

Lab M04: Investigating 2-glider STICKY Collisions with Photogates
(Windows NT/2000 version)

Sep 25 2003

Hardware set-up:

Be sure the LabPro interface is plugged into both the computer and an electric outlet. Be sure the photogates are plugged into Digital/Sonic Port 1 and Port 2 of the LabPro interface box.

Software set-up

1. From the START menu, select PROGRAMS and then the VERNIER SOFTWARE folder. Open the LOGGER PRO 3.1 software.
2. Close the Tip of the Day popup box if it appears. If a Setup Interface box appears, click Scan, then OK. You do NOT want a gray box to appear that says "Device Not Found" or something to that effect. If you do get such a message, you will have to troubleshoot a bit to find out what's wrong; some possibilities include: ac adaptor not plugged in, cable connection between motion detector and interface not secure, etc.. Feel free to call for help if your troubleshooting does not isolate and correct the problem.
3. Go to FILE on the menu bar and select OPEN. Browse until you find the folder titled EXPERIMENTS. Inside this folder, open the folder named PROBES AND SENSORS, then the folder called PHOTOGATES. Now open the file entitled TWO GATE TIMING. You might see one or more graphs and a data table on the screen--you won't need these, so ignore them.
4. Go to INSERT and select METER. Make this meter into a display of the time read by gate 1. Insert a second meter and make it into a display of the time read by gate 2. Enlarge the meters on the screen so they cover the irrelevant graphs and data table.

Shutting down the equipment at the end of data taking

- 1) Remove the Photogate cables from the Lab Pro box, being careful to press on the plastic tab of the connector while pulling out the cable.
 - 2) Clean up your station.
-

Sticky collisions between an initially stationary object and a moving object

In these collisions you will use red and blue gliders. One of the gliders will be at rest before the collision and the other glider will initially be moving. After the collision, the gliders will be stuck together by velcro located on the ends of the carts. You will need to use the photogates to ultimately determine the velocities of each cart before AND after the collision.

1. **Which Gate is Which?** Your first job is to experimentally determine which timing data goes with which gate. Click the Collect button and block a photogate with your hand. Now block the other photogate instead. Pay attention to the values appearing in the table so that you can identify which time data corresponds with which photogate--this is VERY IMPORTANT. You can switch which photogate is plugged into which port or switch the positions of the photogates along the track if you need to for convenience—no switching once you have started doing actual trials.
2. Measure and record the flag width on each of the gliders you will use. Measure to the nearest 0.1cm. Make sure that the flags on both gliders have the same width and the flags are properly oriented (not crooked).
3. Fill in your data table for several sticky collisions (ask instructor how many and which gliders to use). Also, be really sure you have the correct time associated with the correct glider mass. Assign the positive direction to be in the direction of the initially moving cart so that all calculated velocities are positive.
4. Enter your group's data into the class data set as instructed.
5. Answer questions 1-5 as others enter their data into the class set.

