

**Goal - The goal of this lab is to measure the strength of a magnetic field through the use of a Hall Effect device.**

**Procedure -**

1. Connect together an ADP-101 amplifier and a multimeter by connecting the positive terminal of the multimeter to the [red] output terminal of the amplifier and the negative terminal of the multimeter to the [black] ground terminal of the amplifier. The multimeter should be set up as a Voltmeter for this procedure. See diagram below.
2. Perform the following step ONLY if absolutely necessary!
3. Balance the amplifier:
  - a. Turn the amplifier on at least 30 minutes before balancing.
  - b. Turn the amplifier gain to zero. [Counterclockwise to zero.]
  - c. Carefully adjust the DC Offset until the reading on the ammeter is zero [ $\pm 0.01$  Volts]
  - d. Turn the amplifier gain clockwise to maximum. If the reading on the Voltmeter remains zero, skip to step 4.
  - e. With a small screwdriver adjust the “Balance” control screw until the meter reads zero.
  - f. Repeat steps a through e to verify that the meter is now balanced.
4. Plug the Magnetic Field Detector [MFD] module [the Hall Effect device] into the left side of the amplifier.
5. Turn up the gain on the amplifier to about 50, make sure that the Hall Effect probe is not near any substantial magnetic field source and adjust the DC Offset until the reading on the Voltmeter is zero [ $\pm 0.01$  Volts].
6. Insert the Hall Effect probe into the slot in the front of the MFD with the X on top and the O on the bottom as per the symbols printed on the MFD.
7. Adjust the gain on the amplifier until the reading on the multimeter is 7.50 Volts [ $\pm 0.01$  Volts]. Since the calibration source is 750 Gauss [ $10^4$  Gauss = 1 Tesla], and since the Voltage reading across a Hall Effect device is directly proportional to the strength of the magnetic field, your apparatus is calibrated so that each Volt on the multimeter corresponds to 100 Gauss!
8. The magnetic flux passing through the Hall Effect probe will be at a maximum when the probe is oriented so that the “lump” on the end of the probe is perpendicular to the external magnetic field. [Try orienting the probe in a variety of ways near a permanent magnet until you find the maximum reading on the voltmeter and therefore the true magnetic field strength.]



