ENVIRONMENTAL OBSERVATIONS

COMPASS CALIBRATION MANUAL

WAVE BUOY

Revision 1 – April 2022

These operating instructions (rev. 1) describe functionality according to firmware version 3.4 used in equipment manufactured as of June 2021.

We reserve the right to make technical changes and improvements without notice.

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1. INTRODUCTION

The Obscape Wave Buoy measures the directional wave spectrum with the help of electronic motion sensors. Wave direction is determined with the help of an electronic compass. The Wave Buoy compass initially receives a factory calibration as part of the production process. Under normal circumstances, there should be no need to recalibrate the buoy.

Should a need for compass recalibration arise, this manual presents the instructions for it. For any questions or suggestions that remain after reading this manual, do not hesitate to contact us at **support@obscape.com**.

The compass calibration consists of two parts: a horizontal calibration (which calibrates the horizontal axes of the compass) and a vertical calibration (which calibrates the vertical axis of the compass). While these two stages could theoretically be combined into a single 3D compass calibration procedure, splitting them up hugely simplifies the 'calibration moves' that need to be performed with the device.

2. HORIZONTAL COMPASS CALIBRATION

2.1. PREPARATION

To put the Wave Buoy into horizontal compass calibration mode, take the following steps:

1. Remove the top disc from the Wave Buoy and open the back panel of the top disc.
2. Eject the SD card from the Wave Buoy and insert it into your computer.
3. Add the following line to the settings.txt file on the SD card and save the changes:
   `calib = 1`
4. Eject the SD card from your computer and reinsert it into the Wave Buoy.

2.2. CALIBRATION

Now, the horizontal calibration can be performed. The following steps need to be taken:

1. Go to an outdoor location, at some distance from buildings, steel objects, power lines, etc.
2. Power up the Wave Buoy by flipping the power switch.
3. Carefully watch the buoy's display. Fairly soon after powering up the buoy, the display will read: 'Compass calibration. Waiting for start…'. The buoy's buzzer will beep once and the blue LED will blink for 60 seconds. Now, loosely put the top disc onto its back panel (without fastening the screws of the back panel, as this will take too much time) and place everything onto a horizontal, non-steel surface (also avoid wooden table tops with a steel frame underneath).
4. As soon as the buzzer beeps again and the navigation light on top of the buoy starts blinking more quickly than normal, start rotating the top disc slowly about its vertical axis (i.e.: the top

disc stays on the horizontal surface and is rotated on that surface). Rotate it such that the top disc makes a full revolution approximately every 20 seconds. Keep doing this for 2 minutes, until the buzzer beeps once more and the navigation light reverts to its standard, slower flash pattern.

5. Pick up the top disc, remove the back panel and ensure that the display does not read 'Calibration FAILED'. After a successful calibration, the message 'Calibration OK' will be displayed briefly before the buoy continues its normal power-up sequence. The buoy can be powered down again if this is the case. Horizontal compass calibration is done.

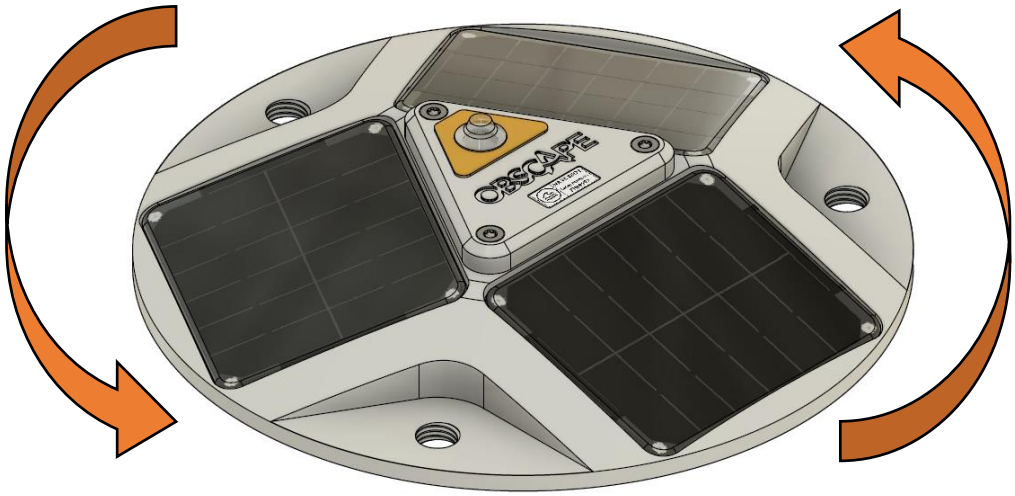

Figure 1: Horizontal calibration movement

3. VERTICAL COMPASS CALIBRATION

3.1. PREPARATION

To put the Wave Buoy into vertical compass calibration mode, take the following steps:

1. Remove the top disc from the Wave Buoy and open the back panel of the top disc.
2. Eject the SD card from the Wave Buoy and insert it into your computer.
3. Add the following line to the settings.txt file on the SD card and save the changes:
   `vcalib = 1`
4. Eject the SD card from your computer and reinsert it into the Wave Buoy.

3.2. CALIBRATION

Now, the vertical calibration can be performed. The following steps need to be taken:

1. Go to an outdoor location, at some distance from buildings, steel objects, power lines, etc.
2. Power up the Wave Buoy by flipping the power switch.
3. Carefully watch the buoy's display. Fairly soon after powering up the buoy, the display will read: 'Vertical calibration. Waiting for start…'. The buoy's buzzer will beep once and the blue LED will blink for 60 seconds.
4. As soon as the buzzer beeps again and the navigation light on top of the buoy starts blinking more quickly than normal, take the top disc in your hands and slowly rotate it about any of its horizontal axes. Rotate it such that the top disc makes a full revolution approximately every 10 seconds. Keep doing this for 1 minute, until the buzzer beeps once more and the navigation light reverts to its standard, slower flash pattern.
5. Pick up the top disc, remove the back panel and ensure that the display does not read 'Calibration FAILED'. After a successful calibration, the message 'Calibration OK' will be displayed briefly before the buoy continues its normal power-up sequence. The buoy can be powered down again if this is the case. Vertical compass calibration is done.

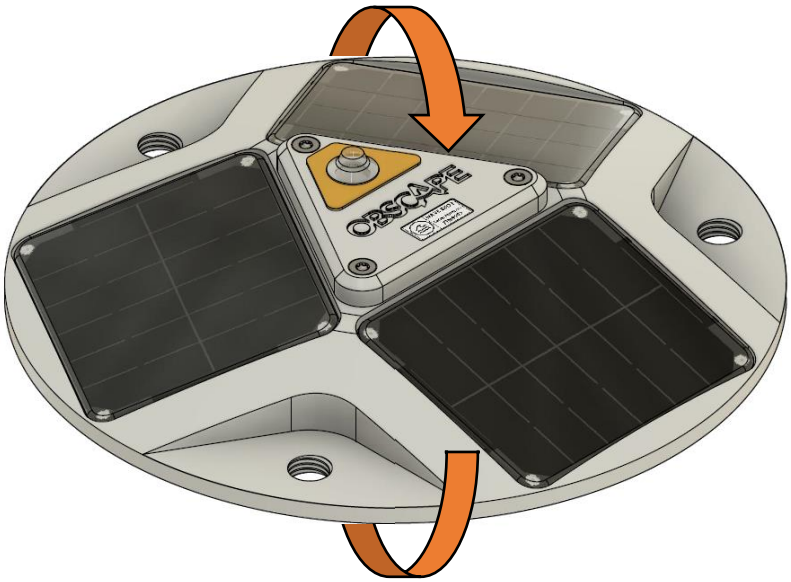

Figure 2: Vertical calibration movement

4. WRAPPING UP

The Wave Buoy will store the raw calibration data on the SD card in files named 'calib.dat' and 'vcalib.dat' for horizontal and vertical calibration respectively. It is advised to save these files on your computer for future reference.

The calibration constants that follow from the above calibration procedures are automatically stored into the buoy's non-volatile memory as soon as each calibration procedure is finished. After calibration has been performed and the buoy has been powered down again, it can be stored again or prepared for deployment as per the Wave Buoy manual.