MULTIMETER- DIFFERENT MODES AND WHOLE FUNCTIONALITY

SET-1

Figure 1. A Multimeter

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Ports in a Multimeter

There are generally 3 ports in a multimeter, the COM port where by convention black probe is inserted, and for normal testing, the red probe is inserted to the VΩmA port. In case we wish to measure currents in the range of 200mA and 10A, we use 10A port.

DC Voltage Measurement

Plug the black probe into COM and the red probe into VΩmA. Since the multimeter is not auto ranging, we have to set the range according to the expected output value. For example, use 2000 mV if you are expecting voltage output value somewhere near 2000mV but less than this.

Remember to set the multimeter knob to the DC Voltage measurement. DC Voltage setting can be easily known by seeing the parallel line and dotted line beside the V symbol.

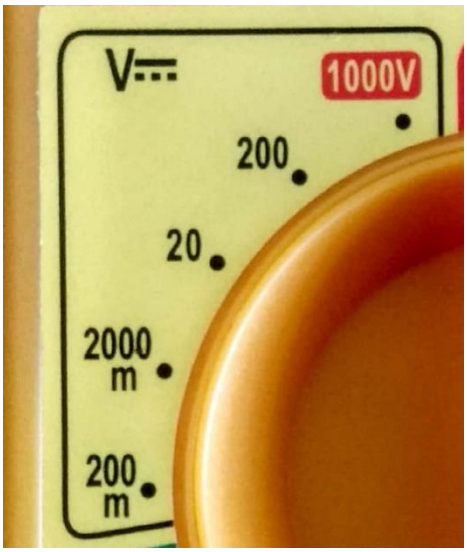

Figure 2. DC Voltage setting on the multimeter

If we switch the red and black probes, the reading on the multimeter becomes negative.

If we use a very low range setting on the multimeter, the multimeter displays 1, meaning out of range. We change the knob to the next higher setting such as 200mV or 2000mV mode.

AC Voltage Measurement

Connect the red test lead to the jack and the black test lead to the COM jack. Set the range switch to the desired range. Connect test leads across the device or circuit to be measured and read the voltage value on the LCD display.

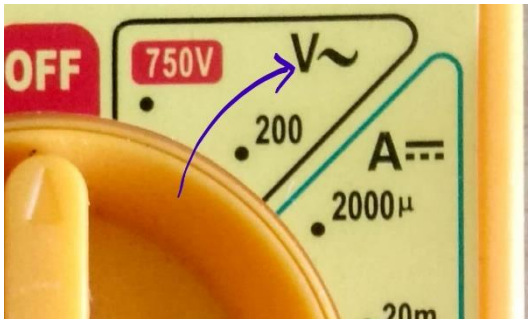

Figure 3. AC Voltage setting on multimeter

Resistance Measurement

To get the value of resistor, we set the knob to one of the resistance range, preferably 20k to start with.

If the meter reads 0.85, meaning this resistor has a value of 850Ω. The range setting is in kΩ, so we have to multiply the output value by 1000.

If the multimeter reads 1, it's overloaded. We have to set to a higher mode such as 200kΩ mode or 2000kΩ mode.

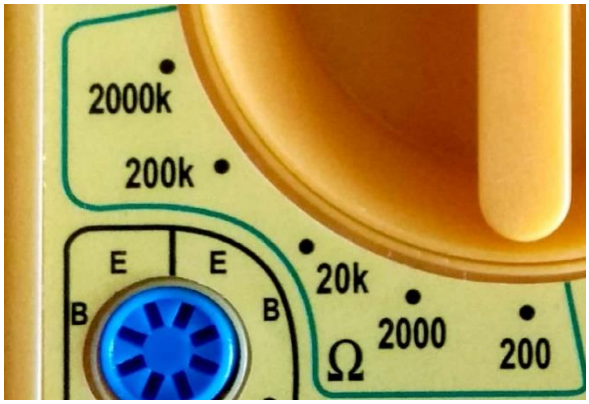

Figure 4. Resistance setting on the multimeter

If the multimeter reads 0.00 or nearly zero, then you need to lower the mode to 2kΩ or 200Ω**.**

Measure resistance of a resistor when it is not physically connected to the circuits as it can vary the value.

Current Measurement

While measuring Voltage between any component in a circuit, we connect the multimeter in parallel, but to measure Current, we have to connect multimeter in series. We need to interrupt the circuit to measure current.

Figure 5. Current setting on multimeter

Set the knob to the Ampere measurement setting. Start with 200mA setting, current is usually lower than this in normal circuits. If you get 1 or 0 as output, we have to shift the setting to higher and lower mode respectively.

However, if we suspect that the circuit will be using close to or more than 200mA, switch the probe to the 10A side, just to be safe. Overloading the current can result in a blown fuse rather than just an overload display.

Diode and Continuity Measurement

Set the range switch to the diode symbol range. Connect the red probe lead to the anode of the diode to be tested and the black probe lead to the cathode of the diode. The approximate forward voltage drop of the diode will be displayed in mV.

If the connection is reversed, only 1 will be shown on the display.

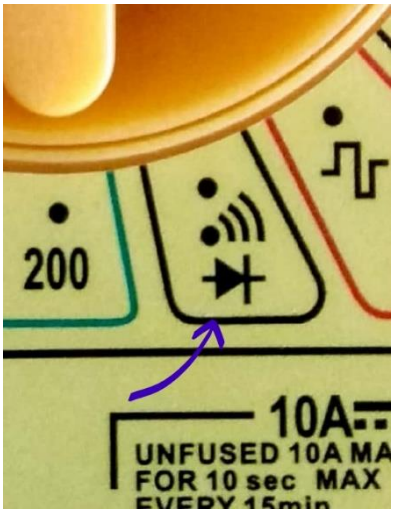

Figure 6. Diode and Continuity measurement

Connect the probe leads to the two terminals of the circuit to be tested. If the resistance is lower than about 50Ω, the built-in buzzer will sound.

In general, turn off the system before checking continuity.

In the case of systems with capacitors, we may hear a small ‘beep’ which lasts for a moment. This is because the capacitor acts as short while being charged and then it acts as an open connection.

Transistor Measurement

Set the range switch to the hFE range. Determine whether the transistor to be tested is PNP or NPN type and locate the emitter, base, collector leads. Insert the leads into the proper holes of the hFE socket on the front panel. The meter will display the approximate hFE value.

Figure 7. hFE measurement of transistor, arrow indicates the location of insertion of diodes

Changing the Fuse

The DT830D series does not contain a fuse, it is rather shorted. But for other multimeters, to change the fuse, remove the old fuse with a fresh one of same rating (usually F 250mA/250V) after opening the case of the multimeter.

Figure 8. Fuse area in a multimeter