MICRONTA®

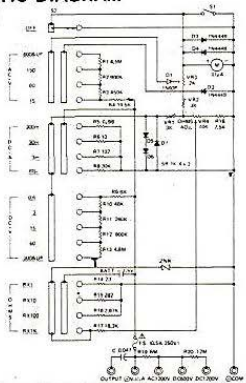
20,000 OHMS/VOLT
FOLDING MULTITESTER
INSTRUCTION MANUAL

CAT.NO.22-211

CUSTOM MANUFACTURED FOR

RADIO SHACK, A DIVISION OF TANDY CORPORATIOI

SCHEMATIC DIAGRAM



NOTES (1) ALL RESISTANCE VALUES ARE INDICATED IN "OHM." (K = 10^3 OHM. M = 10^6 OHM.)
(2) CAPACITANCE VALUE IS INDICATED IN "μF."

CAUTION: COMPONENTS MARKED WITH ⚠ ARE CRITICAL FOR SAFETY

Schematic subject to change without notice.
For most accurate Schematic (and parts) contact Radio Shack, National Parts Depot, Fort Worth TX 76101
In U.K., contact Tandy Electronics, National Parts Depot, Bilston Road, Wednesbury, West Midlands WS10 7JN
In Australia, contact Tandy Australia Limited, National Parts Depot, 91 Kurrajong Avenue, Mount Druitt, N.S.W. 2770

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Fort Worth, Texas 76102

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INTRODUCTION

This compact, sensitive Multitester is designed to measure AC and DC voltages, DC current, and resistance with accuracy and ease.

The single knob function control is easy to read and use. The 4" (10 cm) meter incorporates a mirrored scale for accurate readings and uses three colors for rapid scale identification.

The meter movement is shunted, for protection, during transit. This is accomplished automatically every time the Multitester is folded shut.

The meter circuit incorporates a fuse to protect the delicate meter movement and other internal parts in case of inadvertent overload or improper function selection.

The operating and indicating sections are connected to each other by a hinge-joint with detent. This allows the user to get an optimum angle for easy reading in all operating positions either when portable or on bench top.

44" (110 cm) well insulated test leads with banana-type plugs result in firm, safe, low-resistance circuit connections.

Small and light, this instrument will provide many years of accurate voltage, current, and resistance measurements. One AA cell provides power for resistance measurement.

SPECIFICATIONS

Ranges:	25
DC Voltage	0-0.6-3-15-60-300-600-1200V
AC Voltage	0-15-60-150-600-1200V
DC Current	0-60 μA-3-30-300 mA
Resistance	0-2K, 0-20K, 0-200K, 0-2Meg. (center scale 24)
Decibels	–20 to +63 dB in 5 ranges
Output	0-15-60-150-600V
Accuracy (at horizontal position):	±3% of full-scale, DC voltage and current ±4% of full-scale, AC voltage ±3% of scale-length, Resistance
Influence of Scale Angle (at vertical position):	±2% of full scale
Sensitivity:	20,000 ohms/volt DC 10,000 ohms/volt AC
Meter Movement:	4" (10 cm), 3-color, mirrored scale, 37 μA movement
Detent:	90, 120, 150, 180 degrees
Battery:	Requires one type AA penlight cell for ohms function
Leads:	44" (110 cm) banana-plug style
Fuse:	0.5A, 250V fast-acting, 5x20 mm type
Size:	7.3H x 4.4W x 1.3D inches 18.4H x 11.0W x 3.3D cm (fully open) 4H x 4.4W x 2.5D inches 10.0H x 11.0W x 6.3D cm (fully closed)
Weight:	350 g (0.8 lbs.)

TO USE

The following special markings are designed to remind you of safety.

⚠ Refer to the following operating instructions.

⏚ To avoid electrical shock and/or instrument damage do not connect the common input terminal (–jack) to any source of more than 500 volts with respect to earth/ground.

Press latch on the front of case to open.

Remove battery cover and install one AA cell (not supplied). We recommend our 23-582 or 23-552. Be sure to observe proper polarity. Close the cover.

When you can't adjust the pointer to "0" on OHMS range, it's time for a new battery. Never leave a weak or dead battery in your unit. Even a "leak-proof" battery may leak damaging chemicals. Also, if you are not going to use your unit for a week or more, remove the battery.

Notes: For most accurate readings, keep the meter lying flat on a non-metallic surface. Use a range setting that results in a reading in the upper 1/3rd of the meter scale.

Also, look at the scale from the point where the pointer and its mirror reflection come together; otherwise your reading will be inaccurate due to parallax.

The pointer may shift slightly from the "0" position as you change the angle of the meter section.

If the pointer does not normally rest exactly over the "0" at the left side of the scale, adjust the plastic screw in the lower center of the meter face to bring the needle to "0."

Always observe correct test lead polarity when making DC voltage and current measurements (Black into the ⊖ COM and Red into the ⊕ V-Ω-A or DC600V or DC1200V jacks).

> **CAUTION:** THE MAXIMUM INPUT LIMIT FOR VOLTAGE AND CURRENT MEASUREMENT BETWEEN ⊕ V-Ω-A AND ⊖ COM IS 600V AC, 300V DC AND 300mA DC.

TEST LEADS

Use only the same type of test leads as those supplied with your unit. These test leads are rated for 1200 volts; replacements are available from your local Radio Shack store.

DC VOLTAGE MEASUREMENTS

> **WARNING** ϟ USE EXTREME CARE WHEN MAKING MEASUREMENTS FOR HIGH VOLTAGE; DO NOT TOUCH TERMINALS OR PROBE ENDS.

1. Plug the test leads into the correct jacks (Black into ⊖ COM and Red into ⊕ V-Ω-A).
2. Set the range switch to one of the DCV positions; it is best to start at the top and work down.
   If you're uncertain about voltage level, start with 1200V range as noted in step 5.

3. Touch the test probe tips to the circuit under test; be sure to observe correct polarity.
4. Read the voltage on the black DC scales.
5. For voltages between 300 and 600, set the range switch to 300&UP and plug the red test lead into the DC600V jack. For voltages between 600 and 1200, leave the range at 300&UP and plug the red test lead into the DC1200V jack.
   USE EXTREME CARE WHEN USING THESE RANGES.

AC VOLTAGE MEASUREMENTS

> **WARNING** ϟ USE EXTREME CARE WHEN MAKING MEASUREMENTS FOR HIGH VOLTAGE; DO NOT TOUCH TERMINALS OR PROBE ENDS.

1. Plug the test leads into the correct jacks.
2. Set the range switch to one of the ACV positions. (It is best to start at the top and work down.)

   If you're uncertain about voltage level, start with 1200V range as noted in step 5.
3. Touch the test probe tips to the circuit under test.
4. Read the voltage on the red AC scales.
5. For voltages between 600 and 1200, set the range switch to 600&UP and plug the red test lead into the AC1200V jack.

RESISTANCE MEASUREMENTS

Before taking any resistance measurements, disconnect the power to the unit under test and discharge the capacitors. It is best to remove batteries and unplug line cords.

> **WARNING** ϟ DO NOT APPLY VOLTAGE TO MEASURING TERMINAL WHILE RANGE SWITCH IS IN OHM POSITION.

1. Plug the test leads into the ⊖ COM and ⊕ V-Ω-A jacks.
2. Set the range switch to one of the OHMS positions; touch the test probe tips together and adjust the OHM ADJUST control to bring the pointer to the "0" on the top (green) OHMS scale.
3. Now, touch the probe tips across the circuit or part under test.
4. Read the resistance on the green OHMS scale; use the proper multiplier to obtain the correct value (R times 1, 10, 100, or 1000, depending on the position of the range switch).

Notes: When you are unable to adjust the pointer to "0" on the OHMS scale, the battery must be replaced. When measuring resistance, it is best to disconnect one side of the part under test. (The remainder of the circuit will not interfere with the readings.)

Note for Testing Semiconductor Junctions: When attempting to identify cathode and anode ends or the type of transistor (PNP or NPN), the actual polarity of the tester's voltage is opposite of the lead colors. The red lead is the negative source. The black lead is positive.

DC CURRENT MEASUREMENTS

> **WARNING ϟ** DO NOT APPLY VOLTAGE TO MEASURING TERMINAL WHILE RANGE SWITCH IS IN CURRENT POSITION.

1. Plug the test leads into the correct jacks.
2. Set the range switch to the 300m DCA position (300 milliamp). Always start at the top and work down.
3. Open up the circuit in which you want to measure the current and connect the black lead to the negative side and the red lead to the positive side of the circuit.
4. Apply power to the circuit under test and read the current on the black DC scales.

DECIBEL MEASUREMENTS

1. Plug the test leads into the correct jacks.
2. Set the range switch to one of the ACV ranges.
3. For a range switch setting of 15 ACV, read dB directly on the bottom scale in dB. For other settings of the range switch, add the appropriate number of dB to the dB scale reading as noted on the chart at the lower right on the meter face.

Note: For absolute dB measurements, circuit impedance must be 600 ohms. 0 dB = 1 milliwatt dissipated in a 600 ohm impedance (equivalent to 0.775 volts across 600 ohms).

OUTPUT VOLTAGE MEASUREMENTS

1. To measure AC voltage in the presence of DC voltage, use the output function. Connect the black lead to the ⊖ COM jack and the red lead to the OUTPUT jack.
2. Set the range switch to an ACV position and measure the voltage in the circuit.

Note: The output function incorporates a DC blocking capacitor, rated at 600 volts. Do not exceed the 600 volt rating when measuring output voltages.

3. Read output voltages on the same scales as for AC voltage.

REPLACEMENT OF BATTERY/FUSE

> **WARNING ϟ** TO AVOID ELECTRIC SHOCK, DISCONNECT MEASURING TERMINALS BEFORE REMOVING BATTERY OR FUSE. REPLACE ONLY WITH SAME TYPE BATTERY OR FUSE. THIS INSTRUMENT CONTAINS NO USER SERVICEABLE PARTS.
> SCREW REMOVAL BY QUALIFIED PERSONS ONLY.
> CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE, REPLACE ONLY WITH 0.5A, 250V FUSE.

NOTE:

The fuse used in your Multitester is a special size and type. Replacement fuses may be obtained from your local Radio Shack store.

1. Disconnect the test leads.
2. Open the battery/fuse compartment cover.
3. Pull the red ribbon in the fuse compartment. The fuse will pop out.
4. Insert a new fuse on the ribbon ring. Use only a fuse of the same type/rating (0.5A, 250V. Radio Shack Cat. No. 270-1241).
5. Install the fuse with ribbon in the fuse compartment.
6. Close the battery/fuse compartment cover.
7. Space is provided in the battery/fuse compartment for a spare fuse. It pays to carry spares!

WARNING: DO NOT OPERATE YOUR UNIT UNTIL THE BATTERY/FUSE COVER IS IN PLACE AND FULLY CLOSED.

WARNING: USE EXTREME CAUTION IN THE USE OF THIS DEVICE. IMPROPER USE OF THIS DEVICE CAN RESULT IN INJURY OR DEATH. FOLLOW ALL SAFEGUARDS SUGGESTED IN THE OWNER'S MANUAL IN ADDITION TO NORMAL SAFETY PRECAUTIONS IN DEALING WITH ELECTRICAL CIRCUITS. **DO NOT** USE THIS DEVICE IF YOU ARE UNFAMILIAR WITH ELECTRICAL CIRCUITS AND TESTING PROCEDURES.

GOOD METER MEASUREMENT PRACTICES

Here are some good general rules that apply to the use of electrical meters. Some are common-sense, some are safety precautions, and some are just plain good habits to get into.

1. **CAUTION:** There is always the possibility of dangerous voltage being present in any piece of electrical/electronic equipment. Always use extreme caution when making measurements – high voltage may appear at unexpected points in a suspected defective circuit.
2. When making measurements, never stand on a wet or damp floor. Do not work near (or on) any grounded metal object – for example, a metal work table, metal water or gas pipes, metal electrical conduit. Accidental contact between the grounded metal object and the circuit under test can be lethal.
3. Always use only well-insulated test leads. Never use test leads without insulated test prods. Never allow your fingers to touch the bare metal part of the test probes (or circuit points).
4. Never use test leads with frayed or broken insulation; voltages will appear at all exposed contact points on the leads.
5. Never attempt to measure voltages or currents above the specified maximum the meter is designed for; refer to the specifications section.

6. For safety's sake, disconnect leads as soon as you've completed measurements.

7. Always turn off the unit's power before connecting test leads. This is especially true when working on circuits with 100 or more volts.

8. Get into the habit of keeping one hand in your pocket when trouble-shooting any equipment containing high voltage circuitry. Using only one hand decreases the chance of electric shock.

9. You should remember that even a small shock can be dangerous, for your body's reaction to a minor shock can cause you to bump or fall against a higher-voltage contact.

10. Discharge filter capacitors before connecting test leads: such capacitors can retain hazardous charges in units with high voltage circuits.

11. When making voltage and current measurements always start with the highest range available.

12. Never attempt to measure a voltage when the function is set to resistance or current. (It may burn out the meter movement or other circuitry.) Never attempt to measure current with the meter set for resistance.

13. Never attempt to measure AC voltages or current with the meter set to a DC mode. (Meter circuitry can be damaged.)

14. Do not attempt to measure RF voltages with the meter. (It can be damaged or, at best, the readings will be meaningless.)

15. Do not expose your meter to moisture; avoid high humidity and excessive dust and dirt.

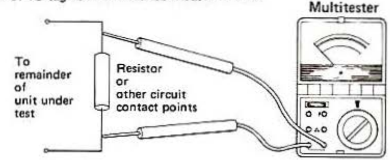
16. Avoid vibration or mechanical shock; the Meter might be damaged or its accuracy affected.

17. Avoid using meters in locations with high magnetic fields. (Inaccurate measurements can result.)

18. Remember that voltage and resistance measurements are made with the Meter connected in parallel. Current measurements are made with the meter connected in series.

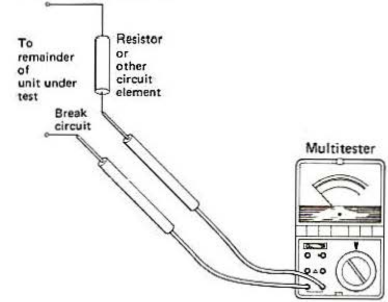
PARALLEL METER CONNECTION

For voltage and resistance measurements



SERIES METER CONNECTION

For current measurements



RADIO SHACK LIMITED WARRANTY

This product is warranted against defects for 90 days from date of purchase from Radio Shack company-owned stores and authorized Radio Shack franchisees and dealers. Within this period, we will repair it without charge for parts and labor. Simply **bring your Radio Shack sales slip** as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover a product subjected to misuse or accidental damage.

EXCEPT AS PROVIDED HEREIN, RADIO SHACK MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

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