

SECTION I

GENERAL DESCRIPTION

1-1. INTRODUCTION. (See figure 1-1.)

1-2. This manual contains operating and servicing instructions, and a parts breakdown, for the Models 400D, 400H, and 400L Vacuum Tube Voltmeters manufactured by the Hewlett-Packard Company, Palo Alto, California. This manual applies to all Models 400D, 400H, and 400L Voltmeters having the serial number prefix 017-. The Model 400D Voltmeter is similar to a military counterpart, Electronic Voltmeter ME-30A/U, in appearance and operation, but contains modified electrical circuits to obtain improved performance. Applicable Federal Stock Numbers for the voltmeters are as follows:

Model 400D: 6625-643-1670
Model 400H: 6625-657-8261
Model 400L: 6625-729-8360

1-3. The Models 400D, 400H, and 400L Voltmeters are the same except for the differences listed below:

a. The front panel meters are different in each model, as described in paragraph 1-6.

b. The accuracy specifications are different for each model, as described in figure 1-2.

1-4. DESCRIPTION.

1-5. The Hewlett-Packard Models 400D, 400H, and 400L Vacuum Tube Voltmeters are general purpose, portable electronic a-c voltmeters of high sensitivity and stability. They are suited to both laboratory and field use. All three voltmeter models measure a-c voltages from 0.001 to 300 volts rms full scale, with a frequency bandwidth covering 10 cps to 4 megacycles. The voltmeters are compact, accurate, and rugged and have fast meter response, high input impedance, stable calibration accuracy, and freedom from the effects of normal line voltage variations. The voltmeters are designed for long instrument life with a minimum of servicing.

a. Voltage Range: 0.1 millivolt to 300 volts in 12 ranges providing full scale readings of the following voltages:

0.001	0.100	10.00
0.003	0.300	30.00
0.010	1.000	100.00
0.030	3.000	300.00

b. Decibel Range: -72 to +52 db, in 12 ranges.

c. Frequency Range: 10 cps to 4 mc.

d. Input Impedance: 10 megohms shunted by 15 pf (15 μ mf) on ranges 1.0 volt to 300 volts; 25 pf on ranges 0.001 volt to 0.3 volt.

e. Stability: Line voltage variations of $\pm 10\%$ do not reduce the specified accuracy, and line voltage transients are not reflected in the meter reading. Electron tube deterioration to 75% of normal transconductance affects accuracy less than 0.5% from 20 cps to 1 mc.

f. Amplifier: OUTPUT terminals are provided so that the voltmeter can be used to amplify small signals or to enable monitoring of waveforms under test with an oscilloscope. Output voltage is approximately 0.15 volt rms on all ranges with full-scale meter deflection. Amplifier frequency response is same as the voltmeter. Internal impedance is approximately 50 ohms over entire frequency range.

g. Accuracy: Model 400D -

$\pm 2\%$ of full scale, 20 cps to 1 mc;
 $\pm 3\%$ of full scale, 20 cps to 2 mc;
 $\pm 5\%$ of full scale, 10 cps to 4 mc.

Model 400H -

$\pm 1\%$ of full scale, 50 cps to 500 kc;
 $\pm 2\%$ of full scale, 20 cps to 1 mc;
 $\pm 3\%$ of full scale, 20 cps to 2 mc;
 $\pm 5\%$ of full scale, 10 cps to 4 mc.

Model 400L -

$\pm 2\%$ of reading or $\pm 1\%$ of full scale, whichever is more accurate, 50 cps to 500 kc.
 $\pm 3\%$ of reading or $\pm 2\%$ of full scale, whichever is more accurate, 20 cps to 1 mc.
 $\pm 4\%$ of reading or $\pm 3\%$ of full scale, whichever is more accurate, 20 cps to 2 mc.
 $\pm 5\%$ of reading 10 cps to 4 mc.

h. Power Requirement: 115/230 volts $\pm 10\%$, 50/1000 cps, approximately 80 watts.

i. Size: 11-3/4 in. high, 7-1/2 in. wide, 12 in. deep.

j. Weight: 18 lbs; shipping weight approximately 23 lbs.

Figure 1-2. Table of Specifications