

Horizontal Antenna Test

Lesson 1

Students will use the Vex Robotics System in a laboratory setting and conduct scientific inquiry-based experiments to determine the effect of transmitter antenna length in the horizontal position on signal strength relative to the receiver.

Students will be able to:

1. Identify and measure the maximum distance from transmitter to receiver at various antenna heights at the horizontal position (pointed at receiver).
2. Use a fixed transmitter antenna height (4 inches) and fixed transmitter distance from receiver to discover the optimal angle of the transmitter antenna.
3. Collect data from their investigation.
4. Apply and describe the various points of experimental procedure:
 - a. Experimental hypothesis
 - b. Measurement technique
 - c. Multiple trials
 - d. Systematic error
 - e. Random error
5. Write a summary describing what they learned in the investigation

Materials needed:

Constructed robotic system
Radio transmitter
Yard stick
Tape measure
Range Table 1 datasheet

Horizontal antenna position testing

1. Place robotic system at a stationary point. Turn on Vex controller and radio. Make sure to have plenty of linear space for this experiment.
2. Place the radio in front of robotic system, lying flat with the back on the ground (Fig.1). Extend the antenna 1" from the radio to gain minimal reception. Move as close as possible.
3. Begin the experiment by using the right joystick (Ch. 2) of the radio to turn on the motor of the robotic system. If you have no signal, extend the antenna 1" more and move closer to the robot.

With the radio on the ground, and your finger on the joystick, slowly slide the radio away from the robotic system until the motor stops moving. Once the motor has stopped, slowly slide the radio toward the robotic system to regain the connection. Once you find a consistent signal at a maximum distance, measure from the antenna tip to the receiver antenna. Record the data in Table 1.
4. Using the yard stick, extend the antenna 4" from the radio (Fig. 2) and follow the same procedure in step 3 to find a consistent signal. Once you find a consistent signal at a maximum distance, measure from the antenna tip to the receiver antenna. Record the data in Table 1.



Figure 1

Horizontal Antenna Test *continued*

Lesson 1



Figure 2

5. Next, extend the antenna 8" from the radio and follow the same procedure in step 3 to find a consistent signal. Once you find a consistent signal at a maximum distance, measure from the antenna tip to the receiver antenna as shown in Figure 2. Record the data in Table 1.
6. Continue to extend the antenna in 4" increments and measuring the distance from antenna tip to the receiver. Record the data in the packet at each increment. You will have 8 distances recorded in Table 1.
7. Complete graph comparison data sheet.
8. Complete a reflection worksheet.