Chassis

a. **CLEANING.** Clean any dirty surface on the chassis, or on its components, by brushing with a small, stiff, short-haired clean brush that has been moistened with solvent (SD). Dry accessible surfaces by wiping with a clean, lint-free cloth. Allow other surfaces to dry in air draft.

b. **INSPECTING.**

- (1) Inspect the chassis top, rear panel, and the underchassis for bent, broken, or loose parts and wires.
- (2) Inspect the three sockets for enlarged prongs.

15. Replacing Removed Parts

Plug the vibrator and the capacitor into their respective sockets. The trouble-shooting and testing procedures given in the section which follows may then be applied.

17. Short-circuit Checks

a. For these checks, remove capacitor C-3 and vibrator E-1 from their sockets. Use Electronic Multimeter TS-505/U, or an equivalent meter, and check for a resistance greater than 1 megohm between pins 3 and 7 and 8 and 7 of connector X-1. Do not apply power to the unit until these conditions are met.

b. A short circuit or a low-resistance reading may indicate shorted or leaky r-f filter capacitors C-1 or C-2, or a grounded wire or lug in the input or output circuits (See schematic diagrams, figs. 8, 9, and 10). Check each capacitor for leakage or a short and replace if necessary. Check wires and lugs. Repair them as needed.

18. Operational Checks (fig. 5)

a. Refer to the operational test set-up shown in figure 5 and proceed as follows, using the test equipment listed in paragraph 11.

- (1) Select a storage battery having the required voltage (6, 12, or 24 volts for Power Supplies PP-448/GR, PP-281/GRC, PP-282/GRC, respectively).

- (2) Connect the battery negative lead to pin 7 of connector X-1.
- (3) Connect the battery positive lead in series with the 5-ampere fuse and the ammeter to pin 3 of X-1 (Use Multimeter TS-352/U or an ammeter with equivalent low-scale ranges).
- (4) Connect a 1,150-ohm, 22-watt resistor across pins 8 and 7 of X-1.
- (5) Use Electronic Multimeter TS-505/U to measure the input and output voltages at the points indicated by meters M-1 and M-3 on figure 5.

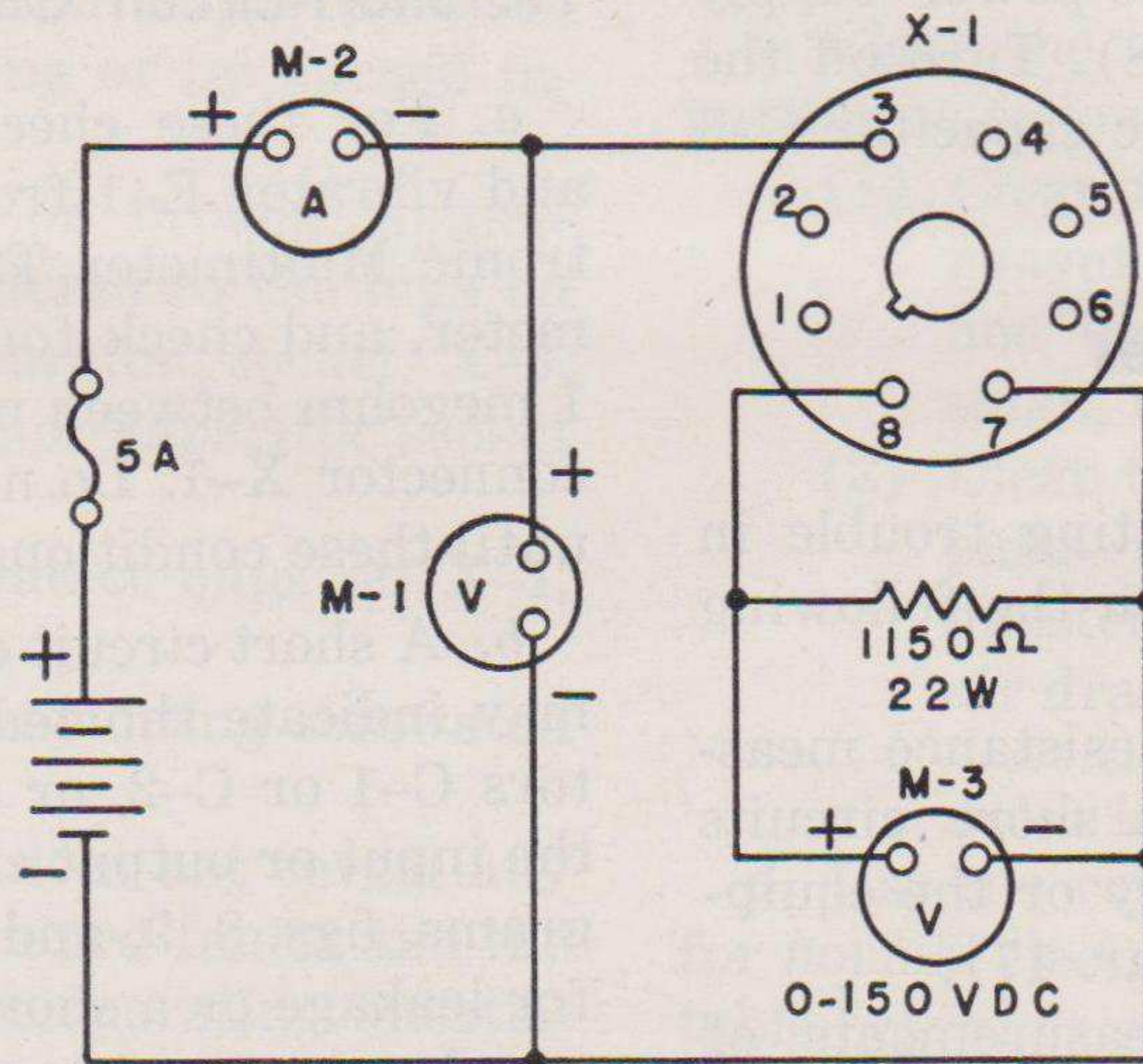
b. The required readings on the input and output meters are listed below:

Power supply	M-1 Input (volts)		M-2 Input (amperes)		M-3 Output (volts)	
	Min	Max	Min	Max	Min	Max
PP-448/GR.....	6.2	6.4	3.7	4.6	130	145
PP-281/GRC.....	12.4	12.8	1.9	2.4	130	145
PP-282/GRC.....	24.8	25.6	1.0	1.3	130	145

c. If the required readings are obtained, proceed with the additional tests given in paragraph 25. If the required readings are not obtained, proceed with the detailed trouble localization checks given in paragraphs 19 and 20.

19. Resistance Measurements

These checks are intended to locate the defective components or wiring responsible for the failure to meet the requirements of paragraph 18b. For these checks, disconnect the battery and remove the vibrator from its socket. Remove the load resistor from socket X-1. Use Electronic Multimeter TS-505/U, or an equivalent meter. The points to be tested, the required readings, and the probable cause of trouble, if the readings are incorrect, are listed in the following table. Replace any component found to be defective. When connecting test leads across electrolytic capacitor C-3, observe the correct polarity.



POWER SUPPLY	NOMINAL BATT. VOLTAGE	METER RANGE M-1	METER RANGE M-2
PP-448/GR	6 V	0-10 V	0-10 A
PP-281/GRC	12 V	0-20 V	0-5 A
PP-282/GRC	24 V	0-50V	0-3 A

NOTES:
UNLESS OTHERWISE SHOWN,
RESISTORS ARE IN OHMS

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Figure 5.—Power supplies PP-281/GRC, PP-282/GRC, and PP-448/GR, operational test set-up.

Point of measurement	Normal reading (ohms)			Probable trouble
	PP-281/GRC	PP-282/GRC	PP-448/GR	
Term. 3 to 7 on X-1.	Infinity.....	Infinity.....	Infinity.....	Defective C-1.
Term. 3 on X-1 to term. 1 on X-3.	1 (approx.).....	2 (approx.).....	Zero*.....	Defective L-1, R-2, or T-1.
Term. 3 on X-1 to term. 6 on X-3.	1 (approx.).....	2 (approx.).....	do.....	Defective L-1, R-2, or T-1.
Term. 3 on X-1 to term. 4 on X-3.	20.....	Zero*.....	do.....	Defective R-4.
Term. 3 on X-1 to term. 3 on X-3.	50.....	Infinity.....	do.....	Defective R-3.
Term. 7 on X-1 to term. 2 on X-2.	15K to 30K.....	15K to 30K.....	15K to 30K.....	Defective C-3 or C-2.
Term. 8 on X-1 to term. 2 on X-2.	155.....	155.....	155.....	Defective L-2 or L-3.
Term. 2 to 5 on X-3.	76.....	62.....	68.....	Defective T-1.
Across R-1.....	1,800.....	1,800.....	1,800.....	Defective R-1.

*Reading too small to be discernible.

20. Voltage Measurements

The voltage checks in this paragraph supplement the resistance measurements of paragraph 19 and are intended to locate defects which are not readily determined by resistance measurements, that is, defective capacitors, or partially shorted windings. Insert the vibrator in its socket. Connect the storage battery, (+) to pin 3 on X-1, and (-) to pin 7 on X-1. Connect the 1,150-ohm, 22-watt load resistor across pins 8 and 7 (ground) of X-1. Refer to the schematics in figures 8, 9, and 10 to identify the points measured with the component involved. The required voltages are listed in the table

below. Use Electronic Multimeter TS-505/U or an equivalent meter.

Point of measurement	Normal reading (volts)			Probable trouble
	PP-281/GRC	PP-282/GRC	PP-448/GR	
From term. 3 to 7 on X-1.	12.6	25.2	6.3	Defective C-1.
From term. 8 to 7 on X-1.	135	135	135	Defective C-2, C-3, L-2, or L-3.
From term. 2 of X-2 to term. 7 of X-1.	155	155	155	Defective T-1, R-1, or C-4.

Section III. REPAIRS

21. Replacement of Parts

When replacing parts in Power Supplies PP-281/GRC, PP-282/GRC, and PP-448/GR, observe the precautions given below.

a. TAGGING LEADS. Tagging leads is essential to assure that correct rewiring will be made when a part is replaced. Before unsoldering leads from transformer T-1, or from sockets X-1, X-2, X-3, or from other parts, tie together the leads that are attached to each of these parts. Use small tags or short pieces of adhesive tape to identify all wires in accordance with their numbered connections. Identify every lead that is to be removed.

b. PARTS AND SUBSTITUTIONS. When damaged parts must be replaced, identical parts should be used. If identical parts are not available and the damaged component is beyond repair, a substitution must be made. The part substituted must have identical electrical properties and must be of equal or higher voltage and current ratings.

c. LOCATION. Relocation of a substituted part may develop hum and is not recommended.

d. MOUNTING. Mount the new or repaired part in the same mounting as that formerly occupied by the damaged parts. Fasten all mountings securely.

e. **SOLDERING.** Before soldering any connections, carefully scrape all parts that will be touched by the solder until all traces of rust, corrosion, paint, or varnish are removed. Dust the scraped parts with a small clean brush. Tin all surfaces to be soldered. Wrap the wire around the lug to be soldered to obtain mechanical support. Solder the connection with very little solder and use sufficient heat to make the solder flow evenly around the tinned surfaces.

f. **RETROPICALIZATION.** If the part to be replaced requires special treatment, such as retropicalization, follow the instructions given in the appropriate publications referred to in section V of this chapter.

22. Special Repair Procedures

Most of the parts in these power supplies are readily accessible and can be easily replaced without special procedure instructions. Special repair procedures required for repairing or replacing r-f chokes L-1 and L-2 and socket X-1 are given below:

a. **R-F CHOKES.** The two r-f chokes, L-1 and L-2, are mounted together and are located near socket X-1. They are fastened to the chassis by a single axial screw and are insulated by three fiber disks. To remove the chokes:

- (1) Remove the red-painted screw below the power-connector socket, and push aside the resistor formerly mounted on that screw.
- (2) Loosen and remove the screw which holds the two r-f chokes on the chassis.
- (3) Unsolder the wires from the two stand-off insulators near the chokes.
- (4) Remove the chokes; repair or replace as necessary.
- (5) Reassemble the chokes on the axial screw and tighten the nut.
- (6) Remount the resistor, taking care not to short its lugs to the chassis.

b. **POWER SOCKET X-1.** To change this part—

- (1) Drill out the two rivets that fasten it to the chassis.
- (2) Unsolder the jumper wire and the three other wires.
- (3) Substitute a new socket and fasten it with machine screws, lock washers, and nuts.
- (4) Resolder the jumper and wires to the socket.
- (5) Clean thoroughly to remove solder drops and metal chips.
- (6) Check the new connections with those shown in the schematic for that unit.

Section IV. FINAL TESTING

23. General

If the unit does not meet the requirements of paragraph 18, repeat the trouble-shooting procedures given in paragraphs 19 and 20 to locate other faults. Repair as found necessary. If the unit operates as required in paragraph 18, replace the bottom and top covers on the unit and perform the test outlined in paragraph 24.

24. A-c Ripple Voltage Measurement

a. Connect the equipment as indicated in figure 5 with the following exceptions:

- (1) Substitute an a-c voltmeter (Electronic Multimeter ME-6/U or an equivalent meter) for M-3 and connect it in series with a 2-uf capacitor (par. 11) across the 1,150-ohm load resistor.

- (2) Connect a 5,100-ohm resistor (par. 11) across the meter terminals.

b. With the a-c meter on its lowest range (2.5 volts on Electronic Multimeter ME-6/U), check for a reading of .0675 volt or less. If a higher reading is indicated, it is probable that capacitor C-3 needs replacement.

25. Additional Test Data

Normal changes in battery voltage and changes in output loads will affect the output voltage of the power supply. Hence, output voltage variation does not necessarily indicate a faulty condition. Typical examples of output voltage changes for changes in battery voltage and output loads are given in the following tables.

Note. The tables are for reference when specified test conditions cannot be met.

Table I.—Output Voltage versus Battery Voltage

Power supply	Battery (volts)	Load (ohms)	Output (volts)	Battery current (amperes)
PP-448/GR.....	5.0	1,150	110	3.3
	6.3	1,150	135 ± 5	4.3
	8.0	1,150	180	5.5
PP-281/GRC.....	10.0	1,150	110	1.8
	12.6	1,150	135 ± 5	2.3
	16.0	1,150	177	3
PP-282/GRC.....	20.0	1,150	109	1.1
	25.2	1,150	135 ± 5	1.25
	32.0	1,150	175	1.65

Table II.—Output Voltage versus Output Load

Power supply	Battery (volts)	Output loads* (ohms)	Output voltages (volts)
PP-448/GR.....	6.3	1,150	135
		5,500	173
PP-281/GRC.....	12.6	1,150	135
		5,500	175
PP-282/GRC.....	25.2	1,150	135
		5,500	170

*The 1,150-ohm resistor is the standard dummy output load recommended for these power supplies. The 5,500-ohm resistor is to be used only as a reference to further check the normal operation of these units.

Section V. LUBRICATION AND WEATHERPROOFING

26. Lubrication

The power supplies described in this manual do not require lubrication. Never apply oil or grease to any parts of these units.

27. Weatherproofing and Rustproofing

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 moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This

treatment is explained in TB SIG 13 and TB SIG 72.

c. WINTER MAINTENANCE. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66.

d. DESERT MAINTENANCE. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained in TB SIG 75.

e. RUSTPROOFING. Rust and corrosion can be prevented by touching up bared surfaces. Clean where necessary with fine sandpaper. Never use steel wool.

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

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

28. Repacking for Shipment or Limited Storage

Wrap and pack securely according to directions given in JAN-P-100, or as directed by officer-in-charge.

29. Demolition of Matériel to Prevent Enemy Use

The demolition procedures outlined below 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.

a. SMASH. Smash capacitors, transformers, resistors, sockets, terminal board, plug, and

vibrator, using sledges, axes, handaxes, pick-axes, hammers, crowbars, or heavy tools.

b. CUT. Cut wiring, using axes, handaxes, or machetes.

c. BURN. Burn technical manual, records and forms, resistors, capacitors, transformers, and vibrator, using gasoline, kerosene, oil, flame throwers, and incendiary grenades.

d. BEND. Bend chassis, panels, and covers.

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

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

g. DESTROY. Destroy everything.

24. Ac Ripple Voltage Measurement

a. Connect the equipment as indicated in Figure 3 with the following exceptions:

- (1) Substitute an ac voltmeter (type 100-0-100 millivolt) or an ac voltmeter (type 100-0-100 millivolt) for M-3 and connect it in series with a 2- μ f capacitor (part 11) across the 1.100-ohm load resistor.

25. Additional Test Data

Normal checks on battery voltage and charge are made. The ac ripple voltage of the power supply should not exceed 100 millivolts. The ac ripple voltage of the output filter should not exceed 100 millivolts. The ac ripple voltage of the output filter should not exceed 100 millivolts. The ac ripple voltage of the output filter should not exceed 100 millivolts.

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310-20-3 and SR 310-20-4. Check Department of the Army Supply Catalog SIG 1 for Signal Corps supply catalogs.

1. Army Regulations

AR 380-5 Safeguarding Military Information.

2. Supply Publications

SIG 1 Introduction and Index.
SB 11-47 Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11-76 Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Preserving

TB SIG 13 Moistureproofing and Fungiproofing Signal Corps Equipment.

4. Demolition

FM 5-25 Explosives and Demolitions.

5. Packaging and Packing Instructions

Joint Army-Navy Packaging specifications.
JAN-D-169 Desiccants (activated).
JAN-P-100 General Specification.
JAN-P-106A Boxes; wood, nailed.
JAN-P-116 Preservation, methods of.
JAN-P-125 Barrier materials, waterproof, flexible.
JAN-P-131 Barrier material; moisture-vaporproof, flexible.

TB SIG 66

TB SIG 72

TB SIG 75

6. Other Publications

AN 16-35TS 352-3 Multimeter TS-352/U.
FM 24-18 Field Radio Techniques.
SR 310-20-3 Index of Training Publications (Field Manuals, Training

TB SIG 123

TB SIG 178

Circulars, Firing Tables and Charts, Army Training Programs, Mobilization Training Programs, Graphic Training Aids, Joint Army-Navy-Air Force Publications, and Combined Communications Board Publications).

Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, Tables of Equipment, and Tables of Basic Allowances.

Winter Maintenance of Signal Equipment.

Tropical Maintenance of Ground Signal Equipment.

Desert Maintenance of Ground Signal Equipment.

Preventive Maintenance Practices for Ground Signal Equipment.

Preventive Maintenance Guide for

TM 9-2857	Radio Communication Equipment. Storage Batteries Lead-Acid Type.
TM 11-430	Batteries for Signal Communication. Except those pertaining to Aircraft.
TM 11-453	Shop Work.
TM 11-455	Radio Fundamentals.
TM 11-483	Suppression of Radio Noises.
TM 11-486	Electrical Communication Systems Engineering.
TM 11-4000	Trouble Shooting and Repair of Radio Equipment.

7. Abbreviations

- a, amp. ampere
- a-c. alternating-current
- C. centigrade
- d-c. direct-current
- F. Fahrenheit
- h. henry
- r-f. radio-frequency
- uf, uuf. microfarad, micromicrofarad
- uh. microhenry
- v. volt
- w. watt

APPENDIX II

IDENTIFICATION TABLE OF PARTS

I. Requisitioning Parts

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 T/O&E, T/E, T/A, T/BA, SIG 6, SIG 7 & 8, SIG 7-8-10, SIG 10, list of allowances of ex-

pendable material, or another authorized supply basis. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1, Introduction and Index.

2. Identification Table of Parts for Power Supply PP-281/GRC

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	POWER SUPPLY PP-281/GRC: vibrator type; sync; output 138 v DC, .12 amp; input 12.6 v DC, 2.14 amp. TECHNICAL MANUAL (TM 11-5040)		3H4497-281. (Order through AGO channels).
C-1, C-2	CAPACITOR, fixed, ceramic dielectric; 5000 uuf ±20%; 500 vdcw.	R-f hash filters	3DA5-215.
C-4	CAPACITOR, fixed: paper dielectric; 20,000 uuf ±10%; 1000 vdcw; JAN type CP25A1EG203K.	Buffer, secondary	3DA20-241.
C-3	CAPACITOR, fixed: electrolytic; 2-sect; 35 uf ea sect; 300 vdcw, ea sect; JAN type CE52C350N.	B+ filter	3DB35-1.
O-1	CLIP	Vibrator holding clip	2Z2712.132.
L-1, L-2	COIL, RF: choke; unshielded	R-f hash filters	3C315-126.
A-1	COVER	Power supply top cover	2Z3351-170.
E-2, E-3	INSULATOR, feedthrough: cylindrical shape; white ceramic, unglazed; .89" lg o/a, .25" diam o/a.	Feedthrough insulators	3G290-14.
N-1	LABEL: ckt label; 5" lg x 2½" wd x .007" thk	Circuit label	6D16777-2.
H-1	MOUNTING: capacitor mtg; holds material 1½" diam	Capacitor holding clamp	2Z6820.251.
A-2	PLATE, cover	Power supply bottom cover	2Z7093-236.
L-3	REACTOR, 2 hy, .13 amp; 170 ohms DC resistance; HS metal case.	B+ filter	3C315-127.
R-2	RESISTOR, fixed: WW; .5 ohm ±10%; 8 w at 275°C max continuous oper temp; JAN type RW30FR50.	Transformer current limiting.	3RW4501.
R-4	RESISTOR, fixed: WW; 20 ohms ±5%; 8 w at 275°C max continuous oper temp; JAN type RW30F200.	Vibrator coil current limiting (series drive).	3RW14126.
R-3	RESISTOR, fixed: WW; 50 ohms ±5%; 8 w; at 275°C max continuous oper temp; JAN type RW30F500.	Vibrator coil current limiting (shunt drive).	3RW16534.
R-1	RESISTOR, fixed: comp; 1800 ohms ±10%; 1 w; JAN type RC30BF182K.	Buffer, secondary	3RC30BF182K.
X-3	SOCKET, tube: 7 cont, small; 1 piece molded in mtg plate.	Vibrator socket	2Z8677.153.
X-1, X-2	SOCKET, tube: octal; 1 piece molder in mtg plate	X-1: Input-output connector X-2: Filter capacitor socket.	2Z8678.337.
T-1	TRANSFORMER, power: vibrator type; input 12.6 v DC, 2.14 amp; output 356 v RMS CT, 118 ma DC; 115 cyc output HS metal case.	Vibrator transformer, 12.6-volt supply.	2Z9625-63.
E-1	VIBRATOR, synchronous: input 6.3 v DC, 4.3 amp	Vibrator	3H6690-15.

3. Identification Table of Parts for Power Supply PP-282/GRC

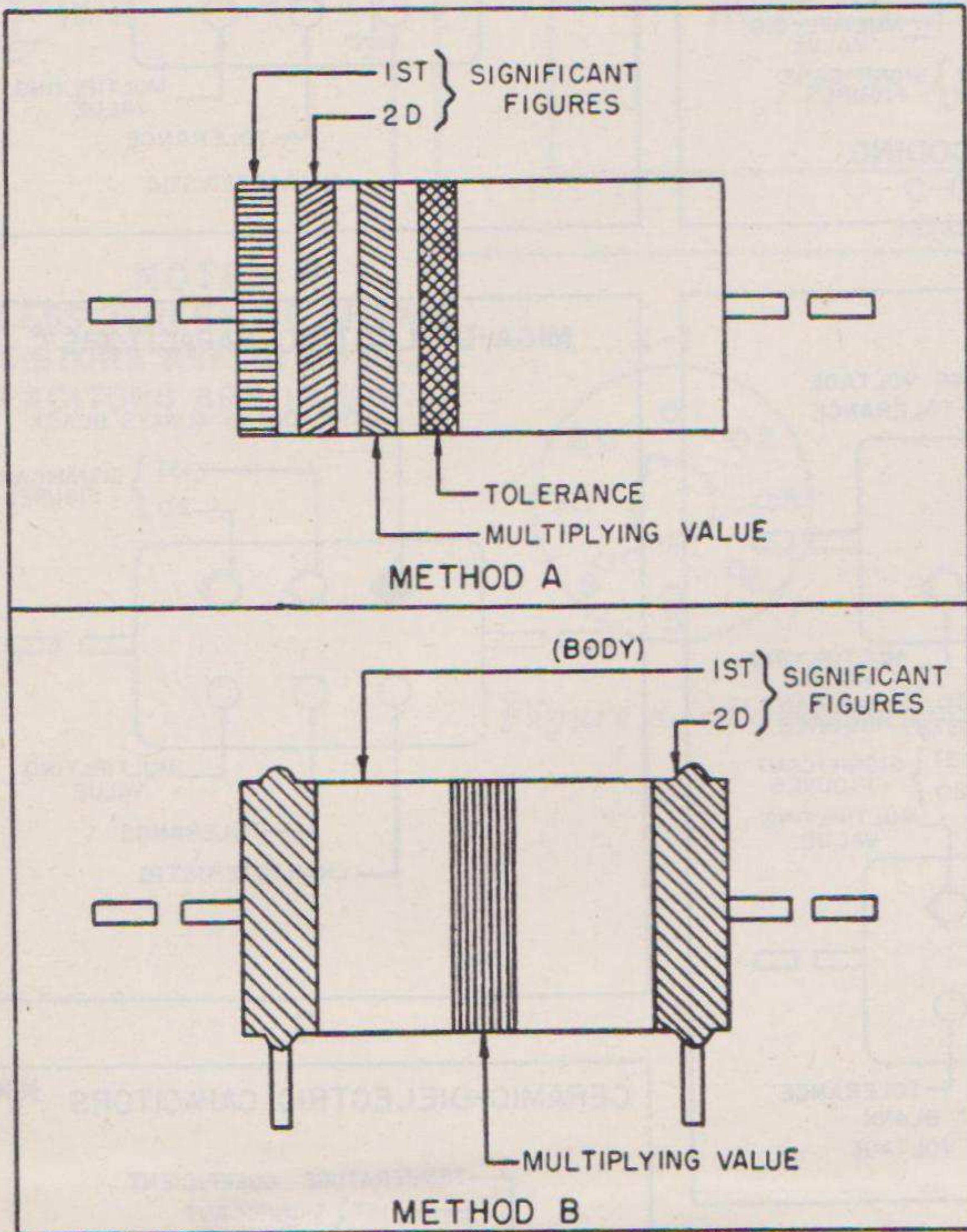
Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	POWER SUPPLY PP-282/GRC: vibrator type; sync; output 138 v DC, .12 amp; input 25.2 v DC, 1.17 amp. TECHNICAL MANUAL (TM 11-5040)		3H4497-282. (Order through AGO channels).
C-1, C-2	CAPACITOR, fixed: ceramic dielectric; 5000 uuf ±20%; 500 vdcw.	R-f hash filters	3DA5-215.
C-4	CAPACITOR, fixed: paper dielectric; 10,000 uuf ±10%; 1000 vdcw; JAN type CP25A1EG103K.	Buffer, secondary	3DA10-506.
C-5	CAPACITOR, fixed: metallized paper dielectric; 1 uf ±10%; 200 vdcw.	Buffer, primary	3DB1-318.
C-3	CAPACITOR, fixed: electrolytic; 2-sect; 35 uf ea sect; 300 vdcw ea sect; JAN type CE52C350N.	B+ filter	3DB35-1.
O-1	CLIP	Vibrator holding clip	2Z2712.132.
L-1, L-2	COIL, RF: choke; unshielded	R-f hash filters	3C315-126.
A-1	COVER	Power supply top cover	2Z3351-170.
E-2, E-3	INSULATOR, feedthrough: cylindrical shape; white ceramic, unglazed; .89" lg o/a, .25" diam o/a.	Feedthrough insulators	3G290-14.
N-1	LABEL: ckt label; 5" lg x 2½" wd x .007" thk	Circuit label	6D16777-4.
H-2	MOUNTING: capacitor mtg; holds material ⅝" diam	Capacitor holding clamp	2Z6820.252.
H-1	MOUNTING: capacitor mtg; holds material ⅜" diam.	Capacitor holding clamp	2Z6820.251.
A-2	PLATE, cover	Power supply bottom cover	2Z7093-236.
L-3	REACTOR: 2 hy, .13 amp; 170 ohms DC	B+ filter	3C315-127.
R-2	RESISTOR, fixed: WW; 1.6 ohms ±5%; 8 w at 275° C max continuous oper temp; JAN type RW30F1R6.	Transformer current limiting	3RW7509.
R-1	RESISTOR, fixed: comp; 1800 ohms ±10%; 1 w; JAN type RC30BF182K.	Buffer, secondary	3RC30BF182K.
X-3	SOCKET, tube: 7 cont, small; 1 piece molded in mtg plate.	Vibrator socket	2Z8677.153.
X-1, X-2	SOCKET, tube: octal; 1 piece molded in mtg plate.	X-1: Input-output connector. X-2: Filter capacitor socket.	2Z8678.337.
T-1	TRANSFORMER, power: vibrator type; input 25.2 v DC, 1.17 amp; output 356 v RMS CT, 118 ma DC; 115 cyc output; HS metal case.	Vibrator transformer, 25.2-volt supply.	2Z9625-64.
E-1	VIBRATOR, synchronous: input 25.2 v DC, 1.3 amp	Vibrator	3H6690-16.

4. Identification Table of Parts for Power Supply PP-448/GR

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	POWER SUPPLY PP-448/GR: vibrator type; sync; output 138 v DC, .12 amp; input 6.3 v DC, 4.3 amp. TECHNICAL MANUAL (TM 11-5040)		3H4497-448. (Order through AGO channels).
C-1, C-2	CAPACITOR, fixed: ceramic dielectric; 5000 uuf ±20%; 500 vdcw.	R-f hash filters	3DA5-215.
C-4	CAPACITOR, fixed: paper dielectric; 20,000 uuf ±10%; 1000 vdcw; JAN type CP25A1EG203K.	Buffer, secondary	3DA20-241.
C-3	CAPACITOR, fixed: electrolytic; 2-sect; 35 uf ea sect; 300 vdcw ea sect; JAN type CE52C350N.	B+ filter	3DB35-1.
O-1	CLIP	Vibrator holding clip	2Z2712.132.
L-1, L-2	COIL, RF: choke; unshielded	R-f hash filters	3C315-126.
A-1	COVER	Power supply top cover	2Z3351-170.
E-2, E-3	INSULATOR, feedthrough: cylindrical shape; white ceramic, unglazed; .89" lg o/a; .25" diam. o/a.	Feedthrough insulators	3G290-14.
N-1	LABEL: ckt label; 5" lg x 2½" wd x .007" thk	Circuit label	6D16777-3.
H-1	MOUNTING: capacitor mtg; holds material 1/8" diam.	Capacitor holding clamp	2Z6820.251.
A-2	PLATE, cover	Power supply bottom cover	2Z7093-236.
L-3	REACTOR: 2 hy, .13 amp; 170 ohms DC resistance; HS metal case.	B+ filter	3C315-127.
R-1	RESISTOR, fixed: comp; 1800 ohms ±10%; 1 w; JAN type RC30BF182K.	Buffer, secondary	3RC30BF182K.
X-3	SOCKET tube: 7 cont, small; 1 piece molded in mtg plate.	Vibrator socket	2Z8677.153.
X-1, X-2	SOCKET, tube: octal; 1 piece molded in mtg plate	X-1: Input-output connector. X-2: Filter capacitor socket.	2Z8678.337.
T-1	TRANSFORMER, power: vibrator type; input 6.3 v DC, 4.1 amp; output 350 v RMS CT, 118 ma DC; 115 cyc output; HS metal case.	Vibrator transformer, 6.3-volt supply.	2Z9625-65.
E-1	VIBRATOR, synchronous: input 6.3 v DC; 4.3 amp.	Vibrator	3H6690-15.

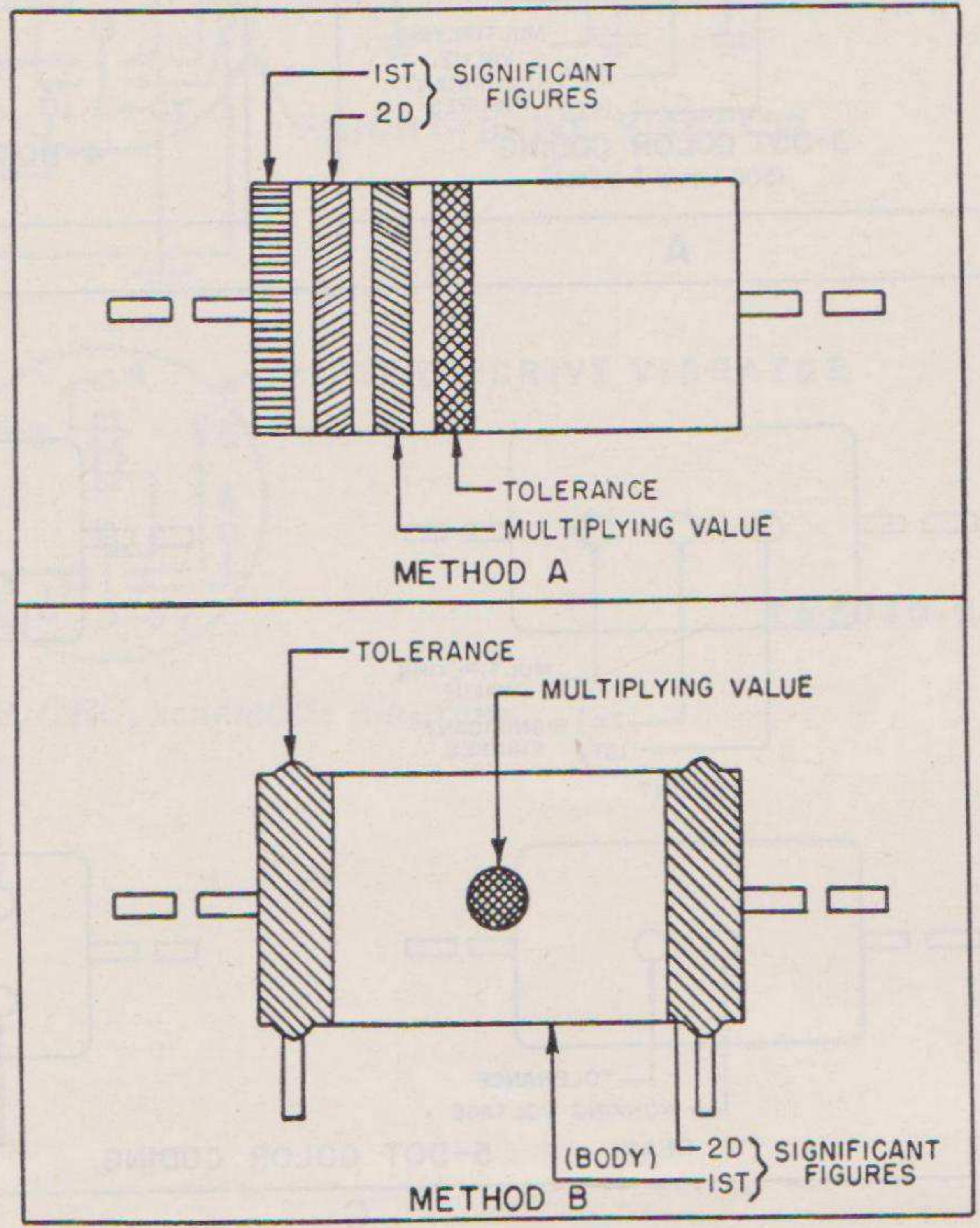
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS*



A

JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS†



B

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)
BLACK	0	1	± -
BROWN	1	10	± 1
RED	2	100	± 2
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
SILVER	-	0.01	± 10
NO COLOR	-	-	± 20

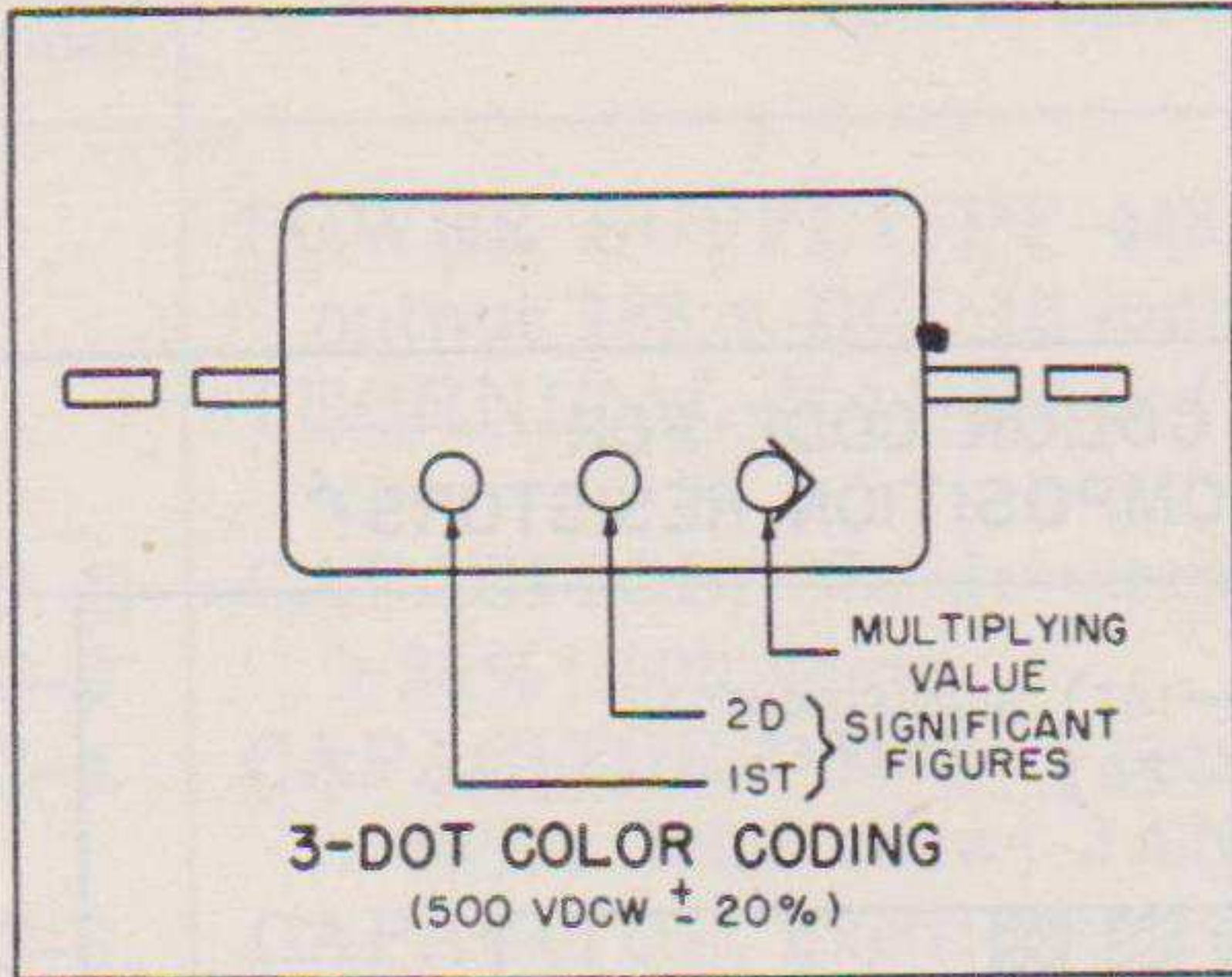
NOTES
* INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A NATURAL TAN BACKGROUND COLOR. NON-INSULATED FIXED COMPOSITION RESISTORS WITH AXIAL LEADS ARE DESIGNATED BY A BLACK BACKGROUND.
† RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.
RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY
THESE COLOR CODES GIVE ALL RESISTANCE VALUES IN OHMS.

Figure 6.—Resistor color codes.

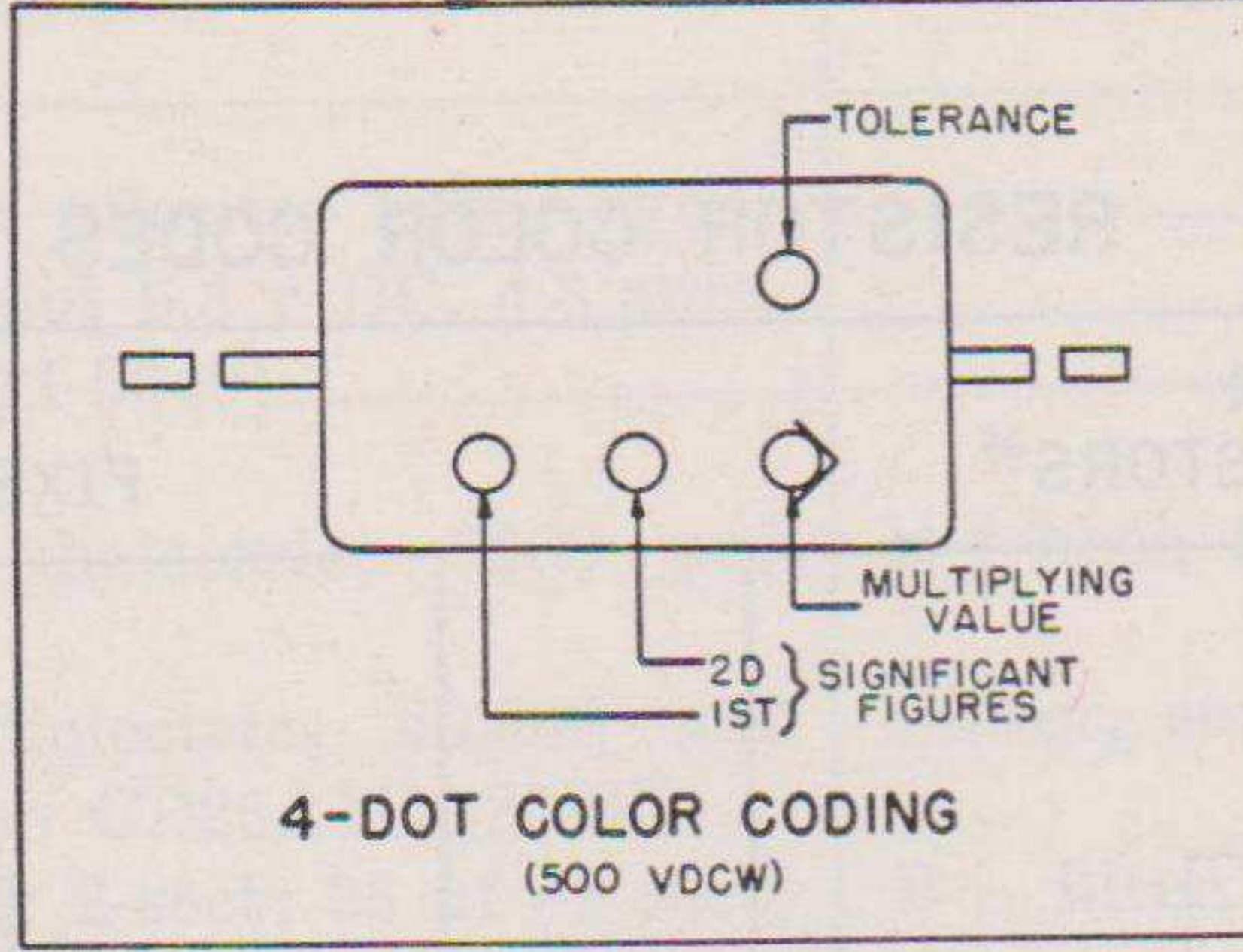
TL32454S

CAPACITOR COLOR CODES

RMA 3-4-5-8-6-DOT COLOR CODES FOR MICA-DIELECTRIC CAPACITORS



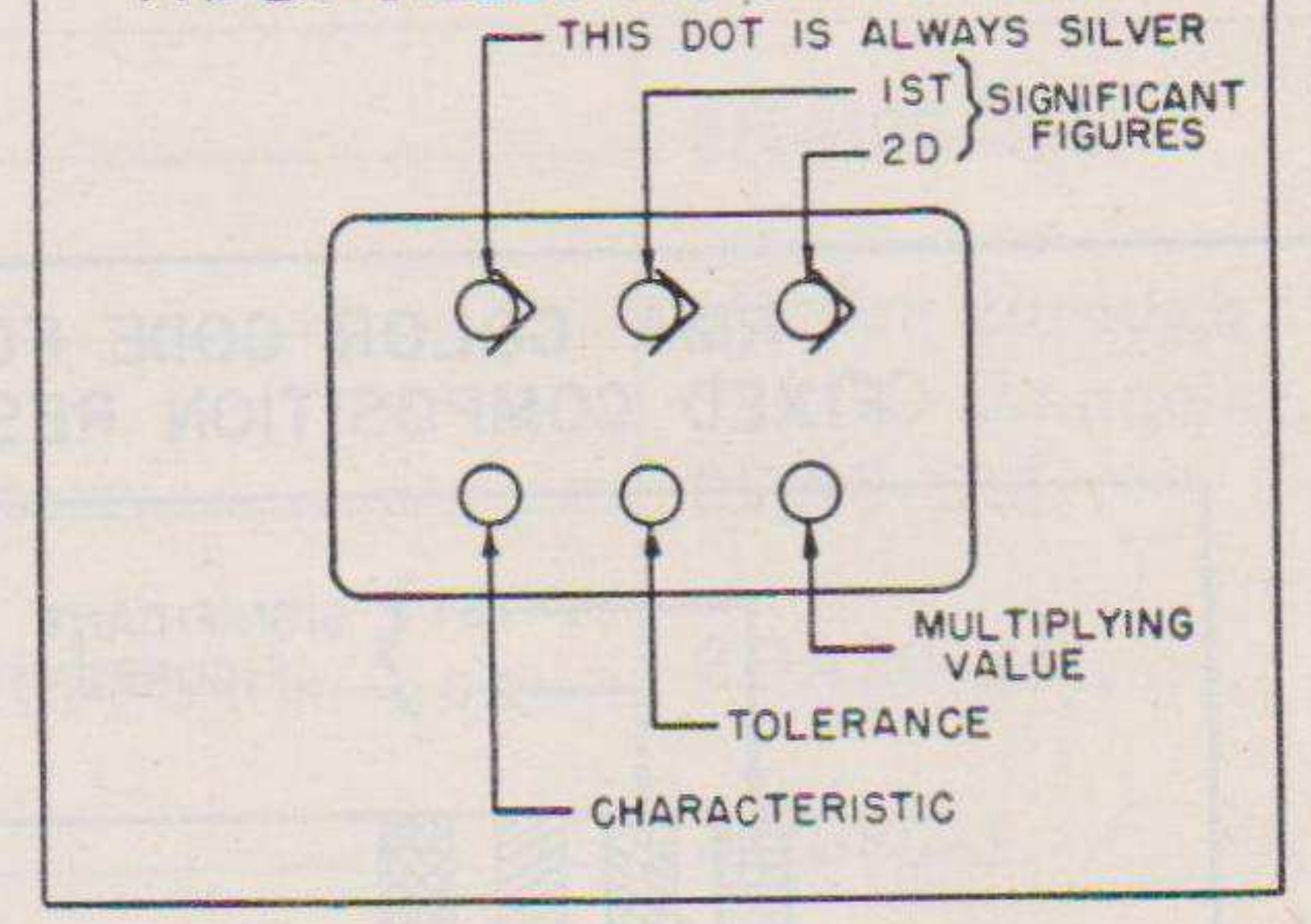
A



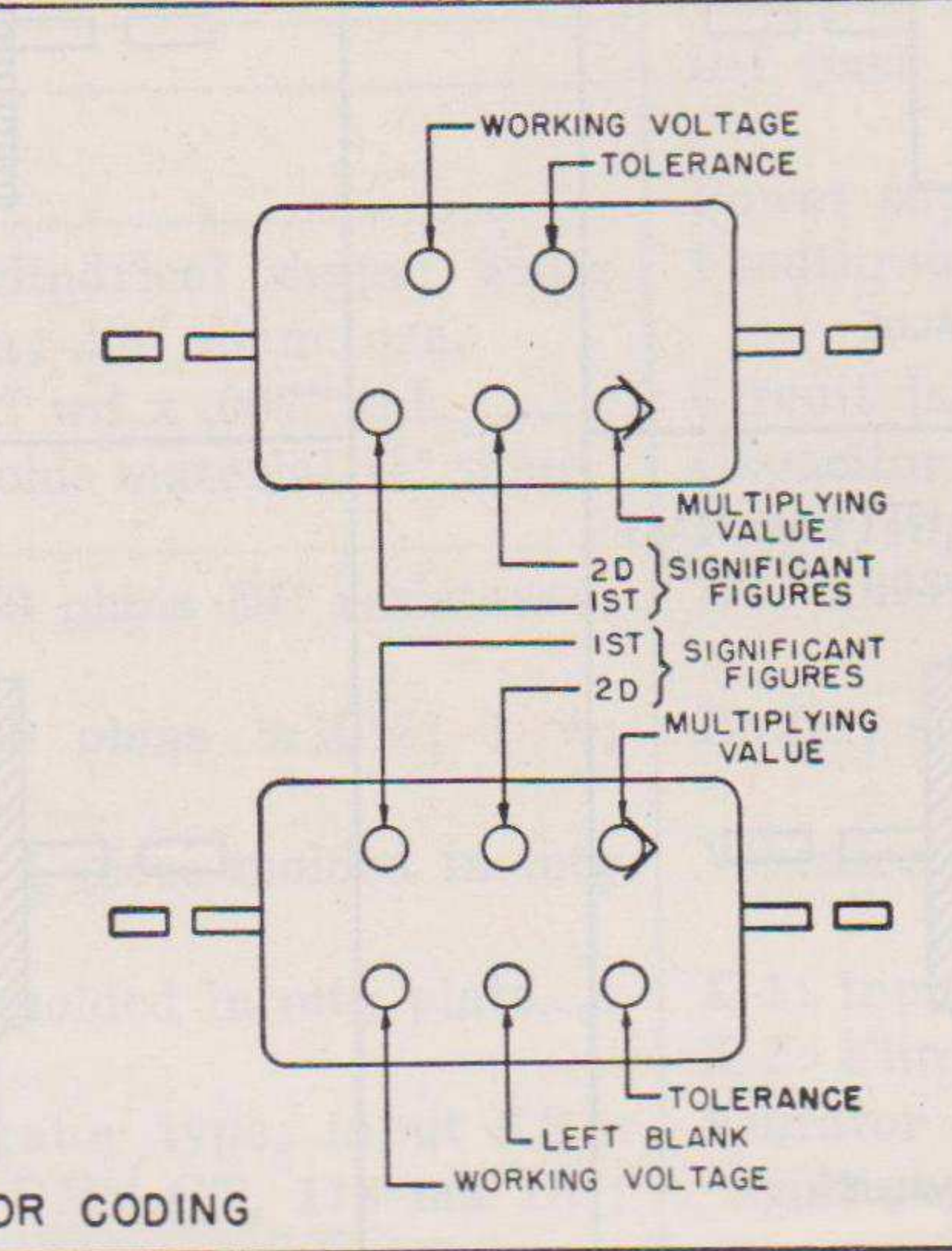
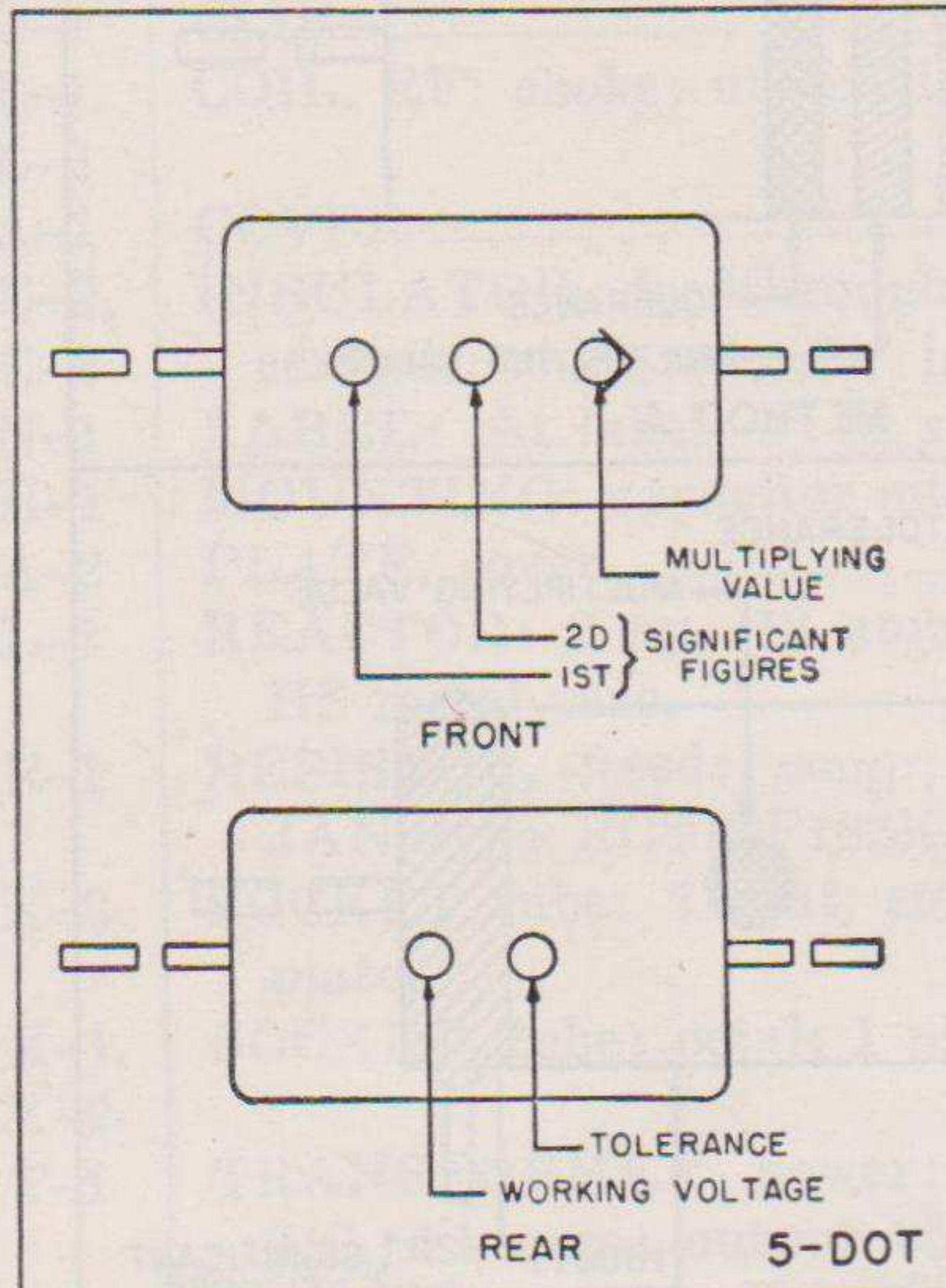
B

JAN 6-DOT COLOR CODES FOR:

PAPER-DIELECTRIC CAPACITORS *

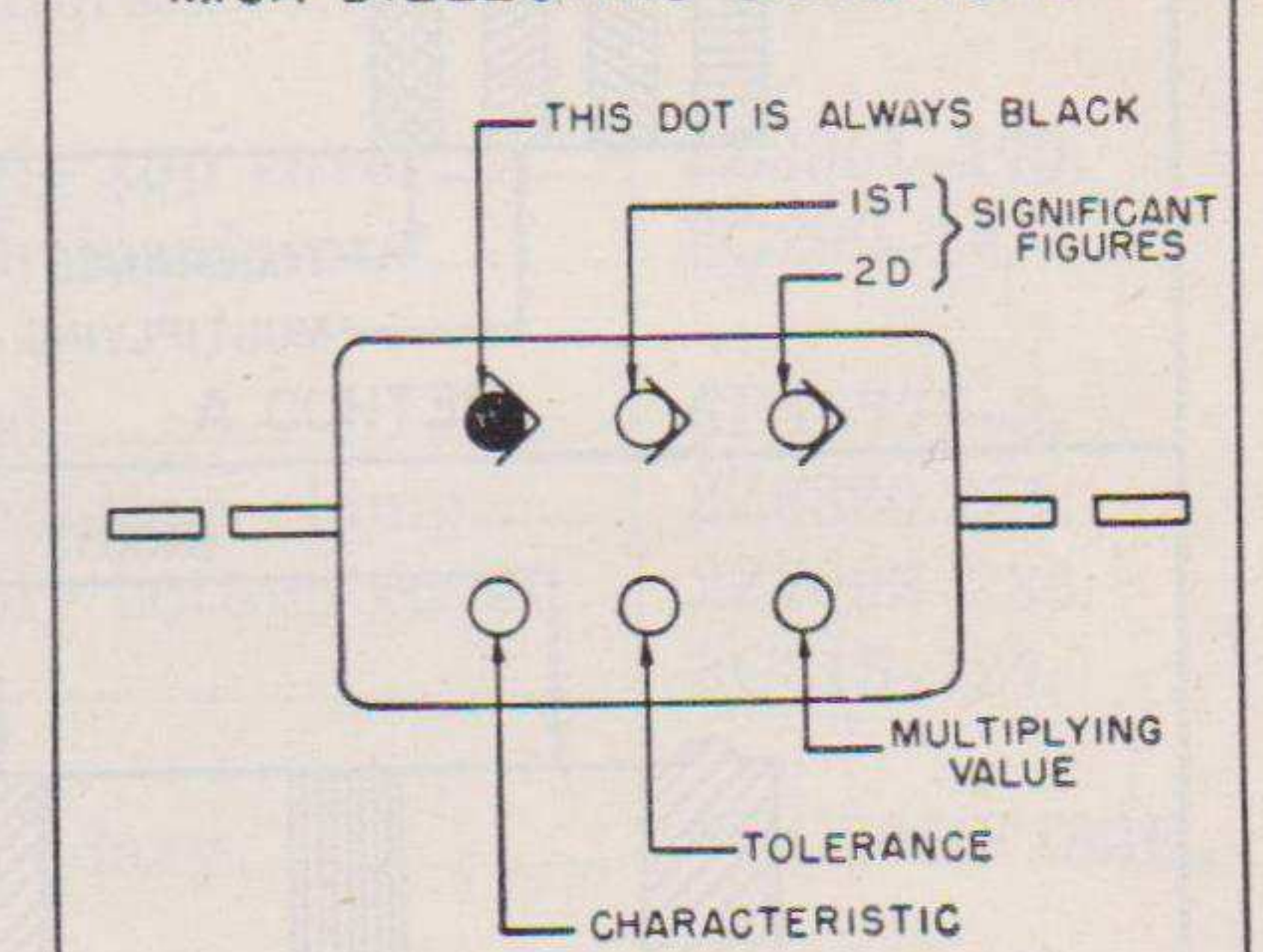


F

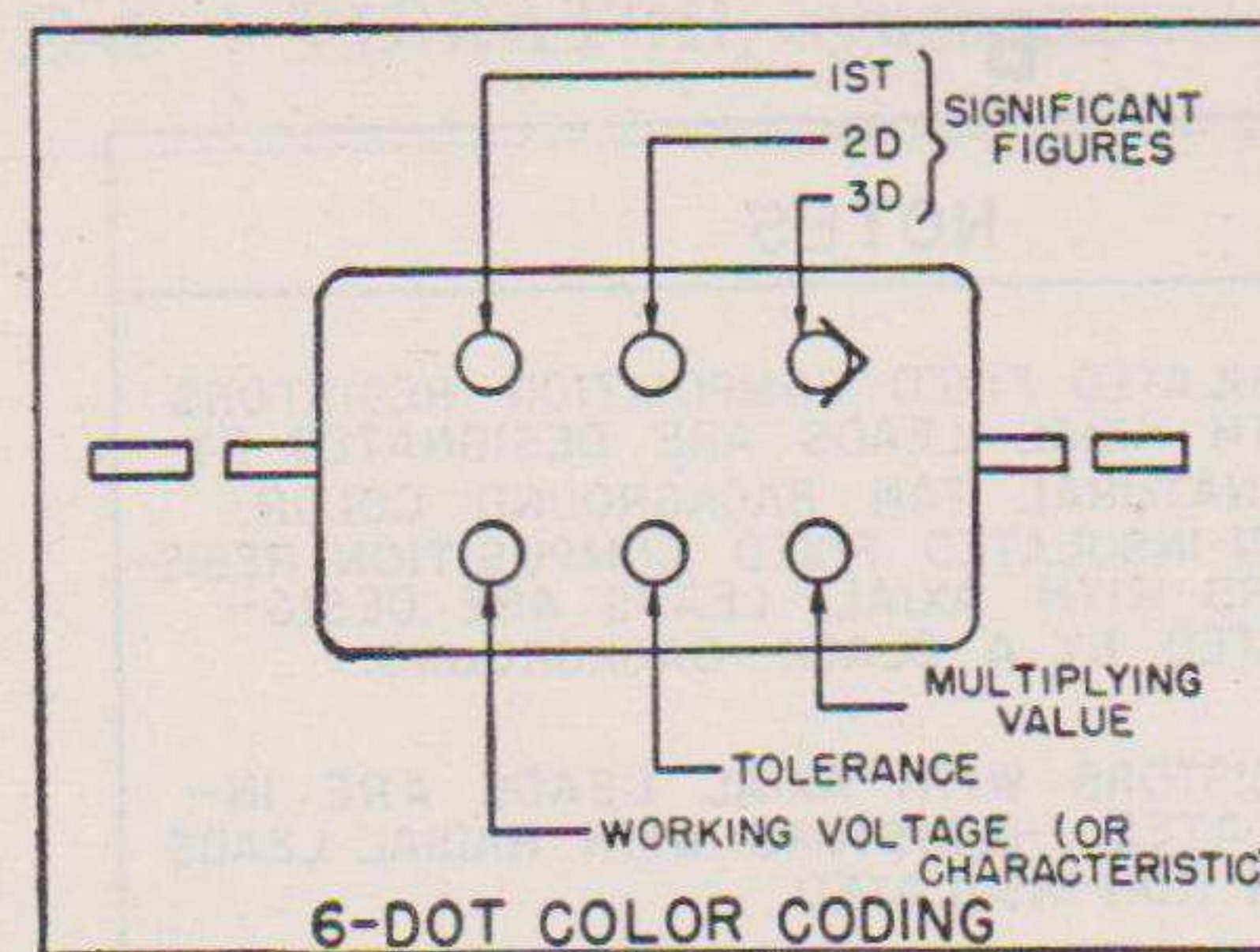


C

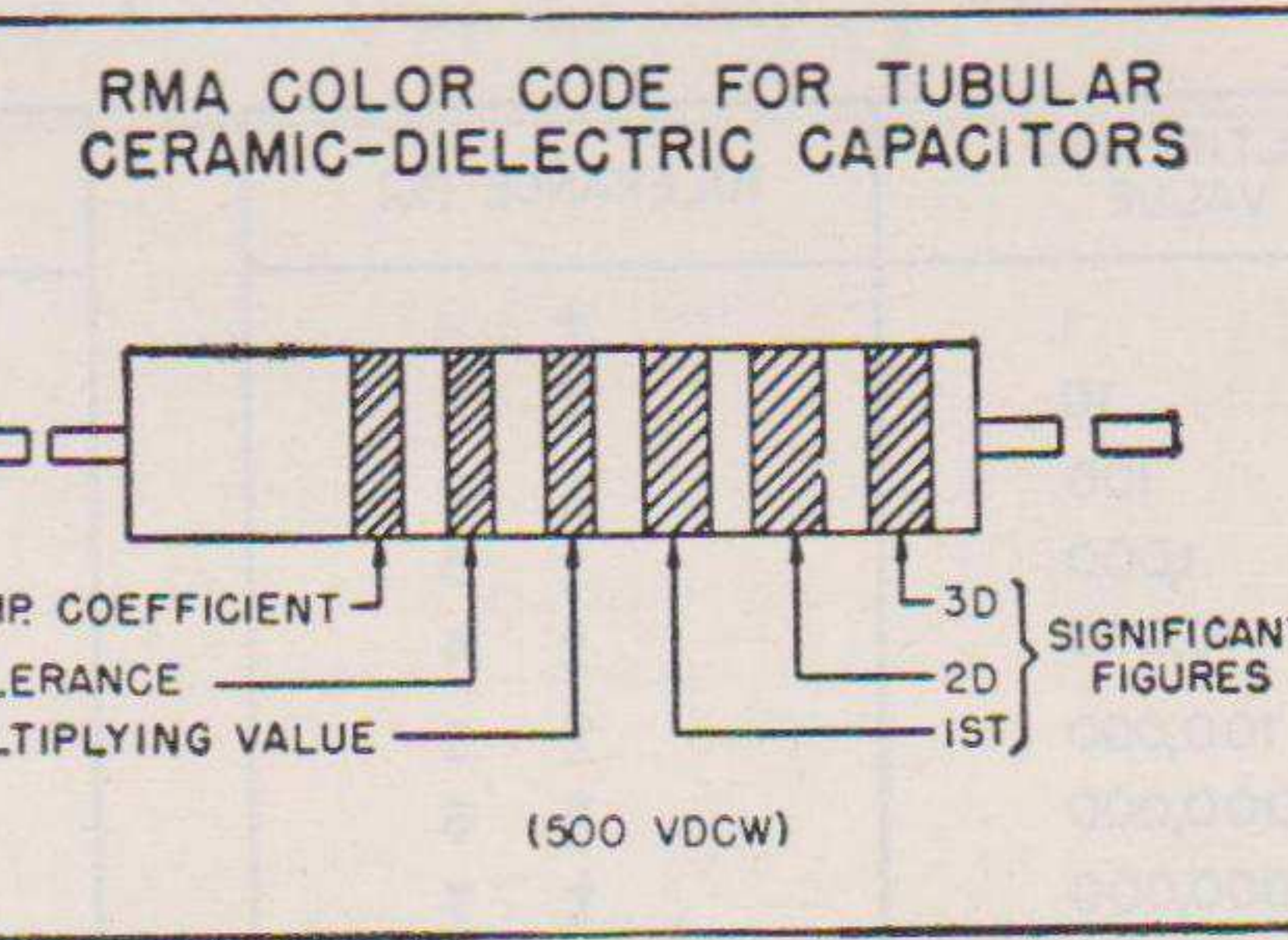
MICA-DIELECTRIC CAPACITORS †



G

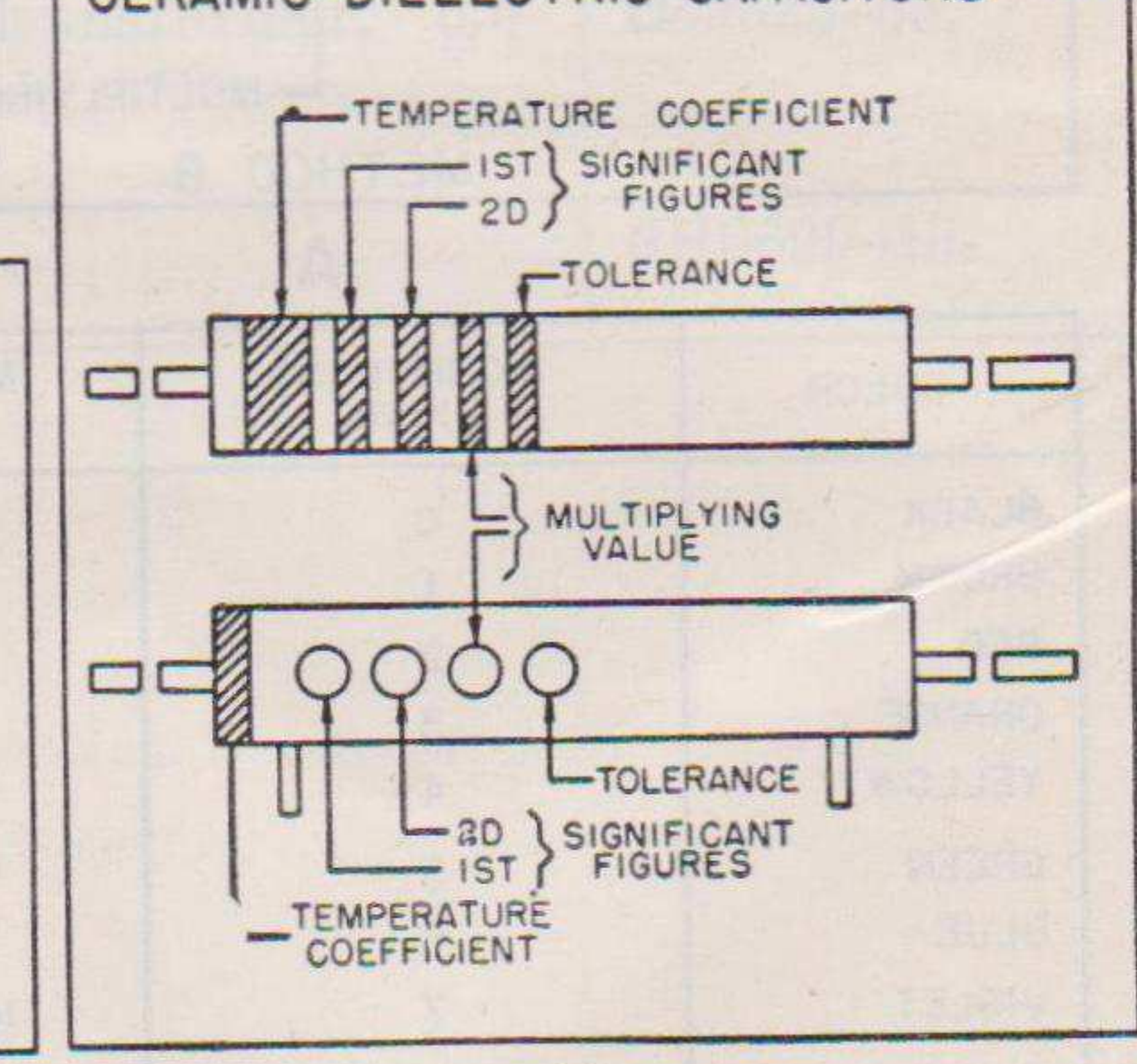


D



E

CERAMIC-DIELECTRIC CAPACITORS **



H

COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE			RMA VOLTAGE RATING
		RMA MICA-AND CERAMIC-DIELECTRIC	JAN MICA-AND PAPER-DIELECTRIC	JAN CERAMIC-DIELECTRIC	
BLACK	0	1	1	1	-
BROWN	1	10	10	10	100
RED	2	100	100	100	200
ORANGE	3	1,000	1,000	1,000	300
YELLOW	4	10,000	10,000		400
GREEN	5	100,000			500
BLUE	6	1,000,000			600
VIOLET	7	10,000,000			700
GRAY	8	100,000,000		0.01	800
WHITE	9	1,000,000,000		0.1	900
GOLD	-	0.1	0.1		1,000
SILVER	-	0.01	0.01		2,000
NO COLOR	-				500

NOTES

* THE SILVER DOT IDENTIFIES THIS MARKING FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

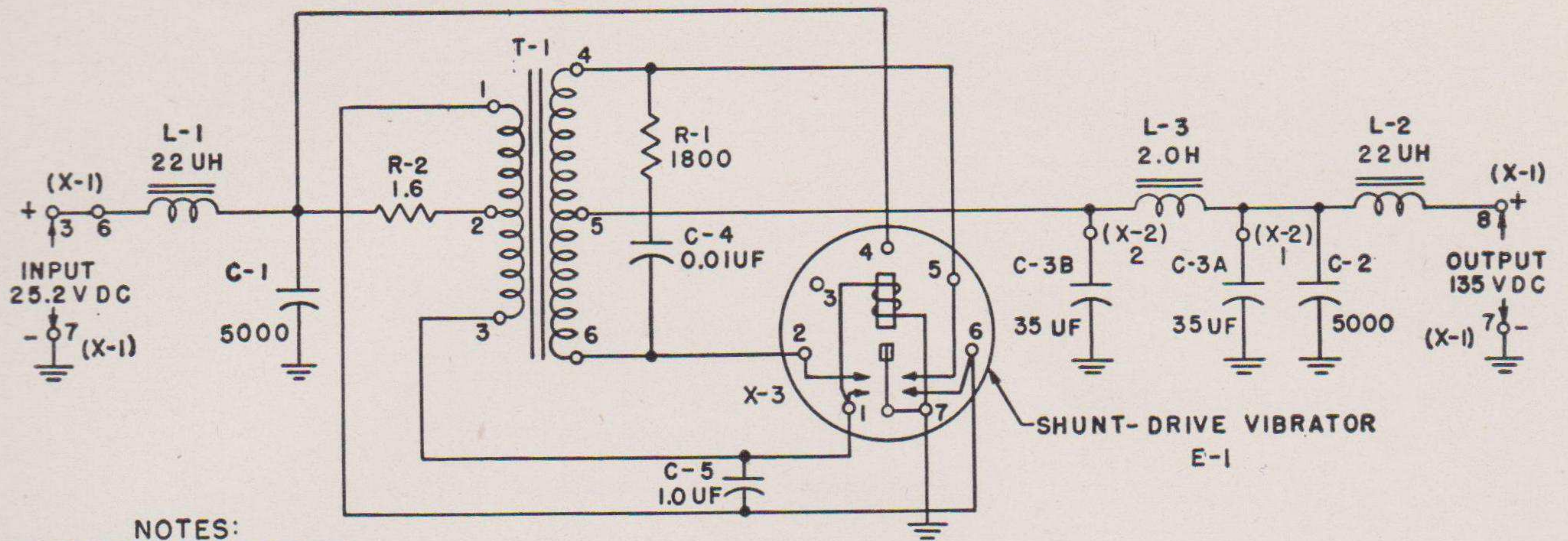
† THE BLACK DOT IDENTIFIES THIS MARKING. FOR WORKING VOLTAGES SEE JAN TYPE DESIGNATION CODE.

** CAPACITORS MARKED WITH THIS CODE HAVE A VOLTAGE RATING OF 500 VDCW. EITHER THE BAND OR DOT CODE MAY BE USED FOR BOTH INSULATED (AXIAL-LEAD) OR UNINSULATED (RADIAL-LEAD) CAPACITORS.

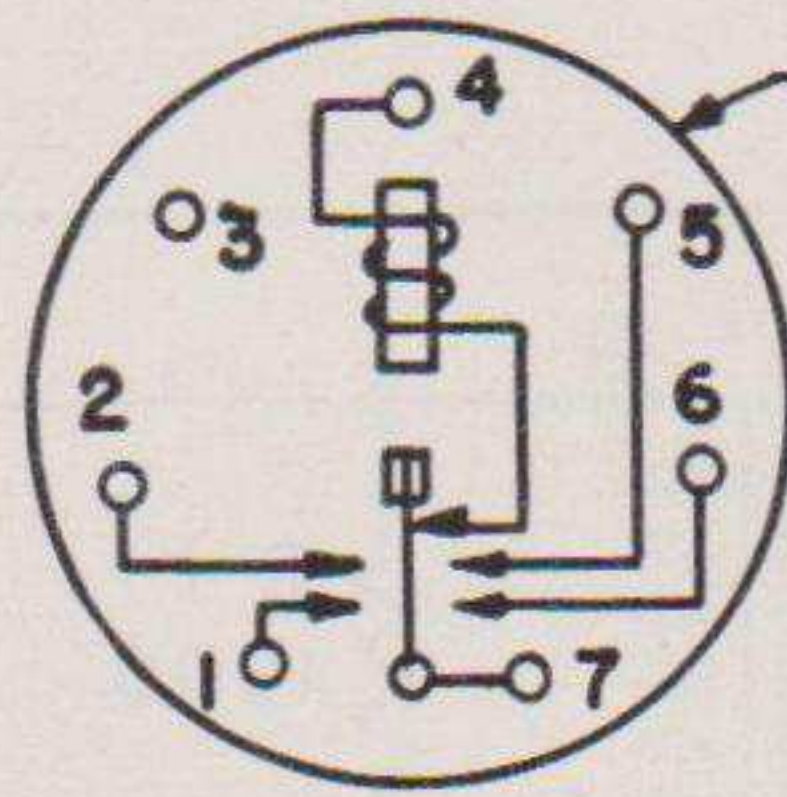
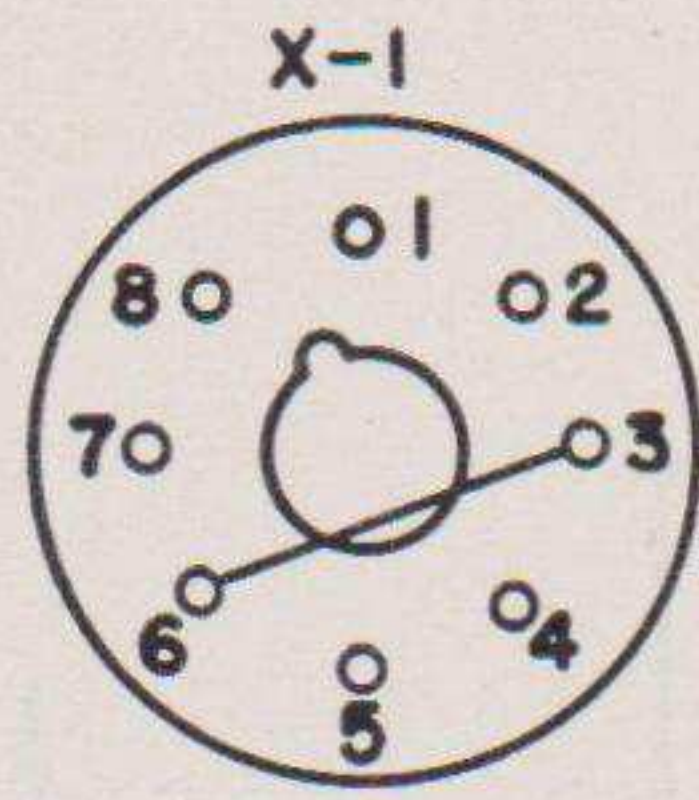
RMA: RADIO MANUFACTURERS ASSOCIATION
 JAN: JOINT ARMY-NAVY
 THESE COLOR CODES GIVE CAPACITANCES IN MICROMICROFARADS.

Figure 7.—Capacitor color codes.

TL 32453S



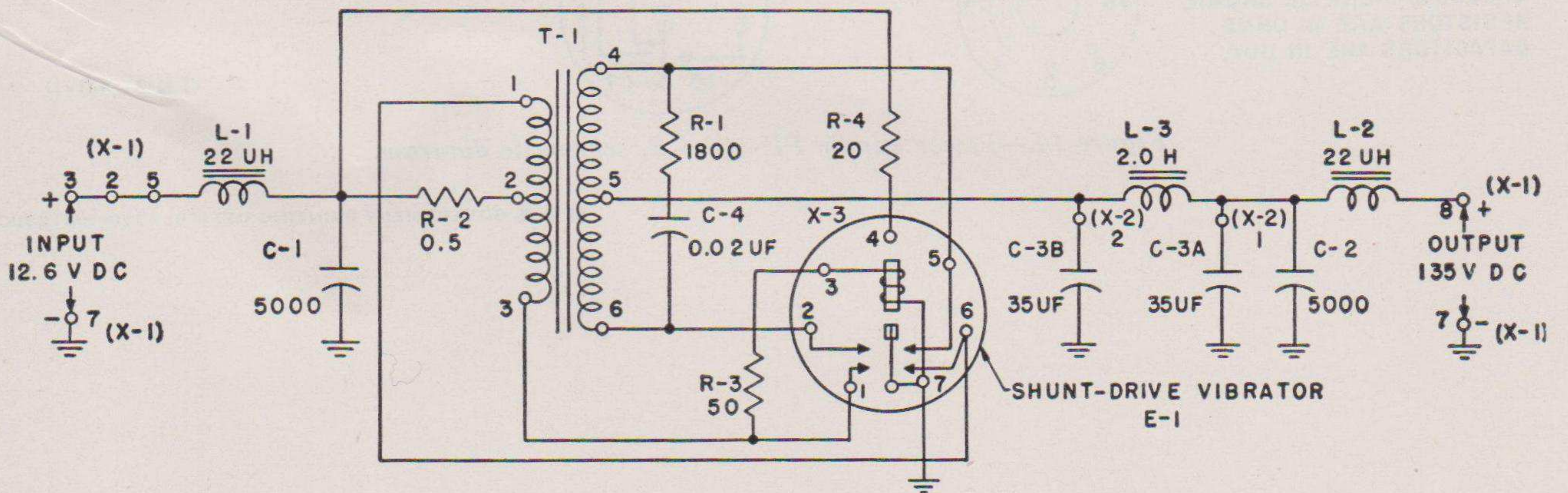
NOTES:
UNLESS OTHERWISE SHOWN,
RESISTORS ARE IN OHMS,
CAPACITORS ARE IN UUF.



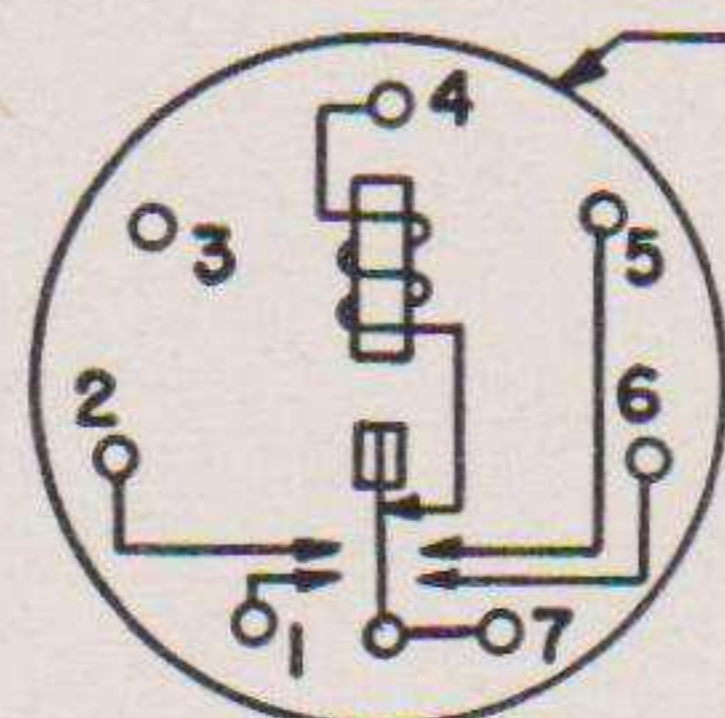
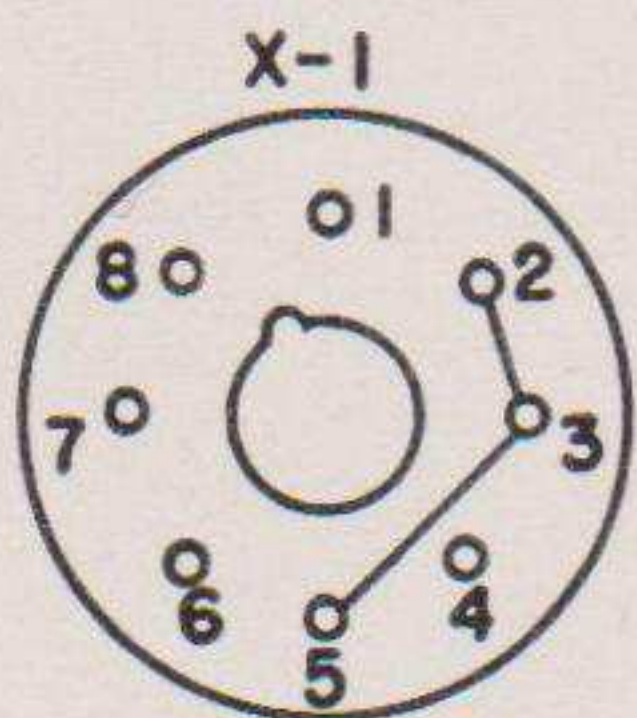
SERIES-DRIVE VIBRATOR

TM5040-9

Figure 8.—Power supply PP-282/GRC, schematic diagram.



NOTES:
UNLESS OTHERWISE SHOWN,
RESISTORS ARE IN OHMS,
CAPACITORS ARE IN UUF.



SERIES-DRIVE VIBRATOR

TM5040-10

Figure 9.—Power supply PP-281/GRC, schematic diagram.

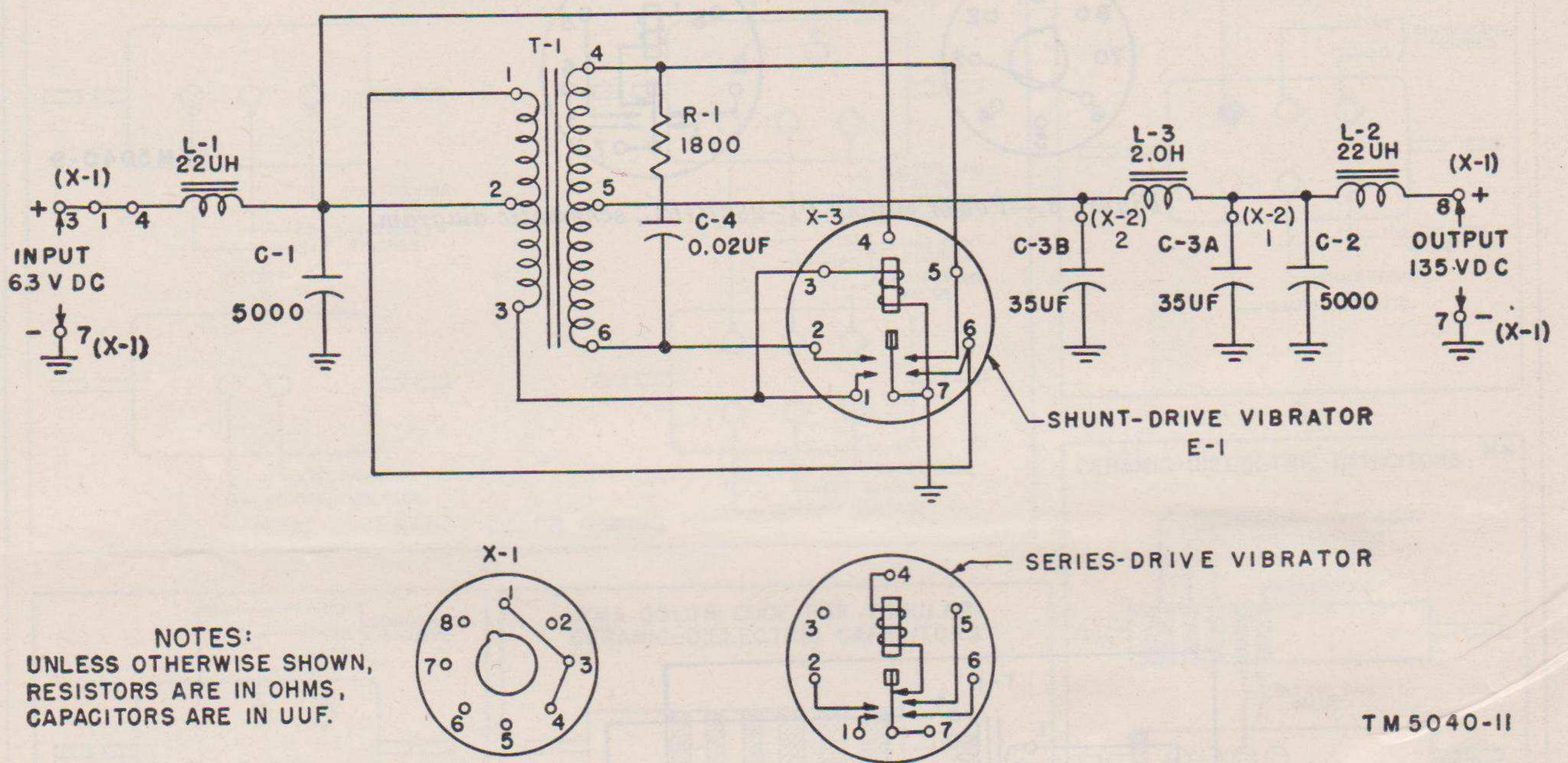


Figure 10.—Power supply PP-448/GR, schematic diagram.

★ U. S. GOVERNMENT PRINTING OFFICE: 1950—910300