

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.

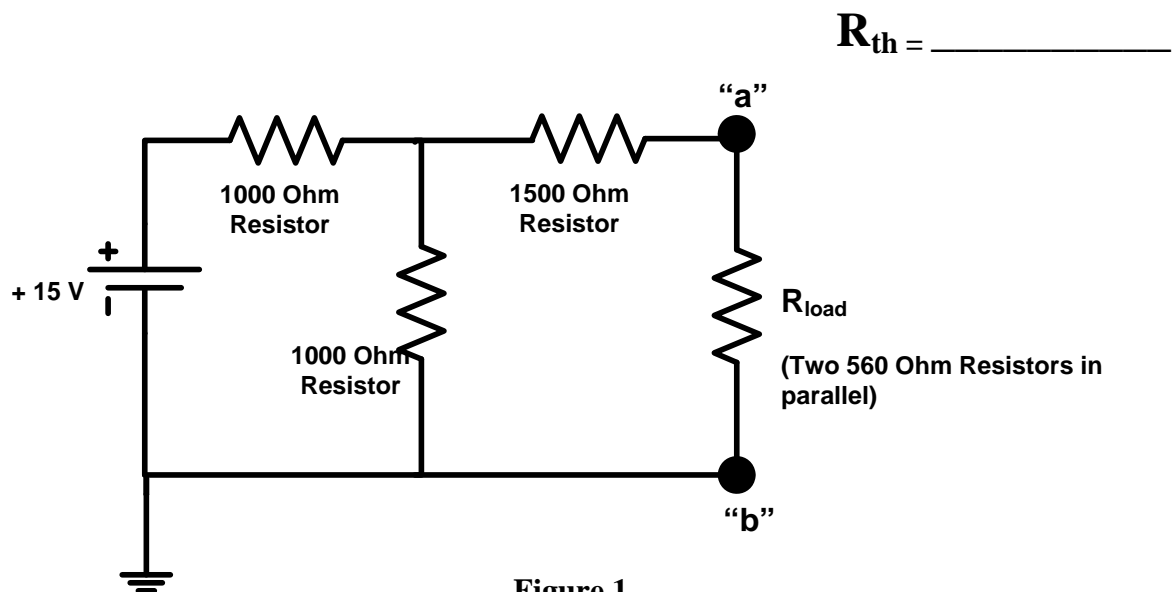
II. Equipment.

Agilent 34401A Digital Multimeter (DMM)
Agilent E3620A Dual DC Power Supply
Quad Board and Test Leads
2x1000, 1x1500, 2x560 Ohm resistors
Decade Box (variable resistor)

III. 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 the Thèvenin equivalent resistance, R_{th} , as seen at terminals "a" and "b" of R_{load} .



PE-8: Thèvenin's Theorem

Step Two: Calculate $E_{\text{Thèvenin}}$ (E_{th}).

- For the DC series/parallel circuit in Figure 1, calculate the *open-circuit voltage* (which is E_{th}) across terminals “a” and “b”. [Remember, this calculation is done with R_{load} removed.]

$$E_{\text{th}} = \underline{\hspace{2cm}}$$

- Sketch the Thèvenin Equivalent circuit in the space provided below.

- If R_{load} were connected to terminals “a” and “b”, use your Thèvenin Equivalent circuit to calculate the DC current, I_{s} , and the total real power, P_{load} , supplied to R_{load} .

$$I_{\text{s}} = \underline{\hspace{2cm}} \quad P_{\text{load}} = \underline{\hspace{2cm}}$$

Step Three: Construct a DC series/parallel circuit.

- Using a QUAD board construct the DC series/parallel circuit in Figure 2. [Remember to set the +15 V using the DMM.]

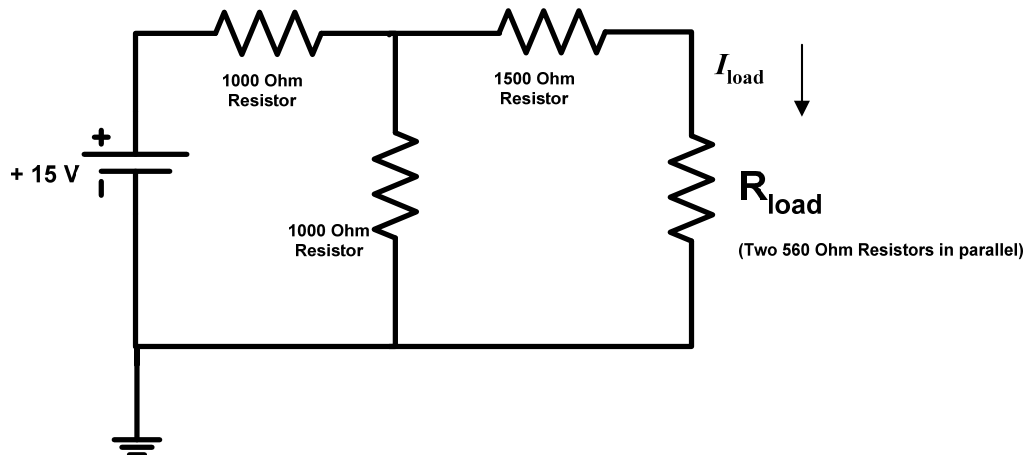


Figure 2
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PE-8: Thèvenin's Theorem

Step Four: Measure DC current.

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

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

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

$R_{th} = \underline{\hspace{2cm}}$

Step Five: Construct your Thèvenin 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} . [Remember to set the DC voltage using the DMM.]

- On a QUAD board construct your Thèvenin Equivalent circuit (Figure 3).

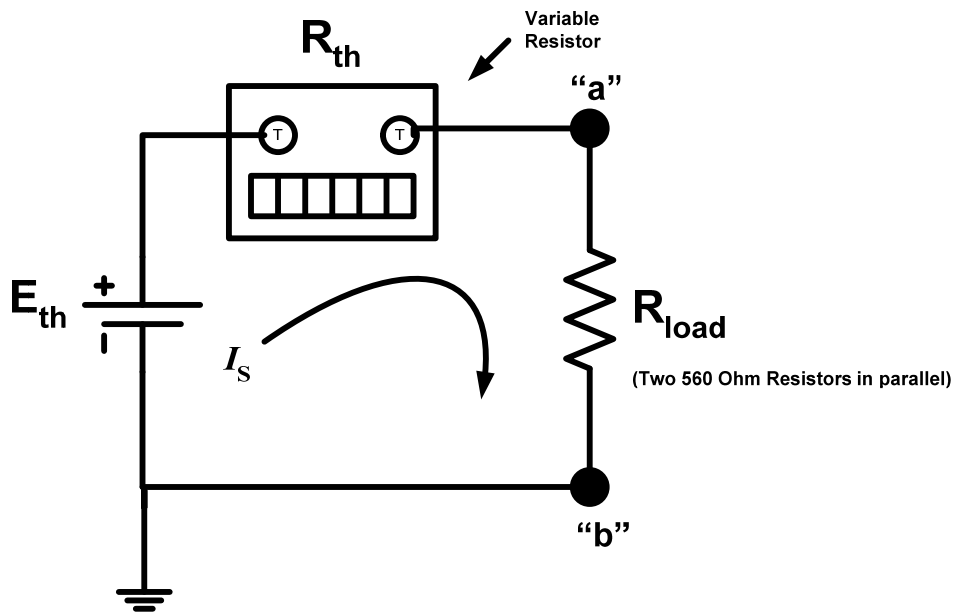


Figure 3

PE-8: Thèvenin's Theorem

- Use the DMM to measure the indicated current, I_S . Use this value of I_S and the previously measured value of R_{load} to calculate P_{LOAD} .

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

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