TM 11-6625-1538-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUAL

HEWLETT-PACKARD AC VOLTMETER AN/USM-265
(MODEL 400EL02) NSN 6625-00-935-4294
ME-459 (MODEL 400EL) NSN 6625-00-229-0457
ME-465 (MODEL 400E) NSN 6625-00-995-7716

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY
11 MAY 1967

This manual contains copyrighted material orginally prepared by the Hewlett-Packard Company.

TECHNICAL MANUAL
TM 11-6625-1538-15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *11 May 1967*

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL FOR HEWLETT-PACKARD AC VOLTMETER AN/USM-265 (MODEL 400EL02) NSN 6625-00-935-4294 ME-459 (MODEL 400EL) NSN 6625-00-229-0457 ME-465 (MODEL 400E) NSN 6625-00-995-7716

Page

SECTION I. GENERAL INFORMATION
l-A.l. Scope 1-0.1
lA.2. Consolidated index of Army publications and blank forms.... . . . . 1-0.1
1A.3. Maintenance Forms, Records, and Reports 1-0.1
lA.4. Reporting Errors and Recommending Improvements 1-0.1
1-A.5. Reporting Equipment Improvement Recommendations (EIR) 1-0.1
l-A.6. Administrative Storge 1-0.1
l-A.7. Destruction of Army Electronics Materiel 1-0.1
1-1. Description 1-1
1-4. Options Available 1-1
1-5. Option 01(400E only) 1-1
1-7. 0ption 02 1-1
1-9. Instrument and manual Identification 1-1
SECTION II. INSTALLATION 2-1
2-1. Introduction 2-1
2-3. Initial Inspection 2-1
2-5. Power Requirements 2-1
2-7. Grounding Requirements 2-1
2-10. Installation 2-1
2-12. Bench Mounting 2-1
2-14. Rack Mounting 2-1
2-16. Combination Mounting 2-1
2-18. Repackaging for Shipment 2-1
SECTION III. OPERATING INSTRUCTIONS 3-1
3-1. Introduction 3-1
3-4. Location of Controls and Indicators 3-1
3-6. Operating Instructions 3-1
3-7. Standard 400E/EL 3-1
3-12. 400E with Option 01 3-2
3-14. 400E/EL with Option02 3-2
SECTION IV. THEORY OF OPERATION 4-1
4-1. General 4-1
4-8. Schematic Description (See Figure 6-l) 4-1
4-9. Impedance Converter 4-1
4-12. Meter Amplifier 4-2
4-15. Meter Bridge 4-2
4-20. AC Output Circuit 4-2
4-22. Power Supply 4-2
SECTION V. MAINTENANCE 5-1
5-1. Introduction 5-1
5-3. Required Equipment 5-1

		Page
	5-4.1. Preventive Maintenance	5-1
	5-4.2. Operator/Crew Preventive Maintenance Checks and Services *Chart*	5-2
	5-5. Mechanical Zero Adjust (400E Only)	5-2
	5-7. Performance Checks Accuracy and Frequency Response Test	5-2
	5-19. Input Impedance Check	5-3
	5-22. Alignment and Calibration Procedure	5-4
	5-24. Cover Removal	5-4
	5-27. Bias Adjust	5-4
	5-29. AC Output Zero	5-4
	5-31. Calibration	5-4
SECTION V.	5-34. Troubleshooting	5-5
	5-38. Power Supply	5-6
	5-40. Amplifiers	5-6
	5-46. AC Output Circuit	5-6
	5-48. Adjustment of Factory Selected Components	5 7
SECTION VI.	CIRCUIT DIAGRAMS	6-1
	6-1. Introduction	6-1
APPENDIX A.	REFERENCES	A-1
APPENDIX D.	MAINTENANCE ALLOCATION	
SECTION I.	INTRODUCTION	D-1
II.	MAINTENANCE ALLOCATION CHART FOR HEWLETT-PACKARD AC VOLTMETER AN/USM-265, ME-459, and ME-465.	D-3
III.	TOOL AND TEST EQUIPMENT REQUIREMENTS FOR HEWLETT-PACKARD AC VOLTMETER AN/USM-265,ME-459, AND ME-465	D-4
IV.	REMARKS (NOT APPLICABLE)	

LIST OF TABLES

Number		*Page*
1-1.	Specifications	1-0
3-1.	Effect of Distortion on Average Responding Meter	3-1
3-2.	AC Amplifier Gain	3-2
5-1.	Required Test Equipment	5-0
5-2.	Calibration Tolerances	5-3
5-3.	l/3 Scale Tracking Tolerances (400E)	5-3
5-4.	l/3 Scale Tracking Tolerances (4WEL)	5-4
5-5.	Troubleshooting Guide	5-6
5-6.	Power Supply Voltages	5-6
5-7.	Impedance Converter Voltages	5-6
5-8.	Meter Amplifier Voltages	5-6
5-9.	AC Voltage Output Circuit	5-6
5-10.	Factory Selected Components	5-7

LIST OF ILLUSTRATIONS

Figure		*Page*
1-1.	Models 400E and 400EL AC Voltmeter	1-0
3-1.	Location of Controls and Indicators	3-0
3-2.	External Battery Connedion	3-1
3-3.	Impedance Correction Graph	3-3
4-1.	Simplified Block Diagram	4-1
4-2.	Meter Bridge	4-2
5-1.	Accuracy and Frequency Response Test Setup	5-2.1
5-2.	Input Impedance Check	5-4
5-3.	Location of Internal Adjustments	5-5
6-1.	400E/EL Schematic Diagram and Location of Compnents	6-3
6-2.	Location of Important Mechanical Parts	6-4

Section I
Figure 1-1 and Table 1-1

Model 400E/EL

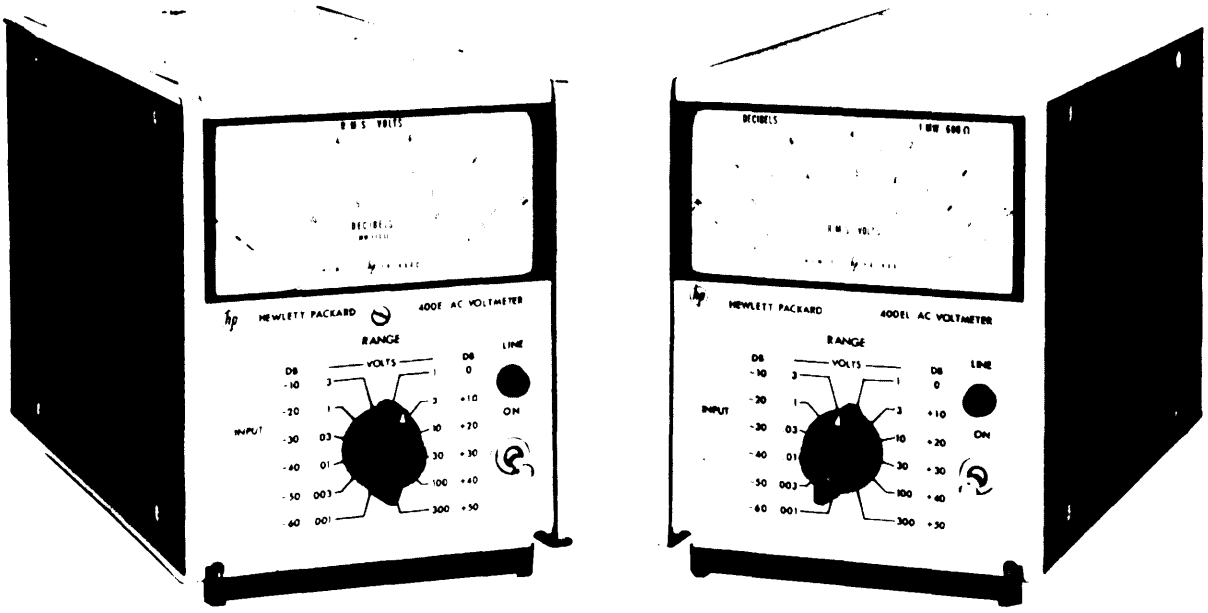

FIGURE I–I. MODELS 400E AND 400EL AC VOLTMETERS

EL6625—1538—TM—CI—I

Table 1-1. Specifications

-hp- MODEL 400E/EL	-hp- MODEL 400E/EL (Cont'd)
Voltage Range: 1 mv full scale to 300 v full scale in 12 ranges in 1, 3, 10 sequence. -72 dbm to +52 dbm in 12 ranges with 10 dbm between ranges.	Response Time: 1 second to within 1% of final value for a step change.
Frequency Range: 10 Hz to 10 MHz.	AC Power: 115 or 230 volts +10%, 50 to 1000 cps, approximately 5 watts.
Calibration: Responds to absolute average value of applied signal, calibrated in rms volts.	Temperature Range: 0 to +55°C (except where noted on accuracy charts).
Input Impedance: 10 megohms shunted by 21 pf on the 1 mv-1 v ranges and 10 megohms shunted by 8 pf on the 3 v-300 v ranges.	External Battery Operation: Terminals are provided on rear panel; positive and negative voltages between 35 v and 55 v are required; current drain from each voltage is approximately 54 ma.
Amplifier AC Output: 150 mv rms for full scale meter indication; output impedance 50 ohms, 10 Hz to 10 MHz (105 mv on the 1 mv range).	Weight: Net: 6 lbs. (2, 7 kg). Shipping: 9 lbs. (4 kg).
AC-DC Converter Output: 1 vdc output for full scale meter deflection.	Dimensions: 6-1/2" high, 5-1/8" wide, 11" deep (165, 1 x 130,2 x 279,4 mm).
Output Resistance: 1000 ohms.	

SECTION I

GENERAL INFORMATION

1-A.1. SCOPE

This manual includes installation and operation instruction and covers operator's, organizational, direct support (DS), general support (GS), and depot maintenance of the Hewlett-Packard AC Voltmeter AN/USM-265 (Model 400EL02), ME-459 (Model 400EL), and ME-465 (Model 400E). The repair parts and special tools list are located in TM 11-6625-1538-24P.

1-A.2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

Refer to the 1 test issue of DA Pam 310-1 to determine whether there are new editions, changed or additional publications pertaining to the equipment.

1-A.3. MAINTENANCE FORMS, RECORDS, AND REPORTS

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

b. Report of Packaging and Handling Deficiencies, Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/ NAVMATINST 4355.73A/AFR 400-54/ MCO 430.3F.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/ DLAR 4500.15.

1-A.4. REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703.

In either case, a reply will be furnished direct to you.

1-A.5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your AC Voltmeter AN/USM-265 needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

1-A.6. ADMINISTRATIVE STORAGE

Administrative Storage of Equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in paragraphs 2-18 through 2-21, and TM 740-90-1 Administrative Storage of Equipment.

1-A.7. DESTRUCTION OF ARMY ELECTRONICS MATERIEL

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