



Grand Blanc High School Robotics Team



Initial Member Deliverables Wiring Simulation and Battery Test

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Mentor(s) to ask if you have questions about, and can sign off on this Challenge: Clinton Bolinger or Cathy Fillwock for the simulation, and Dave Bolinger or Cathy Fillwock for the battery measurements.

Challenge Instructions:

*This Deliverable has two parts – the Wiring Simulation Test and the Battery Measurement portion. You may complete these tasks separately and/or on different days, but BOTH must be finished before your Engineering Notebook will be validated for completion of this challenge. **READ THE REFERENCE MATERIALS FOR BOTH PARTS BEFORE GETTING STARTED.***

Engineering Notebook Entry Instructions:

- a. Take notes while you are working and discuss any difficulties that you may have,
- b. Answer the following questions:
 - a. Did you enjoy this simulation and measurement task? Why or why not?
 - b. What did this task teach you about the electrical subsection that may assist you if you are a member of the other subsections (mechanical, programming, etc.)?
 - c. Which port is connected when the switch is in the open state?
 - d. Which port is connected when the switch is in the closed state?
 - e. Make a table that includes the following information for your battery:
 1. Battery Identifier and Year, The Status, The Charge, The Voltage at No Load, The Voltage at Load 1, The Voltage at Load 2, The Internal Resistance (Rint)
 - f. Why is it important to know the status and charge of any given battery? Why would you need to know this information, and when would you use it?

Part One – Simulation Test

Gather the following Materials:

Part One – Simulation Test

1. Check the board in the conference room to see if a Simulation Board Kit is available to check out.
2. See Brandi or Cathy in the Conference Room to check-out a Kit (if available), sign the log.
 - If anything is missing, please inform Brandi or Cathy BEFORE you take the kit out of the conference room,
3. Multimeter (from the tool box. Need help finding it? Ask a returning Team Member!)

Background Information – Part One:

The Simulation Test Board simulates a circuit containing a switch. The electrical current enters the switch through the Common wire and exits the switch through *EITHER* the Port A wire or the Port B wire (you can't tell which!), depending if the switch is in the open or closed state.

Reference Material:

Multimeter Reference Materials:

1. Read the "How to Use a Multimeter" document (contains pages 2-10, read all) linked below
2. For the full, online version, visit here (you'll need pages 2-10):
<https://www.ifixit.com/Guide/How+To+Use+A+Multimeter/25632#s64987>



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Assigned Simulation Instructions:

1. Check to ensure that you have all of the materials on the checklist (included in the kit). If any materials are missing, please inform one of the Mentors listed above BEFORE you get started with build
 2. Use the multimeter to determine the following for the simulation board:
 - a. Which port is connected when the switch is in the open state?
 - b. Which port is connected when the switch is in the closed state?
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Part Two – Battery Measurement

Gather the following Materials:

Part Two – Battery Measurement

1. Battery Beak (attached to the battery cart downstairs - do not detach)
2. Competition Battery for the FRC Robot (noted by a sticker on the top with a Team logo, Battery number, and year.) **PLEASE KEEP BATTERIES AND BATTERY BEAK DOWNSTAIRS.**

Reference Material:

Battery Beak Reference Materials:

1. Read pages 2, 6 (begin at the “TESTING” section near the bottom of the page), 7, and 8 of the Cross the Road Battery Beak Manual (linked below),

For the full, online version, visit here: <https://www.ctr-electronics.com/downloads/pdf/Beak-User-Manual.pdf>

FRC Battery Measurement Instructions:

1. Use the multimeter to measure the DC voltage of the battery,
2. Use the Battery Beak to measure the following for a competition FRC battery:
 - a. The Status
 - b. The Charge
 - c. The Voltage at No Load
 - d. The Voltage at Load 1
 - e. The Voltage at Load 2
 - f. The Internal Resistance (Rint)



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To Complete Your Challenge:

1. Ensure that your Engineering Notebook entry is complete
2. Find one of the Mentors listed above and escort him/her to your workstation to inspect your completed work for the challenge you've completed.
3. Ask Clinton OR Cathy to approve your Engineering Notebook entry and have your deliverables checklist validated. Ask Dave to validate the battery measurement.
4. Be sure to turn off the multimeter, **return it to the correct spot in the TOOL BOX** (IMPORTANT NOTE: this may be a different place than where you found it. If you don't know the CORRECT place to put it away... ASK! Veteran Students and Mentors are here to help ☺)
5. Return the Materials to the Electrical Simulation Bin,
 1. Cross-reference the checklist and ensure that all of the items on the list are included. If anything is missing, please inform Brandi when you check the kit back in,
 2. Return the Bin to Brandi
 3. Sign the check-in/Check-out sheet
6. Clean your workspace AND the floor around you:
 1. Wipe off tables
 2. Push in Chairs
 3. Sweep the floor