

# MEDITRON

Model R-77

## INSTRUCTIONS

MULTITESTER

BOBINA MOVIL  
protegida contra sobrecargas

I

## DESCRIPTION

The R-77 Multitester is a high-sensitivity instrument designed for use in the electronics laboratories and service shops. The voltage, current and resistance ranges have been selected for maximum usefulness. It is well suited for measurements of the low DC voltages which are encountered in testing transistorized circuits, the lowest range is 0.1 DC volt full scale. A feature included is the scales for testing diodes and other non-linear devices. Capacitance measurements can be made in conjunction with an external AC source.

## SPECIFICATIONS

DC Voltage	0-0.1-0.5-5-50-250-500-1,000 volts at 20,000 $\Omega$ /V.
AC Voltage	0-2.5-10-50-250-1,000 volts at 10,000 $\Omega$ /V.
DC Current	0-50-500 $\mu$ A; 0-5-50-500mA.
OHMS	X $\frac{1}{5}$ , X1, X10, X100, 1K. (6, 30, 300, 3K, 30K at center scale ; separate scales for voltage drop and current in load).
Capacitance	0.02 to 0.0001 $\mu$ F, with external 50V AC.
Power Level	-20 to +10dBm (1mW, 600 $\Omega$ ).
Batteries	2 ea. : Type Z, UM3 or equivalent, 1.5V cells.
Accessory	1 pair Test leads.

## MEASUREMENTS

Preparation Insert the BLACK test lead in the "-" jack and the RED test lead in the "+" jack (the jacks are located at the lower left and right respectively).

### DC Voltages :

The DCV ranges are indicated along the left side on the panel.

1. Set the selector at the expected range . If the magnitude is not known, start from 500V and lower the range as required to obtain a reading reasonably high up on the scale. This procedure will prevent overloading the meter and possible damage.

2. Connect the test leads across the circuit under test, red to plus and black to minus sides.  
If the pointer swings in the opposite direction, reverse the connection to the circuit.
3. The scale markings to be read will depend on the ranges; use of the following chart will be found convenient.

RANGE	SCALE		V/division
	AC	DCmA	
500V	0- 50		10
250	0-250		5
50	0- 50		1
5	0- 50	0.1	0.1
0.5	0- 50	0.01	0.01
0.1	0- 10	0.001	0.001

4. For measurement of voltages between 500 and 1,000 volts, set the selector at 500V and insert the RED test lead in the +DC 1kV jack at the upper right side. The 0-10 markings on the AC DC mA scale are multiplied by 100; each division represents 20 volts.

#### AC Voltages :

The ACV ranges are indicated along the right side on the panel. For the full scale ranges 10V and higher, use the AC DC mA scale and the same figures for the DC ranges.

A separate scale and markings are provided for the 0-2.5 volt range, i.e., AC 2.5V.

1. Set the selector at the expected range. If the magnitude is not known, start from the 1000V range and work down.
2. Connect the test leads across the circuit under test.  
The polarities are not important but it is good practice to use the black test lead for the lower potential or the grounded side in the circuit.
3. The scale figures to be read will depend on the ranges as shown in the following chart.

RANGE	SCALE		V/division
	AC	DCmA	
1000V	0- 10		20

III

3. The scale figures to be read will depend on the ranges as shown in the following chart.

RANGE	SCALE AC DCmA	SCALE MULTIPLIER	V/division
1000V	0- 10	100	20
250	0-250		5
50	0- 50	1	1
10	0- 10	1	0.2
2.5	0-2.5 on AC 2.5V	1	0.05

III

#### DC Currents :

The full scale DC current ranges are indicated along the lower side on the panel.

All ranges are read on the AC DC mA scale using the U-50 figures.

1. The test leads are connected in series with the resistor or circuit under test.

Before the measurement, always turn off the power; this is important for safety.

2. Connect the red test lead to the plus side and the black test lead to the minus side.

3. Set the selector at the expected range. If the magnitude is not known, start from 500mA and work down.

If the pointer swings in the opposite direction, turn off the power, reverse the connections and turn on the power again.

4. When using the  $50\mu\text{A}$  range, selector at 0.1DCV, check the circuit to make certain that the current is in the microampere range.
5. The application of the scale multiplier will depend on the range in use as shown in the following chart.

#### Resistance :

RANGE	SCALE AC DCmA	SCALE MULTIPLIER	(mA or $\mu\text{A}$ ) /division
$500\mu\text{A}$		10	10mA
50mA		1	1mA
5mA	0-50	0.1	0.1mA
$500\mu\text{A}$		10	$10\mu\text{A}$
$50\mu\text{A}$ (0.1DCV)		1	$1\mu\text{A}$

IV

For the ohmmeter use (resistance measurement) the  $\Omega$  ranges indicated along the upper side of the panel are used in conjunction with the R scale (two upper arcs on the dial).

The ranges are marked X1, X10, X100 and 1k which are the multipliers for the "R" scale. The X1/5 range is read direct on the top markings.

It will be noted that above the range markings, the current figures for L.I are given in mA and  $\mu$ A. These are the "short circuit" current values when the test lead tips are connected together and will be explained in the NOTES FOR DIODE TESTING.

1. "O ADJ" adjustments.

When the selector is set at one of the  $\Omega$  ranges, connect the tips of the test leads together. The pointer will swing towards the right on the dial.

Adjust the 0 ADJ control at the upper left on the panel so that the pointer is set at the 0 mark at the right end on the R scale. Disconnect the tips after this test.

This adjustment must be made each time the range is changed; however it will be found that when the adjustment is made at the lower ranges, very little adjustment is required on the higher ranges provided the batteries are fresh.

2. NOTE: When the "0 ADJ" test described above fails to bring the pointer to the 0 mark, replace the internal batteries. The cover is removed by unscrewing the two side screws. Observe the proper polarities when installing, center cap (+) to the terminal with the white-red connection wire.

3. Connect the test leads across the resistor, device or circuit under test.

When the resistor is in a wired circuit, make certain that power is turned off.

VI

4. The selector settings shown in the following chart are suggested for ease and accuracy in the read-out.

RANGE	RESISTANCE in OHMS	SCALE MULTIPLIER
X $\frac{1}{5}$	0-20	1 on top markings
X1	up to 100	1
X10	up to 1000	10
X100	up to 10,000	100
X1K	over 5K to 1M	1K

#### NOTES FOR DIODE TESTING :

- a. This Multitester can be used in the determination of the approximate values of the forward and reverse currents for diodes. This feature will be found to be very convenient in checking and also to identify the polarities of unmarked diodes and rectifiers.

The procedure is identical with that for the resistance measurements and will be outlined below.

- b. There are two scales, L.V and L.I, just below the AC 2.5 V scale. These indicate the Load Voltage, L.V, and the Load current, L.I respectively.

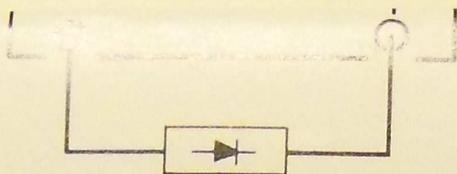
By reading these scales it is possible to measure the voltage and current applied to the diode under test.

The L. V scale is marked from 1.5 (volt) to 0 and the reading indicates the voltage drop across the diode.

The L. I scale is marked from 0 to 50 to indicate the current flowing in the diode at the indicated voltage on the L. V scale. The full scale value corresponds to the current figures indicated above the  $\Omega$  range markings.

- c. The diode connections are shown in the drawing for the forward direction; the current will be higher than when connected in the reverse mode. A good comparison of the "rectification efficiency" can be made easily.

The maximum applied voltage is 1.5 volt (internal batteries are connected in parallel) at 0 current.



d. Examples.

In the chart given below, the values of the voltages and currents are listed at the center of the scales.

$\Omega$ RANGE	L.V(volt)	L.I(current)	STATIC RESIS.
$X\frac{1}{5}$ (250mA)	0.75	125mA	$6\Omega$
X1 (50 mA)	0.75	25mA	30
X10 (5 mA)	0.75	2.5mA	300
X100(500 $\mu$ A)	0.75	250 $\mu$ A	3K
X1K(50 $\mu$ A)	0.75	25 $\mu$ A	30K

In the STATIC RESISTANCE column, the readings on the  $\Omega$  scales are indicated. These values should not be confused with the dynamic resistances which are very different.

**Capacitance:**

For determining the capacitance of tubular, ceramic capacitors, etc., in the range, 0.02 to 0.0001 $\mu$ F, an external AC source at 50V, 50 or 60Hz, is required.

1. Set the selector at 50ACV.
2. Connect the test leads across the AC source and adjust to exactly 50 volts (full scale).
3. Disconnect one test lead and connect to one terminal of the capacitor.  
Connect the other terminal of the capacitor to the AC to form a closed circuit.
4. Read the capacitance on the scale marked for the frequency of the local AC line.

**Power Level:**

The lowest scale, -20 to +10dBm, on the dial is calibrated for the reference 0dBm = 1mW in a 600 $\Omega$  line.

This range is used with selector set at 2.5ACV.

The dBm ranges can be increased by setting the selector at 10

VIII

**Power Level:**

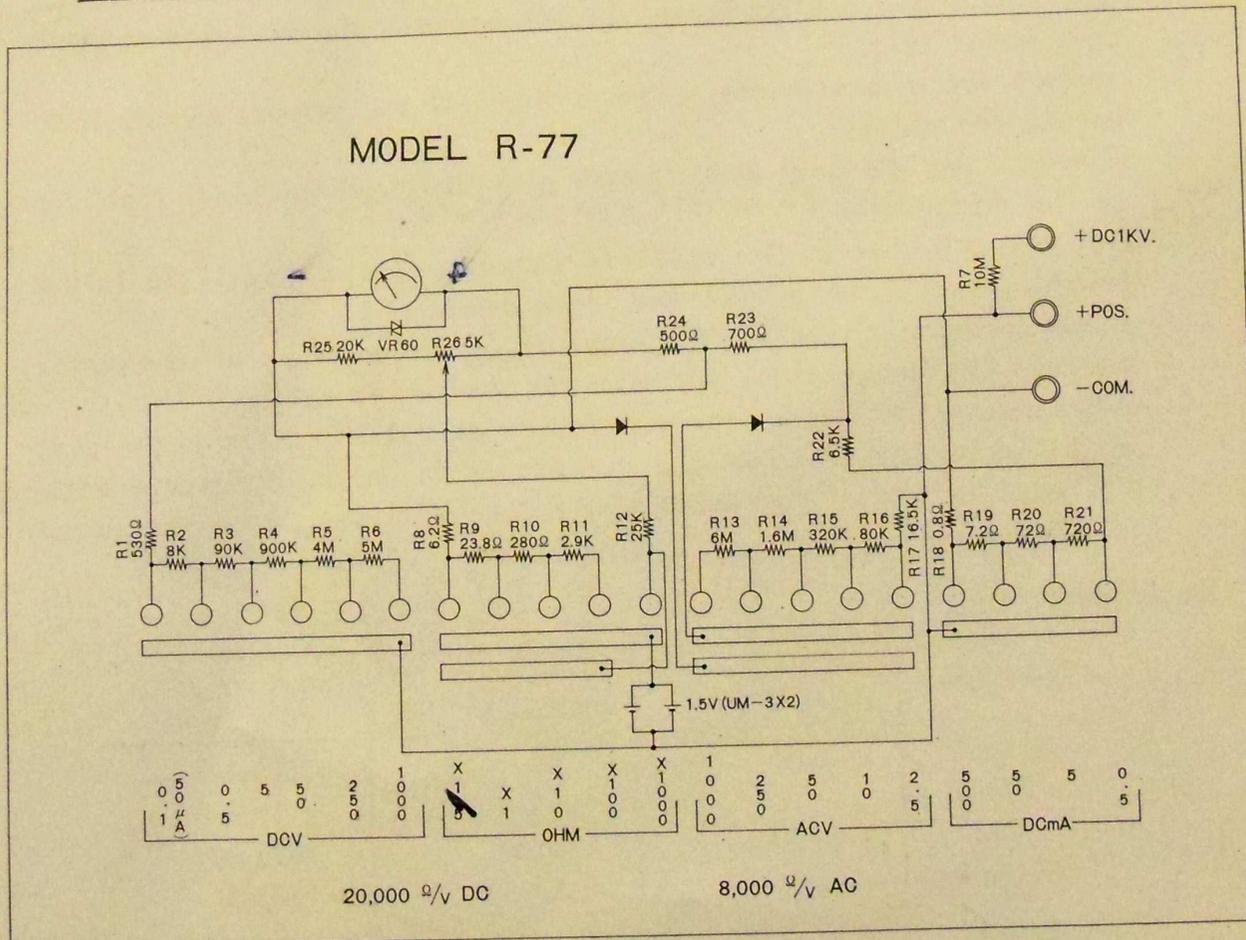
The lowest scale, -20 to +10dBm, on the dial is calibrated for the reference 0dBm = 1mW in a 600Ω line.

VIII

This range is used with selector set at 2.5ACV.

The dBm ranges can be increased by setting the selector at 10 and 50ACV, and adding 12 or 26 respectively to scale readings, see below.

RANGE, ACV	ADD dB	POWER LEVEL RANGE
2.5	0	-20 to +10 dBm
10.	12	-8 to +22
50.	26	+6 to +36



IX