TM 9-4933-241-14&P

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT
AND GENERAL SUPPORT MAINTENANCE
MANUAL INCLUDING REPAIR PARTS LIST
FOR

VOLTMETER, DIGITAL
MODEL 2340
(NSN 4933-01-018-9820)
GENERAL MICROWAVE CORP.

HEADQUARTERS, DEPARTMENT OF THE ARMY

AUGUST 1981

Technical Manual
No. 9-4933-241-14&P

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Washington, DC, *7 August 1981*

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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, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS, Rock Island, IL 61299. A reply will be furnished directly to you.

NOTE

This manual is published for the purpose of identifying an authorized commercial manual for the use of the personnel to whom this voltmeter is issued.

Manufactured by: General Microwave Corp.
155 Marine St.
Farmingdale, NY 11735

Procured under Contract No. DAAA09-79C-4621

This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

INSTRUCTIONS FOR REQUISITIONING PARTS

NOT IDENTIFIED BY NSN

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

1 - Manufacturer's Federal Supply Code Number - 11332

2 - Manufacturer's Part Number exactly as listed herein.

3 - Nomenclature exactly as listed herein, including dimensions, if necessary.

4 - Manufacturer's Model Number - Model 2340

5 - Manufacturer's Serial Number (End Item)

6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.

7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50.

Complete Form as Follows:

(a) In blocks 4, 5, 6, list manufacturer's Federal Supply Code Number - 11332 followed by a colon and manufacturer's Part Number for the repair part.

(b) Complete Remarks field as follows:
Noun: (nomenclature of repair part)
For: NSN: 4933-01-018-9820
Manufacturer: General Microwave Corp.
155 Marine Street
Farmingdale, NY 11735
Model: 2340
Serial: (of end item)

Any other pertinent information such as Frame Number, Type, Dimensions, etc.

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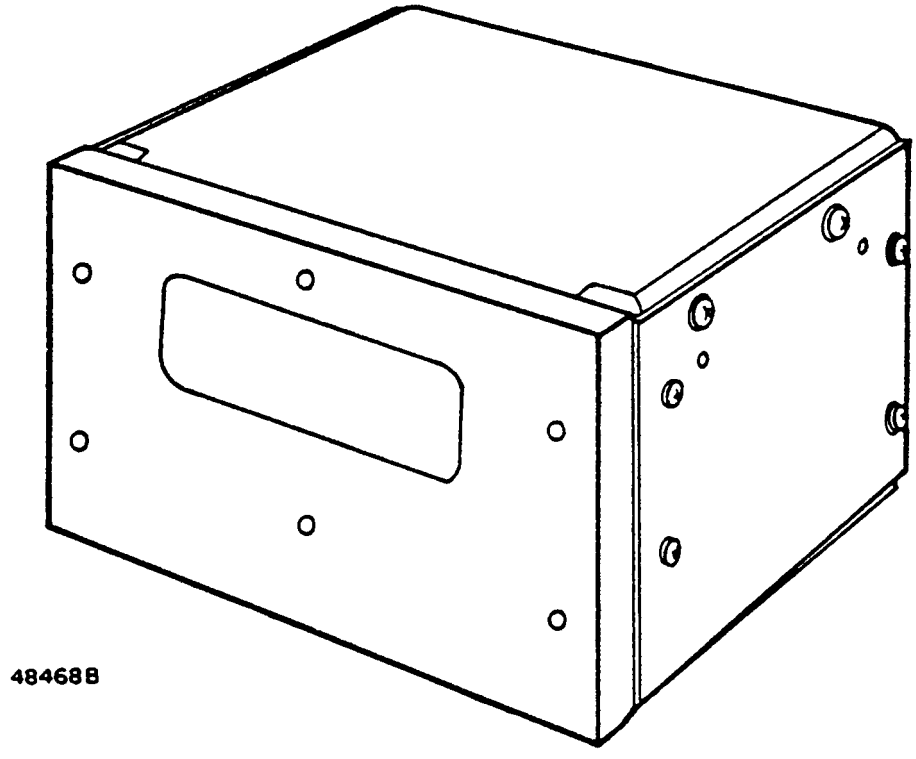

Figure 1. Digital Voltmeter Model 2340

1. DESCRIPTION

Model 2340 Digital Voltmeter is a panel mounted unit that is designed to automatically measure 0 to ±60 volts dc. The readout is shown on a 5-digit LED display. This manual contains information for operation, troubleshooting, repair, and parts list. Refer to Table 1 for a summary of the features and characteristics of the digital voltmeter. Appendix A provides the calibration procedure. This instrument does not require lubrication. Safety precautions and cleaning instructions are described in repair section 4.

2. OPERATION

Apply primary dc power and input voltage. There are no external controls. After at least a five-minute warmup period, the following operation can be observed:

The value and polarity of input voltages in the range of 0 to 60.00 volts will be automaticall y displayed.

Inputs in the 0 to ±9.999 volt range will be displayed to a resolution of .001 volt.

Inputs greater than ±10.999 volts will be displayed to a resolution of .01 volt.

Inputs in the ±10.000 to ±10.999 volts range will be displayed to a resolution of either .001 volt, or .01 volt, depending on the automatically selected range.

3. TROUBLESHOOTING

A detailed understanding of the unit block diagram (figure 3) and timing diagram (figure 4) is essential to troubleshooting the Model 2340. Study the material provided under Block Diagram Description and Timing, including the schematic (figure 5) before initiating troubleshooting procedures.

The flow diagram (figure 6) and test chart (table 2) are logical troubleshooting guides. Careful observation of the display, dc voltages, and waveforms will expedite isolation of a malfunction to a functional block. At that point, the unit schematic and the flow diagram are required to further localize and identify the cause of malfunction.

3.1 RECOMMENDED TEST EQUIPMENT

The following test equipment (or equivalent) is required to implement the troubleshooting procedure.

QTY	DESCRIPTION	
1	Power Supply, LAMBDA	LPD-422A-FM
1	DC Signal Standard, ANALOGIC	AN3100
1	Digital Multimeter, FLUKE	8000A
1	Oscilloscope, TEKTRONIX w/type W Plug-in	545A

8.2 BLOCK DIAGRAM (Figure 3)

Model 2340 circuits are contained in three major subassemblies:

1. Dc power supply module 8656-P1 which converts input, unregulated, 22-30V dc to well-regulated +15 vdc, −15 vdc and +5 vdc outputs.

2. Analog pc board assembly 8661-G1 which contains all circuitry required by the voltmeter other than the counter chain, storage latches, and the 4-1/2 digit LED readout.

3. Counters and Digital Readout pc board assembly 8659-G1 which contains the 4-1/2 digit LED readout, 4-decade counter chain, storage latches, BCD decoder drivers and LED current limiting resistor networks. (Note: This assembly interfaces with the other assemblies via a 20-pin plug-in integral connector which has its mating connector on the analog pc board assembly.)

Functionally the Model 2340 is a precision, dual-slope, A/D converter with a LED numeric readout. It includes autoranging circuits which route the signal directly to the input buffer or via a precise 10:1 voltage divider to the input buffer. Routing is determined by the reading in the counter circuits; if below 1,000, the signal goes directly to the buffer; if above 10,999, the signal is attenuated through the 10:1 divider.

The input power protection circuits prevent damage to the power supply module when a wrong polarity or a transient overvoltage is present at the dc power input.

To reduce the temperature extremes to which key thermally sensitive components are exposed, a heated enclosure is used on the analog pc board. A temperature sensor and controller applies power to several heating elements to keep the compartment from dropping below 30° C (approx).

3.3 TIMING (Figure 4)

All timing measurements are referenced to the negative going output pulse of rate control oscillator U15. (The waveforms of figure 4 are typical for a positive input voltage measurement .)

The rate control pulse sets S/R flip-flop U11 to generate the INTEGRATE SIGNAL ENABLE which in turn sets a second S/R flip-flop (also part of U11) to provide the CLK ENABLE signal. While the CLK ENABLE is high, CLOCK pulses are generated from the clock circuit consisting of three inverters of U8 and R53 and C11. The clock frequency is primarily determined by the values of R53 and C11.

To establish initial conditions in the counter chain, consisting of decade counter integrated circuits U101 through U104, the CLAMP output of timer U15 (pin 7) is differentiated and coupled to Q14 to generate a narrow RESET pulse. After 8000 negative clock pulse transitions, the 8 digit from counter U104 goes high; after 2000 additional clock pulses the 8000 signal at U104 (pin 11) goes low. At that instant the output from one-half of J-K flip-flop U13 complements and the negative going edge of U13 (pin 13) is differentiated and applied to S/R flip-flop U12. This permits the integration of either the plus or minus reference voltage depending on the output of polarity flip-flop U14. Simultaneously, the negative going edge of the U13 (pin 13) output resets INTEGRATE SIGNAL flip-flop U11 to end the signal integration phase of the measurement.

Signal polarity is determined by sampling the comparator output level (U7 pin 7) at the end of the INTEGRATE SIGNAL phase of the measurement. The sampling pulse (POLARITY STROBE) is generated by differentiating the