Setting Accelerometer Biases

NOTE: This instruction assumes that the MIDG Series INS/GPS Software and Utilities has previously been installed on the computer. This software needs to be installed prior to performing this operation.

1 Introduction. The MIDG Series INS/GPS has the capability to compensate for the accelerometer biases. this functionality is provided to compensate for the inherent biases in the accelerometers.

2 Prerequisites. The following prerequisites will be needed to perform this operation: MIDG Series INS/GPS, MIDG Display Utility installed; MIDG Series INS/GPS Interface cable (MBI#SLC2JUSB, SLC2J09SF, or user supplied), a known flat surface and this instruction.

**********WARNING**********

WARNING: DO NOT apply power to unit prior to connecting the interface cable. DO NOT use voltages higher than stated in the MIDG Series INS/GPS specifications sheet. DO NOT connect the GPS antenna to the unit while powered. Doing any of these actions may damage the unit. THESE DAMAGES ARE NOT COVERED BY WARRANTY.

**********WARNING**********

3 Set Up. Performing the accelerometer bias compensation must be done prior to mounting the unit into the application. Refer to the MIDG Series INS/GPS for information on how to properly interface the unit with a PC or laptop.

1. **Open an instance of the MIDG Display Utility and select the communications port (Port) which will be used** (Figure 1).
2. **Select "Options" drop -down menu, then select "MIDG Config." to open the MIDG Config dialog box** (Figure 1).
3. **Select the "Accel" tab of the MIDG Config dialog box** (Figure2)
4. **Enter a zero (0) for the "x," "y," and "z" biases. Press the "Set" button to send these to the unit.**

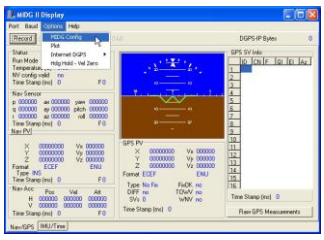

Figure 1. MIDG Display

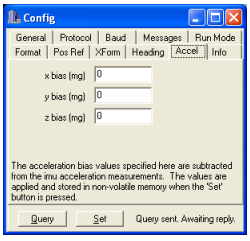

Figure 2. Accel tab.

The MIDG Series INS/GPS is now ready for the accelerometer bias procedure.

4 Compensating for Accelerometer Biases. The following steps will instruct the user on how to perform the measurements to calculate for the accelerometer biases.

1. **Locate the "Nav Sensor" section on the "NAV/GPS" tab of the MIDG II Display utility** (Figure 3). The column of data which will be used is "ax, ay, az."

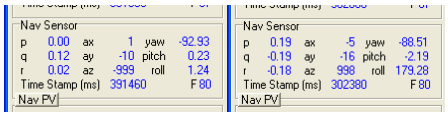

Figure 3. Nav Sensor section of the NAV/GPS tab ("az" bias shown).

2. **Using the flat surface, place the unit on the "-z" axis (product label facing up) and record the "-az" value. Flip the unit over to the "+z" axis (product label facing down) and record the "+az" value** (Figure 3).
3. **Using the formula shown below, calculate the "z" axis bias.**

$$Accel\ Bias(z) = \frac{-az + \mathrm{az}}{2}$$

Copyright Microbotics Inc. 2011

4. **Using the flat surface, place the unit on the "-y" axis (calibration label facing down) and record the "-ay" value. Flip the unit over to the "+y" axis (calibration label facing up) and record the "+ay" value** (Figure 4).

5. **Using the formula shown below, calculate the "y" axis bias.**

$$Accel\ Bias(y) = \frac{-ay + \text{ay}}{2}$$

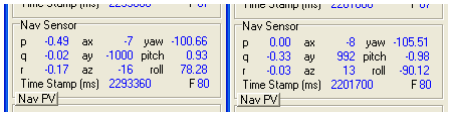

Figure 4. Nav Sensor section of the NAV/GPS tab ("ay" bias shown).

4. **Using the flat surface, place the unit on the "-x" axis (connectors facing up) and record the "-ax" value. Flip the unit over to the "+x" axis (connectors facing down) and record the "+ax" value** (Figure 5).

5. **Using the formula shown below, calculate the "x" axis bias.**

$$Accel\ Bias(x) = \frac{-ax + \text{ax}}{2}$$

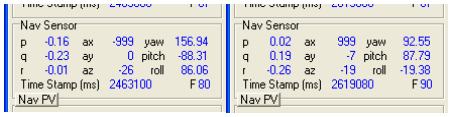

Figure 5. Nav Sensor section of the NAV/GPS tab ("ax" bias shown).

These three (3) calculated values are the biases and will be entered into the MIDG Config dialog box under the "Accel" tab.

Note: Bias values should range from -30 to +30. If calculated bias values are beyond this range, the unit is out of calibration and will need to be returned for a full recalibration.

6. **Enter the calculated biases into the "Config" dialog box under the "Accel" tab** (Figure 6).

Note: Only whole number values may be entered into the "Accel" tab. Bias values which result in decimals will need to be rounded.

7. **After the bias values are entered, press the "Set" button at the bottom of the "Config" dialog box.**

8. **Select the "General" tab and press the "Save Configuration" button to store the values as part of the configuration profile.** These values will be saved even during a loss of power to the unit (Figure 7).

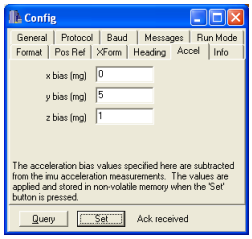

Figure 6. Biases entered into the "Accel" tab.

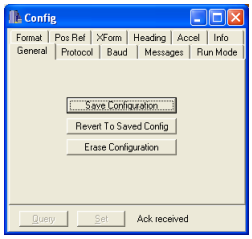

Figure 7. General tab.

Figure 8 shows the accelerometer values before and after bias corrections. As can be noted, even though these bias values are in milli-g's (mg), they do produce a profound effect on unit's performance.

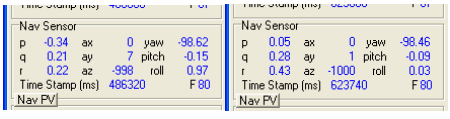

Figure 8. Accelerometer readings before and after bias corrections.

5 Help and Support. Microbotics, Inc. is dedicated to supporting the missions of our clients and offers free thirty (30) days of support for all of our products.

Contact Microbotics, Inc. for pricing and availability. Specific technical questions should be sent to support@microboticsinc.com

Copyright Microbotics Inc. 2011