TM 11-6625-1541-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DS, GS,

AND DEPOT MAINTENANCE MANUAL

HEWLETT-PACKARD RMS VOLTMETER

MODEL 3400A

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1967

Section Page
I GENERAL INFORMATION 1-0.1
1-A.1 Scope 1-0.1
1-A.2 Index of Publications . . . 1-0.1
1-A.3 Forms and Records 1-0.1
1-3. Description 1-1
1-8. Specifications. 1-1
1-10. Instrument Identification 1-1
1-12. Equipment Supplied 1-1
1-14. Accessory Equipment Available . . . 1-1

Section Page
II INSTALLATION 2-1
2-1. Introduction 2-1
2-3. Initial Inspection 2-1
2-5. Power Requirements 2-1
2-8. Installation 2-1
2-10. Combining Case (hp Models 1051A or 1052A) 2-1
2-12. Adapter Frame (hp Part No. 5060-0797). 2-1
2-14. Repackaging for Shipment. 2-1

Section Page
III OPERATING INSTRUCTIONS 3-1
3-1. Introduction 3-1
3-3. Controls and Indicators. 3-1
3-5. Turn On Procedure 3-1
3-7. Operating Instructions 3-1
3-9. Applications. 3-1
3-11. RMS Value of AC Signals with DC Component 3-1
3-13. RMS Current 3-1
3-15. RMS AC-to-DC Converter. 3-1

Section Page
IV THEORY OF OPERATION. 4-1
4-1. Introduction 4-1
4-3. General Description. 4-1
4-11. Detailed Description 4-1
4-12. Input Attenuator Assembly A1. . . 4-1
4-15. Impedance Converter Assembly A2. 4-1
4-19. Second Attenuator Assembly A3. . 4-2
4-22. Video Amplifier Assembly A4. . . 4-2
4-27. Modulator/Demodulator Assembly A5, Chopper Amplifier Assembly, and Thermocouple Pair Assembly (part of A4) 4-2
4-37. Power Supply Assembly A7 4-3
4-40. Regulator Operation 4-3
4-48. Neon Lamp Drive Oscillator. . . . 4-3

Section Page
V MAINTENANCE 5-1
5-1. Introduction 5-1
5-3. Test Equipment. 5-1
5-5. Performance Checks 5-1
5-7. Accuracy, Linearity, and DC Output Performance Checks. 5-1
5-9. Frequency Response Performance Check 5-2
5-11. Input Impedance Performance Check 5-2
5-13. Crest Factor Performance Check. 5-3
5-15. Residual Noise Performance Check 5-3
5-17. Repair Procedures 5-3
5-18. Cover Removal. 5-3
5-20. Servicing Etched Circuit Board . . 5-4
5-23. Thermocouple Replacement 5-4
5-25. Adjustment and Calibration Proce - dure. 5-5
Meter Zero 5-5
5-29. Power Supply Checks 5-6
5-31. Low Frequency Calibration 5-6
5-36. High Frequency Calibration 5-6
5-41. Troubleshooting Procedure. 5-7
5-50. Neon Subassembly Replacement . . . 5-15

Section Page
VI CIRCUIT DIAGRAM 6-1/6-2
6-1. Introduction 6-1/6-2
6-3. Schematic Diagrams 6-1/6-2
6-6. Parts Location Diagrams. 6-1/6-2

Section I **Model 3400A**
Figure 1-1 and Table 1-1

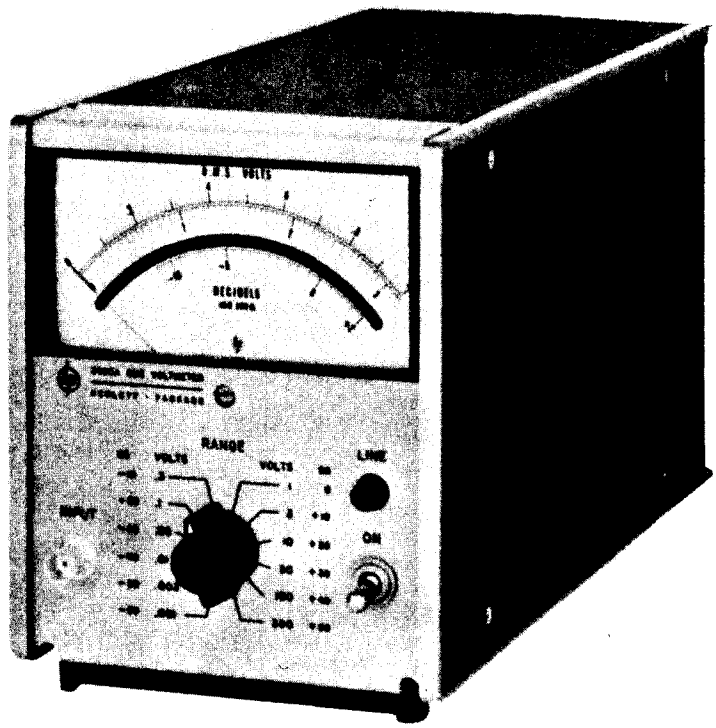

Figure 1-1. Model 3400A RMS Voltmeter

Table 1-1. Model 3400A Specifications

RANGE: 12 full scale ranges from 1 mv to 300 v in a 1, 3, 10 sequence. -72 to +52 dbm. (Usable indications to 100 μv.)

METER SCALES: Voltage, 0. 1 to 1 and 0.3 to 3. Decibel, -12 to +2 dbm (0 dbm = 1 mw, 600 ohms). Scales are individually calibrated to the meter movement.

FREQUENCY RANGE: 10 cps to 10 Mc.

ACCURACY: Within ±1% of full scale, 50 cps to 1 Mc. Within ±2% of full scale from 1 to 2 Mc. Within ±3% of full scale, 2 to 3 Mc. Within ±5% of full scale, from 10 to 50 cps and from 3 to 10 Mc. (Usable readings to 5 cps and 20 Mc.)

RESPONSE: Responds to rms value (heating value) of the input signal for all waveforms.

CREST FACTOR: (ratio of peak amplitude to rms amplitude): 10 to 1 at full scale (except where limited by maximum input), inversely proportional to pointer deflection, e.g. 20 to 1 at half-scale, 100 to 1 at tenth-scale.

MAXIMUM INPUT: 1000 v peak.

INPUT IMPEDANCE: From 0.001 v to 0. 3 v Range: 10 megohms shunted by 40 pf. From 1.0 v to 300 v Range: 10 megohms shunted by 15 pf.

RESPONSE TIME: Typically <2 sec. to within 1% of final value for a step change.

OVERLOAD PROTECTION: 30 db or 1000 v peak, whichever is less, on each range.

OUTPUT: Negative 1 vdc at full scale deflection, proportional to pointer deflection (from 10-100% of full scale). 1 ma maximum. Nominal source impedance is 1000 ohms.

POWER: 115 or 230 v ±10%, 50 to 1000 cps, approximately 7 watts.

DIMENSIONS: 5-1/8 in. wide, 6-1/2 in. high, 11 in. deep (1/3 module). (130 x 165 x 279 mm).

WEIGHT: Net, 7-1/4 lbs. (3,3 kg) Shipping, 11 lbs. (5 kg).

This manual contains Copyrighted material originally prepared by Hewlett-Packard Co.

Section I

GENERAL INFORMATION

1-A.1. Scope

This manual describes Hewlett-Packard (Federal Supply Code 14493) RMS Voltmeter Model 3400A serial numbers prefixed by 528, 401, and 322. It includes installation and operation instructions and covers operators, organizational, direct support (DS), general support (GS), and depot maintenance. This manual does not include a basic issue items list.

1-A.2. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 7, 8, and 9), supply bulletins, lubrication orders, and modification work orders that are available through publications supply channels. The index lists the individual parts (-10, -20, 35P, etc.) and the latest changes to and revisions of each equipment publication.

1-A.3. Forms and Records

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

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

c. Reporting of Equipment Manual Improvements. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-MR-NMP-AD, Fort Monmouth, N.J. 07703.