

## Hall Effect Measurement

Note: Yellow fields are things you need to change. White fields generally can be left alone. The exception is radio buttons, which you may need to change, but which aren't colored.

### Sample Preparation:

1. Replace double stick tape if needed and make it less tacky. This facilitates removal of sample when finished.
2. Carefully affix sample material to circuit board so as not to damage the sample surface and such that it matches the orientation of the board by holding it up to the light to find the crosshairs.
3. Apply a small amount of indium to the end of the wire leads.
4. Press the end of the wire lead into the corner of the sample.
5. Solder the wire leads to the numbered pad in the corner of the board.
  - 5.1. Note: This should be done using indium. Lead solder is not permitted on the boards.
6. Trim excess wire from the lead.

### Sample Measurement:

1. Power on the instrument rack (black box above magnet power supply).
  - 1.1. Note: Do not touch or adjust sources, switches or meters. Power on the electromagnet.
2. Ensure cooling water is flowing.
3. Ensure the current meter connector in the back of the equipment rack is in the correct position. (current meter or shorted)
4. Power on the computer and monitor.
5. Remove probe from between magnets.
6. If not already, raise the sample arm to the horizontal position and lock with spring loaded pin.
7. Install sample circuit board on the sample arm so that all pins align and the sample is on the north (equipment rack) side of the board.
8. Lower the sample arm to the vertical position and lock with spring loaded pin so that the sample is centered between the two poles.
9. Reinstall the probe so that its tip is centered between the two poles and lined up with sample.
  - 9.1. Note: failure to replace the probe will result in the electromagnetic controller alarming and requiring a reset of the system.
10. At the computer click the Hall measurement system icon to start the program.
11. Do a resistance measurement.
12. Ensure resistance range is correct based on the sample type. (low or high  $\gg 100\text{kohm}$ )
13. Ensure DC current is correct for the sample type.
14. Click measure
  - 14.1. Note: If a message pops up that states "make sure that ammeter is removed from the circuit." Go to the back of equipment rack and move current meter connector to the shorted point then click OK.
15. Adjust current to make voltage 5-6V.

16. When all contacts (1 thru 4) have been tested at least once and DC voltage is good, make a note of the DC current.
17. Close window.
18. Click measurements in the measurement window.
19. Click add IV curve measurement set up window.
  - 19.1. Click add default contacts.
  - 19.2. Enter starting current equal to negative the DC current noted before.
  - 19.3. Enter ending current equal to the DC current noted before.
  - 19.4. Enter current step as appropriate for the sample.
  - 19.5. Enter dwell time, 2 seconds in the norm. Try 5 if results are noisy.
  - 19.6. Enter resistance. (low or high)
  - 19.7. Enter Ammeter wiring. (in circuit or out-of-circuit), in circuit if the current meter probe connector in the back of the equipment rack is on the current meter position, out-of-circuit if it is on the shorted position.
  - 19.8. Click OK.
20. Click measurements in the measurement window.
  - 20.1. Click add variable field measurement.
  - 20.2. Enter maximum field normally 20kG.
  - 20.3. Enter minimum field normally between 10 – 15kG.
  - 20.4. Enter field step normally 1kG or 500G.
  - 20.5. Click next.
  - 20.6. Under current excitation enter current, should be the DC current noted earlier.
  - 20.7. Enter resistance range. (low or high)
  - 20.8. Enter Ammeter wiring. (in circuit or out-of-circuit) ), in circuit if the current meter probe connector in the back of the equipment rack is on the current meter position, out-of-circuit if it is on the shorted position.
  - 20.9. Click finish.
21. Click start
  - 21.1. If a window pops up stating that the excitation voltage exceeds the maximum current, ensure the current meter position the back of the equipment rack is on the shorted position.
  - 21.2. Depending on the number of measurement points selected, the run will take between 10 and 45 minutes.
22. Reinstall the probe so that its tip is centered between the two poles.
  - 22.1. Note: failure to replace the probe will result in the electromagnetic controller alarming and requiring a reset of the system.