

I. Purpose.

1. Review the measurement of DC current in a DC series/parallel circuit.
2. Review the calculation of real power supplied and real power dissipated in a DC series/parallel circuit.
3. Introduce the concept of Thevenin's Theorem for determining the Thevenin equivalence of a DC series/parallel circuit from the standpoint of a two-terminal load.

II. Equipment.

Agilent 34401A Digital Multimeter (DMM)
Agilent E3620A Dual DC Power Supply
Quad Board and Test Leads
Two 1000 Ohm resistors
1500 Ohm resistor
Two 560 Ohm resistors (R_{load})
Variable Ohm resistor

III. Preparation.

Review procedures for measuring resistance, voltage, and current.

IV. Lab Procedure.

You must read and complete each step.

Step One: Calculate $R_{thevenin}$ (R_{th}).

- For the DC series/parallel circuit in Figure 1 calculate R_{th} as seen at terminals "a" and "b" of R_{load} .

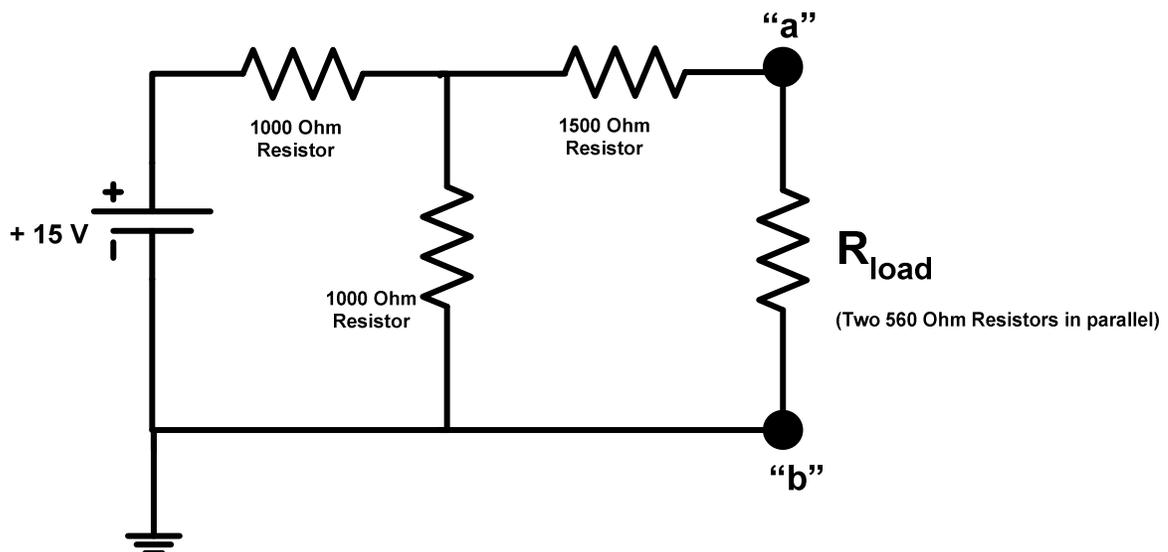


Figure 1

A Practical Exercise

$$R_{th} = \underline{\hspace{4cm}}$$

Step Two: Calculate $E_{thevenin}$ (E_{th}).

- For the DC series/parallel circuit in Figure 1 calculate the open-circuit voltage (E_{th}) across terminals “a” and “b”.

$$E_{th} = \underline{\hspace{4cm}}$$

- Sketch the Thevenin’s Equivalent circuit in the space provided below.

- If R_{load} was connected to terminals “a” and “b”, using your Thevenin’s Equivalent circuit calculate the DC current supplied to R_{load} , and the total real power supplied to R_{load} .

$$I_s = \underline{\hspace{4cm}} \quad P_{load} = \underline{\hspace{4cm}}$$

Step Three: Construct a DC series/circuit.

- Using a QUAD board construct the DC series/parallel circuit in Figure 2.

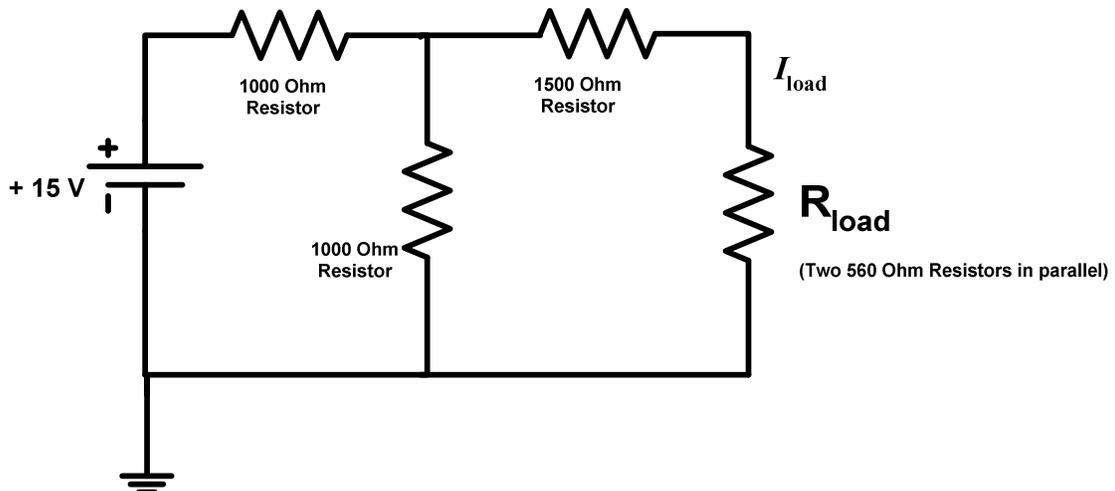


Figure 2

A Practical Exercise

Step Four: Measure DC current.

- Use the DMM to measure the indicated branch current, I_{load} , (Figure 2) for R_{load} .

	Measured current		Power dissipated by the load
I_{load}		P_{LOAD}	

- Use the measured DC current value to calculate the power dissipated by R_{load} .
- Measure the circuit's Thevenin equivalent resistance (R_{th})

$$R_{th} = \underline{\hspace{10em}}$$

Step Five: Construct your Thevenin's Equivalent circuit.

In this step we will construct another circuit on the QUAD board. You will set your variable resistor box to R_{th} and the Dual DC Power Supply to E_{th} .

- On a QUAD board construct your Thevenin's Equivalent circuit (Figure 3).

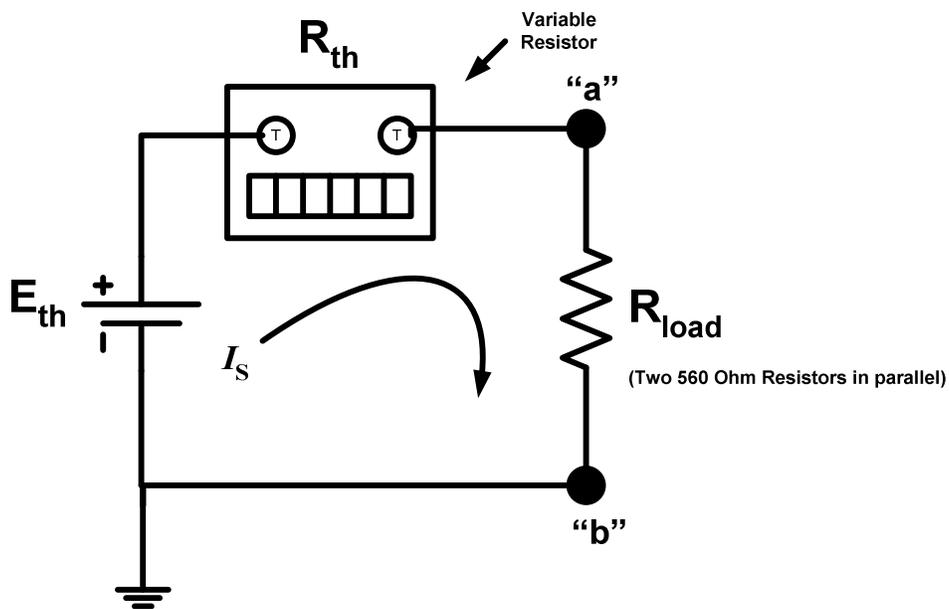


Figure 3

- Use the DMM to measure the indicated current, I_s .

A Practical Exercise

	Measured current		Power dissipated by the load
I_S		P_{LOAD}	

Does the power dissipated by R_{load} in the Thevenin's Equivalent circuit (Figure 3) equal the power dissipated by the same load in the DC series/parallel circuit (Figure 2)? _____