



**CAUTION:** This Hall sensor is sensitive to electrostatic discharge (ESD). Use ESD precautionary procedures when handling, or making mechanical or electrical connections to this device in order to avoid performance degradation or loss of functionality.

## 1.0 GENERAL

This document provides operation instructions for operating a Hall sensor with a Lake Shore 420, 421, 450, or 460 gaussmeter. Using a Hall sensor with a Lake Shore gaussmeter is described in Paragraph 1.1. MCBL-6 and MCBL-20 programmable cables details are provided in Paragraph 1.2. Finally, setup and operation of the Hallcal.exe software is described in Paragraph 1.3.

Instructions in this chapter are intended for the low impedance “bulk” Hall sensors. The instructions do *not* apply to HGT-2100, HGT-2010, and HGA-2010 (which are intended for use with the Model 410 gaussmeter). The impedance and control current requirements of these three Hall sensors are not compatible with the Lake Shore gaussmeters that use the MCBL cables.

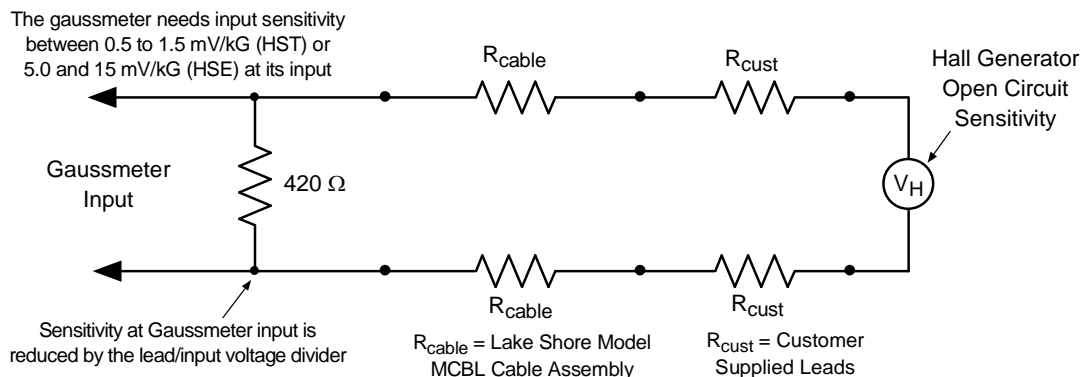
## 1.1 USING A HALL SENSOR WITH A LAKE SHORE GAUSSMETER

To hook up a Hall sensor, you must use a Lake Shore MCBL-6 or MCBL-20 cable assembly (Paragraph 1.2). The MCBL-6 cable is 2 m (6.5 ft) long with a DA-15 connector on one end and four leads on the other. The MCBL-20 cable is 6 m (20 ft) long. The Hall sensor is a 4-lead device. The 4 leads are labeled +Ic (Red), -Ic (Black or Green), +VH (Blue), and -VH (Yellow), corresponding to the 4 leads on all the Hall sensors.

The typical Lake Shore 421, 450, or 460 gaussmeter has an input impedance of 420  $\Omega$ . Therefore, the actual sensitivity at the gaussmeter input will be less than the value given with the Hall sensor due to drop in the leads and cable. This fact is important because a sensitivity value is supposed to be loaded into the cable PROM to set calibration. We recommend that the customer always check accuracy against a reference field rather than use the sensitivity value sent with the bare Hall generator. Because Lake Shore has no control of the conditions beyond the cable, the customer must accept responsibility for accuracy and compatibility.

Finally, Manganin wire is not usually acceptable for gaussmeter connections. The resistance of Manganin wire is often too high. Hall generators are normally connected using twisted pairs of copper wire such as 34 gauge, Teflon insulated. There are two reasons for this:

1. The gaussmeter current source is limited in compliance voltage. The gaussmeter should not drive a load (Hall sensor, wires in cryostat, and probe cable) greater than 50  $\Omega$ . In fact, for best performance, the load should be less than 30  $\Omega$ .
2. Because the typical Lake Shore gaussmeter input impedance is 420  $\Omega$ , there is a voltage drop due to lead resistance in series with the gaussmeter input. The Lake Shore Hall sensor sensitivity given on the data sheet is basically with no lead resistance. See Figure 1-1.



**Figure 1-1. Typical Hall Sensor Input Impedance**

## 1.2 MCBL-6 AND MCBL-20 PROGRAMMABLE CABLES

MCBL-6 and MCBL-20 have 15-pin D-Style connectors on one end for attachment to the PROBE INPUT connector on the back panel of a Lake Shore gaussmeter. Four tinned wires are provided for connection to the Hall sensor. The leads may be soldered directly to these wires. See Figure 1-2.

**CAUTION:** Care must be exercised when handling the Hall sensor. The Hall sensor is very fragile. Stressing the Hall sensor can alter its output. Any excess force can easily break the Hall sensor. Broken Hall sensors are not repairable.

**CAUTION:** The Hall sensor should be isolated from all line voltages (or voltages referenced to earth ground). *If not, damage to the gaussmeter is almost a certainty.*

**CAUTION:** The probe must be connected to the rear of the instrument before applying power to the gaussmeter. Probe memory may be erased if connected with power on.

The DA-15 connector is detailed in Figure 1-3. Once connections are made, refer to Paragraph 1.3 for instructions on using the Hallcall.exe program to store probe parameters in the internal EPROM.

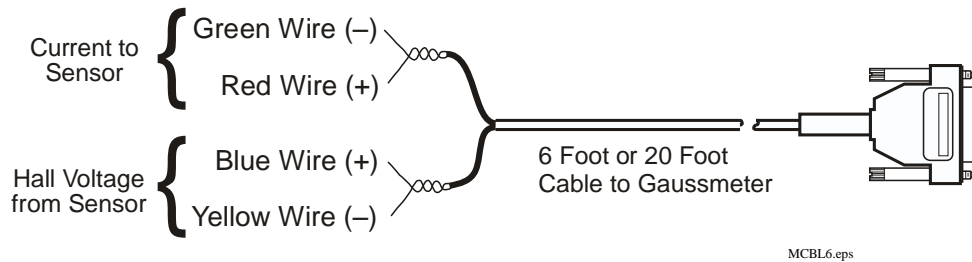
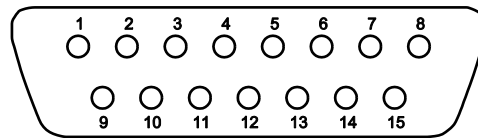


Figure 1-2. Model MCBL-6 and MCBL-20 Programmable Cables



DA-15 Connector

Connector.eps

Pin	Description	Pin	Description
1	INPUT +	9	INPUT -
2	NC	10	NC
3	NC	11	GND 1
4	ITEMP +	12	Vcc
5	ITEMP -	13	A/D CLK
6	NC	14	EE-DATA
7	NC	15	I <sub>C</sub> -
8	I <sub>C</sub> +		

Figure 1-3. DA-15 Connector Details

### 1.3 HALLCAL.EXE

The Hallcal.exe program was developed by Lake Shore to allow the interfacing of a customer attached Hall sensor to a Lake Shore gaussmeter. Because of the many intricacies involved with proper calibration, the Customer must accept responsibility for the measurement accuracy.

#### 1.3.1 Requirements

- Lake Shore gaussmeter connected via RS-232 to the computer in the COM1 port. (NOTE: Computer interface cable must be a NULL MODEM type.)
- Lake Shore MCBL-6 or MCBL-20 cable assembly.
- IBM or compatible computer.
- Hall sensor meeting the sensitivity ranges given below.
- Calibration or sensitivity constant and serial number of the Hall sensor.

#### 1.3.2 Program Setup and Operation

1. Set the Lake Shore gaussmeter to 300 baud. Refer to your User's Manual on how to set the gaussmeter to communicate at 300 baud.
2. Insert the disk into the computer and type in the default drive (**A:** or **B:**).
3. Either double click on Hallcal.exe or enter the command **HALLCAL** from the program line. This will execute the Hallcal.exe program.
4. The program will prompt for the Probe serial number. Any combination of 6 letters or number can be entered. Press **Enter** when this is accomplished.
5. The program will prompt for the probe type (0 or 1).  
Enter "**0**" for Hall sensors with sensitivities between 5.5 and 10.5 mV/kg (at 100 mA current).  
Enter "**1**" for Hall sensors with sensitivities between 0.55 and 1.05 mV/kg (at 100 mA current).
6. The program will prompt for the "Calibration Constant." Enter the magnetic sensitivity in mV/kg at a control current of 100 mA. Remember to account for the 420  $\Omega$  input impedance of the gaussmeter when calculating the proper load resistor to install.
7. The program will display all the values entered along with designated F keys:

<b>F1</b>	Probe Serial Number	ABC123
<b>F2</b>	Probe Type	0
<b>F3</b>	Calibration Constant	X.XXX
<b>F10</b>	Program Probe	
<b>Esc</b>	Exit Program	
8. At this time, if any of the parameters need to be changed, just press the appropriate F key and type in the new value. When everything appears correct, press F10 to program the probe.
9. It takes about 20 s to program the probe. After the probe is programmed, press the **Esc** key to exit the program.

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