Boat Calibration Worksheet

Boat_____ **Team name**_____

Team members_____

Use the hardware test programs to view data from sensors and test actuators. Mechanically adjust the rudder and sail as needed. Enter the low/high values in your BoatCode to calibrate the boat.

1. Wind Sensor
    a. Program: WindSensorTest
    b. Read data from the Wind sensor (10 bit magnetic encoder) and record the raw data range: low_____ high _____.
    c. To calibrate the windvane, point it forward (wind over the bow) and rotate the magnetic encoder until it reads about 0°. Tighten it in place and check again.

2. Transmitter/Receiver (Sail and Rudder) controls.
    a. Program: RCReceiver
    b. Read data from the Sail lever and record values. Be sure to set trim slider to center.
        Sail full-in (down):_____ Sail full-out (up): _____
    c. Read data from the Rudder lever and record values. Be sure to set trim slider to center and Gain knob to full Clockwise

        Rudder left: _____ Rudder Center: _____ Rudder Right: _____

3. Mechanical adjustment of Rudder:
    a. Program: RudderServoTest
    b. Send rudder to various positions between -50°and 50° to verify that it can rotate fully to both sides. Rudder range: _____
    c. Send the servo to 0° and check that rudder is straight. If not, loosen the screws on the rudder linkage, straighten it and re-tighten.
        Completed _____

4. Mechanical adjustment of Sail:
    a. Program: SailServoTest
    b. Send sail servo to 0°and check that the sail is at "full-in" but not too tight. Loosen or tighten the main sheet and the jib sheet by sliding the ends down the boom. Completed _____
    c. Send the servo to 90° and check that sail is full out and that the lines from the servo to the sails move freely. If not, look for tangles.
        Completed _____

5. Full system wiring check: Control boat with all transmitter commands going through computer on the way to servos.
    a. Program: RCPassthrough
    b. Read data in from the Receiver, turn it into positions for the servos, and send commands out to the rudder and sail servo motors. Adjust the trim sliders for the Rudder and the Sail to get the best performance. View data on the Serial Monitor and check that they all make sense. Confirm that the boat now acts like the original RC boat (without a computer in between the Receiver and the servo motors!). Completed _____
    c. Unplug the computer and connect the 9V battery to the Arduino. Confirm that it still functions like the original RC boat. Completed_____

Advanced Calibration:

6. Accelerometer/Tilt Sensor
    a. Program: XYZAccel
    b. Read data from the Accelerometer and come up with a way to use it for sail trim adjustments based on boat heel (tilt).
       Roll to Port max_____   Roll to Starboard max _____

7. GPS
    a. Program: GPSTest
    b. Confirm wiring, transmission, and position "fix"
    c. Use reset button to reset (0, 0) coordinates and test accuracy by moving known distances from the origin.
       Completed _____

8. Compass
    a. Program: Several in Compass folder
    b. Calibrate using these programs in order:
       1. compassBasic - verify hardware and connections prints raw accelerometer and magnetometer readings to the screen
       2. compassCalibration - Code to use to determine hardiron calibration values for other the programs
       3. compassBasicwithCalibration - same as CompassBasic with hardiron correction
       4. compassTest - Tilt-compensated compass with hard-iron correction. Uses the Orientation library
       5. compassBasicwithCalibrationandTilt - same as CompassTest, but does the tilt-compensation in the code and does NOT require the orientation library