

MICRONATA

MODEL 22-025

Vacuum Tube Volt Meter

INSTRUCTION MANUAL

A PRODUCT OF RADIO SHACK
DIVISION OF TANDY CORPORATION

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1. General Description

Your Micronta VTVM is highly dependable for measurements in a high range of voltages from DC to RF, output (db) and DC resistance. Ideally suited for tests and adjustments of FM radio, Stereo, TV and other communication equipment.

Features

- 1) A large, easy-to-read $6 \times 4\frac{1}{4}$ " meter.
- 2) High input impedance—circuit loading is practically nil.
- 3) Excellent frequency response.
Parallel capacity of DC voltage is as small as 1.5 $\mu\mu\text{f}$ even when it is superimposed by RF voltage, which hardly affects measurements.
- 4) Uniform performance and excellent stability.
- 5) Trouble-free printed circuitry. Light in weight yet sturdy in construction.
- 6) Easy to use.

2. Specifications:

AC Voltage

Measurement Range: Sine wave: 0.1V-1500V (in 7 ranges)
0-1.5V, 0-5V, 0-15V, 0-50V,
0-150V, 0-500V, 0-1500V

Peak-to-peak: 0-4000V (in 7 ranges)
0-4V, 0-14V, 0-40V, 0-140V,
0-400V, 0-1400V, 0-4000V

Output (db m): -20 db to +65 db (in 7 ranges)
(0 db=1 mW in 600 ohm line)
-20 to +5/16/25/36/45/56/65 db

Input impedance: 14 Megs.

Input capacitance: 30 $\mu\mu\text{f}$ or below (1.5/5/15/50/150V Range)
15 $\mu\mu\text{f}$ or below (500/1500 Range)

Accuracy: within $\pm 5\%$ full scale

Frequency Response: 30 c/s-500 Kc within $\pm 3\%$
20 c/s-10 Mc within $\pm 10\%$

DC Voltage

Measurement Range: 0.1V-1500V (in 7 ranges)
0-1.5V, 0-5V, 0-15V, 0-50V, 0-150V, 0-500V, 0-1500V

Input impedance: 11 Megs. 2 $\mu\mu\text{f}$ or below (using DC Probe)
Accuracy: within $\pm 3\%$ full scale

Resistance

Measurement Range : 0.2 Ω - 1000 M Ω (in 7 ranges)

0-1K/10K/100K/1000K/10M/100M/1000M/10000M ohms

Accuracy : within $\pm 3\%$ of the scale length.

Power Consumption : 8 Watts

Rectifier and Tubes : 1 SR1A-4

1 12AU7

1 6AL5

Meter used : DC 200 μ A

Input Power : 117 VAC 50/60 cys.

Dimensions : $7\frac{1}{2} \times 6\frac{3}{4} \times 4-1/8$ inches

Weight : net 4.5 lbs.

Accessories : 1 DC Probe

1 Test Lead (red)

1 Test Lead (black)

1 Instruction Manual

3. Preparations

- 1) Place the unit either horizontally or vertically.
- 2) Set the "Function Selector" to the "OFF" position.
- 3) Make sure that the pointer of the meter is at the "0" position. If not, adjust it by turning the Zero Adjusting screw located on the meter.
- 4) Insert the red test lead into the "AC OHMS" jack, the black lead into the "COMMON" jack, and the DC Probe into the "DC Probe into the "DC" jack.
- 5) Connect the AC cord into the AC outlet.
- 6) Turn the Function Selector clockwise from the "OFF" position. Allow about one minute for warm-up, which is necessary for stabilized performance.
- 7) Once again see if the pointer is at zero position. If not, adjust it properly, this time by turning the "ZERO ADJ" knob on front panel.

The rotation of knob and the swing of the pointer are in the same direction when the Function Selector is at AC or DC—; reverse direction if at DC+or OHMS position.

4. AC Voltage Measurements

- 1) Set the "Function Selector" to "AC" position.
- 2) Short the tips of the test leads (red and black), connected to "AC OHMS" and "COMMON" Jacks. Adjust the "ZERO ADJ" knob until the pointer comes to "0" on the scale.
Next, set the Range Selector to the " $R \times 1$ 1.5V" Range and the " $R \times 1$ Meg 1500V" Range and make sure that the pointer is at the zero position on each range.
If the pointer is not zeroed at the lower range, turn the "AC BAL" screw by means of a screw-driver; if not zeroed at the higher range, adjust it by rotating the "ZERO ADJ" knob.

- 3) Now set the Range Selector to a desired position and read the meter as you apply the tips of test leads to the circuit being measured.

Cautions :

1. Select a proper range likely to correspond to an estimated value.
2. If the voltage being measured is unknown, set the Range Selector to the highest range . . . then to a lower range for proper reading.

Measurements of sine wave voltage.

Table 1.

<u>Ranges</u>	<u>Scale to be used</u>	<u>Multiplier</u>
1.5V	AC-1.5V (Black Scale)	Direct reading
5V	AC-5V (")	" "
15V	AC-DC 15V (Black Scale)	" "
50V	" 50V (")	" "
150V	" 15V (")	×10
500V	" 50V (")	×10
1500V	" 15V (")	×100

Example:

If an estimated voltage is about 350V, select the "R×100K 500V" Range, use the "AC-DC 50V" Scale and multiply the reading by 10. If the scale reads 35.6, multiply by 10 to get the proper value—in this example 356V.

Measurement of peak-to-peak voltage.

Table 2.

<u>Ranges</u>	<u>Scales to be used</u>	<u>Multiplier</u>
1.5V	AC-1.5V (Black) & 40V P-P (red)	Direct reading
5V	AC-5V (/) & 140V P-P (/)	/" "
15V	AC-15V (black) & 40V P-P (/)	/" "
50V	AC-50V (/) & 140V P-P (/)	/" "
150V	AC-15V (/) & 40V P-P (/)	×10
500V	AC-50V (/) & 140V P-P (/)	×10
1500V	AC-15V (/) & 40V P-P (/)	×100

Example:

If the voltage being measured is nearly 350V, select the "R×10K 150V" range, use the scale of P-P 40V (right below the "AD-DC 15V" Scale) and multiply the reading by 10. If the indicated value is 35.6, the desired value is $35.6 \times 10 = 356V$.

Measurement of Output Voltage (db)

Table 3.

<u>Ranges</u>	<u>Scales to be used</u>	<u>Value to be added</u>
1.5V	DBM5 (red)	Direct reading
5V	DBM15 (red)	" "
15V	AC-DC 15V & DBM5	20 db
50V	AC-DC 50V & DBM15	" "
150V	AC-DC 15V & DBM5	40 db
500V	AC-DC 50V & DBM15	46 db
1500V	AC-DC 15V & DBM5	60 db

Note: Decibels can be read direct on the 1.5V and 5V Ranges but not on 15V, 50V, 150V, 500V and 1500V Ranges as each of them lacks db calibration. With such ranges, it is necessary that a proper value be added in accordance with Table 3.

5. DC Voltage Measurement

- 1) Set the Function Selector either to "DC —" or "DC +" position. In the "DC —" position, the "COMMON" is positive (+), and the "DC" Probe is negative (-). At the "DC +" position, the polarities are reversed.
- 2) Short the tip of "DC" probe and the "COMMON" black test lead and adjust the pointer to zero by turning the "ZERO ADJ" knob.
- 3) Set the Range Selector to a desired range, connect each tip of "DC" Probe and the test lead (black) to the circuit being measured and read the meter.

Caution.

- 1) Never fail to connect the "COMMON" test lead first.
- 2) Select a range somewhat higher than an estimated value, gradually going to lower one.

Table 4.

Ranges	Scale to be used	Multiplier
1.5V	AC-DC 15V (black)	$\times 0.1$
5V	" 50V (")	$\times 0.1$
15V	" 15V (")	Direct Reading
50V	" 50V (")	" "
150V	" 15V (")	$\times 10$
500V	" 50V (")	$\times 10$
1500V	" 15V (")	$\times 100$

Example 1.

For measurement of a 9V dry battery, where polarities and approximate voltage are known, set the Range Selector to " $R \times 100$ 15V" Range, connect the "COMMON" test lead (black) to the negative polarity of the battery, the tip of "DC" Probe to the positive polarity. Reading can be made direct on the scale.

Example 2.

Use of this unit as a zero-center tester for adjusting the detector of FM receiver. If the estimated value is $\pm 2V$ or more, set the Range Selector to " $R \times 100$ 15V" and turn the ZERO ADJ Knob until the pointer of the meter rests at the center 7.5V. When the indicated value at this measurement is 10V, subtract 7.5 from 10 with a resultant value of 2.5V.

If the indicated value is 5V, subtract this sum from 7.5V—the resultant value is—2.5V.

7. Resistance Value Measurement.

- 1) Set the Function Selector to the "OHMS" position.
- 2) Short the tips of "AC OHMS" test lead (red) and the "COMMON" test lead (black) and turn the "ZERO ADJ" knob until the pointer is exactly zeroed.
- 3) Release the shorted leads, rotate the "OHMS ADJ" knob until the pointer lines up with end of scale.
- 4) Set the Range Selector to a desired range, apply the tip of each test lead to the material or circuit being measured and take the reading.

Caution :

1. Select a range on which estimated value may be read at mid-scale.
2. When resistance being measured is unknown, start with a higher range, gradually going down to a lower one.

Table 5.

<u>Ranges</u>	<u>Multiplier</u>
R \times 1	1
R \times 10	10
R \times 100	100
R \times 1K	10^3
R \times 10K	10^4
R \times 100K	10^5
R \times 1MEG	10^6

Example 1.

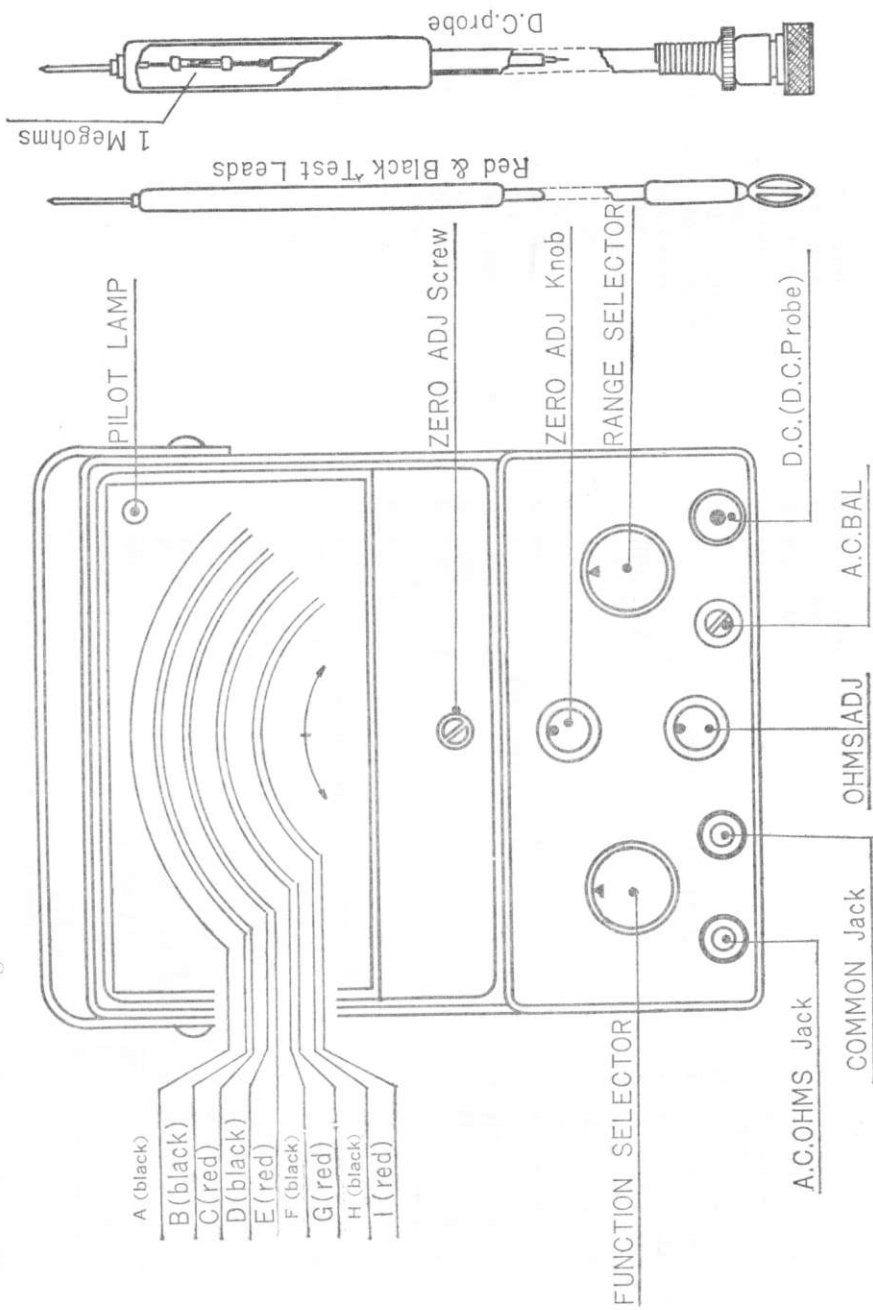
When measuring a resistance body estimated at about 80K ohms, set the Range Selector to “R \times 10K 15V” position and apply each tip of the test leads across the item to be checked for resistance. If the indicated value reads 8.5 on the meter scale, multiply by 10K. Your answer is 85K.

Table 6

(Use in conjunction with the drawing shown on next)

Type of Measurement	Quantity To Be Measured	Set Function Selector Switch To	Set Range Selector Switch To	Connect Test Leads To	Read From Scale	CORRECTION To Scale Reading
AC Volts	0-1.5V	AC	R × 1, 1.5V	(AC OHMS) & (COMMON) Jacks	H	Read Directly
"	1.5-5V	"	R × 10, 5V	"	F	Read Directly
"	5-15V	"	R × 100, 15V	"	D	Read Directly
"	15-50V	"	R × 1K, 50V	"	B	Read Directly
"	50-150V	"	R × 10K, 150V	"	D	Multiply by 10
"	150-500V	"	R × 100K, 500V	"	B	Multiply by 10
"	500-1500V	"	R × 1MEG, 1500V	"	D	Multiply by 100
DC Volts	0-1.5V	DC	R × 1, 1.5V	(DC) & (COMMON) Jacks	D	Divide by 10
"	1.5-5V	"	R × 10, 5V	"	B	Divide by 10
"	5-15V	"	R × 100, 15V	"	D	Read Directly
"	15-50V	"	R × 1K, 50V	"	B	Read Directly
"	50-150V	"	R × 10K, 150V	"	D	Multiply by 10
"	150-500V	"	R × 100K, 500V	"	B	Multiply by 10
"	500-1500V	"	R × 1MEG, 1500V	"	D	Multiply by 100
Resistance	0-30	OHMS	R × 1, 1.5V	(AC OHMS) & (COMMON) Jacks	A	Read Directly
"	30-300	"	R × 10, 5V	"	A	Multiply by 10
"	300-3K	"	R × 100, 15V	"	A	Multiply by 100
"	3K-30K	"	R × 1K, 50V	"	A	Multiply by 1K
"	30K-300K	"	R × 10K, 150V	"	A	Multiply by 10K
"	300K-3M	"	R × 100K, 500V	"	A	Multiply by 100K
"	3M-10000M	"	R × 1MEG, 1500V	"	A	Multiply by 1MEG
Output (dBm)	-20~+5DBM	AC	R × 1, 1.5V	(AC OHMS) & (COMMON) Jacks	I	Read Directly
"	+5~+15DBM	"	R × 10, 5V	"	G	Read Directly
Peak to peak	0-40V	"	R × 100, 15V	"	E	Read Directly
"	40-140V	"	R × 1K, 50V	"	C	Read Directly
"	140-400V	"	R × 10K, 150V	"	E	Multiply by 10
"	400-1400V	"	R × 100K, 500V	"	C	Multiply by 10
"	1400-4000V	"	R × 1MEG, 1500V	"	E	Multiply by 100

10. Front Panel Arrangement



12. Maintenance.

Although your Micronta VTVM was designed to withstand long and continued use, the tubes and battery should be replaced when necessary.

1. 6AL5 Tube should be replaced when you notice that:
 - a. It is impossible to properly adjust the "ZERO ADJ."
 - b. A decreased indication of measurements of AC voltage.
2. 12AU7 Tube should be replaced when you note the following:
 - a. A decrease in indicated value.
 - b. Fluctuation in power source causing shift of zero indication; impossible to make zero adjustment.
 - c. You are unable to adjust zero and "∞" for resistance measurements.

3. Dry Battery.

When the battery is weak or defective—

- a. The pointer cannot be set to “ ∞ ” when the Range Selector is set to the “OHMS” position.
- b. The pointer cannot be zeroed or falls back when the “AC OHMS” test lead and “COMMON” test lead are shorted together and left in this position for about ten seconds.

When replacing tubes or battery, remove the 3 screws at the back of the VTVM.

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