

Seeing the Seafloor Using Sound – Computer Method

Name _____

Partner _____

Date _____

PURPOSE:

You will use a motion detector to learn about the how sound waves can be used to "image" objects. The motion probe is connected to a LABPRO interface to collect reflected sound data in real time to produce a graphical representation of their experimental seafloor.

OBJECTIVES:

In this experiment, you will:

- use a computer, a LABPRO System, and a motion detector to measure distance
- use a computer to produce a graph representing the seafloor
- analyze and interpret graphs

MATERIALS:

- ✓ LABPRO System (1 per group)
- ✓ Meter stick (1 per group)
- ✓ Computer and LoggerPro
- ✓ Masking tape (for marking their start and end points and to aid in securing string)
- ✓ Bottles, Cans, Boxes, etc. (serve as the objects imaged on the seafloor)
- ✓ Stools (2 per group)
- ✓ String (2 meters per group)
- ✓ Vernier Motion Detector (1 per group)

PROCEDURE:

1. Place five or more objects, (cans, bottles, boxes, etc) between two stools. The stools will serve as your start and end point. Use a meter stick to measure the distance between the two stools. This is an important measurement and should be done to the nearest centimeter. Record this distance in your data table.
2. Stretch a string tightly between the two stools approximately 1 to 1.5 meters above the floor. This string will function as your sea level reference.
3. Connect the motion detector to the Sonic Channel of the LABPRO. (Plug the white end of the connect cable into the sonic port on the right side of your LABPRO. It will click when it is in properly.) Connect the LABPRO System to the TI computer port with the link cable
4. Launch the LoggerPro Program. When the main screen starts, select **File** and **New** from the program task bar to open a new window. The window will have three graphs. You need to reset the windows so that you have a data table present.
5. You are now ready to up the program and LABPRO for use with a motion detector.
 - ✓ Select **Window** from the task bar. Choose **New Tall Window**. Choose **Table**
 - ✓ Delete the graph for velocity and acceleration by clicking on the X in the upper right hand corner of the graph window. You should have one graph left. Distance vrs time and two columns in your data table.

6. The motion detector will experimentally behave like a ship mapping the seafloor. Take a few practice runs with your motion detector. Start at one end of the string and move the detector the length of the string in three (3) seconds. Make sure that the detector speaker does not interfere with the string. Once you have mastered technique you are ready to collect data.
7. REMEMBER, as you begin to collect data move the detector along the string as you practiced. As you move the motion detector will send out a sonic pulse that will be reflected off the surface of any object that it hits. Slowly move the probe from one stool to the other as the probe is running. Have the calculator to graph your data as distance versus time graph.
8. Sketch your distance vs. time graph for your seafloor data into your report or print it out. Check with your teacher to see which method to use.
9. Describe the shape of your graph. Compare the graph to the actual height and shape of the objects on your seafloor. To do this, measure the height of each object at specific distances along the length of the string and construct a graph of vertical height versus horizontal distance from these measurements. Notice that the two graphs are 180 degrees opposite to one another. Discuss with your teacher how you will resolve this problem.