TM 11-6625-2724-12

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL

MAINTENANCE MANUAL

VOLTMETER, ELECTRONIC

ME-202C / U

(NSN 6625-00-972-4046)

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1976

TECHNICAL MANUAL

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HEADQUARTERS
DEPARTMENT OF THE ARMY
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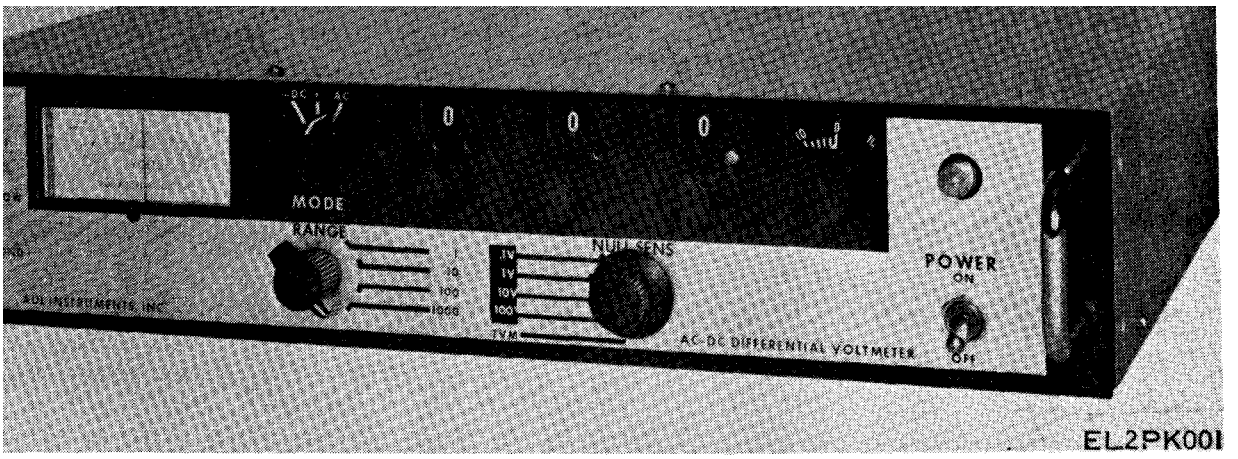

Figure 1-1. Voltmeter, Electronic ME-202C/U.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual describes Voltmeter, Electronic ME-202C/U (voltmeter) and covers its installation, operation, and maintenance. It includes instructions for operation, cleaning, and inspection of the equipment. As an aid to the operator and organizational maintenance personnel, a limited discussion on the functioning of the equipment is given in chapter 5. Maintenance tasks are not authorized at the direct support or general support levels. All repair is authorized at the depot level only.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the euqipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A and DSAR 4145.8.

c. Discrepancy in Shipment Record (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/ARC 75-18/MCO P461O.19B and DSAR 4500.15.

1-4. Administrative Storage

For procedures, forms and records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1.

1-5. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be as prescribed in TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-6. Purpose and Use

(fig. 1-1)

The voltmeter is used for accurately measuring direct current (dc) and alternating current (ac) voltage levels. The dials of the instrument permit measurements to be resolved to 5 digits. The voltmeter is equipped with a recorder (dc) output which may be connected to auxiliary meters or strip-chart recorders.

1-7. Description

The voltmeter is a solid state type with the ac voltage readout calibrated in terms of the root-mean-square (rms) voltage of a sine wave. The instrument is capable of measuring + or - dc and ac voltages from 1 volt full scale to 1,000 volts full scale through a frequency range of 5 Hertz (Hz) to 100 Kilohertz (kHz).

1-8. Tabulated Data

Technical data for Electronic Voltmeter ME-202C/U is as follows:

NOTE

All specifications apply to differential mode of operation unless otherwise specified.

a. Input:

(1) *Ranges.* 1, 10, 100, 1000 VAC and ±DC, each with 10% overranging capability.

(2) *Dc resistance.* Infinite at null from 0 to 1100 vdc.

(3) *Ac impedance.* 1 megohm, 20 picofarads (pf).

b. Null Detector.

(1) *Ranges:*

(a) Input range (AC and DC). Null ranges.

(b) 1v. 0.001, 0.01, 0.1v.

(c) 10v. 0.0001, 0.01, O.lv.

(d) 100v. 0.01, 0.1, 1, 10v.

(e) 1000v. 0.1, 1, 10, 100v.

(2) *Input resistance.* 100 megohms on all ranges except 10 megohms minimum on 0.01 and 0.001 volt ranges.

(3) *Type of circuitry.* Electronic chopper amplifier with synchronous demodulation.

c. Accuracy (10% overrange of capability).

(1) *Dc: ± (0.01%* of input + 0.001% of range + lO uv) from 0 to 1100 vdc at 23° C +2 °C, up to 80% relative humidity (R.H.).

(2) *Ac* (% of *input) at 23° C* ±2°C; *less than 80% R.H.*

(a) 50 Hz to 10 kHz; 0.001 to 500V: ±(.05% + 25 uv).

(b) 50 Hz to 10 kHz; 500 to 11OOV: ±0.1%.

(f) 20kHz to 50kHz; 0.001 to 11OV; ±(0.15%$_0$+ 25uv).

(g) 20kHz to 50kHz; 110 to 11OOV: ±O.5%.

(h) 10kHz to 100kHz; 0.001 to 11OV: ±0.5%.

(i) 50kHz tQ 100kHz; 110 to 11OOV: 1.0%.

d. Kelvin-Varley Divider. ±0.005%. of dial setting above 1/10 of full scale, Derate 15 ppm/°C from 0°C to 10°C and from 40°C to 50°C.

e. Resolution.

(1) *Meter.* 10 uv maximum (1 ppm of range above 1v, 10 ppm of lv range).

(2) *Voltage dial.* 10 uv maximum (10 ppm of range).

f. Solid State Voltmeter.

(1) *Range and input resistance.*

Range	DC input	AC input
1000-	100 M	1 M 35 pf
100-0-100	100 M	1 M 35 pf
10-0-10	100 M	1 M 35 pf
1-0-1	100 M	1 M 40 pf
•01-0-0.1	100 M	1 M 40 pf
••001-0-0.01	100 M	1 M 40 pf
••0001-0-0.001	100 M	1 M 40 pf

•10% over-ranging capability

••These ranges obtained using null ranges with all readout dials at zero

(2) *Accuracy.*

(a) Dc. ±3% of range.

(b) Ac. ±3% of range within frequency and voltage ranges listed under *Ac accuracy as a differential voltmeter.*

g. Electrical Design. Completely solid state.

h. Reference Element. Temperature compensated zener diodes.

i. Regulation of 1100-volt Reference Supply. 0.0005% for a 10% line voltage change.

j. Recorder Output. Available at rear panel terminals.

k. Polarity. Reversible via front panel switch, input posts are not reversible.

l. Warm-up Time. Less than 1 minute, normal operation.

m. Stability of ll00 volt Reference Supply. 10 ppm/hr; 20 ppm/day; 40 ppm/month; 90 ppm/year.

n. Common Mode Rejection.

(1) *Dc.* 120 db (1 uv/volt of common mode voltage).

(2) *Ac.* Up to 100 v peak-to-peak 50-500 Hz produces no measurable instrument error.

o. Temperature Range.

(1) *Storage.* -40°C to +70°C.

(2) *Operating.* 10°C to 40°C. Derate dc accuracy outside these limits to 0°C and 50°C at 15 ppm/C. Derate ac accuracy outside these limits to 0°C and 50°C at 40 ppm/C.

(3) *Humidity.* Up to 80 RH below 25°C; up to 70% RH above 25°C.

p. Input Power. 115-/230 volts ac ± 10%, 50 to 500 Hz. Rear panel switch for changing from 115-volt ac to 230-volt ac operation. ON-OFF switch on front panel and fuse on rear panel. Power cord 68-inches long with 3-wire grounding plug.

q. Size. 17-inches wide x 3 1 /2-inches high x 14-1/2-inches deep. (19 inches wide after installation of rack mounting brackets.)

r. Weight. 12 1/2 pounds.

s. Mounting. No internal fans. Will operate satisfactorily without overheating for 24 hours when restricted on all sides and the rear with clearance of two inches. Brackets are used for rack mounting.

1-9. Items Comprising An Operable Equipment

Electronic Voltmeter ME-2O2C U comprises an operable equipment.

CHAPTER 2

SERVICE UPON RECEIPT AND INSTALLATION

2-1. Sitting

The ME-202C/U is intended for indoor shop use. As normally supplied, it is a bench-top portable instrument. Rack-mounting adapters are available to convert from the instrument to standard 19-inch rack mounting, with a modular height of 3 1/2 inches.

2-2. Shelter Requirements

The ME-202C/U should be operated only at ambient temperatures greater than 32°F (0°C) and less than 123°F (50°C). Although the unit is housed in a protective case, prolonged exposure to salt spray, sand, or dust should be avoided.

2-3. Unpacking

The ME-202C/U should be unpacked carefully to avoid damage to the equipment. Figure 2-1 shows the packaging and packing techniques used by the factory for shipment. Avoid damaging the packing material if reshipment is desired. Do not thrust sharp tools through the walls of the containers.

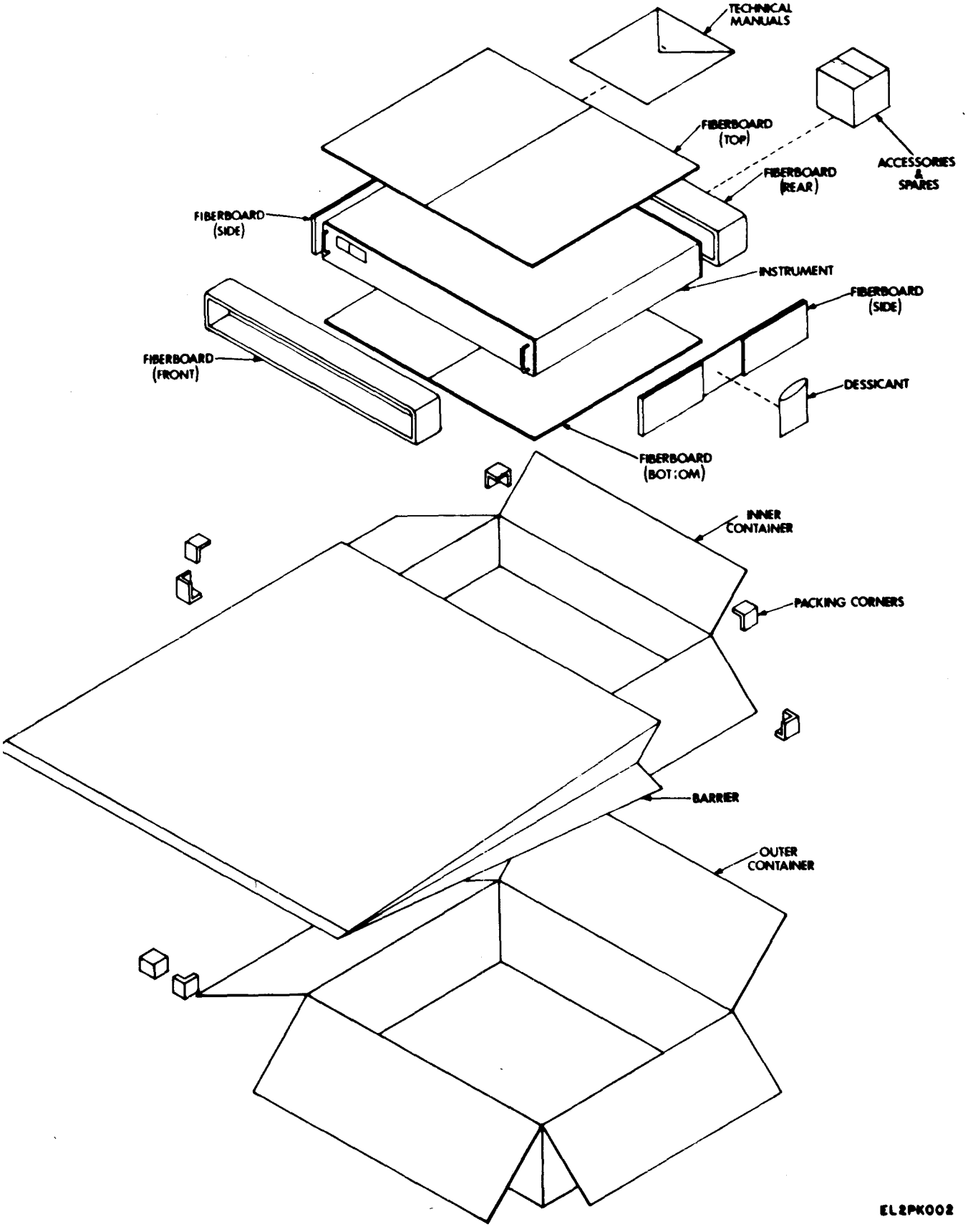

Figure 2-1. Equipment packaging and packing diagram.

24. Checking Unpacked Equipment

a. Inspect the equipment for damage during shipment. If the equipment has been damaged, report the damage on DD Form 6.

b. Check the equipment against the component listing in the operator's manual and the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38-750. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether the equipment has been modified. Equipment which has been modified will have the MWO number on the front panel, near the nomenclature plate. Check also to see whether all currently applicable MWO have been applied. (Current MWO applicable to the equipment are listed in DA Pam 310-7.)

2-5. Tools, Test Equipment, and Materials Required for Installation

No special tools are needed for normal installation of the equipment.

2-6. Assembly of Equipment

As normally supplied by the factory, the unit need only be placed on a horizontal flat surface in an upright position for use. If rack mounting is necessary, the rack mounting kit furnished with the instrument should be used. Figure 2-2 illustrates the assembly of this kit.

2-7. Interconnection

CAUTION

The line voltage switch located on the rear panel of the instrument *must* be set to the proper line voltage (115 or 230 volts). Verify that the proper switch setting has been made *before* connecting equipment to the power source.

The ME-202C/U is designed to be operated from a single phase power source having the following characteristics:

a. Voltage of 115- or 230-volt nominal, ±1O%.

b. Frequency of 50 - 400 Hz.

c. Power capability of 15 watts.

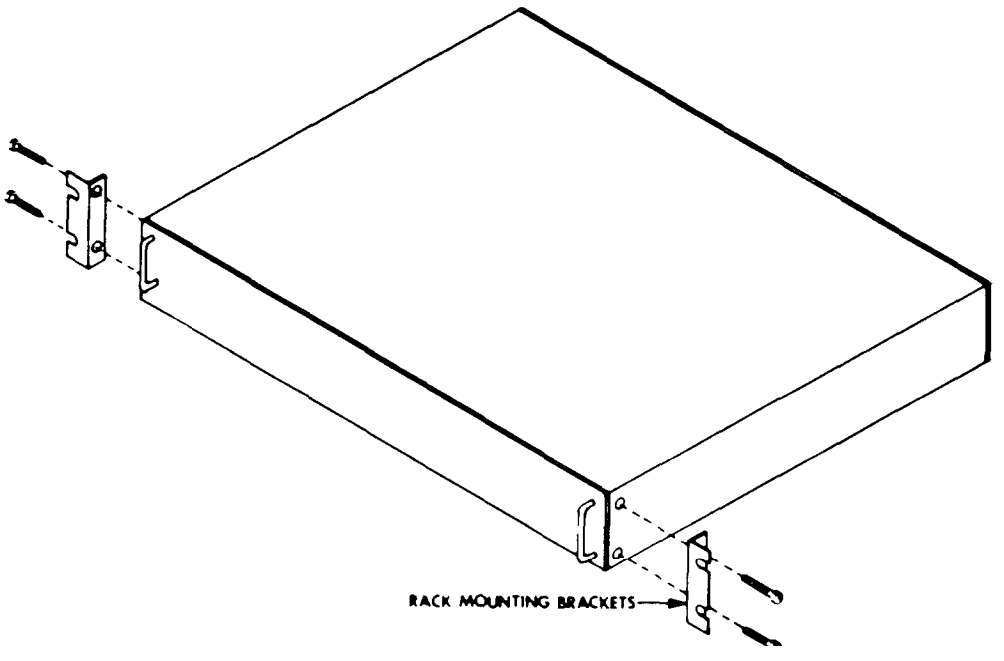

Figure 2-2 Assembly of rack mounting brackets.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INSTRUMENTS

3-1. Front and Rear Panel Controls

Table 3-1 describes each of the front and rear panel controls, jacks and terminals. Figure 3-1 illustrates these controls. The index numbers on figure 3.1 refer to the index numbers used on table 3-1.

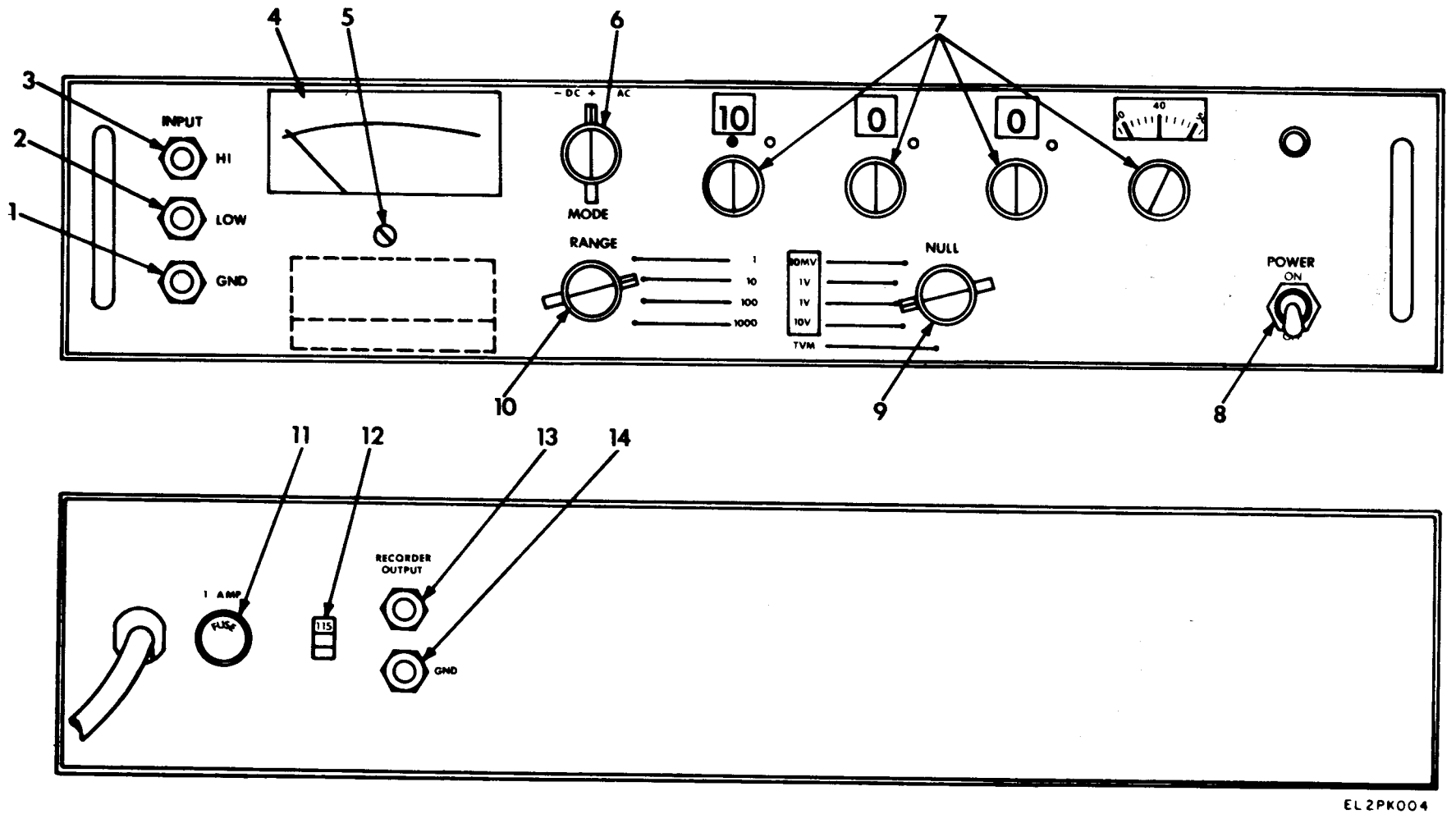

Figure 3-1. Electronic Voltmeter ME-202C/U, controls and indicators.

3-2. Optional Recorder Output

The instrument is equipped with a recorder output voltage which is available at rear terminals. The voltage is from O- to ±1-volt dc and corresponds to the indication of the null meter. Instruments such as center-zero recorders or auxiliary voltmeters may be connected to these terminals. The negative terminal is permanently connected to these terminals. The negative terminal is permanently connected to the chassis ground of the ME-202C/U, regardless of the status of the input LOW terminal with respect to ground.

Table 3-1. Operator's Controls and Indicators

Index Number	Control or Indicator	Function
1	GROUND terminal	Connected to the chassis and power line ground.
2	LOW terminal	Connected to circuit common and isolated when shorting strap is removed.
3	HI terminal	Connected to input of voltmeter.
4	Null meter	Displays input or null voltage and polarity.
5	Mechanical zero control	Allows mechanical (power off) zeroing of the meter.
6	MODE switch	Selects AC or DC mode of operation. Selects polarity (+ or —) for DC modes.
7	Readout dials	Provides a readout of the exact input voltage when the null meter indicates zero.
8	POWER switch	Controls input power to the instrument.
9	NULL SENS switch	Selects RVM (transistor voltmeter) mode of operation or full scale null range to be used.
10	RANGE switch	Selects the input voltage range to be used. The lowest range that is higher than the input voltage should be selected.
11	Fuse	Fuse is in series with input power line.
12	115/230 switch	Should be set to the appropriate nominal line voltage.
13	RECORDER OUTPUT switch	Provides a ± 1-volt output proportional to the indication of the null meter.
14	GND terminal	Return for the recorder. Terminal is connected to chassis.

Section II. OPERATION OF ME-202C/U

3-3. Preliminary Operating Procedures

Perform the following steps prior to placing the voltmeter into operation for measuring voltage or resistance (para 3-4 through 3-7).

a. Check to see that the POWER switch is in the OFF position.

b. Set the front panel controls as follows:

(1) RANGE control to 1000.

(2) MODE switch to + DC.

(3) Readout dials to O.

(4) Check mechanical zero of meter, adjust if necessary.

(5) Set POWER switch to ON position.

(6) Allow the voltmeter to warmup for at least one minute before attempting any measurements.

3-4. TVM Mode Operation

The ME-202 C/U can be used on the TVM mode to measure ac or dc voltages from 10 microvolt to 1100 volts dc with an accuracy of ±3% of the selected range. Operate the voltmeter on the TVM mode as follows:

a. Place the MODE switch to the AC or DC position that corresponds to the measurement source.

b. Connect the circuit to be measured between the HI and LOW INPUT terminals. If one side of the voltage source is grounded, connect the grounded side to the LOW INPUT terminal.

c. Place the RANGE switch to the lowest range possible that maintains an on-scale meter deflection. The meter deflection multiplied by the RANGE switch position is the value of the measured voltage. Left or right meter deflection during dc measurements corresponds to a negative or positive polarity of the measured dc voltage.

d. Measurement of ac or dc voltages from .00002 to 0.1 volts is accomplished on respective NULL SEMS switch positions of 0.001 to 0.1. In this application, the RANGE switch is placed to the 1 VOLT range and the-readout dials to .00000. The resulting meter deflection multiplied by the NULL SENS switch position is the value of the measured voltage.

NOTE

On the 10 and 1 millivolt ac ranges, an observed offset of 200 microvolt is normal, This is the internal noise of the voltmeter, and will not affect the accuracy of measurements above this level.

3-5. Differential Voltmeter Operation

Operate the voltmeter as an ac or dc differential voltmeter as follows:

a. Determine the approximate value of the measured voltage by performing the TVM mode measurements described in paragraph 3-4.

b. Place the MODE switch to the respective polarity observed on the TVM mode measurement and set the readout dials to the TVM measurement value. If an ac measurement is being made, leave the MODE switch in its AC position.

c. Place the NULL SENS switch to successively high null sensitivity positions and adjust the readout dials to obtain a center-zero meter indication.

3-6 Use of Shorting Link

The INPUT ground terminal is directly connected to the chassis of the instrument to provide a convenient connection to earth ground whenever the line cord is connected to line power. Whenever measurements of voltages having a reference other than ground, but not exceeding 500 volts, are performed, the shorting link between the LOW INPUT and ground terminal must be removed or damage to the measurement source, or the ME-202C/U, or both, may occur.

3-7. High Resistance Measurements

The ME-202C/U can be used as a megohmmeter for measurements of high resistances from 10 to 106 megohms with a typical accuracy of ± 05%. The instrument is operated as a megohmmeter as follows:

a. Place the ME-202C/U controls to the following positions:

(1) POWER switch to ON.

(2) RANGE switch to 10.

(3) NULL SENS switch to .01 (.001 if the R is greater than 10^{10}).

(4) MODE switch to +DC.

(5) Readout dials to 0.00 00.

b. Connect the unknown resistance between the HI and LOW INPUT terminals. Use short isolated leads to prevent measuring the leakage resistance between the leads.

c. Rotate the readout dials to botain a meter deflection of - 1 and use the formula given in *d* below to determine the value of the unknown resistance.

d. The unknown resistance is as follows:

$$Rx = \left(\frac{Ero}{Em} - 1\right) 10$$

Rx = Unknown resistance

Ero = Readout dial voltage

Em = meter deflection in volts (proportional to selected NULL SENS).

343. Operation Under Unusual Conditions

Paragraph 1-9 lists the environmental conditions under which performance of the unit is specified. Operation or storage beyond those limits, or under conditions of sand, salt spary, etc, is not recommended.

CHAPTER 4

OPERATOR AND ORGANIZATIONAL MAINTENANCE

Section I. GENERAL

4-1. Tools and Test Equipment

The only tools required for Operator or organizational maintenance is a .050 hex head (Allen) wrench.

4-2. Special Tools and Test Equipment

No special tools or test equipment is required for **maintenance** at the operator or organizational maintenance levels.

4-3. Lubrication Instructions

No lubrication of the ME-202C/U is required.

Section II. OPERATOR'S AND ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-4. General

The operator and organizational maintenance actions are described in this section.

4-5. Scope of Operator's and Organizational Maintenance

Due to the specialized test equipment required for calibration, maintenance or repair of internal parts or assIemblies of the ME-202C/U is confined to depot maintenance. The only authorized operator or organizational maintenance is the performance of preventive maintenance checks and services, and replacement of fuse, knobs, or lamp. Operator maintenance is listed in table 4-1 and organizational maintenance is listed in table 4-2.

Table 4-1. Operator Preventive Maintenance Checks and Services

D—Daily **W—Weekly**

Total Man-hours Required: 0.6 **Total Man-hours Required: 0.8**

Interval		ITEM TO BE INSPECTED TO BE INSPECTED Procedure	Worktime (M/ H)
D	W		
1	1	**EXTERIOR** Check for damage to knobs, power cord, and cabinet.	0.1
	2	**CLEANLINESS OF EQUIPMENT** Inspect equipment for exterior cleanliness. Follow the cleaning procedure in paragraph 4-6.	.02
2	3	**OPERATIONAL TEST** Perform the operational test contained in table 4-4.	0.5

Table 4-2. Organzational Preventive Maintenance Checks and Services

Q—Quarterly
Total Man-hours Required: 0.7

Sequence No.	ITEM TO BE INSPECTED Procedure	Worktime (MI H)
1	MECHANICAL LINKAGE Rotate all switches and controls through all positions and check for smoothness of operation and that there is no binding or scraping.	0.2
2	OPERATIONAL TEST Perform the operational test contained in table 4-4.	0.5

4-6. Cleaning

Cleaning under normal circumstances should be confined to removal of dust or dirt from the voltmeter case and panel with a damp lint-free cloth. It may be necessary to occasionally clean the decade dial indicators or null range indicator with a mild soap, DO NOT press heavily on the glass since damage could result.

4-7. Touchup Painting Instructions

When Electronic Voltmeter ME-202C/U requires repainting, refinishing, or touchup painting use paint color 26307 (Federal Standard No. 595a). SB 11-573 lists painting tools and miscellaneous supplies required for painting.

a. Refer to TB43-0118 for instructions on painting and preserving Electronics Command equipment. In touchup painting, a perfect match with the exact shade of the original paint surface may not be possible. There are many reasons for this, such as change in the original pigment because of oxidation and differences as a result of manufacture. The prevention of corrosion and deterioration is the most important consideration in touchup painting; appearance is secondary. This, however, should not be construed to mean that appearance of the equipment is not important. Touchup paint should be accomplished neatly and in good workmanshiplike manner. Inspection personnel in the field should make allowances for slight color mismatch where minor touchup has been done, but not for neglect, poor workmanship, or in cases where the need for refinishing is obvious.

b. 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.

Section III. TROUBLESHOOTING

4-8. Visual Inspection

Inspect the voltmeter for broken knobs or loose hardware. Inspect the line cord for cracked or peeling insulation, and for loose wires in the line cord connector plug.

4-9. Troubleshooting

The scope of operator and organizational troubleshooting is confined to the following:

a. Replacement of knobs, fuses or indicator lamp.

b. Determination of operational status of equipment for the purpose of referring necessary maintenance to the depot level for repair (table 4-3).

4-10. Replacement of Fuse

The fuse located on the rear panel of the voltmeter is replaced as follows:

a. Disconnect the power cord from the power source.

b. Twist the end of the fuseholder counterclockwise.

c. Remove and replace the fuse with one of the same ratings.

d. Reinsert and twist the end of the fuseholder clockwise.

e. Reconnect the power cord to the power source.

4-11. Replacement of Indicator Lamp

The indicator lamp located on the right hand side of the front panel is replaced as follows:

a. Disconnect the power cord from the power source.

b. Unscrew and remove the lens cap.

c. Remove and replace the bulb with one of the same rating.

d. Replace the lens cap and reconnect the voltmeter to the power source.

Table 4-3. Organizational Troubleshooing chart

Symptom	Probable cause	Corrective action
Voltmeter does not energize when POWER switch it set to the ON position.	1. Blown fuse. 2. Defective line cord. 3. Other.	1. Replace fuse (para 4-10). 2. I nspect visually. 3. Refer to higher category of maintenance.
Voltmeter energized but indicator lamp does not light.	Defective pilot lamp.	Replace pilot lamp (para 4-11).
Voltmeter does not conform to operational test (table 4-4).		Refer to higher category of maintenance.

4-12. Replacement of Knobs

All knobs are secured by recessed set screws. The setscrews are loosened or removed with a .050 Allen or hex wrench. After replacing a knob make certain it is aligned properly and the setscrew is tightened.

Table 4-4. Operational Test

Step	Control Settings	Normal Indication
1	POWER: ON RANGE: 1V MODE: +DC NULL SENS: .1V Decades: 1.0000 Shorting link connected between INPUT HI and INPUT LOW	Meter should indicate left between .97 and 1.03.
2	Same as step 1 EXCEPT: RANGE: 10V NULL SENS: 1V	Same as for step 1.
3	Same as step 1 except: RANGE: 100V NULL SENS: 10V	Same as for step 1.
4	Same as step 1 except: RANGE: 1000V NULL SENS: 100V	Same as for step 1.

CHAPTER 5

FUNCTIONING OF EQUIPMENT

5-1. General

This chapter explains the functioning of the ME-202C/U on a block diagram basis. Since no internal maintenance is authorized, except at the depot level, a functional description is not provided in this manual. Refer to figure 5-1 for the discussion contained in paragraphs 5-2 through 5-10.

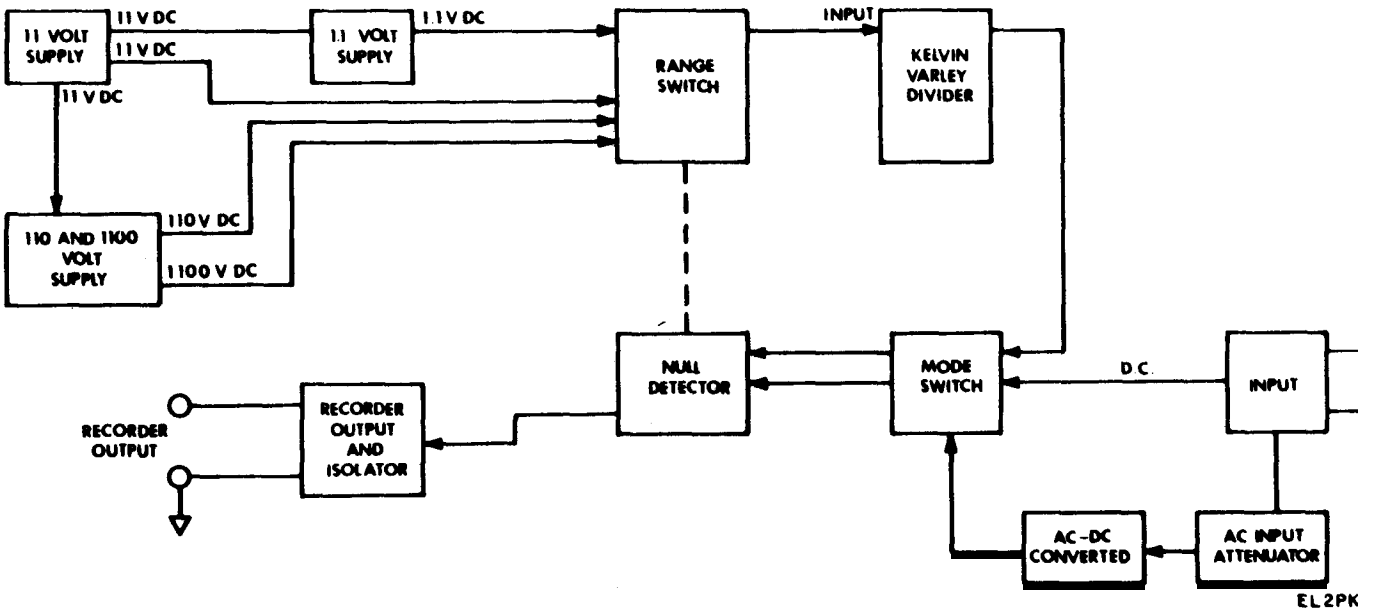

Figure 5-1. Electronic Voltmeter ME-202C/U, block diagram.

5-2. 11 Volt Power Supply

The 11 volt power supply is the dc voltage reference for the (entire voltmeter. The reference element is a temperuture compensated zener diode in an oven. A reguluted power supply provides current to the zener diode. The 11 volt output is connected to the RANGE switch.

5-3. 1.1 Volt Resistive Divider

The 1.1 volt resistive divider divides the 11 volt reference by 10 for use on the 1 volt and ac ranges. The 1.1 volt output is connected to the RANGE switch.

5-4. 110 and 1100 Volt Power Supply

The 110 and 1100 volt power supply is a transistor regulated power supply which uses the 11 volts as a reference and provides a 110 and 1100 volt output. These outputs are connected to the RANGE switch.

5-5. RANGE Switch

The RANGE switch selects the corresponding power supply on the dc ranges and the **1.1 volt** power supply on all the ac ranges. The RANGE switch works in conjunction with the NULL SENS switch to provide the proper null ranges.

5-6 Kelvin-Varley Divider

The Kelvin-Varley divider consists of the three decade and vernier control. It divides whichever voltage is selected by the RANGE switch by the number (less than unity) to which it is set.

5-7. Null Detector

The null detector is actually a transistorized voltmeter with 8 decade ranges from 100 uv full scale to 1000 volts full scale (zero center). The 100 microvolt range is not directly selectable on the front panel, but is used to achieve .001 percent resolution on the 10 volt and up ac ranges. A combination of the RANGE and NULL SENS switch settings determines the effective null range, which is displayed on the front panel.

5-8. MODE Switch

The MODE switch connects the INPUT to the appropriate assembly for measurement. In the dc function, the dialed output of the Kelvin-Varley voltage divider is connected in opposing series to the input unknown voltage. The difference between these two voltages is displayed on the null meter. When the Kelvin-Varley output voltage (as displayed on the decade dials) is exactly the same as the input voltage, the null meter will read zero.

5-9. Ac-Dc Converter and Ac Input Attenuator

The ac-dc converter converts the unknown input (if ac) to its equivalent rms value in dc. The ac-dc converter always has a 1.1 volt output at full range. An input attenuator is used to attenuate the input signal on the 10, 100, and 1000 volt ranges.

5-10. Recorder Output Isolator

The recorder output circuit isolates the null detector meter output voltage and transfers it to the RECORDER OUTPUT terminals on the rear panel.

APPENDIX A

REFERENCES

The following is a list of references that are available to the operator and organizational maintenance personnel for the ME-202C/U:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Index of Modification Work Orders.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TB 43-180	Calibration Requirements for the Maintenance of Army Materiel.
TB 43-0118	Field Instructions for: Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 760-244-2	Procedure for Destruction of Electronics Materiel Equipment to Prevent Enemy Use (Electronics Command).

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for ME-202C/U. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. **To** determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristic with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to about optimum *or* desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. lnstall. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, model (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component /assembly, end item or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc) considered in classifying Army equipment/components.

C-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having

the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn (s), the lowest ' of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that Maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of man-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/ quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C - Operator/crew
O - Organizational
F - Direct Support
H - General Support
D - Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

C-4. Tool and Test Equipment Requirements (Table 1)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment, column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This colunn lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

SECTION II MAINTENANCE ALLOCATION CHART FOR

VOLTMETER, ELECTRONIC ME-202C/U

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
00	Voltmeter, Electronic ME-202C/U	Inspect		0.5				
		Service		0.5				
		Replace[1]		0.5				
		Repair					1.0	5,6
		Test					1.0	1-13
		Calibrate					2.0	1-4, 7-13
		Rebuild					2.0	1-13

(1) Fuse, knobs, lamps.

TABLE 1. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
VOLTMETER ELECTRONIC ME-202C/U

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	D	GENERATOR, SIGNAL, AN/URM-127	6625-00-783-5965	
2	D	TEST SET, TRANSISTOR TS-1836	6625-00-893-2628	
3	D	TRANSFORMER, VARIABLE CN-16	5950-00-235-2086	
4	D	VOLTMETER, ELECTRONIC ME-30/U	6625-00-669-0742	
5	D	TOOL KIT, RADAR AND RADIO REPAIRMAN TK-105/U	5180-00-610-8177	
6	D	TOOL KIT SUPPLEMENTAL RADAR AND RADIO REPAIRMAN TK-100/U	5180-00-605-0079	
7	D	GALVANOMETER, L&N 2439C OR EQUAL		
8	D	STANDARD CELL EPPLEY NO. 100A OR EQUAL		
9	D	WESTON 61 RFL TYPES 1900 OR 1967		
10	D	PINCH TYPE SWITCH, L&N 3294		
11	D	POTENTIOMETER, L&N K-2 OR EQUAL		
12	D	VOLTAMMETER TRANSFER, HERMACH ENGLEHARD		
13	D	VOLT BOX, L&N 7592		

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703

DATE 10 July 1975

PUBLICATION NUMBER	DATE	TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/MPQ-76

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		FO3		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. + 24 VDC is the input voltage.

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof [illegible]-2776

SIGN HERE: SSG I.M. DeSpiritof

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

HISA 1686-75

TEAR ALONG DOTTED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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PUBLICATION NUMBER	DATE	

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PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

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By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

Official:
PAUL T. SMITH
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-36, Organizational Maintenance requirements for AN/AKT-18, AN/APS-94, AN/ASW-12 and AN/TKQ-l.

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