Wiring Instruction for the MiniMost Experiment

The wiring of the MiniMost experiment can be separated into four parts: displacement sensor, load cell, strain gauge and motor. Connections that need to be connected are labeled with same numbers or characters, so it is easy to reconnect the whole experiment. Following are some detail instructions and information:

**Displacement Sensor**

The Lucas Schaevitz LVDT is used in the MiniMost to measure the deflection of the beam. The data is also be utilized for stepper motor feedback control. Four connectors are used:

- Connector M: provides power and common ground
- Connector L: provides the displacement sensor reading and split the signal to connectors K and J.
- Connector K: sends displacement signal to ADC CH0 through BNC cable
- Connector J: provide displacement signal to motor driver AIN and the connection is shown in Figure 1. Red wire numbered as 1 goes to the pin 1 (AIN 1) and black wire numbered as 6 goes to the pin 6 (AIGND)

The sensitivity of the LVDT is 3 inches/ 10 volts

![Fig. 1: AIN connection detail of the motor driver side](image)

**Load Cell**

The connection for the Omega strain type load cell is relative easy. Connector N will take care of everything. This connector will provide the load cell power from
the Omega DP25-B-S strain meter (amber color display) and send the measurement signal back to the meter. The connection is shown in Fig 2.

As can be seen, there are 4 pairs of wires:

- **Top:** Excitation to the load cell. Black wire goes to E OUT- and red wire connects to E OUT+.
- **Bottom Left:** Line power. Black is line, white is neutral, and green is ground.
- **Bottom Right:** Load cell signal read back. Black is +S IN and read is -S IN.
- **Bottom Middle:** Analog output to the DAQ board through BNC cable. The center copper wire of the BNC cable goes to the VOLT and the ground of the BNC cable goes to the RTN. The BNC cable goes to the DAC CH1.

The load cell has a full range of ±25 lb and a sensitivity of 1 mv/lb. Because of the low voltage output, the strain meter is used to amplify the signal before it is sent to the DAC board. The load signal going to the DAC board has a sensitivity of 0.2 V/lb and 5-volt signal represents zero pounds. The unit of readout at the strain meter panel is in Newton.

**Strain Gauge**
To obtain the strain gauge reading, strain gauge completion bridge and strain meter (green reading) are required. The wire connection at the bridge side is shown in Figure 3. The connection at the strain meter side is the same as the load cell wiring. The connection between the strain gauge bridge and strain meter is summarized below:
<table>
<thead>
<tr>
<th>Strain Meter Side</th>
<th>Strain Gauge Bridge Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>+E OUT</td>
<td>EX +</td>
</tr>
<tr>
<td>-E OUT</td>
<td>EX -</td>
</tr>
<tr>
<td>+S IN</td>
<td>VOUT +</td>
</tr>
<tr>
<td>-S IN</td>
<td>VOUT -</td>
</tr>
</tbody>
</table>

Figure 3: Wire Connection at the Strain Gauge Bridge Side.

The unit of the read out at the strain meter panel is microstrain.
Stepper Motor
The wiring between the stepper motor and motor driver is shown in the Figure 4. Wires 1 and 2 are from motor phase A, and wires 4 and 5 are from motor phase B. Pin 3 is empty because the motor we are using does not provide the ground wire.

Figure 4: Stepper motor connection at the back of motor driver.
Numbers indicate the number of wires inside a cable.

Letters indicate connectors (J, K, L, M, N).