

Current Draw How much current will my motor draw?

Lesson 1

An important concern of any mobile robot designer is powering the vehicle. In our robot designs we are using batteries to power our robots. In this investigation you will study the affect that “work” has on current.

Students will be able to describe:

- Current flow
- The causes of excessive current flow
- How current is affected by work
- How to measure DC motor current with a multimeter

Materials needed:

- Digital multimeter
- VEX Squarebot
- Radio control transmitter
- Board or plywood (8 ft. by 12 in.)
- White foam board (8 ft. by 4 ft.) or other board suitable for drawing.
- Protractor

Set Up

1. If you are not familiar with the multimeter, go through the slide show resources/ Multimeter on the current lesson page. It will explain how to use the multimeter.
2. Plug the red wire of the multimeter into the highest current labeled. For this multimeter, it is 10 amps.



Current Draw *continued*

Lesson 1

3. Plug the multimeter's black wire into the port labeled "COM".



4. Set the multimeter's dial to the "A" which has two flat lines over it, one of them dotted. You have now set the multimeter to measure Direct Current.
DO NOT set the multimeter to the "A" which has a sine wave over it. This would set the multimeter to measure Alternating Current, which you should not do for this lesson.



Current Draw

Lesson Set Up

5. Modify the battery so that you can put it in series with the multimeter. View the crimping show if you do not have any experience stripping wires and crimping. Click resources/Crimping on the lesson page. See Figure 3 to see the finished set up.

- Cut the RED WIRE of the battery



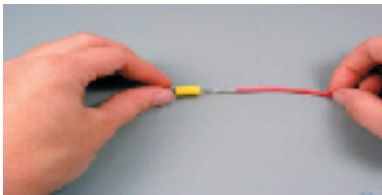
- Attach connectors to BOTH ENDS of the CUT RED WIRE. We recommend alligator clips or female spade connectors (pictured), though many others will work.



- To attach a female spade connector, strip 1-2 centimeters of the wire with an appropriate tool.



- Place the wire inside the female spade connector



- Use a crimping tool or pliers to firmly lock the spade connector to the wires.



Current Draw

Lesson Set Up

- Repeat the process of placing the wire into the spade connector and locking it with a crimping tool or pliers for the other end of the cut red wire, which will be attached to the Vex controller.
- Push the pin of the red wire of the multimeter into the connector on the red wire on the battery.



- Wrap electrical tape around any exposed metal to avoid shorting the circuit.



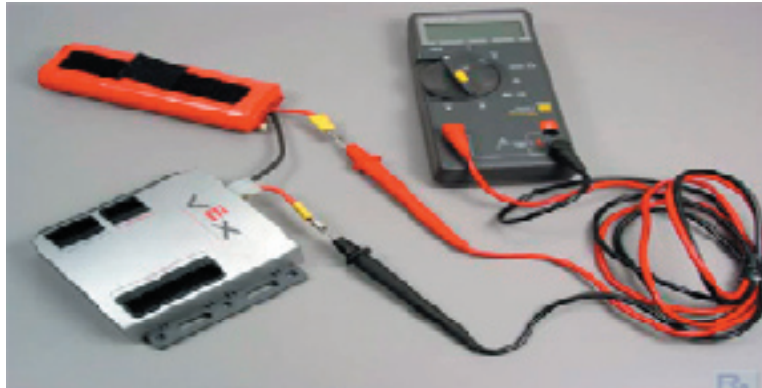
- Place the BLACK wire of the multimeter in the end of the red wire which will be connected to the Vex controller, and wrap all exposed metal on it with electrical tape also. **Note:** it doesn't matter if the pins of the multimeter are switched. This will only make your readings negative.



Current Draw

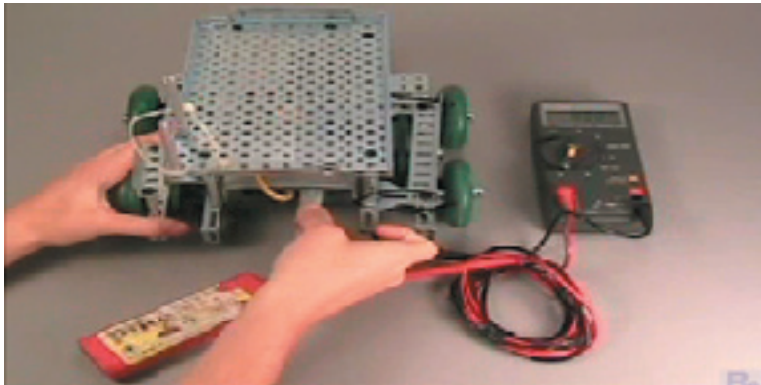
Lesson Set Up

6. Check that the finished set up of the multimeter and battery looks like the picture below.

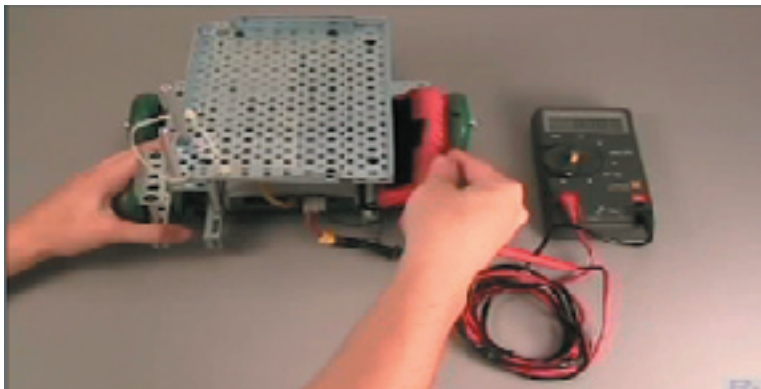


7. While you may attach the battery and multimeter any way that gets a good reading, we recommend the following:

- Attach connector to the Vex microcontroller



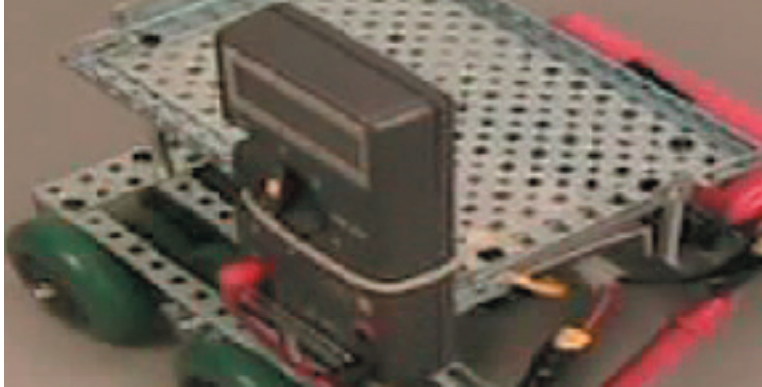
- Place the battery in a secure holder to the side of the robot.



Current Draw

Lesson Set Up

- Place the multimeter securely on the side of the robot. Make sure to place the multimeter upright and to the side of the robot so that it is easy to read the multimeter during the experiment. Pictured in Figure 4 at left, the multimeter is attached with zip ties.



- Your robot and multimeter should now be ready to begin the experiment with current and work. A useful test to see if you have attached the multimeter correctly is to turn on the vex controller. There should be idle current that should show up on the multimeter display.

