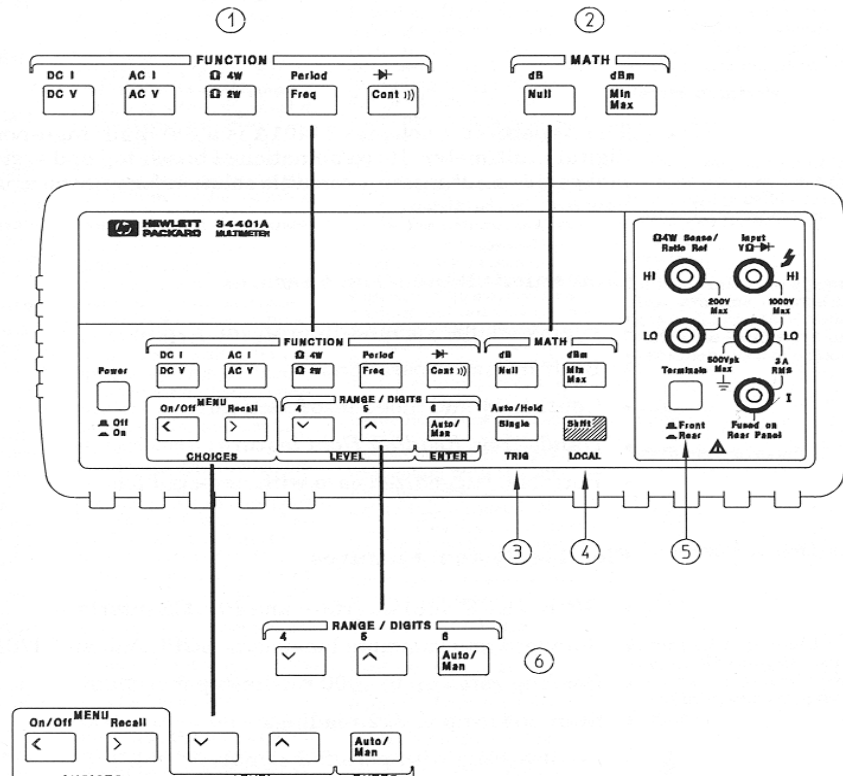


Excerpts from: "An Introduction to Using the Agilent 54622D Digital Oscilloscope, E3631A DC Power Supply, 34401A Digital Multimeter, and 33220A Arbitrary Waveform Generator"
 by Walter Banzhaf, University of Hartford, Ward College of Technology, USA

Part Four - The Agilent 34401A Digital Multimeter

1. Measuring DC and AC Voltage
2. Measuring Resistance
3. Measuring Current

Part Four – The Agilent 34401A Digital Multimeter



- | | |
|---------------------------------------------------|-------------------------------------------|
| 1 Measurement Function keys | 5 Front / Rear Input Terminal Switch |
| 2 Math Operation keys | 6 Range / Number of Digits Displayed keys |
| 3 Single Trigger / Autotrigger / Reading Hold key | 7 Menu Operation keys |
| 4 Shift / Local key | |

The DMM (digital multimeter) is a very important laboratory instrument. This section will show you how to make three of the basic measurements: voltage, resistance and current. The 34401A has many capabilities beyond measuring V, R and I; consult the Agilent User's Guide for information on measuring frequency, period, continuity & diodes, and using the many features and functions of this DMM.

When you turn the DMM on, it will be in the "Power-On and Reset State":

Function = DC volts

Input resistance = 10M Ω (may be changed to 10G Ω ! for 100 mV, 1 V, & 10 V DC ranges)

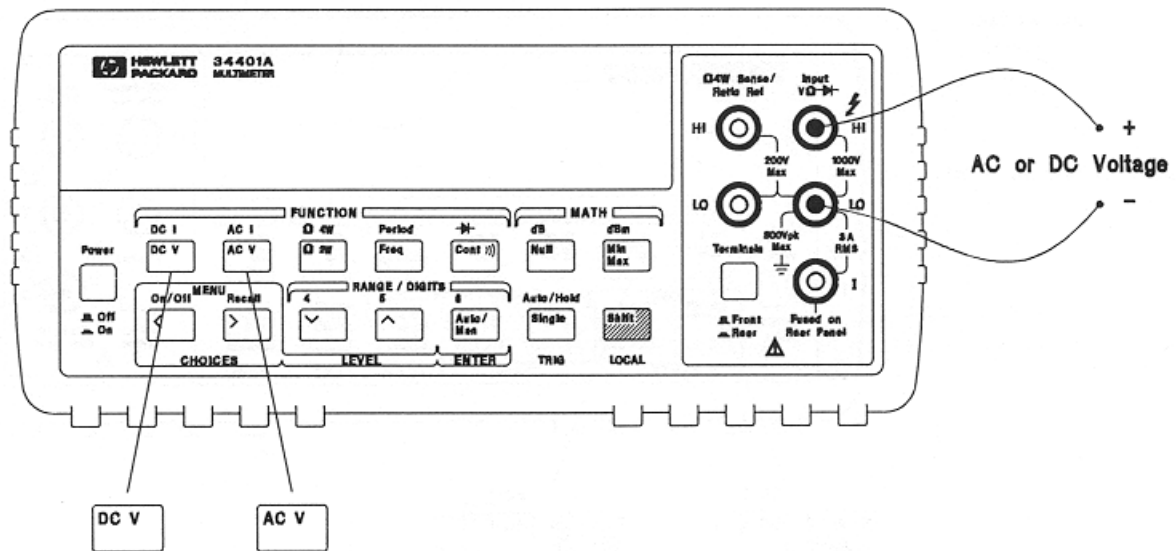
Range = Autorange
Resolution = 5½ digits

To Measure Voltage

Ranges: 100 mV, 1 V, 10 V, 100 V, 1000 V (750 Vac)

Maximum resolution: 100 nV (on 100 mV range)

AC technique: true RMS, ac-coupled



Measuring DC and AC Voltage

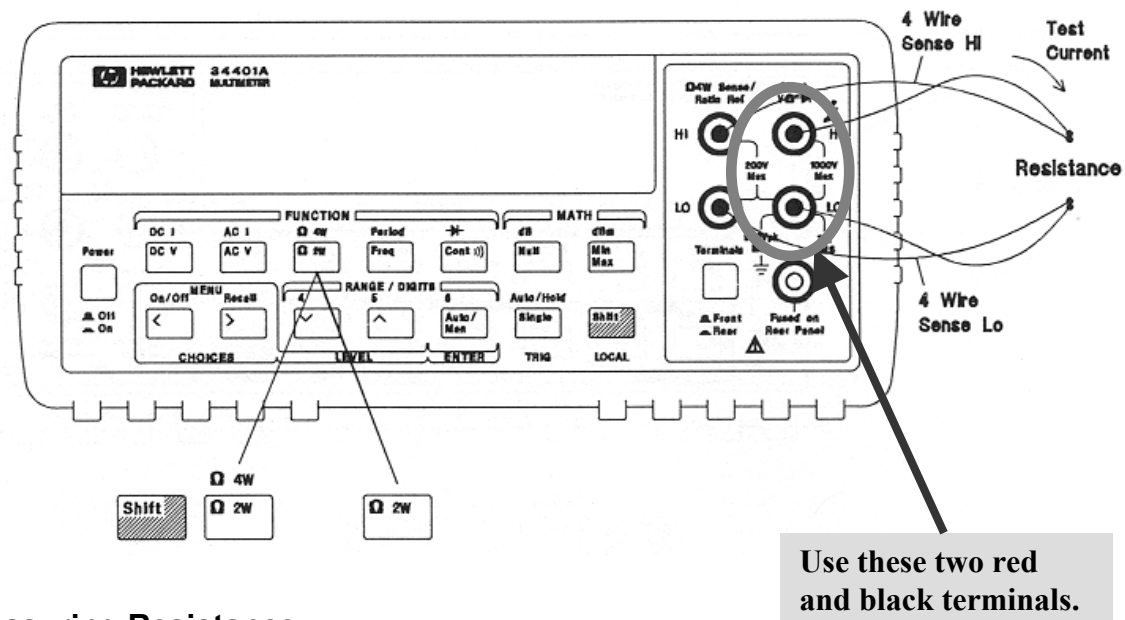
Key points:

- You **must insert the voltmeter leads across** the two points in a circuit for which you want to measure the voltage. Use the red and black input jacks as shown below.
- You *can* use the rear panel red and black input jacks also (be sure to select front or rear).
- If you use front and rear, you can easily and quickly select one of two voltages.
- The DMM will **Autorange**, unless you override it by selecting a range.
- You can choose the number of digits displayed, using the **DIGITS** buttons.
- Be sure to select **DC V** or **AC V**, as needed.
- AC voltage displayed is the true RMS value of the waveform.
- AC voltage is accurate to less than 1% up to 100 kHz.
- Input impedance for AC V is 1M Ω in parallel with 100 pF (not including test leads).
- Input resistance for DC V is 10M Ω, unless changed to 10G Ω ! for 100 mV, 1 V, & 10 V DC ranges

To Measure Resistance

Ranges: 100 Ω , 1 k Ω , 10 k Ω , 100 k Ω , 1 M Ω , 10 M Ω , 100 M Ω

Maximum resolution: 100 $\mu\Omega$ (on 100 ohm range)



Measuring Resistance

Key points:

- **NEVER** measure resistance in a "live" circuit. Turn off all power to the circuit.
- If an ohmmeter is used in a "live" circuit, at best you will get incorrect readings; at worst you can seriously damage the DMM.
- You **must insert the ohmmeter leads across** the two points in a circuit for which you want to measure the resistance. Use the red and black input jacks as shown below.
- Use the red and black input jacks (on the right) as shown below.
- You *can* use the rear panel red and black input jacks also (be sure to select front or rear).
- If you use front and rear, you can easily and quickly select one of two voltages.
- The DMM will **Autorange**, unless you override it by selecting a range.
- You can choose the number of digits displayed, using the **DIGITS** buttons.
- Be sure to select **Ω 2W** (ohms, two-wire).
- **Ω 4W** (ohms, four-wire) is a more complex measurement that gives greater accuracy by eliminating the contact resistance (of the leads to the device under test).
- Make sure your hands don't contact both test leads; if they do, then you're measuring the device under test in parallel with **you**.

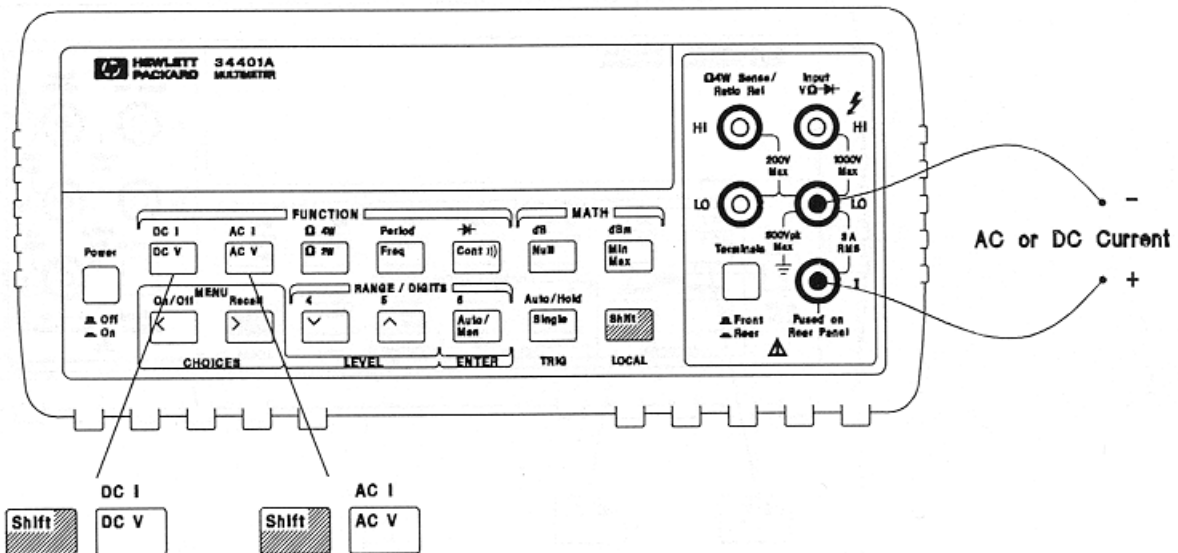
- See User's Guide page 216 for the test current for each resistance range.

To Measure Current

Ranges: 10 mA (dc only), 100 mA (dc only), 1 A , 3 A

Maximum resolution: 10 nA (on 10 mA range)

AC technique: true RMS, ac-coupled



Measuring Current

Key points:

- You **must insert the ammeter leads in series** to measure current in a circuit.
- Use the red and black input jacks (on the right) as shown below.
- You *can* use the rear panel red and black input jacks also (be sure to select front or rear).
- If you use front and rear, you can easily and quickly select one of two currents.
- The DMM will **Autorange**, unless you override it by selecting a range.
- You can choose the number of digits displayed, using the **DIGITS** buttons.
- Be sure to select **DC I** or **AC I** to measure DC and AC current.
- See User's Guide page 216 for the "Burden Voltage" for each current range.