TM 11-6625-475-25

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL, FIELD,

AND DEPOT MAINTENANCE MANUAL

MULTIMETER AN/PSM-6, AN/PSM-6A

PART NO.	FEDERAL STOCK NO.
56-5002A	6625-643-1686
56-5002B	6625-643-1686
165-5002	6625-656-5871

(BRUNO)

This copy is a reprint which includes current pages from Changes 2 and 3.

HEAQUARTERS, DEPARTMENT OF THE ARMY

JULY 1962

TM 11-6625-475-25
C 3

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., *12 August 1966*

Organizational, DS, GS, and Depot Maintenance Manual

MULTIMETER AN/PSM-6, AN/PSM-6A, AND AN/PSM-6B

TM 11-6625-475-25, 5 July 1962, is changed as follows:

The title is changed as shown above.

Add or AN/PSM-6B after AN/PSM-6A in the following places:

Page 1-1, paragraph 1-2, line 14.
Paragraph 1-3, lines 2 and 7.

Page 1-3, figure 1-4, "Position of function" column, last line.

Page 2-1/3-1/3-2, paragraph 3-2, line 8.

Page 4-1, paragraph 4-1, line 16 and last line.
Paragraph 4-2, line 1.
Paragraph *4-2a*, line 2
Paragraph 4-2b, line 3.

Page 4-2, Paragraph 4-6, line 8.

Page 4-4, paragraph 4-9, line 2.

Page 5-1, paragraph 5-2, line 6.

Page 6-1, figure 6-1, "Possible Cause of Abnormal Indication" column, line 4.

Page 6-2, figure 6-1, "Function Switch Setting" column, line 6.

Page 8-1, paragraph 8-2, line 3.
Paragraph *8-3a*, line 2.
Paragraph *8-4a*, line 2.
Paragraph *8-5a*, line 2.
Paragraph *8-7a*, line 2.
Paragraph *8-9a*, line 2.

Page 8-2, paragraph 8-10, line 2.

Add or ME 70C/PSM-6B after ME-70B/PSM-6A in the following places:

Page 1-1, paragraph 1-2, line 16.

Page 1-2, paragraph 1-5, line 2.
Figure 1-3, at top of figure.

Page 2-1/3-1/3-2, paragraph 3-2, line 5.

Page 5-1, paragraph 5-4, heading and line 3.

Page 6-1, paragraph 6-5, lines 7 and 9.

Page 1-1, paragraph 1-2, lines 6 and 7. Add after 6625-656-5871: and Multimeter AN/PSM-6B, part No. 199-5002, Federal stock No. 6625-957-4374.

Page 1-2, figure 1-3, caption. Add: or Multimeter AN/PSM-6B using Multimeter ME-70C/PSM-6B.

Page 4-1, paragraph 4-1, third sentence from bottom. Change figure 7-3 to figure 7-3; and for ME-70C/PSM-6B schematic diagram, see figure 7-4.

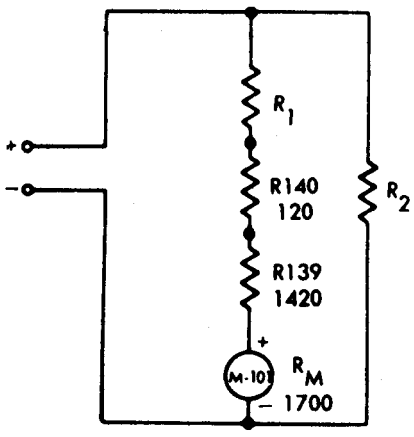
Page 4-2, figure 4-2. Add the following note to the figure:

NOTE:
RESISTOR R151 IS IN SERIES WITH RESISTOR R103 IN MULTIMETER AN/ PSM-6B.

Page 4-3, figure 43. Change the work "NOTE" to: NOTES. Number the existing note "l" and add:

2. RESISTOR R151 IS IN SERIES WITH RESISTOR R103 IN MULTIMETER AN/PSM-6B.

Page 4-4. Delete figure 4-5 and substitute new figure 4-5:



RANGE SETTING	VALUE OF R1		VALUE OF R2	
	RESISTORS	OHMS	RESISTORS	OHMS
5	NONE	0	R112+R129+R138 +R137+R136+R135 +R134+R133	360
2.5	R133+R134	288	R112+R129 +R138+R137 +R136+R135	72
10	R133+R134+R135	342	R112+R129+R138 +R137+R136	18
50	R133+R134 +R135+R136	356.4	R112+R129 +R138+R137	3.6
250	R133+R134+R135 +R136+R137	359.28	R112+R129+R138	.72
500	R133+R134 +R135+R136 +R137+R138	359.64	R112+R129	.36
1000	R133+R134+R135 +R136+R137 +R138+R129	359.82	R112	18

Multimeter AN/PSM-6 and AN/PSM-6A

RANGE SETTING	VALUE OF R1		VALUE OF R2	
	RESISTORS	OHMS	RESISTORS	OHMS
.5	NONE	0	R112 + R129 + R138 + (R147 ‖ R137) + (R148 ‖ R136) + (R146 ‖ R135) + R134 + (R152 ‖ R133)	360
2.5	(R152 ‖ R133) + R134	288	R112 + R129 + R138 + (R147 ‖ R137) + (R148 ‖ R136) + (R146 ‖ R135)	72
10	(R152 ‖ R133) + R134 + (R146 ‖ R135)	342	R112 + R129 + R138 + (R147 ‖ R137) + (R148 ‖ R136)	18
50	(R152 ‖ R133) + R134 + (R146 ‖ R135) + (R148 ‖ R136)	356.4	R112 + R129 + R138 + (R147 ‖ R137)	3.6
250	(R152 ‖ R133) + R134 + (R146 ‖ R135) + (R148 ‖ R136) + (R147 ‖ R137)	359.28	R112 + R129 + R138	.72
500	(R152 ‖ R133) + R134 + (R146 ‖ R135) + (R148 ‖ R136) + (R147 ‖ R137) + R138	359.64	R112 + R129	.36
1000	(R152 ‖ R133) + R134 + (R146 ‖ R135) + (R148 ‖ R136) + (R147 ‖ R137) + R138 + R129	359.82	R112	.18

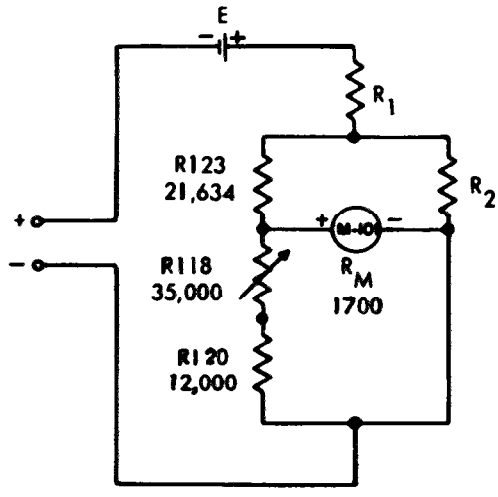
Multimeter AN/PSM-6B Parentheses indicate resistors in parallel.

TM6625-475-25-C3-2

Figure 4-5. Simplified circuit, dc current.

Paragraph 4-9, line 5. Add after "terminal 4": (white dot terminal in Multimeter AN/PSM-6B).

Page 4-5/4-6. Delete figure 4-6 and substitute new figure 4-6.



RANGE SETTING	VALUE OF R1		VALUE OF R2		E
	RESISTOR	OHMS	RESISTOR	OHMS	(VOLTS)
X1	R125	0.54	R117	23.75	1.34
X10	R126	17.5	R119	234.8	1.34
X100	R127	175	R122	2583	1.34
X1000	R128	1750	NONE	OPEN	1.34
X10000	R124	226750	NONE	OPEN	13.4

Multimeter AN/PSM-6 and AN/PSM-6A

RANGE SETTING	VALUE OF R1		VALUE OF R2		E
	RESISTOR	OHMS	RESISTOR	OHMS	(VOLTS)
X1	R125	0.54	(R150 R117)	23.75	1.34
X10	R126	17.5	(R149 R119)	234.8	1.34
X100	R127	175	R122	2583	1.34
X1000	R128	1750	NONE	OPEN	1.34
X10000	R129	226750	NONE	OPEN	13.4

Multimeter AN/PSM-6B. Parentheses indicate resistors in parallel.

TM6625-475-25-C3-3

Figure 4-6. Simplified current, resistance.

Page 5-1, paragraph 5-5. In subparagraph *f,* delete lines 3 and 4 and substitute: 5-5.1. Adjustments of the mechanical zero of the meter pointer for the AN/PSM-6A and AN/PSM-6B is as follows:.

Page 6-2, figure 6-1. Make the following changes in the "Possible Cause of Abnormal indication" column: After AN/PSM-6A on last line of each group of possible causes for each range switch setting, starting with .5 and ending with 1,000, add: and A101, CB-101, R146, R147, R148, and R152 in AN/PSM-6B.

For the Xl range switch setting, add to the last line of "Possible causes," after AN/PSM-6A: and A101, CB101, and R150 in AN/PSM-6B.

For the X10 range switch setting, last line, after AN/PSM-6A, add: and A101, CB101, and R149 in AN/PSM-6B.

Page 6-3, figure 6-1. Make the following changes in the "Possible Cause of Abnormal Indication" column: For the range switch settings "X100, X1,000, and X10,000 delete the possible causes and substitute: (A101 and CB101 in AN/PSM-6A and AN/PSM-6B).

For range switch setting .5, add after AN/PSM-6A: and A101, CR101, R146, R147, R148, and R152 in AN/PSM-6B.

Page 6-4, figure 6-1. For range switch settings 2.5, 10, and 50, add after AN/PSM-6A: and A101, CB101, R146, R147, R148, and R152 in AN/PSM-6B.

For range switch settings 250, 500, and 1,000, add after AN/PSM-6A: A101, CB101, R146, R147, R148, R151, and R152 in AN/PSM-6B.

For range switch setting .5 and 2.5, add after AN/PSM-6A: and AN/PSM-6B.

Page 6-5, figure 6-1. For range switch settings 10, 50, 250, 500, and 1,000, add after AN/PSM-6A: and AN/PSM-6B.

Page 7-3/7-4. Add figure 7-4 after figure 7-3:

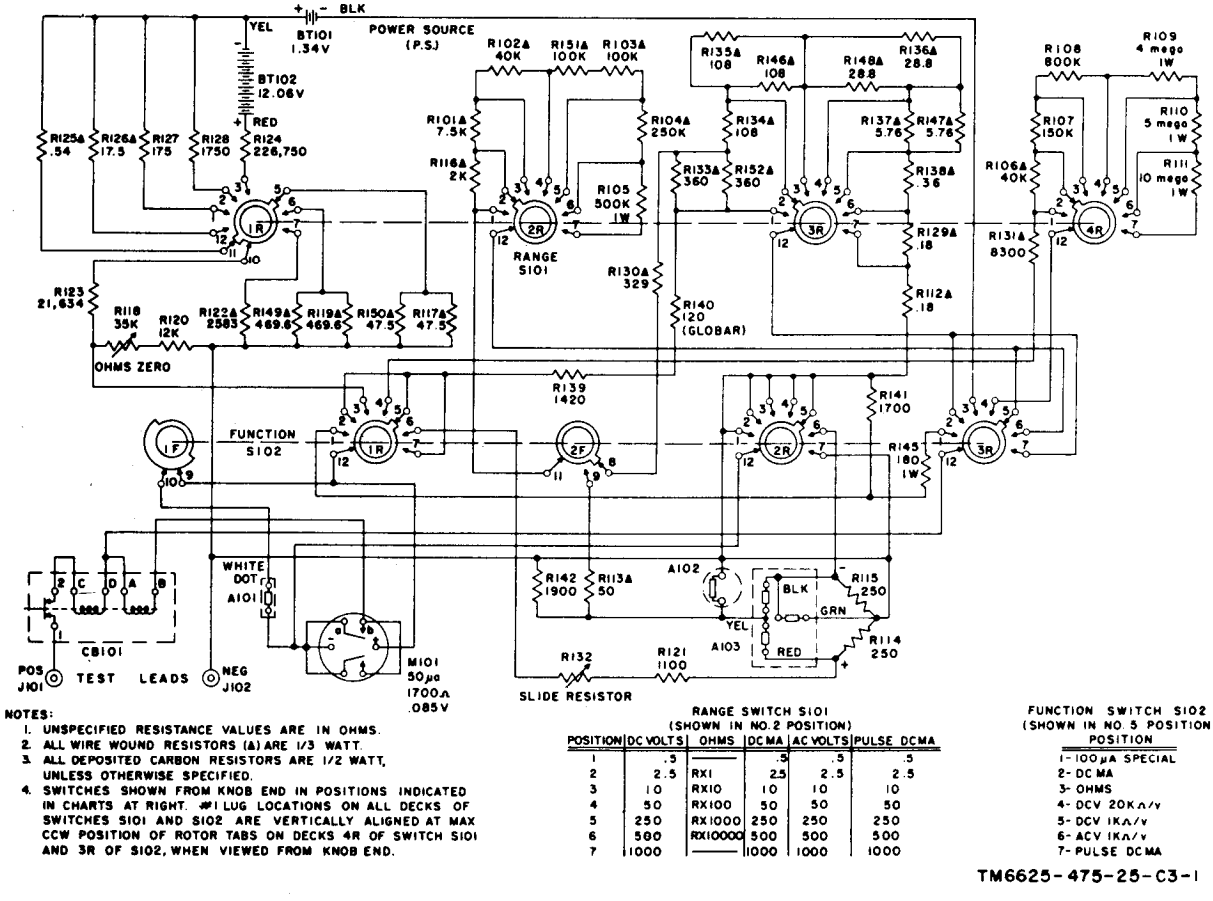


Figure 7-4. Multimeter ME-70C/PSM-6B, schematic diagram.

Page 8-2, paragraph 8-10. Delete the second sentence.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-32, Section II requirements for organizational maintenance literature for the Hawk System.

TM 11-6625-475-25
*C 2

Organizational, Field and Depot Maintenance Manual
MULTIMETERS AN/PSM-6 AND AN/PSM-6A

CHANGE No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *25 June 1964*

TM 11-6625-475-25, 5 July 1962, is changed as follows:

Change "TS-679/U" to "ZM-16/U" in the following places (as changed by S 1, 14 Jan 1964):

Page 2-1/3-1/3-2, paragraph 2-1, chart, part No. or model column, last item.

Page 8-1, paragraph 8-2*b*.

Page 8-2, paragraph 8-9d, last line.

Page 1-1, paragraph 1-2, line 2, after "operating" add: and maintenance.

Add paragraph 1-2.1 after paragraph 1-2 (as added by C1, 14 January 1964).

1-2.1. 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 improvement recommendations. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-MR-MP, Fort Monmouth, N. J. 07703. One information copy will be provided to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc).

Note. For applicable forms and records, see paragraph 1-2.2, TM 11-6625-475-10.

Page 1-2. Add paragraph 1-3.1 after paragraph 1-3.

1-3.1. Batteries

Multimeter ME-70/PSM-6 uses one battery, Bruno Industries part No. 56-1010, Federal stock No. 6135-295-2613. Multimeters ME-70A/PSM-6 and ME-70B/PSM-6A use two batteries; battery BT-101 is a BA-1328/U, Federal stock No. 6135-274-4035: battery BT-102 is a Bruno Industries part No. 123-1046, Federal stock No. 6135-672-8604, also identified as a mallory 302609.

Page 5-1. Delete paragraph 5-2 (as changed by C 1, 14 Jan 1964) and substitute:

5-2. Scope

a. This section contains instructions covering organizational maintenance of the equipment. It includes instructions for performing preventive and periodic maintenance services, and repair functions to be accomplished by the organizational repairman.

* This change supersedes C 1, 14 January 1964.

b. Organizational maintenance of the equipment includes:

(1) Monthly preventive maintenance checks and services (para 5-2.2).
(2) Quarterly preventive maintenance checks and services (para 5-2.3).
(3) Touchup painting (para 5-2.4).
(4) Battery replacement (para 5-3 and 5-4).
(5) Mechanical zero adjustment (para 5-5).
(6) Test lead repair (para 5-6).
(7) Lubrication (para 5-7).

5-2.1. 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 operation capability. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacing of parts, subasssemblies, 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 and quarterly intervals unless otherwise directed by the commanding officer.

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

5-2.2. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that the equipment is complete.	Para 1-3 and figs. 1-1 and 1-2.
2	Exterior surfaces	Clean the exterior surfaces, including the panel and meter glass. Check the meter glass for cracks.	Para 5-6 TM 11-6625-475-10.
3	Controls and indicators	During operation, observe that the mechanical action of each knob and switch is smooth and free of external or internal binding, and that there is no excessive looseness. Also, check the meter for sticking or bent pointer.	None.
4	Cables	Inspect cords, cables, and wires for chafed, cracked, or frayed insulation. Replace connectors that are broken, arced, stripped, or worn excessively.	None.
5	Handle and latches	Inspect handle, latches, and hinges for looseness. Replace or tighten as necessary.	None.
6	Metal surfaces	Inspect exposed metal surfaces for rust and corrosion. Touch up paint as required.	Para 5-2.4.
7	Batteries and compartment	Inspect the batteries for loose terminals and leakage. Check the compartment for corrosion.	None.
8	Lubrication	Lubricate the equipment.	Para 5-7.
9	Jacks	Inspect jacks for snug fit and good contact.	None.
10	Resistors	Inspect resistors for cracks, blistering, or other detrimental defects.	None.
11	Interior	Clean interior of chassis and cabinet.	None.
12	Batteries	Before storing or shipping, remove the batteries.	None.
13	Operation	During operation, be alert for any unusual performance or condition.	None.

5-2.3. Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
2	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.	TM 38-750 and DA Pam 310-4.
3	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on valid requisitions.	

5-2.4. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TM 9-213.

Page 8-1, paragraph 8-6. Subparagraph *b*, line 2, Change .5 to 2.5. Subparagraph *d*. Delete and substitute:

d. The multimeter indication for 60-cycle ac should be approximately 70 percent of the indication obtained in paragraph 8-5*d* for the 2.5-volt range. Indication discrepancies may be caused by a defective capacitor C101. Subparagraph *e*. Delete in its entirety.

Page 8-2, appendix (as added by C 1, 14 Jan 1964).

Add the following after section VIII.

APPENDIX I

REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.	TM 11-2535B	Meter Test Set TS-682A/GMS-1.
		TM 11-5102	Resistors, Decade ZM-16/U, ZM-16A/U, and ZM-16B/U.
		TM 11-6625-475-10	Operator's Manual: Multimeter AN/PSM-6, and AN/PSM-6A.
TM 9-213	Painting Instructions for Field Use.	TM 38-750	Army Equipment Record Procedures.

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and the subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subasssemblies) is listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelons.

(a) Service. To clean, to preserve, and to replenish lubricants.

(b) Adjust. To regulate periodically to prevent malfunction.

(c) Inspect. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(d) Test. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) Replace. To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(f) Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straighten-

ing, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(g) Align. To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) Overhaul. To restore an item to *completely serviceable* condition as prescribed by serviceability standards. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(j) Rebuild. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *1st, 2d, 3d, 4th, 5th echelons.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding column.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* The dagger (†) symbol indicates the echelons normally allocated the facility

(3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

SECTION II. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	ECHELON 1	2	3	4	5	TOOLS REQUIRED	REMARKS
MULTIMETER AN/PSM-6; AN/PSM-6A	service	X						
	inspect	X						
	repair		X				5	Knobs, etc.
					X		5,4	
	calibrate				X		6	
	overhaul					X	1,2,3,4	
TEST LEAD SET, CX-2140/U; MIL TYPE 56-2003	replace		X					

SECTION III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	ECHELON 1	2	3	4	5	TOOL CODE	REMARKS
AN/PSM-6; AN/PSM-6A (continued)							
METER TEST SET TS-682/GSM-1				†	†	1	
MULTIMETER ME-77/U				†	†	2	
RESISTOR, DECADE ZM 16/U				†	†	3	
TOOL EQUIPMENT TK-87/U				†	†	4	
TOOL AND TEST EQUIPMENT NORMALLY AVAILABLE TO THE REPAIRMAN USER BECAUSE OF HIS ASSIGNED MISSION.		†				5	
MAGNET CHARGER TS-336/GSM-1				†	†	6	

Army-Ft Monmouth, NJ-MON 2136-63

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:

To be distributed in accordance with DA Form 12-32, Section III (Unclas) requirements for Hawk, TM, test equipment (Sig C).

☆ U.S. GOVERNMENT PRINTING OFFICE : 1983 O - 381-302 (3384)

TECHNICAL MANUAL)
)
No. 11-6625-475-25)

DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., 5 July 1962

ORGANIZATIONAL, FIELD, AND DEPOT MAINTENANCE MANUAL

MULMETER AN/PSM-6, AN/PSM-6A

Section		Page
I	DESCRIPTION AND LEADING PARTICULARS	1-1
	1-1. Introduction	1-1
	1-2. Descrtption	1-2
II	TEST EQUIPMENT AND SPECIAL TOOLS	2-1/3-1/3-2
III	PREPARATION FOR USE AND RESHIPMENT	2-1/3-1/3-2
	3-1. Preparation for Use	2-1/3-1/3-2
	3-4. Preparation for Reshipment	2-1/3-1/3-2
IV	THEORY OF OPERATION	4-1
	4-1. General	4-1
	4-2. Funtional Operation	4-2
V	ORGANIZATIONAL AND SQUADRON MAINTENANCE . .	5-1
	5-1. Maintenance Required	5-1
VI	FIELD AND FASRON MAINTENANCE	6-1
	6-1. Minimum Performance Standard and Trouble Analysis	6-1
	6-4. Repair	6-1
VII	DIAGRAMS	7-1
VIII	CALIBRATION	8-1

LIST OF ILLUSTRATIONS

Figure		Page
1-1	Multimeter AN/PSM-6 using Multimeter ME-70A/PSM-6 .	ii
1-2	Multimeter AN/PSM-6 using Multimeter ME-70/PSU-6 . .	1-1
1-3	Multimeter AN/PSM-6A using Multimeter ME-70B/PSM-6A	1-2
1-4	Measurement Ranges	1-3
1-5	Handle Positions	1-4
4-1	Simplified Circuit, DC Voltage 20,000 ohms/volts . . .	4-1
4-2	Simplified Circuit, DC Voltage 1,000 ohms/volts	4-2
4-3	Simplified Circuit, AC Voltage	4-3
4-4	Simplified Circuit, Output	4-3
4-5	Simplified Circuit, DC Curredt	4-4
4-6	Simplified Circuit, Resistance	4-5/4-6
4-7	Simplified Circuit, 100 Microamperes Special	4-5/4-6
4-8	Schematic Diagram Shunt MX-1409/U	4-5/4-6
6-1	Trouble Chart (6 Sheets)	6-1
6-2	Protection System Test Voltage Table	6-6
6-3	Protection System Testing Tables	6-6
7-1	Schematic Diagram, Multimeter ME-70/PSM-6	7-1
7-2	Schematic	7-2

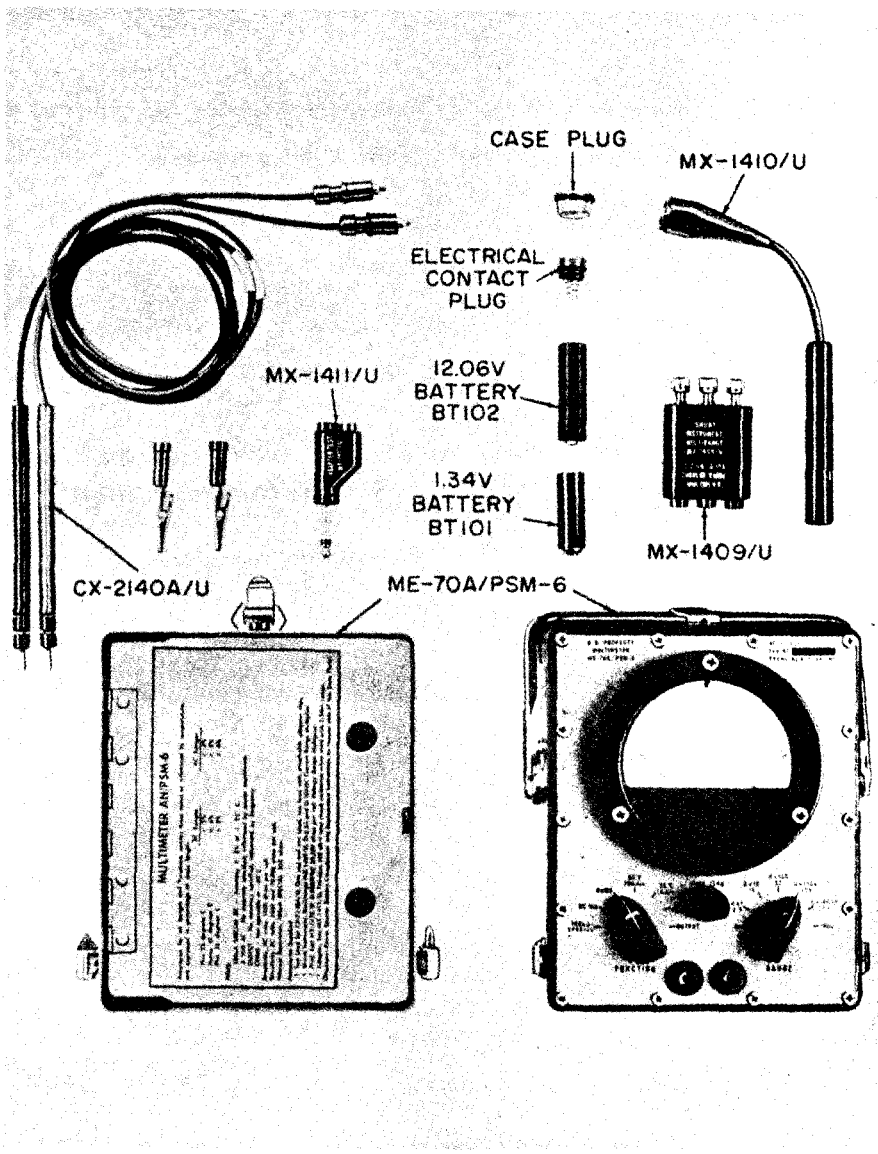


Figure 1-1. Multimeter AN/PSM-6 using Multimeter ME-70A/PSM-6

SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. **INTRODUCTION.**

1-2. **GENERAL. This publication comprises the operating instructions for Multimeter AN/PSM-6, Part No. 56-5002, Federal Stock No. 6625-643-1686, Multimeter AN/PSM-6, Part No. 56-5002B, Federal Stock No. 6625-643-1686, and Multimeter AN/PSM-6A, Part No. 165-5002, Federal Stock No. 6625-656-5871, manufactured by Bruno-New York Industries Corporation, New York, N. Y.** Figure 1-1 **shows Multimeter AN/PSM-6, using Multimeter ME-70A/PSM-6 as its major component. Serial numbers 25298 and above are assigned to these units. Multimeter AN/PSM-6, illustrated in** figure 1-2 **uses Multimeter ME-70/PSM-6, to which serial numbers below 25298 are assigned. Multimeter AN/PSM-6A . illustrated in** figure 1-3, **uses Multimeter ME-70B/PSM-6A as its major component.**

1-3. **PURPOSE. Multimeters AN/PSM-6 and AN/PSM-6A are items of general purpose test equipment used to measure dc voltage up to 5,000 volts, low-frequency ac up to 1,000 volts RMS, dc current up to 10 amperes and resistances up to 10 megohms. The AN/PSM-6 can also measure output voltage up to 1,000 volts RMS and the AN/PSM-6A can measure pulsed dc current up to 1,000 ma. Their operating temperature ranges for all measurements, except resistance, are from -40°F (-40°C) to 131°F (55°C). The multimeters are completely self-contained and include the following accessories stored under the lid in the cover:**

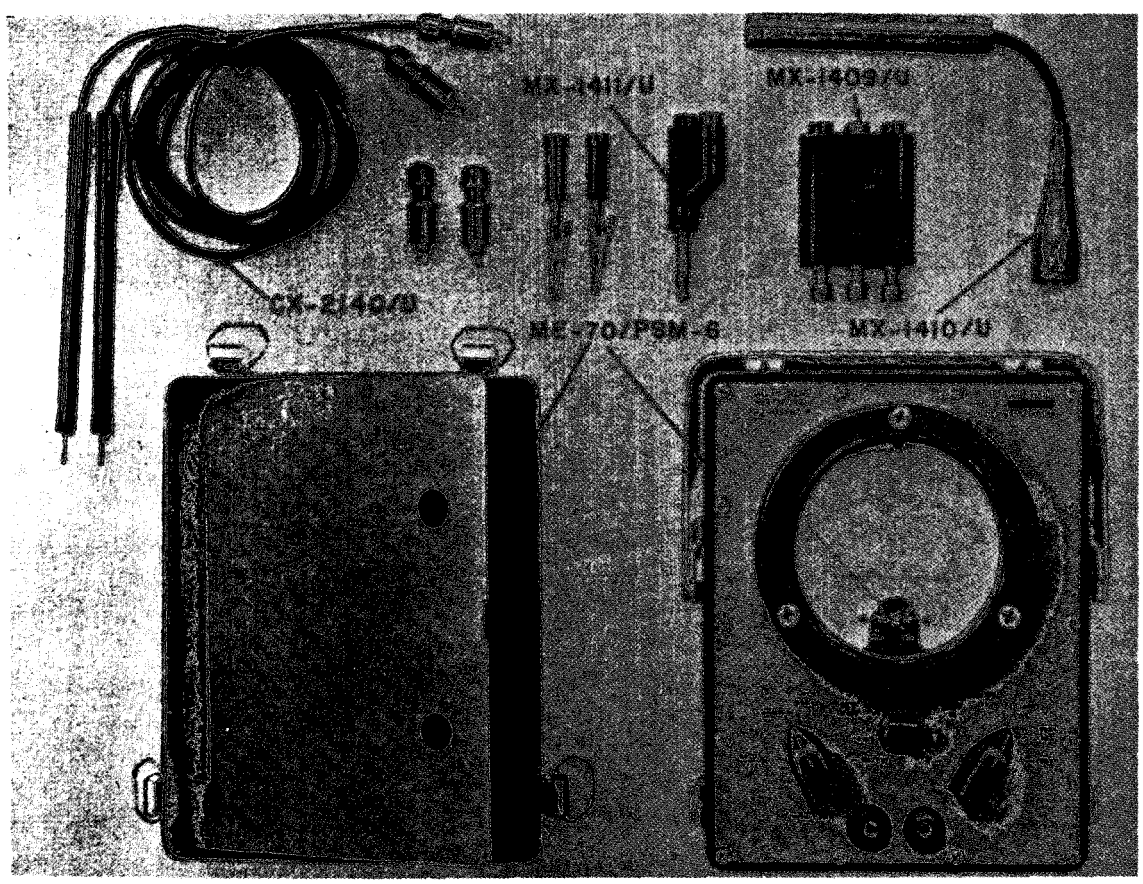


Figure 1-2. **Multimeter AN/PSM-6 using Multimeter ME-70/PSM-6**

a. Test Adapter MX- 1411/U.
b. Test Prod MX-1410/U.
c. Multirange Instrument Shunt MX- 1409/U.
d. Test Lead Set CX-2140/U or CX-2140A/U, with detachable alligator clips.
e. One pair of spare test lead plugs, in multimeters with serial numbers below 25298.

1-4. DESCRIPTION.

1-5. MULTIMETER. Multimeter ME-70/PSM-6, ME-70A/PSM-6 or ME-70B/PSM-6A, consists of a damped precision 50-microampere meter mounted on an aluminum panel. The meter is connected through two multiple switches to calibrated circuits made up of precision resistors. All connections are made to the two jacks at the bottom of the panel, with the switch settings controlling the meter scale and ranges in use. A zeroing control is provided for the resistance ranges to compensate for variations in battery voltage. Without accessories, the ranges shown in figure 1-4 are available. Two dc voltage positions, with sensitivities of 20,000 ohms per volt and 1,000 ohms per volt, respectively, are provided. For ac voltage readings, the sensitivity is 1,000 ohms per volt. The multimeter in its die-cast aluminum case is designed to be watertight, with the cover off. The panel is gasketed to the case, and the meter gasket and seal nuts over the switch and zero control shaft bushings provide adequate panel sealing. The test jacks are of waterproof construction. A dual-purpose handle may be used either to carry or suspend the instrument, or, in the folded and locked position, as an easel support to hold the meter at a 30-degree angle upon a test bench, as illustrated at the left of figure 1-5. To lock the handle in its stowed position for packaging, as illustrated at the right of figure 1-5, fold the handle over the top of the case and pull forward the extreme lower hinged portion of the handle until a positive lock is obtained. To unlock, snap the extreme lower hinged portion towards the rear of the instrument until released.

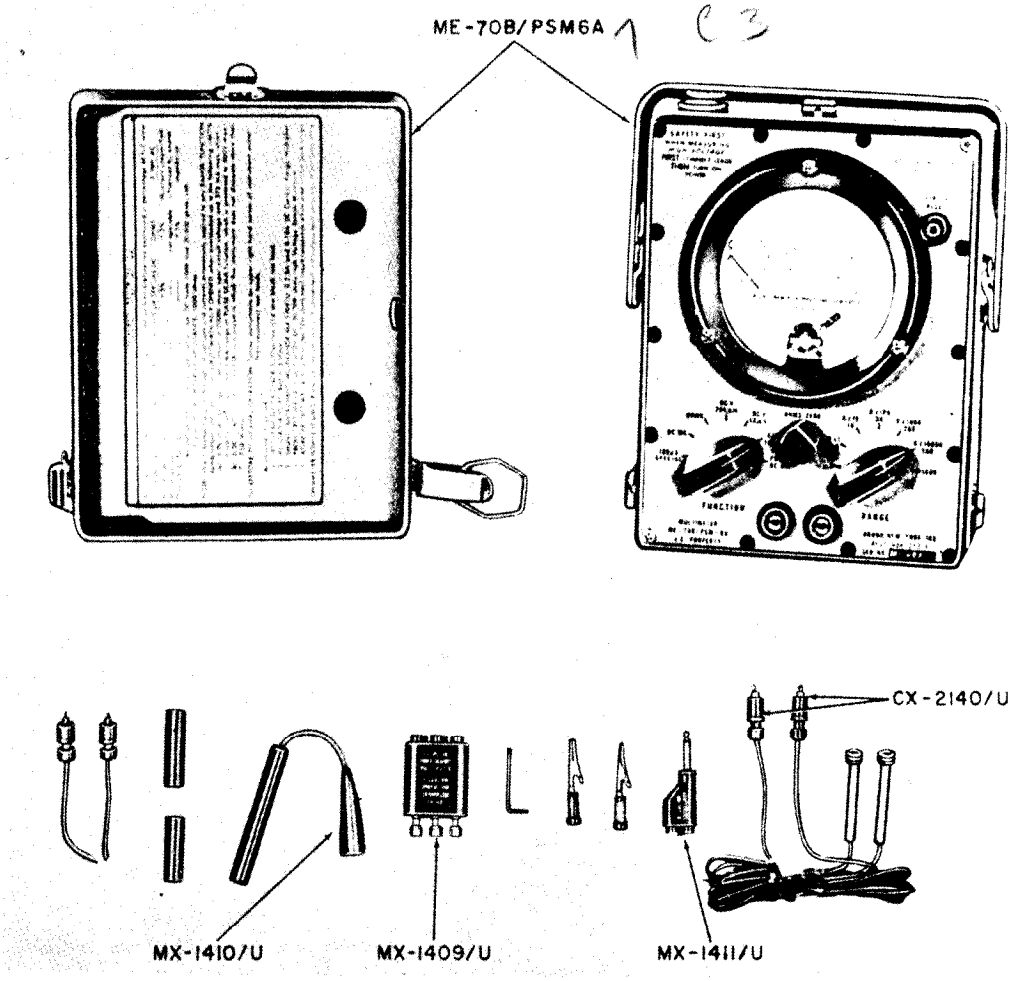


Figure 1-3. Multimeter AN/PSM-6A using Multimeter ME-70 B/PSM-6A

Position of Function Switch	Position of Range Switch	Measurements Scale Available
DCV-20KΩ/V	.5, 2.5, 10, 50, 250, 500, 1,000	0-.5, 0-2.5, 0-10, 0-50, 0-250, 0-500, 0-1,000 volts (sensitivity 20,000 ohms/volt)
DCV-1KΩ/V	.5, 2.5, 10, 50, 250, 500, 1,000	0-.5, 0-2.5, 0-10, 0-50, 0-250, 0-500, 0-1,000 volts (sensitivity 1,000 ohms/volt)
ACV-1KΩ/V	.5, 2.5, 10, 50, 250, 500, 1,000	0-.5, 0-2.5, 0-10, 0-50, 0-250, 0-500, 0-1,000 volts RMS (sensitivity 1,000 ohms/volt)
Output (Applicable to AN/PSM-6)	.5, 2.5, 10, 50, 250, 500, 1,000	0-.5, 0-2.5, 0-10, 0-50, 0-250, 0-500, 0-1,000 volts RMS (1 mfd. series internal capacitor in circuit)
DC MA	.5, 2.5, 10, 50, 250, 500, 1,000	0-.5, 0-2.5, 0-10, 0-50, 0-250, 0-500, 0-1,000 milliamperes dc
100 uA Special	Any	0-100 microamperes dc
Ohms	X1, X10, X100, X1,000, X10,000	0-1,000, 0-10,000, 0-100,000, 0-1,000,000, 0-10,000,000 ohms
PULSE DC MA (Applicable to AN/PSM-6A)	.5, 2.5, 10, 50, 250, 500, 1,000	0.5, 0-2.5, 0-10, 0-50, 0-250, 0-500, 0-1,000 ma, dc

Figure 1-4. **Measurement Ranges**

1-6. MULTIRANGE INSTRUMENT SHUNT MX-1409/U. Multirange Instrument Shunt MX-1409/U is a dual external shunt to extend the dc current range of the instrument to allow for 0-2.5 ampere and 0-10 ampere measurements. Three terminals are provided at each end of the molded plastic case for both the load and meter circuits, and are marked ±, 2.5, and 10. The meter circuit terminals are standard pin jacks to accommodate the test lead prods, while the load circuit terminals are of the binding post type to minimize contact resistance. When using the shunt, the FUNCTION switch is set to DC MA and the RANGE switch to 2.5 or 10, as applicable.

1-7. TEST PROD MX-1410/U. Test Prod MX-1410/U is a high-voltage prod which extends the dc voltage range to 5,000 volts. With the FUNCTION switch set to DCV-20KΩ/V and the RANGE switch set at 500, the test prod is connected to the POSITIVE test lead. Then, with the test circuit off, the test prod clip and the negative test lead are connected to the positive and negative test points, respectively. When the test circuit is turned on, the voltage, up to 5,000 volts dc, may be read directly on the meter scale. The test prod and test leads are not designed to connect to a high-voltage circuit while the power is on.

1-8. TEST ADAPTER MX-1411/U. In order to be able to make standard crystal current measurements requiring a 100-ohm load, Test Adapter MX-1411/U is furnished. The adapter contains a built-in supplementary resistor of the correct value so that when the adapter pin jacks are connected to the test leads and meter, and the FUNCTION and RANGE switches are set to DC MA and 2.5 respectively, the total resistance seen from the plug end of the adapter is 100 ohms.

1-9. TEST LEAD SET CX-2140/U OR CX-2140A/U. Each test lead set includes a pair of test leads with interlocking plugs at one end and test prod tips which connect into standard pin jacks at the other end. Detachable alligator clips are furnished for use as required. The interlocking plugs provide a semi-permanent low-resistance connection to the meter jacks. To connect the plugs into the jacks, the rear portion of the plug is slid forward with respect to the front and the plug inserted. When the plug is released, it will automatically lock in place and cannot be removed until the rear of the plug is again slid forward and the plug lifted out. Two spare plugs are provided with the multimeter.

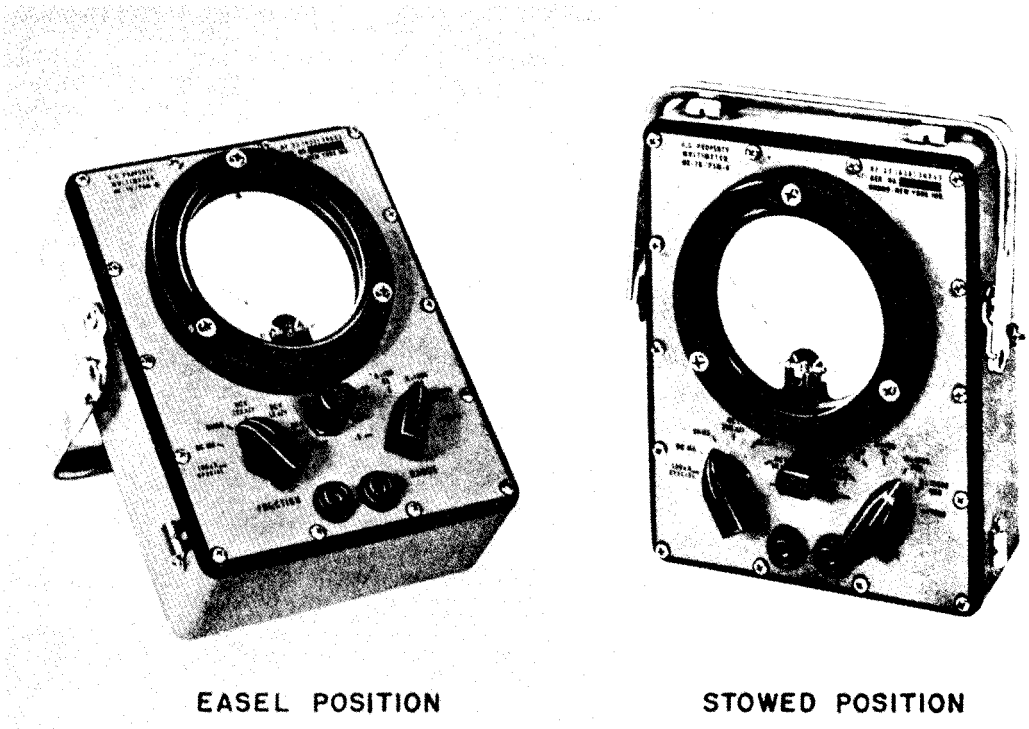


Figure 1-5. **Handle Positions**

SECTION II

TEST EQUIPMENT AND SPECIAL TOOLS

2-1. The following test equipment is required to service the multimeter:

Nomenclature	Part No. or Model	Application	Range	Accuracy
Wheatstone Bridge (Leeds and Northrup Co., Phila., Pa.) or equivalent	5300	Check accuracy of resistance range	0.1 to 100 meg ohms	±0.05 percent
Variable AC Voltage Source		Check AC scale		
Meter Test Set	TS-682/GSM-1	Calibration of multimeter		
Decade Resistor	TS-679/U	Calibration of multimeter		

SECTION III

PREPARATION FOR USE AND RESHIPMENT

3-1. **PREPARATION FOR USE.**

3-2. **GENERAL.** Multimeters ME-70/PSM-6 and ME-70A/PSM-6 are shipped with batteries already in place under the panel, and therefore require no preparation procedure before using, other than an operational battery check. Multimeter ME-70B/PSM-6A is shipped with batteries packed in a box and placed in the accessory compartment in the cover. Before using the AN/PSM-6A, unpack the batteries and install according to the instructions on the inside of the accessory compartment lid.

3-3. **BATTERY CHECK.** To check the battery, the procedure is as follows:

a. Set FUNCTION switch to OHMS.
b. Set RANGE switch to X1.
c. Plug test leads into meter jacks and short-circuit the e nds.
d. Adjust OHMS ZERO control until meter pointer reads zero on the ohms scale.
e. Repeat step d with RANGE switch set in turn to X10, X100, X1, 000 and X10, 000. If the pointer cannot be adjusted to zero with the OHMS ZERO control, the battery voltage is low. Refer to Section V for procedure to change battery.

NOTE

If there is no meter indication, check the circuit breaker setting by momentarily depressing the OVERLOAD RESET button. Since the circuit breaker may open when the multimeter is transported or otherwise jarred, this should be a routine check.

3-4. **PREPARATION FOR RESHIPMENT.**

3-5. **GENERAL.** No preparation for reshipment other than packaging and packing the multimeter is necessary.

3-6. **PRESERVATION AND PACKAGING.** Unless otherwise specified, the multimeter shall be preserved and packaged in unit containers in accordance with Military Specification MIL-P-116C, Method IIB and with the following special precautions:

a. Stow the multimeter accessories in the lid compartment and fasten cover to multimeter case.
b. Fold the handle until the top rests next to the catch strikes at the top of the case. Lock handle in place by pulling forward the extreme lower hinged portion of the handle until a positive lock is obtained.

3-7. **PACKING.** Use commercial shipping cartons or wooden export cases as required.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL. The multimeter is a precision general-purpose test instrument which combines the functions of a dc voltmeter (with both 20,000 ohms/volt and 1,000 voltmeter sensitivities), an ac voltmeter, a dc milliammeter, an output meter (on AN/ PSM-6) and an ohmmeter. The settings of the FUNCTION and RANGE switches control the characteristics and ranges of the meter circuit, and the discussion of the theory of operation will therefore be divided into the individual circuits resulting from each combination of switch settings. The complete schematic diagram for multimeter ME-70/ PSM-6 is shown in figure 7-1; for ME-70A/ PSM-6 schematic, see figure 7-2; for ME-70B/PSM-6A schematic, see figure 7-3. The differences between the AN/ PSM-6 and the AN/PSM-6A do not appear in the individual circuit figures 4-1 through 4-8, since the basic circuits are identical. Figure 4-4 does not apply to the AN/ PSM-6A.

4-2. Multimeter AN/ PSM-6A differs from Multimeter AN/PSM-6 in the following two respects:

a. The output function in the AN/PSM-6 has been replaced in the AN/ PSM-6A by the more useful pulsed dc current function which is employed in the maintenance of certain Fire Control apparatus. This makes it possible to measure pulsating dc currents having high peak values, and average values up to 1 ampere. Such currents cannot be measured accurately with the AN/PSM-6 incorporating Multimeter ME-70A/ PSM-6.

b. To minimize down-time of the multimeter in the field, a protective system has been incorporated in the AN/ PSM-6A to protect the instrument against damage due to incorrect setting of the RANGE or FUNCTION Switch or wrong polarity of test lead connection. This system is capable of protecting every RANGE - FUNCTION combination under the following maximum conditions:

From a power source having 2000 volts open circuit, capable of delivering a maximum short-circuit current of 375 ma and a maximum surge current of 30 amperes which decays to 400 ma within 2 milliseconds:

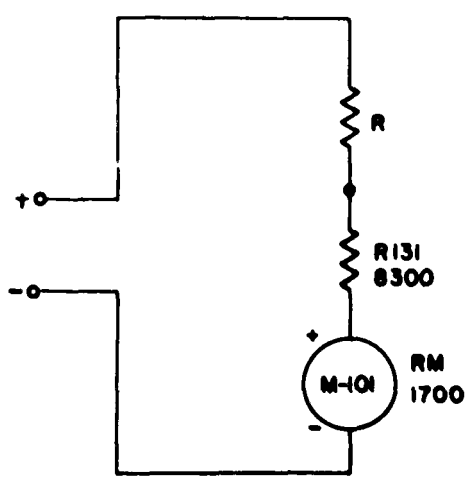
2000 volts dc applied in the forward direction,
2000 volts dc applied in the reverse direction,
and 2000 volts ac at 60 cps.

From a power source such that the multimeter is not required to dissipate more than 750 watts of power in any current range:

10 amperes dc applied in the forward direction,
10 amperes dc applied in the reverse direction,
and 10 amperes ac at 60 cps.

NOTE

Because of the variability among identical components with respect to their ability to withstand peak overload voltages and currents, the number of overloads for which any individual multimeter is protected will vary from unit to unit.



RANGE SETTING	VALUE OF R	
	RESISTORS	OHMS
.5	NONE	0
2.5	R106	40,000
10	R106 + R107	100,000
50	R106 + R107 + R108	990,000
250	R106 + R107 + R108 + R109	4,990,000
500	R106 + R107 + R108 + R109 + R110	9,990,000
1000	R106 + R107 + R108 + R109 + R110 + R111	19,990,000

Figure 4-1. Simplified Circuit, DC Voltage 20,000 ohms/volt

4-3. FUNCTIONAL OPERATION.

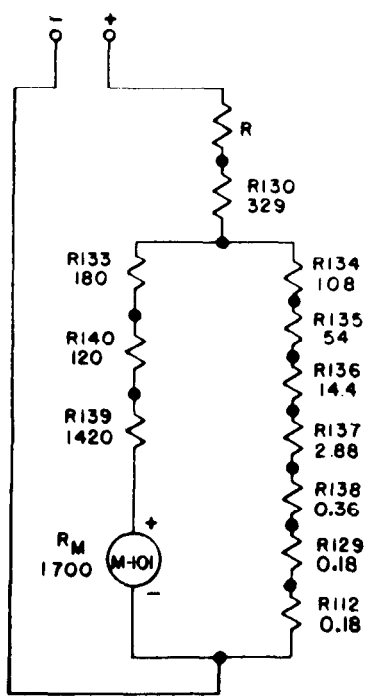
4-4. DC VOLTAGE-20, 000 OHMS/VOLT. With the FUNCTION switch set at DCV-20KΩ/V and the RANGE switch at any position, the circuit reduces to the simplified diagram of figure 4-1. The value of R depends upon the position of the RANGE switch and is given in the accompanying table. The total circuit resistance, including 1, 700 ohms meter resistance, provides a 20, 000 ohms/volt sensitivity for all ranges.

4-5. DC VOLTAGE-1, 000 OHMS/VOLT. With the FUNCTION switch set at DCV- 1KΩ/V and RANGE switch at any position, the simplified circuit is shown in figure 4-2. Again, the value of R is dependent upon the RANGE setting and is shown in the table. Between the input jacks, the circuit resistance provides a 1, 000 ohms/volt sensitivity for all ranges.

4-6. AC VOLTAGE. With the FUNCTION switch set at ACV and the RANGE switch at any position, the circuit reduces to figure 4-3, with the values of R as shown in the table. The ACV ranges are also designed for a sensitivity of 1, 000 ohms/volt and the total resistance between points A and B should therefore be 450 ohms. The two rectifier sections CR-101 (A103 in the AN/PSM - 6A) rectify the alternate half-cycles of the incoming ac voltage, and the resulting pulsating dc is read on the meter. R132 is an adjustable slide-wire resistor which is set at the factory to provide compensation for variations in rectifier characteristics and temperature correction.

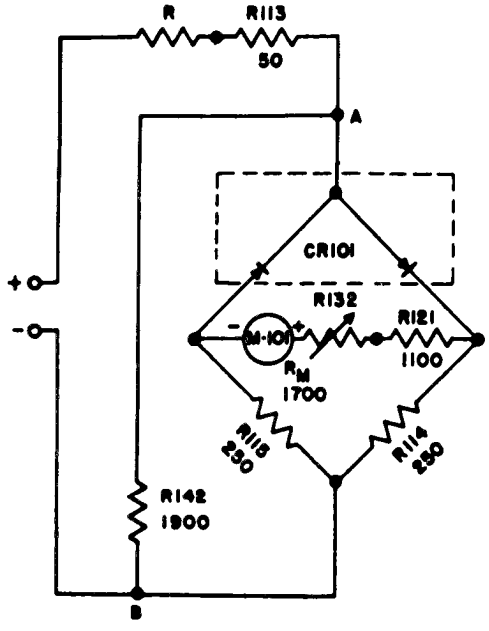
4-7. OUTPUT. The following applies to the AN/PSM-6 only. With the FUNCTION switch set at OUTPUT and the RANGE switch at any position, the circuit reduces to figure 4-4 which is exactly the same as for the ac voltage function except for addition of series capacitor C101. This capacitor blocks any dc component of the voltage measured from the meter circuit, and allows only the alternating components to pass. Since the impedance of C101 is inversely proportional to frequency, the circuit sensitivity and accuracy may be affected by the frequency of the measured voltage.

4-8. DC MILLIAMPERES. With the FUNCTION switch set at DC MA and the RANGE switch at any position, the circuit is as shown in figure 4-5. Since R1 and R2 vary as shown in the table, the circuit is essentially a dc milliammeter and shunt, with the shunt and meter resistance changing with each range to keep 50 microamperes flowing in the meter for full-scale deflection.



RANGE SETTING	VALUE OF R	
	RESISTORS	OHMS
.5	NONE	0
2.5	R116	2,000
10	R116 + R101	9,500
50	R116 + R101 + R102	49,500
250	R116 + R101 + R102 + R103	249,500
500	R116 + R101 + R102 + R103 + R104	499,500
1000	R116 + R101 + R102 + R103 + R104 + R105	999,500

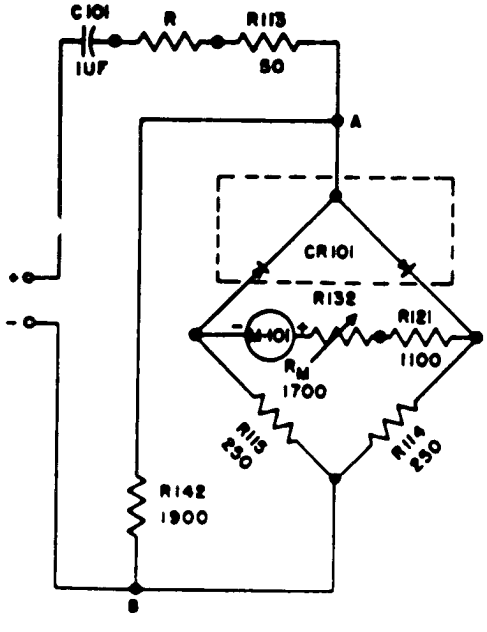
Figure 4-2. **Simplified Circuit, DC Voltage 1, 000 ohms/volt**



RANGE SETTING	VALUE OF R	
	RESISTORS	OHMS
.5	NONE	0
2.5	R116	2,000
10	R116 + R101	9,500
50	R116 + R101 + R102	49,500
250	R116 + R101 + R102 + R103	249,500
500	R116 + R101 + R102 + R103 + R104	499,500
1000	R116 + R101 + R102 + R103 + R104 + R105	999,500

NOTE:
ALL RESISTANCE VALUES ARE IN OHMS

Figure 4-3. Simplified Circuit, AC Voltage



RANGE SETTING	VALUE OF R	
	RESISTORS	OHMS
.5	NONE	0
2.5	R116	2,000
10	R116 + R101	9,500
50	R116 + R101 + R102	49,500
250	R116 + R101 + R102 + R103	249,500
500	R116 + R101 + R102 + R103 + R104	499,500
1000	R116 + R101 + R102 + R103 + R104 + R105	999,500

NOTE:
ALL RESISTANCE VALUES ARE IN OHMS

Figure 4-4. Simplified Circuit, Output

4-9. PULSED DC MILLIAMPERES. The following applies to the AN/PSM-6A: With the FUNCTION switch set at PULSE DC MA and the RANGE switch in any position the circuit is as shown in figure 4-5. In the AN/PSM-6A terminal 4 of assembly A101 is disconnected from the meter, this is necessary to prevent some of the pulse current from being by-passed around the meter; otherwise, the circuit is exactly as described in paragraph 4-8 for the DC MA function.

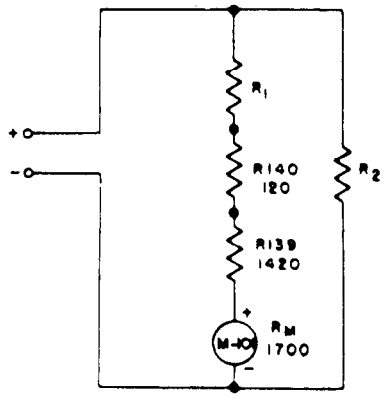
4-10. OHMS. When the FUNCTION switch is at OHMS, a 1.34-13. 4-volt mercuric oxide type battery is switched into the circuit as shown in figure 4-6. The full 13.4 volts is used only in the X10, 000 range. The 1. 34-volt section is used for all other ranges. The OHMS ZERO control R-118 is provided to allow zeroing of the meter for a considerable drop in battery voltage.

4-11. 100 MICROAMPERES SPECIAL. With the FUNCTION switch set at 100 uA SPECIAL and the RANGE switch in any position, the circuit reduces to that shown in figure 4-7, which is simply the meter shunted by a 1, 700-ohm resistor. Since the meter resistance is also 1, 700 ohms the load current will split into two equal parts, allowing a full- scale deflection of the 50-microampere meter for a load current of 100 microamperes.

4-12. TEST ADAPTER MX- 1411/U. Test adapter MX-1411/ U is used with the FUNCTION switch set at DC MA and the RANGE switch at 2. 5. With these switch settings, the impedance between the test jacks of the multimeter circuit is 70. 6 ohms. Since standard crystal current measurements require a load of 100 ohms, the adapter, in addition to providing a phone plug connection, contains a built-in 29.4-ohms precision resistor so that this resistor in series with the meter circuit totals the required 100 ohms.

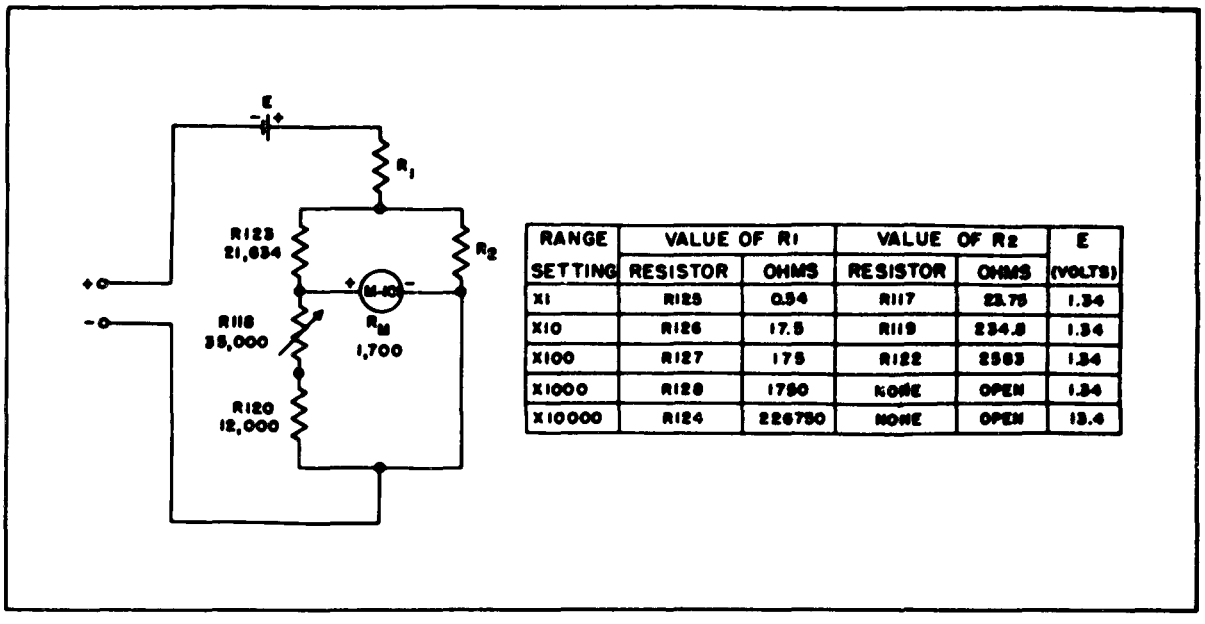
4-13. MULTIRANGE INSTRUMENT SHUNT MX-1409/U. With the FUNCTION switch set at DC MA and the RANGE switch in the 2. 5 and 10 positions, the multimeter impedance is 70. 6 and 17. 9 ohms, respectively. To provide for current measurements up to 2. 5 and 10 amperes, two shunts of . 071 and . 018 ohms are required. These are constructed as shown in figure 4-8. The two resitive sections are used in series to give the resistance of . 071 ohms required for the 2. 5 ampere shunt.

4-14. TEST PROD MX-1410/U. Test Prod MX-1410/U contains a precision 90-megohm resistor which is connected in series with the meter circuit when used as described in Section I. With the FUNCTION switch at DC V- 20 KΩ/V and the RANGE switch at 500, the meter circuit resistance is 10 megohms and therefore the total resistance would be 100 megohms. Hence, for a test voltage of 5, 000 volts dc, 4, 500 volts would be dropped across the high-voltage prod leaving 500 volts to cause full-scale deflection on the meter.



RANGE SETTING	VALUE OF R1		VALUE OF R2	
	RESISTORS	OHMS	RESISTORS	OHMS
.5	NONE	0	R112 + R129 + R138 + R137 + R136 + R135 + R134 + R133	360
2.5	R133 + R134	288	R112 + R129 + R138 + R137 + R136 + R135	72
10	R133 + R134 + R135	342	R112 + R129 + R138 + R137 + R136	18
50	R133 + R134 + R135 + R136	356.4	R112 + R129 + R138 + R137	3.6
250	R133 + R134 + R135 + R136 + R137	359.28	R112 + R129 + R138	.72
500	R133 + R134 + R135 + R136 + R137 + R138	359.64	R112 + R129	36
1000	R133 + R134 + R135 + R136 + R137 + R138 + 129	359.82	R112	18

Figure 4-5. Simplified Circuit, DC Current



RANGE SETTING	VALUE OF R1		VALUE OF R2		E (VOLTS)
	RESISTOR	OHMS	RESISTOR	OHMS	
X1	R125	0.54	R117	23.76	1.34
X10	R126	17.5	R119	234.8	1.34
X100	R127	175	R122	2583	1.34
X1000	R128	1750	NONE	OPEN	1.34
X10000	R124	226750	NONE	OPEN	13.4

Figure 4-6. **Simplified Circuit, Resistance**

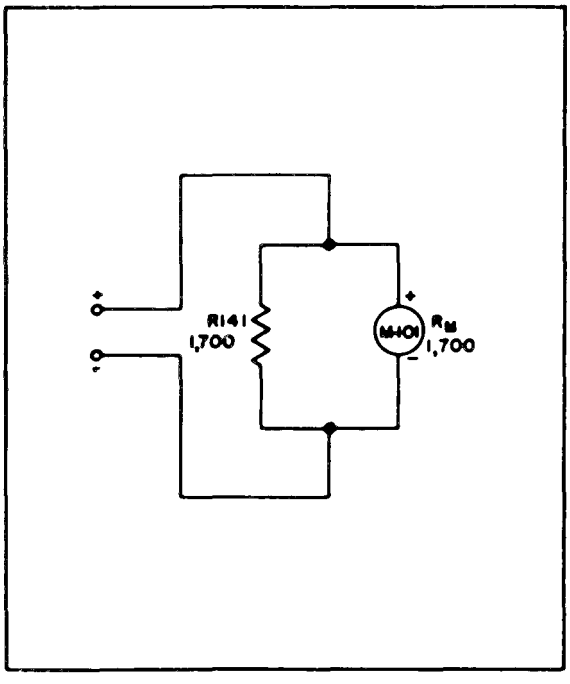


Figure 4-7. **Simplified Circuit, 100 Microamperes Special**

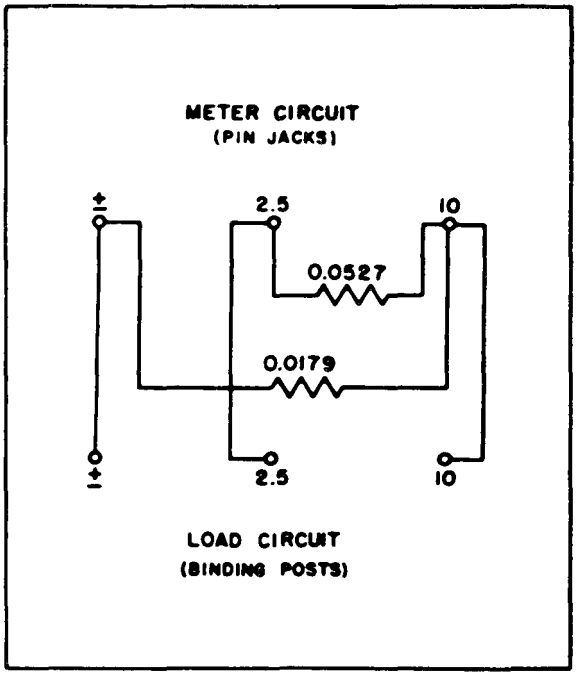


Figure 4-8. Schematic Diagram Shunt MX-1409/U

SECTION V

ORGANIZATIONAL AND SQUADRON MAINTENANCE

5-1. MAINTENANCE REQUIRED.

5-2. GENERAL. No periodic maintenance is required beyond replacement of the battery, adjustment of the mechanical zero and visual inspection of the multimeter and accessories. The high-voltage Test Prod, Current Shunt, Test Adapter, and circuit breaker (in the AN/PSM-6A) are precision components which cannot be repaired in the field but must be replaced in their entirety if defective.

5-3. BATTERY REPLACEMENT (ME-70/PSM-6). Multimeter ME-70/PSM-6 uses a plastic-encased 13.4-1.34-volt battery of the mercuric oxide type with a rated life of approximately 3,600 milliampere-hours. The battery is mounted by c lamps to the underside of the panel. If the procedure of paragraph 3-3 indicates a weak battery, the battery may be replaced as follows:

a. Remove the 14 mounting screws which fasten the panel and gasket to the case and lift out the panel assembly.

b. Unsolder the three battery leads from their terminal lugs.

c. Unscrew the two clamps holding the battery, and remove the battery.

d. Fasten the new battery in place and tighten the two clamp screws.

e. Solder the leads of the new battery to the proper terminal marked with the corresponding color.

f. Replace the panel and gasket in the case and tighten the 14 mounting screws.

NOTE

When replacing the battery for multimeters with serial numbers below 2431, also replace R120 and R125 (15,000 ohms and 1.27 ohms respectively) with new values (12,000 ohms and 0.54 ohms).

5-4. BATTERY REPLACEMENT (ME-70A/PSM-6 and ME-70B/PSM-6A). Two batteries are used in Multimeter ME-70A/PSM-6 and ME-70B/PSM-6A. These batteries are easily replaced from the watertight opening on the top of the case. The batteries are of the long life mercuric oxide type. One battery provides 1.34 volts and the other, 12.06 volts. Either one or both of these batteries may be replaced, as explained in step d below. If the procedure of paragraph 3-3 indicates a weak battery, replace as follows:

a. Remove slotted threaded case plug from top of meter case with a coin or screwdriver.

b. Grip grooved pin on electrical contact plug with a narrow nose pliers and withdraw carefully.

c. Turn meter case over. Batteries will drop out.

d. If the X10,000 ohms range cannot be adjusted to zero, replace top battery with a fresh 12.06 volt battery. If any of the other resistance ranges cannot be adjusted, replace bottom battery with a new 1.34 volt battery.

e. Replace contact plug carefully. It should be fully recessed. Replace slotted case plug and then tighten until the "O" ring packing seal is compressed.

5-5. MECHANICAL ZERO. Adjustment of the mechanical zero of the meter pointer for the AN/PSM-6 is as follows:

a. Remove the panel mounting screws and lift out the panel assembly.

b. Unscrew the large screw at the bottom of the rear of the meter. This screw is accessible by a cutout in the terminal board. Lift out the screw and rubber washer.

c. Adjust zeroing lever with long screwdriver for proper zero point.

d. Replace screw and washer.

e. On Multimeters ME-70/PSM-6 with serial numbers below 25298, coat the rivet heads and ends on the rotor of the FUNCTION switch with Corona Dope. Do this on the front and rear of section three, being careful not to get any dope on the conducting surface of the contacts. This coating stops any arcing between the rivets which may occur on the 1,000 volt AC range.

f. Replace panel assembly in case and fasten mounting screws.

The adjustment of the mechanical zero of the meter pointer for the AN/PSM-6 is as follows:

a. Remove the three meter mounting screws and lift the meter out of its panel hole.

b. Adjust zeroing screw with screwdriver for proper zero point. The zeroing screw is at the bottom of the rear of the meter.

c. Replace meter in panel hole and fasten mounting screws.

5-6. TEST LEAD SET. In the event a test lead breaks or an interlocking plug becomes defective, a spare plug may be attached as follows:

a. Strip approximately 1/2 inch of insulation from the test lead end, leaving the wire bare.

b. Unscrew the rear plastic cap of the plug and slide it over the end of the test lead.

c. Press the plug end against a flat surface, and at the same time slip the threaded metal portion of the plug down toward the plug end, exposing the eyelet.

d. Insert the test lead wire into the eyelet and crimp it around the hole.

e. Allow the threaded metal portion to slide back over the eyelet and wire.
f. Screw the rear cap over the metal portion of the plug.

5-7. LUBRICATION. The only lubrication required is the oiling of the handle hinges with a light grade of machine oil, Federal Specification, VV-O- 526, or equivalent, at 100-hour intervals.

5-8. INSPECTION. Under conditions of normal use, only routine visual inspection is necessary to determine mechanical condition, evidences of corrosion, etc., after approximately each 100 hours of operation.

SECTION VI

FIELD AND FASRON MAINTENANCE

6-1. MINIMUM PERFORMANCE STANDARDS AND TROUBLE ANALYSIS.

6-2 MINIMUM PERFORMANCE STANDARDS. The accuracies which this instrument is designed to meet are marked on the cover lid of the multimeter. These measurement accuracies constitute the minimum acceptable performance standards, and may be checked by comparing the readings of the multimeter against standard voltmeters or milliammeters. The minimum accuracies at ambient temperatures of approximately 77° F (25° C) are ±3 percent for all dc ranges and ±4 percent for all ac ranges. At -40° F (-40° C) accuracies of dc ranges are within ±6 percent and ac ranges ±7 percent, while at 131° F (55° C) the accuracies are within ±5 percent and ±6 percent for dc and ac ranges, respectively. No accuracies are specified at the 0.5 volt ac range or for the output ranges, since the former is influenced by source impedance, and the latter by frequency.

6-3. TROUBLE ANALYSIS. The particular circuit causing the trouble may be isolated by comparison with standard meter readings and also by referring to the schematic diagram, figures 7-1, 7-2 or 7-3 and following the trouble analysis chart, figure 6-1.

CAUTION

The voltage of a wheatstone bridge or ohmmeter used to analyze trouble may burn out meter M101. When this possibility exists, temporarily disconnect meter and replace with a 1, 700-ohm precision resistor.

When using ohmmeter or wheatstone bridge connect its positive lead to the multimeter's positive jack (J 101) and negative lead to the multimeter's negative jack (J102).

NOTE

Failure to observe correct polarity will result in misleading indications.

6-4. REPAIR.

6-5. GENERAL. In addition to the maintenance procedures covered in Section V, the permissible field repair of electrical parts consists of replacing resistors, rectifier, capacitor, switches, assemblies E101 (in Multimeter ME-70A, PSM-6). A101. A102, A103, and CB101 (all in Multimeter ME-70B, PSM-6A) or the meter. The meter used in Multimeter ME-70, PSM-6 can be replaced by the meter used in Multimeter ME-70A, PSM-6 or ME-70B, PSM-6A when supplies of the old meter replacements are exhausted. The accuracy of measurement depends completely upon the precision of the component parts and it is therefore necessary that each defective part be replaced by its exact equivalent, both in nominal value and in tolerance. Refer to the Parts Breakdown handbook for this equipment for part nomenclature.

6-6. AC VOLTAGE CIRCUIT. Due to the manufacturing tolerances on the rectifier, the slide-wire resistor R 1 32 is set for each individual rectifier. If either the rectifier or the slide-wire resistor is replaced, the procedure for adjusting the resistor setting is as follows:

a. Set the FUNCTION switch a t ACV and the RANGE switch at 50.
b. Connect a source of variable ac voltage and a standard ac voltmeter to the input jacks of the multimeter.
c. Set the voltage at 50 volts RMS.
d. Loosen the adjustable contact on the slide-wire resistor and move it until the multimeter deflection is exactly full-scale.
e. Tighten the contact.

6-7. REPLACEMENT OF CIRCUIT BREAKER. Replacement of Circuit Breaker CB101 involves the tightening of its sealed nut. When this operation is performed the torque used must not exceed 10 inch-pounds. Use of a torque wrench is recommended.

6-8. REPLACEMENT OF PROTECTION SYSTEM COMPONENTS. Whenever one of the assemblies, A101, A102, A103, and CB101 has been replaced, the protection system must be tested for satisfactory operation. To make this test power sources in accordance with figure 6-2 must be used. Test protection system using table 6-3.

Test Equipment Required	Test Points	Function Switch Setting	Range Switch Setting	Normal Indication	Possible Cause of Abnormal Indication
Wheatstone Bridge or precision ohmmeter	Jacks J-101 & J-102	100uA SPECIAL	Any	850 ohms	AN/PSM-6: S101, S102, R141, M101, E101*
				1030 ohms	AN/PSM-6A: S101, S102, R141, M101, R145, A101, CB101

*Multimeter ME-70A/PSM-6 only.

Figure 6-1. Trouble Chart (Sheet 1 of 6)

Test Equipment Required	Test Points	Function Switch Setting	Range Switch Setting	Normal Indication	Possible Cause of Abnormal Indication
Wheatstone Bridge or precision ohmmeter	Jacks J-101 & J-102	DC MA (and PULSE DC MA for AN/ PSM-6A)	.5	324 ohms	S101, S102, M101, R139, R140, R133, R134, R135, R136, R137, R138, R129, R112, E101* (Also, A101 and CB101 in AN/PSM-6A)
			2.5	70.6 ohms	S101, S102, M101, R139, R140, R133, R134, R135, R136, R137, R138, R139, R112, E101* (Also, A101 and CB101 in AN/PSM-6A)
			10	17.9 ohms	S101, S102, M101, R139, R140, R133, R134, R135, R136, R137, R138, R129, R112, E101* (Also A101 and CB101 in AN/PSM-6A)
			50	3.6 ohms	S101, S102, M101, R139, R140, R133, R134, R135, R136, R137, R138, R129, R112, E101* (Also A101 and CB101 in AN/PSM-6A)
			250	0.72 ohms	S101, S102, M101, R139, R140, R133, R134, R135, R136, R137, R138, R129, R112, E101* (Also A101 and CB101 in AN/PSM-6A)
			500	0.36 ohms	S101, S102, M101, R139, R140, R133, R134, R135, R136, R137, R138, R129, R112, E101* (Also A101 and CB101 in AN/PSM-6A)
			1,000	0.18 ohms	S101, S102, M101, R139, R140, R133, R134, R135, R136, R137, R138, R129, R112, E101* (Also A101 and CB101 in AN/PSM-6A)
Precision Resistor	Jacks J-101 & J-102	OHMS	X1	Value of Resistor	S101, S102, M101, BT101, BT102, R125, R117, R123, R118, R120, E101* (Also A101 and CB101 in AN/ PSM-6A)
			X10	Value of Resistor	S101, S102, M101, BT101, R126, R119, R123, R118, R120, E101* (Also A101 and CB101 in AN/PSM-6A)

*Multimeter ME-70A/PSM-6 only.

Figuro 6-1. **Trouble Chart (Sheet 2 of 6)**

Test Equipment Required	Test Points	Function Switch Setting	Range Switch Setting	Normal Indication	Possible Cause of Abnormal Indication
			X100	Value of Resistor	S101, S102, M101, BT101, R127, R122, R123, R118, R120, E101* (Also A101 and CB101 in AN/PSM-6A)
			X1, 000	Value of Resistor	S101, S102, M101, R128, R123, R118, R120, E101* (Also A101 and CB101 in AN/PSM-6A)
			X10, 000	Value of Resistor	S101, S102, M101, R124, R123, R118, R120, E101* (Also A101 in CB101 in AN/PSM-6A)
Wheatstone Bridge or precision ohmmeter	Jacks J-101 & J-102	DCV 20KΩ/V	.5	10, 000 ohms	S101, S102, M101, R131, E101* (Also A101 and CB101 in AN/PSM-6A)
			2.5	50, 000 ohms	S101, S102, M101, R131, R106, E101* (Also A101 and CB101 in AN/PSM-6A)
			10	200, 000 ohms	S101, S102, M101, R131, R106, R107, E101* (Also A101 and CB101 in AN/SPM-6A)
			50	1 meg-ohm	S101, S102, M101, R131, R106, R107, R108, E101* (Also A101 and CB101 in AN/PSM-6A)
			250	5 meg-ohms	S101, S102, M101, R131, R106, R107, R108, R109, E101* (Also A101 and CB101 in AN/PSM-6A)
			500	10 meg-ohms	S101, S102, M101, R131, R106, R107, R108, R109, R110, E101* (Also A101 and CB101 in AN/PSM-6A)
			1, 000	20 meg-ohms	S101, S102, M101, R131, R106, R107, R108, R109, R110, R111, E101* (Also A101 and CB101 in AN/PSM-6A)
Wheatstone Bridge or precision ohmmeter	Jacks J-101 & J-102	DCV 1KΩ/V	.5	500 ohms	S101, S102, M101, R130, R133, R134, R135, R136, R137, R138, R139, R140, R129, R112, E101* (Also A101 and CB101 in AN/PSM-6A)

*Multimeter ME-70A/PSM-6 only.

Figure 6-1. Trouble Chart (Sheet 3 of 6)

Test Equipment Required	Test Points	Function Switch Setting	Range Switch Setting	Normal Indication	Possible Cause of Abnormal Indication
Wheatstone Bridge or precision ohmmeter	Jacks J-101 & J-102	DCV 1KΩ/V	2.5	2,500 ohms	S101, S102, M101, R112, R129, R130, R133, R134, R135, R136, R137, R138, R139, R140, R116, E101* (Also A101 and CB101 in AN/PSM-6A)
			10	10,000 ohms	S101, S102, M101, R112, R129, R130, R133, R134, R135, R136, R137, R138, R139, R140, R116, R101, E101* (Also A101 and CB101 in AN/PSM-6A)
			50	50,000 ohms	S101, S102, M101, R112, R129, R130, R133, R134, R135, R136, R137, R138, R139, R140, R116, R101, R102, E101* (Also A101 and CB101 in AN/PSM-6A)
			250	250,000 ohms	S101, S102, M101, R112, R129, R130, R133, R134, R135, R136, R137, R138, R139, R140, R116, R101, R102, R103, E101* (Also A101 and CB101 in AN/PSM-6A)
			500	500,000 ohms	S101, S102, M101, R112, R129, R130, R133, R134, R135, R136, R137, R138 R139, R140, R116, R101, R102, R103, R104, E101* (Also A101 and CB101 in AN/PSM-6A)
			1,000	1 meg-ohm	S101, S102, M101, R112, R129, R130, R133, R134, R135, R136, R137, R138, R139, R140, R116, R101, R102, R103, R104, R105, E101* (Also A101 and CB 101 in AN/PSM-6A)
Wheatstone Bridge or precision ohmmeter	Jacks J-101 & J-102	ACV 1KΩ/V	.5	500 ohms (Approx.)	S101, S102, M101, CR101, (AN/PSM-6), E101* R113, R114, R115, R121, R132, R142 (Also A101, A102, A103 and CB101 in AN/PSM-6A)
			2.5	2,500 ohms	S101, S102, M101, CR101, (AN/PSM-6), E101*, R113, R114, R115, R121, R132, R116, R142 (Also A101, A102, A103, and CB101 in AN/PSM-6A)

*In Multimeter ME-70A/PSM-6 only.

Figure 6-1. Trouble Chart (Sheet 4 of 6)

Test Equipment Required	Test Points	Function Switch Setting	Range Switch Setting	Normal Indication	Possible Cause of Abnormal Indication
			10	10,000 ohms	S101, S102, M101, CR101, (AN/PSM-6), E101*, R113, R114, R115, R121, R132, R116, R101*, R142* (Also A101, A102, A103 and CB101 in AN/PSM-6A)
			50	50,000 ohms	S101, S102, M101, CR101, (AN/PSM-6), E101*, R113, R114, R115, R121, R132, R116, R101, R102, R142 (Also A101, A102, A103 and CB101 in AN/PSM-6A)
			250	250,000 ohms	S101, S102, M101, CR101, (AN/PSM-6), E101*, R113, R114, R115, R121, R132, R116, R101, R102, R103, R142 (Also A101, A102, A103 and CB101 in AN/PSM-6A)
			500	500,000 ohms	S101, S102, M101, CR101 (AN/PSM-6), E101*, R113, R114, R115, R121, R132, R116, R101, R142, R102, R103, R104 (Also A101, A102, A103 and CB101 in AN/PSM-6A)
Wheatstone Bridge or precision ohmmeter	Jacks J-101 & J-102	ACV 1KΩ V	1,000	1 megohm	S101, S102, M101, CR101 (AN/PSM-6), E101*, R113, R114, R115, R121, R132, R116, R101, R102, R103, R104, R105, R142 (Also A101, A102, A103 and CB101 in AN/PSM-6A)
Variable AC Voltage Source	Jacks J-101 & J-102	OUTPUT	5	Readings dependent on frequency	If ACV scale operates properly but OUTPUT does not, check C101 and S102
(Applicable to AN/PSM-6 only)			2.5	Readings dependent on frequency	If ACV scale operates properly but OUTPUT does not, check C101 and S102
			10	Readings dependent on frequency	If ACV scale operates properly but OUTPUT does not, check C101 and S102
			50	Readings dependent on frequency	If ACV scale operates properly but OUTPUT does not, check C101 and S102
*In Multimeter ME-70A/PSM-6 only.					

Figure 6-1. Trouble Chart (Sheet 5 of 6)

Test Equipment Required	Test Points	Function Switch Setting	Range Switch Setting	Normal Indication	Possible Cause of Abnormal Indication
			250	Readings dependent on frequency	If ACV scale operates properly but OUTPUT does not, check C101 and S102
			500	Readings dependent on frequency	If ACV scale operates properly but OUTPUT does not, check C101 and S102
			1,000	Readings dependent on frequency	If ACV scale operates properly but OUTPUT does not, check C101 and S102

Figure 6-1. Trouble Chart (Sheet 6 of 6)

POWER SOURCE		Application	Reference Symbol
Voltage (open circuit)	Current (short circuit)		
1800 V	375 ma	Forward DC Reverse DC AC, 60cps	+A -A ~A
200 V	200 ma	Forward DC Reverse DC AC, 60cps	+B -B ~B
150 V	150 ma	Forward DC Reverse DC AC, 60cps	+C -C ~C

Figure 6-2. Protection System Test Voltage Table

Setting		Assembly Replaced		
Function	Range	A101	A102, A103	CB101
DC MA	0.5 ma	+A, -B, ~B	-	+B, -B
OHMS	X1	+A	-	-
	X100	-A, ~A	-	+A
DC VOLTS (20KΩ/V	50 V	-A, ~A	-	+A
DC VOLTS (1KΩ/V)	0.5 V	+A, -C, ~C	-	-C, -C
	500 V	-A, ~A	-	+A
AC VOLTS	0.5 V	+A	+A, -A	+A
	500 V	-	-	+A

Note

If two or more assemblies are replaced all applicable tests for all the replaced assemblies should be performed.

Figure 6-3. Protection System Testing Tables

SECTION VII

DIAGRAMS

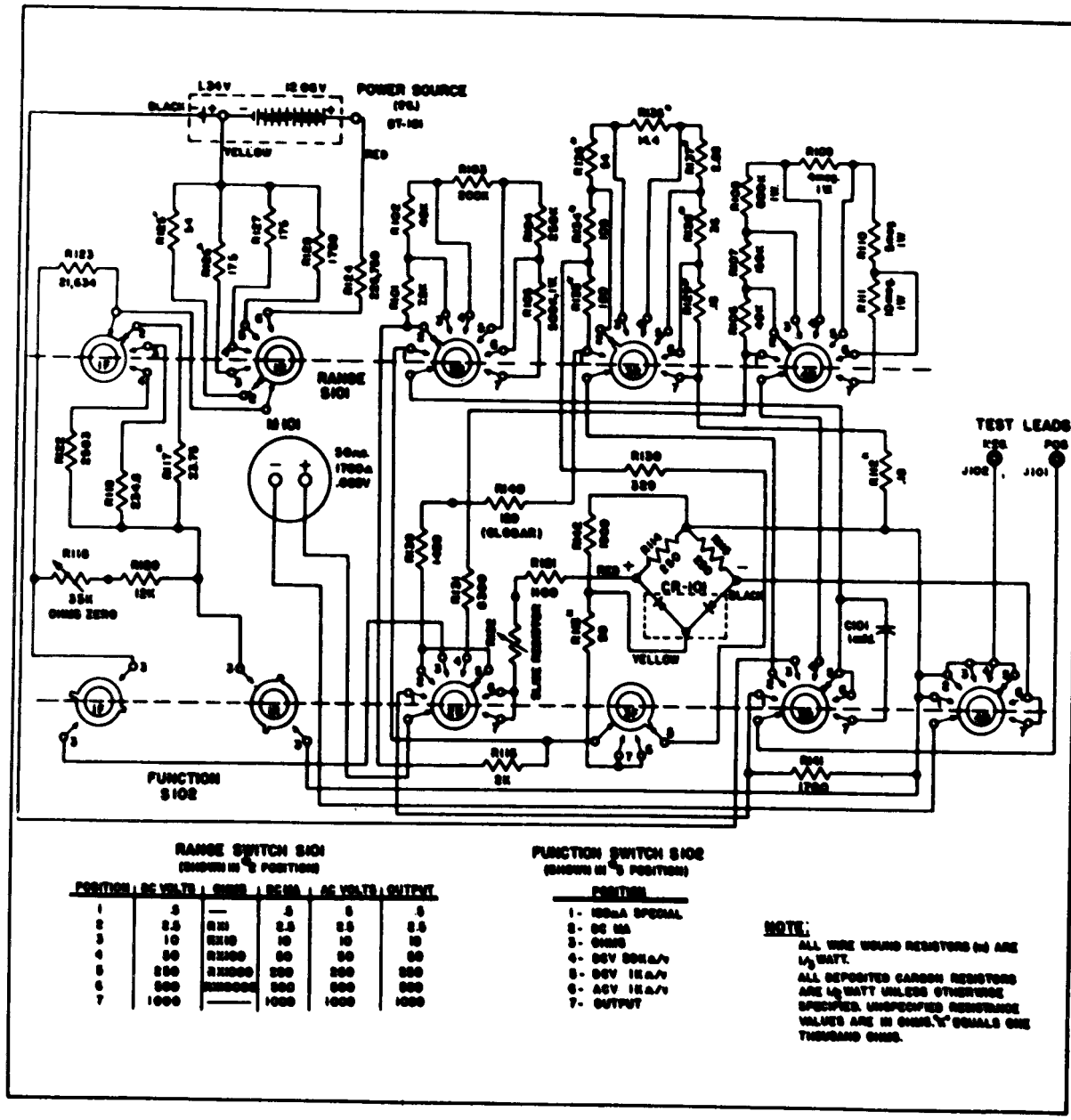
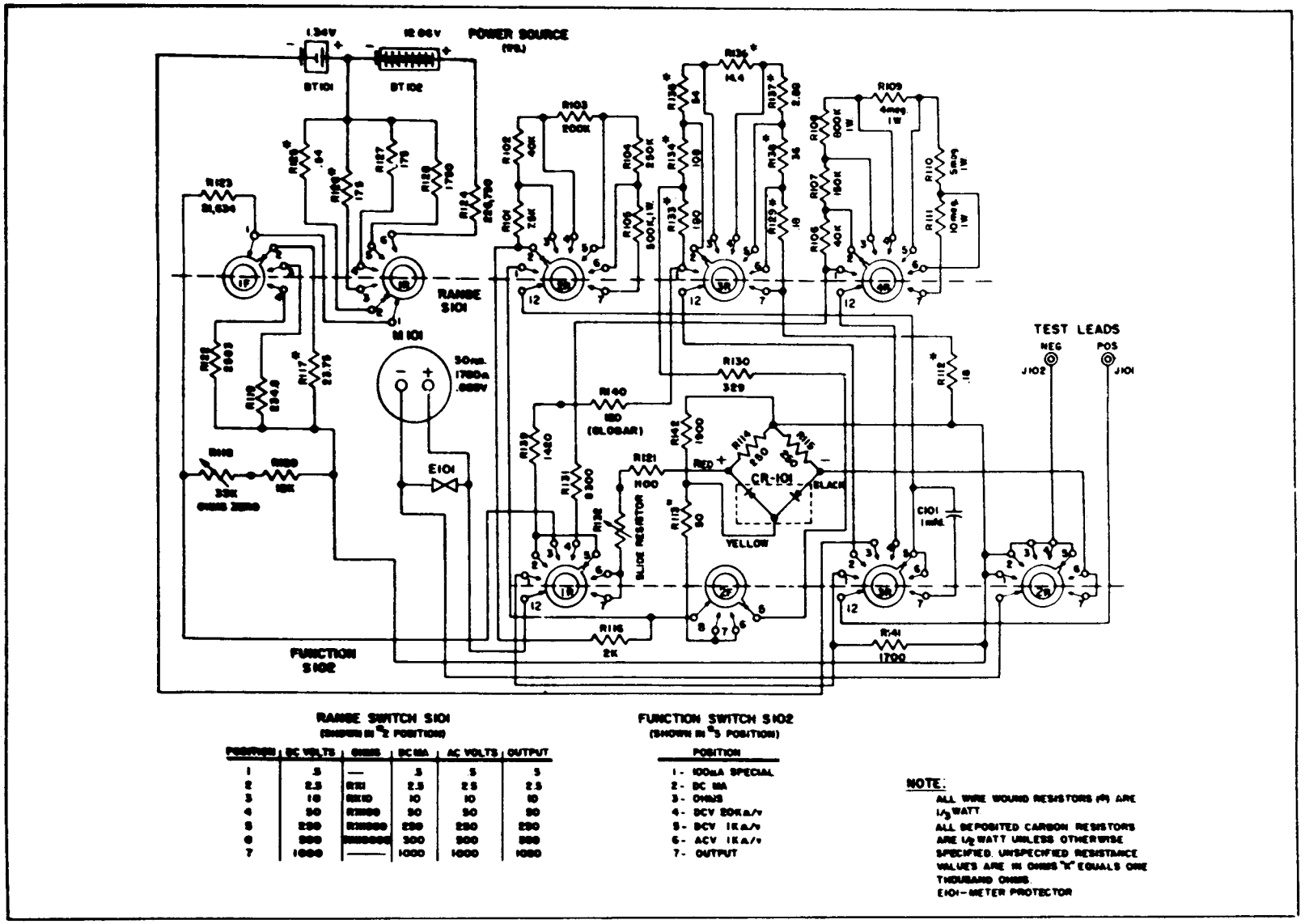
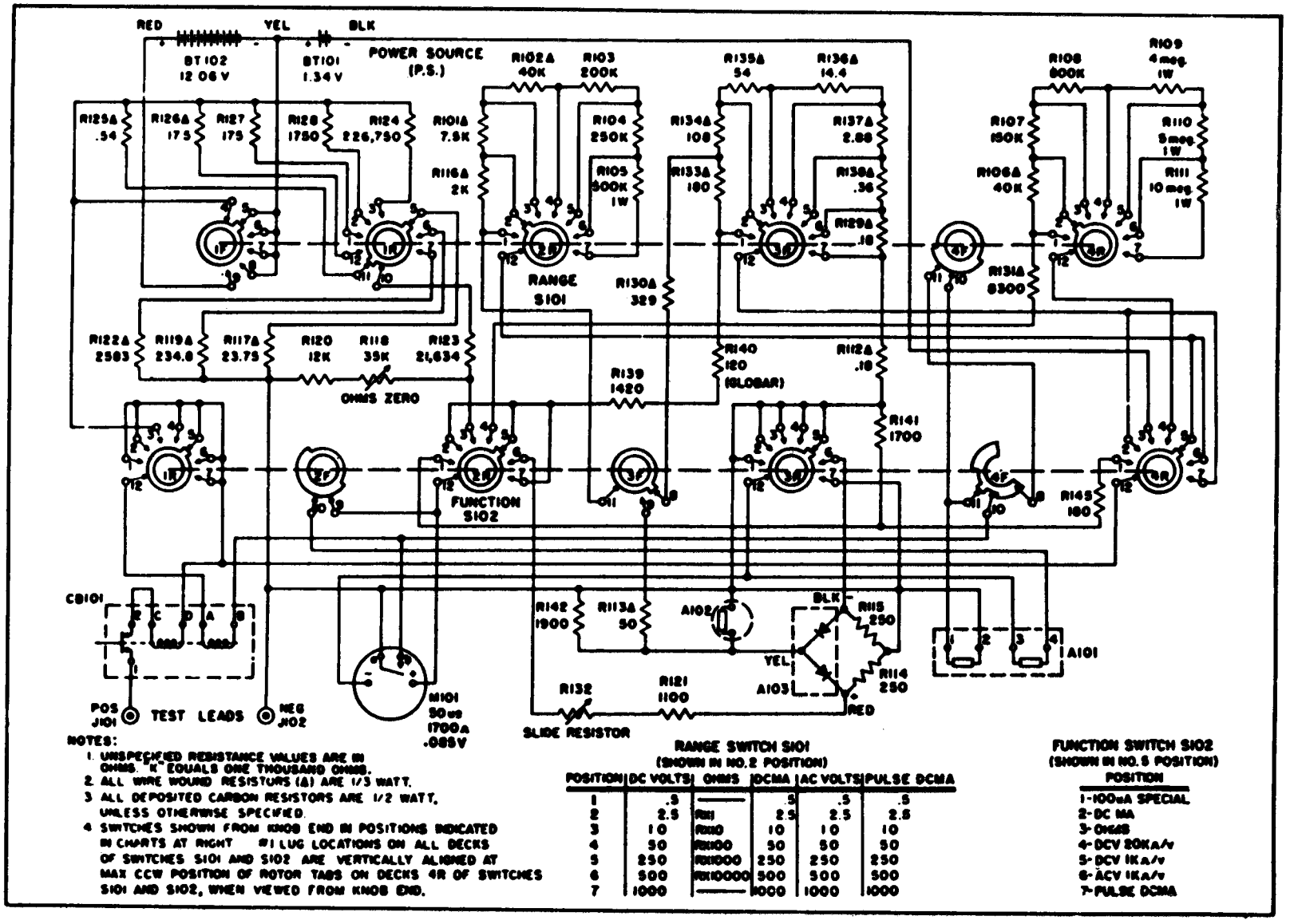


Figure 7-1. Schematic Diagram, Multimeter ME-70/PSM-6



POSITION	DC VOLTS	OHMS	DC MA	AC VOLTS	OUTPUT
1	.5	—	.5	.5	.5
2	2.5	R131	2.5	2.5	2.5
3	10	R130	10	10	10
4	50	R129	50	50	50
5	250	R128	250	250	250
6	500	R127	500	500	500
7	1000	—	1000	1000	1000

Figure 7-2. Schematic Diagram, Multimeter ME-70A/PSM-6



NOTES:

1. UNSPECIFIED RESISTANCE VALUES ARE IN OHMS. "K" EQUALS ONE THOUSAND OHMS.
2. ALL WIRE WOUND RESISTORS (Δ) ARE 1/3 WATT.
3. ALL DEPOSITED CARBON RESISTORS ARE 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
4. SWITCHES SHOWN FROM KNOB END IN POSITIONS INDICATED IN CHARTS AT RIGHT. #1 LUG LOCATIONS ON ALL DECKS OF SWITCHES S101 AND S102 ARE VERTICALLY ALIGNED AT MAX CCW POSITION OF ROTOR TABS ON DECKS 4R OF SWITCHES S101 AND S102, WHEN VIEWED FROM KNOB END.

RANGE SWITCH S101
(SHOWN IN NO.2 POSITION)

POSITION	DC VOLTS	OHMS	DCMA	AC VOLTS	PULSE DCMA
1	.5	———	.5	.5	.5
2	2.5	R11	2.5	2.5	2.5
3	10	R110	10	10	10
4	50	R1100	50	50	50
5	250	R11000	250	250	250
6	500	R110000	500	500	500
7	1000	———	1000	1000	1000

FUNCTION SWITCH S102
(SHOWN IN NO.5 POSITION)

POSITION
1-100uA SPECIAL
2-DC MA
3-OHMS
4-DCV 20KΩ/V
5-DCV 1KΩ/V
6-ACV 1KΩ/V
7-PULSE DCMA

Figure 7-3. Schematic Diagram, Multimeter ME-70D/PSM-6A

SECTION VIII

CALIBRATION

8-1. GENERAL. This equipment will be inspected at intervals of 90 days to determine the accuracy of calibration.

8-2. TEST EQUIPMENT REQUIRED. The following test equipment or its equivalent is required to calibrate Multimeter AN/PSM-6 or AN/PSM-6A.

a. Meter Test Set TS-682/GSM-1.
b. Decade Resistor TS-679/U.

8-3. DCV-20KΩ/V CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-6 or AN/PSM-6A to appropriate jacks of Meter Test Set TS-682/GSM-1.
b. Set FUNCTION switch of multimeter to DCV-20KΩ/V and RANGE switch to .5.
c. Apply 0, 1/4, 1/2, 3/4 and full scale values of voltage from meter test set and compare with reading of multimeter.
d. Repeat steps a through c for the 2.5, 10, 50, 250, 500 and 1,000 volt ranges.
e. If multimeter indications are not within ±3 percent of meter test set indications, refer to figure 4-1 for resistance values.

8-4. DCV-1KΩ/V CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-6 or AN/PSM-6A to appropriate jacks of Meter Test Set TS-682/GSM-1.
b. Set FUNCTION switch of multimeter to DCV-1KΩ/V and RANGE switch to .5.
c. Apply 0, 1/4, 1/2, 3/4 and full scale values of voltage from meter test set and compare with reading of multimeter.
d. Repeat steps a through c for the 2.5, 10, 50, 250, 500 and 1,000 volt ranges.
e. If multimeter indications are not within ±3 percent of meter test set, refer to figure 4-2 for resistance values.

8-6. ACV-1KΩ/V CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-6 or AN/PSM-6A to appropriate jacks of Meter Test Set TS-682/GSM-1.
b. Set FUNCTION switch of multimeter to ACV-1KΩ/V and RANGE switch to .5.
c. Apply 0, 1/4, 1/2, 3/4 and full scale values of voltage from meter test set and compare with reading of multimeter.
d. Repeat steps a through c for the 2.5, 10, 50, 250, 500 and 1,000 volt ranges.
e. If multimeter indications are not within ±4 percent of meter test set, refer to *figure 4-3* for resistance values.

8-6. OUTPUT CALIBRATION PROCEDURE. This applies to AN/PSM-6 only.

a. Connect test leads from test jacks of Multimeter AN/PSM-6 to appropriate jacks of Meter Test Set TS-682/GSM-1.
b. Set FUNCTION switch of multimeter to OUTPUT and RANGE switch to .5.
c. Apply 0, 1/4, 1/2, 3/4 and full scale values of voltage from meter test set and compare with reading of multimeter.
d. Repeat steps a through c for the 2.5, 10, 50, 250, 500 and 1,000 volt ranges.
e. If multimeter indications are not within ±4 percent of meter test set, refer to figure 4-4 for resistance values.

8-7. DC MA CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-6 or AN/PSM-6A to appropriate jacks of Meter Test Set TS-682/GSM-1.
b. Set FUNCTION switch of multimeter to DC MA and RANGE switch to .5.
c. Apply 0, 1/4, 1/2, 3/4 and full scale values of current from meter test set and compare with reading of multimeter.
d. Repeat steps a through c for the 2.5, 10, 50, 250, 500 and 1,000 volt ranges.
e. If multimeter indications are not within ±3 percent of meter test set, refer to figure 4-5 for resistance values.

8-8. 100 UA-SPECIAL CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-6 or AN/PSM-6A to appropriate jacks of Meter Test Set TS-682/GSM-1.
b. Set FUNCTION switch of multimeter to 100 MA-SPECIAL and RANGE switch to any position.
c. Apply 100 microamperes from meter test set and compare reading of multimeter.
d. If multimeter does not indicate same reading as meter test set, measure resistor R141 and refer to *figure 4-7.*

8-9. OHMS CALIBRATION PROCEDURE.

a. Plug test leads in Multimeter AN/PSM-6 or AN/PSM-6A test jacks and short circuit test lead tips together.
b. Set FUNCTION switch of multimeter to OHMS and RANGE switch to X1.
c. Adjust OHMS ZERO knob until multimeter reads zero.

NOTE

If pointer cannot be zeroed on all ranges, the battery voltage is low. Instructions for replacing the battery are found in paragraph 5-3.

d. Connect test leads from multimeter to test jacks of Decade Resistor TS-679/U.

e. Set mid-scale reading on multimeter with decade resistor.

f. Repeat step e for the X10, X100, X1000 and X10000 ranges.

g. If multimeter does not indicate same readings as decade resistor, refer to figure 4-6 for resistance values.

8-10. PULSE DC MA. This applies to the AN/PSM-6A only. Repeat paragraph 8-7, except with FUNCTION switch in the PULSE DC MA position.

BY ORDER OF THE SECRETARY OF THE ARMY:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:

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

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
Tech Stf, DA (1) except
CSigO (14)
Tech Stf Bd (1)
USCONARC (5)
USAARTYBD (1)
USAARMBD (2)
USAIB (1)
USARADBD (2)
USAAVNBD (1)
USA Abn, Elct & SPWAR Bd (1)
USAATBD: (1)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Cored (3)
OS Base Cored (2)
LOGCOMD (2)
MDW (I)
Armies (2)
Corps (2)
Instl (2)
Ft Monmouth (63)
USATC AD (2)
CSATC Engr (2)
CSATC Inf (2)
USATC FA (2)
USATC Armor (2)
USAOMC (2)
Svc College (2)
Br Svc Sch (2)
GENDEP (2) except
Atlanta GENDEP (None)
Sig Sec. GENDEP (5)
Sig Dep (12)
WRAMC (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
USAEPG (2)
AFIP (1)
AMS (1)
Army Pictorial Cen (2)
EMC (1)
Yuma Test Sta (2)
USA Strat Comm Comd (4)
USASSA (20)
USASSAMRO (1)
USARCARIB Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
Def Log Svc Cen (1)
USA Corps (3)
JBUSMC (2)
Units org under fol TOE:
11-7 (2)
11-16 (2)
11-57 (2)
11-98 (2)
11-117 (2)
11-155 (2)
11-157 (2)
11-500 AA-AE (4)
11-557 (2)
11-587 (2)
11-592 (2)
11-597 (2)

NG: None.

USAR: None.

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

★ US GOVERNMENT PRINTING OFFICE : 1989 O - 237-972