Miniboard Parallel Circuit Trainer

Operating Manual

General Information

Each Miniboard comes complete and is fully functional when a 9 volt battery is installed, the green power light will illuminate. The Green light is a reminder that when finished with the simulator the battery should be removed.

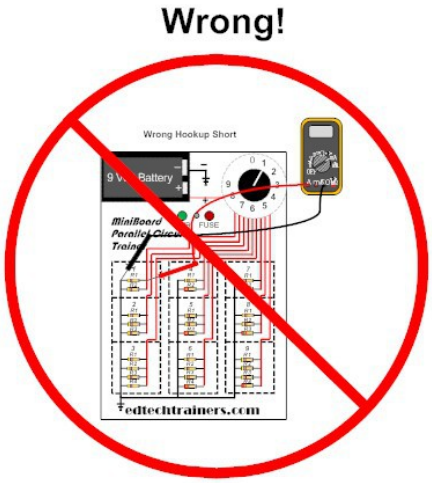
Each Miniboard has a “fuse” circuit. When a power circuit is shorted an onboard PTC rated at 350 miliamps(under the amperage rating of most meters, the PTC will open and the red light will come on if multimeter is hooked up wrong, which will save the multimeters fuse and avoid any damage to the miniboard. When the circuit is shorted the PTC opens and the path is altered to the RED LED which will illuminate as long as the short exists. When the short is removed the RED LED will go out and the circuit resumes normal function.

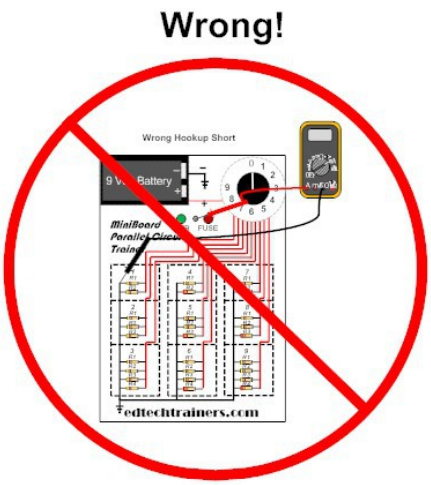
Each Miniboard, in order to maintain more accuracy, contains an onboard Constant Voltage Regulator which maintains a constant voltage of 5 volts. The 9 volt battery will maintain a constant 5 volts supply to the switch input and to selected practice circuit. This will allow the 5 volts supply even if the battery drops as low as 7 volts.

Each Miniboard contains a 10 position switch with positions from 0 to 9. This allows the user to select one of nine practice circuits. The Miniboard is laid out from Left to right with practice circuits numbered 1 through 9. Miniboards come in three different types of circuits S= Series, P= Parallel, and SP= SeriesParallel. This board is the ‘Parallel”’ board and the circuits will be referred to practices P1, P2, P3 and so on. When referring to specific resistors R1, R2, R3 and so on.

Measuring Parallel Current:

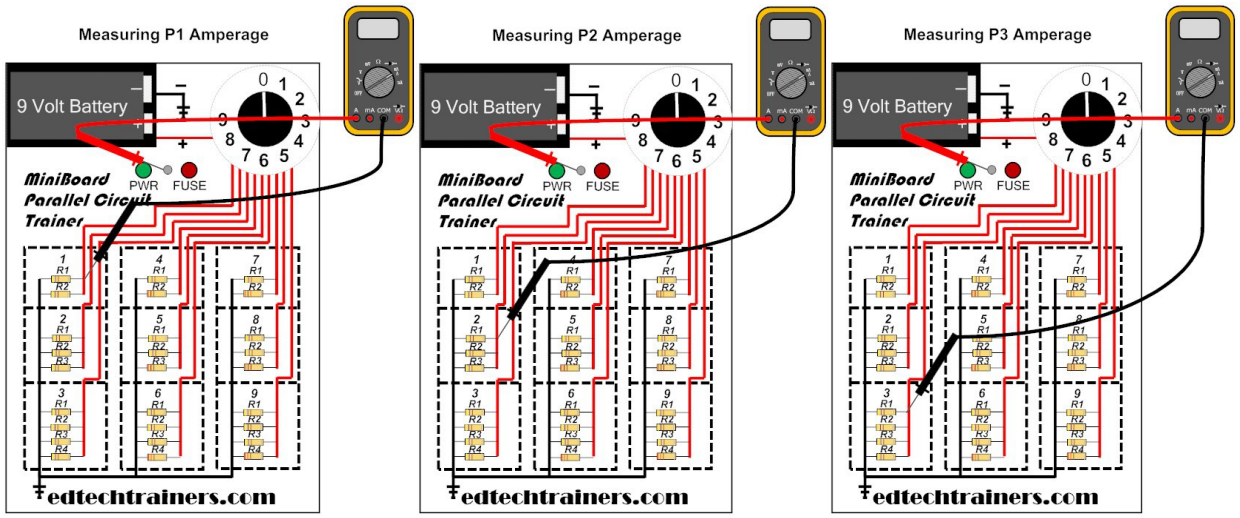
This method is used due to the fact that the Miniboard operates on 5 volts constant supply to the switch, the circuit operates on 5 volts but the Miniboard is supplying a 9 volt supply to the CVR, which then supplies a regulated 5 volts to the rotary switch. In order to hook an ammeter in series with the 5 volt power supply a port has been provided to the 5v B+ positive terminal. This allows for easily hooking a meter in series with each circuit. This port is protected with a 350 milliamp PTC fuse. Most meters are fused on the milliamp setting is 500 milliamps. If the meter is hooked incorrectly the circuit will open until the short is corrected. Since the open will occur at 350 miliamps this should protect the internal meter fuse in most meters.





When measuring current flow on each circuit the Switch should be in the “0” position so that power supply is open to the input of each circuit. This switch should remain in the “0” position for all current measurements. Figure 1 below shows how current measurement should be taken.

FIG 1.

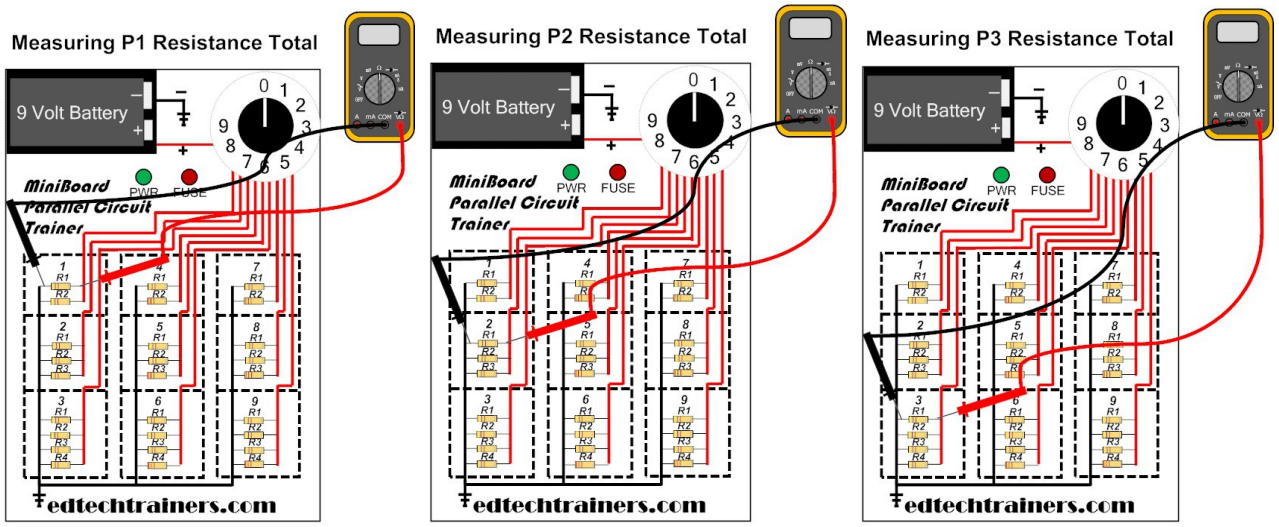


and so on……..

Measuring Parallel Resistance

Measurements are taken with the Rotary Switch in the 0 position. In a Parallel circuit measuring resistance for each individual resistor is not possible to measure, only total resistance “Rt” can be measured for each individual circuits.

In order to take resistance readings on each circuit the Rotary Switch must be placed in the “0” position. When hooking up the meter leads it does not matter which position the Red and Black leads are placed, polarity does not matter. For the example however it is a good practice to get used to hooking the leads up as usual. This is shown in Fig 2.

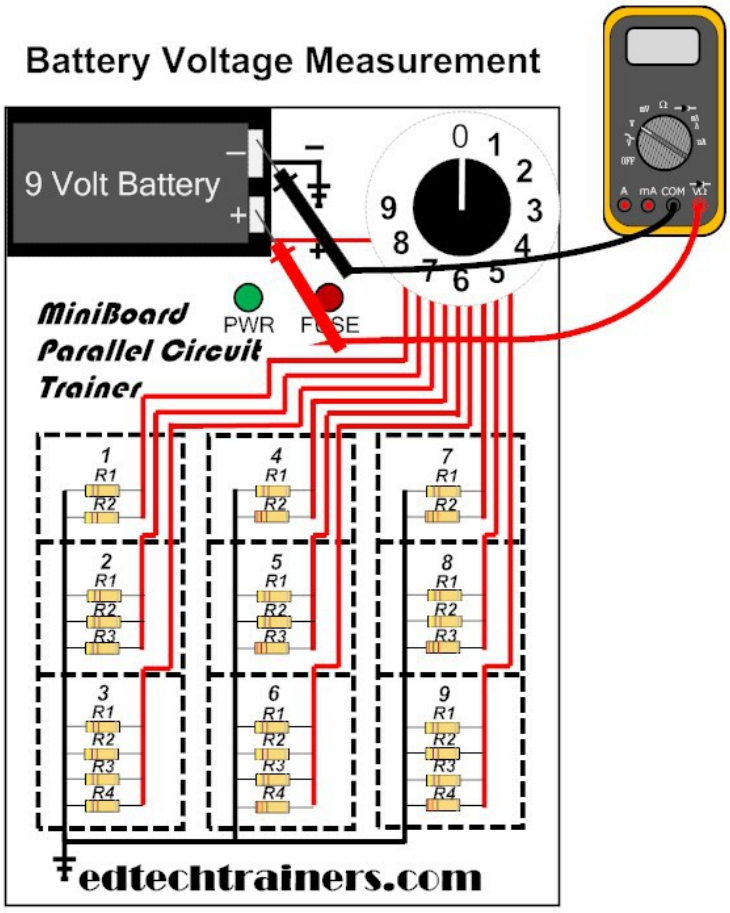


and so on……..

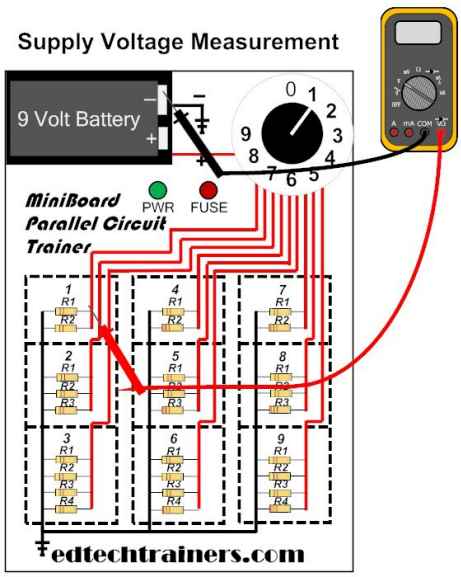
Measuring Parallel Voltage

In order to take voltage measurements it is necessary to power up each individual circuit using the Rotary switch, which applies a regulated 5 volt to the selected circuit.

Measuring Battery Voltage Place Negative lead on the battery negative terminal, and the positive lead on the positive post of the battery (See Fig 5)



Measuring Supply Voltage to the circuit, Place negative lead on the negative battery terminal and the other to the top of the selected circuit Fig 6



Measuring P1 Total Voltage Drop

Measuring P2 Total Voltage Drop

Measuring P3 Total Voltage Drop

and so on……..

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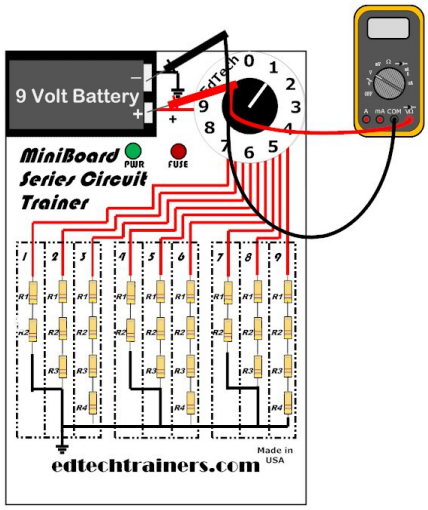
Measuring Voltage Drop;
R1 Voltage Drop Measurement Fig. 7
R2 Voltage Drop Measurement Fig 8
Total Circuit Voltage Drop Measurement Fig 9

When ready to measure another circuit, move the rotary switch to the next circuit you would like to measure, 1 through 9

Fig. 5



Fig, 6

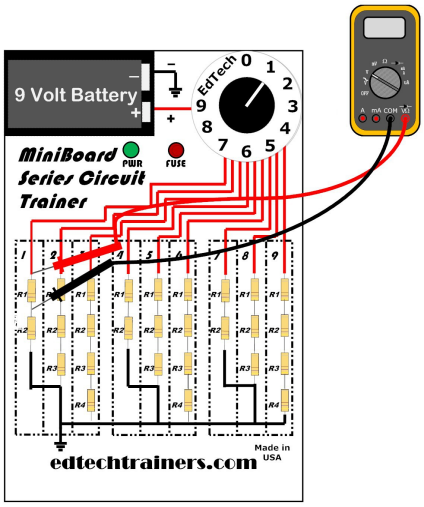
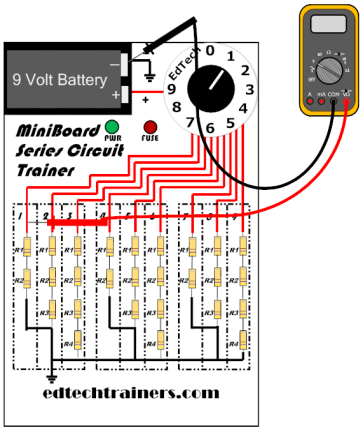


Fig. 7



Fig, 8

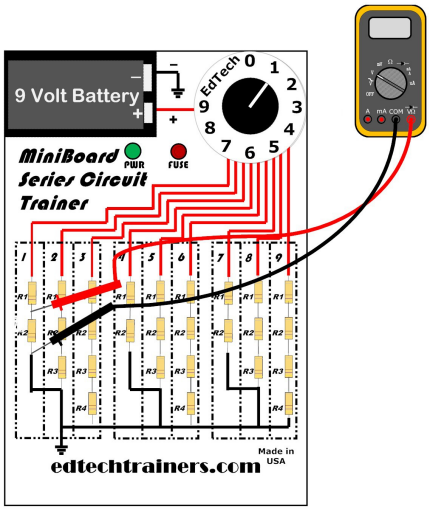
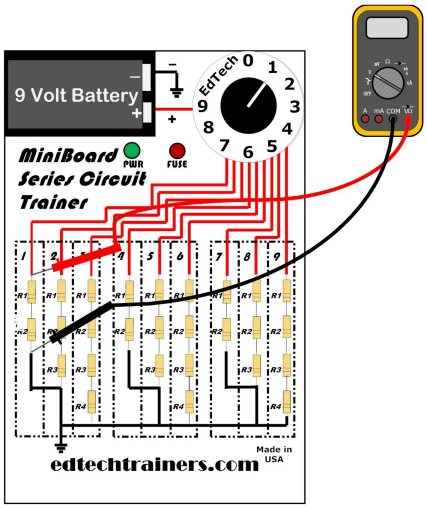


Fig. 9



Each Miniboard includes the following Documents:

- Ohms Law Calculation Worksheets and Answer Keys
- Meter Reading Worksheets and Answer Keys
- Current Measurement Procedures information
- Resistance Measurement Procedures information
- Voltage Measurement Procedures information
- Instructor Guide