

# Photogate Bar Tape Kit

(Order Code TAPE-VPG)



The Photogate Bar Tape Kit contains a flexible plastic tape called “Bar Tape” and a guide that allows the tape to be used with a Vernier Photogate. The tape is 3 m long, and it has alternating opaque and transparent bars that have a spacing of 1.524 cm. The tape can be attached to objects and pulled through the photogate. This allows you to perform experiments much like what you would do with a “ticker tape timer”. Experiments include

- Studying the motion of a toy car
- Studying the motion of other toys, e.g., air powered rockets
- Studying the motion of a person as they hold the tape and walk away from the photogate

## What Is Included with the Photogate Bar Tape Kit?

- (1) 3 m section of Bar Tape
- (1) Bar Tape Guide
- (2) 1 3/8 in outside diameter O-rings
- (2) 1 3/16 in outside diameter O-rings

## What Software Is Compatible with the Photogate Bar Tape Kit?

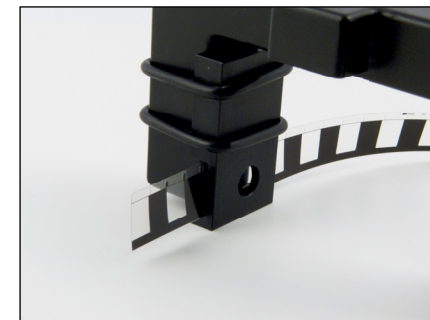
This kit is designed for experiments using any of the following programs:

- Logger Pro® (for computers)
- LabQuest® App (for LabQuest 2 or original LabQuest)
- EasyData™ (for TI graphing calculators)
- DataQuest™ for TI-Nspire™ Technology

With each program, you need to select Bar Tape as the object that is moving through the photogate. The exact details of the process depend upon the version of the program. Refer to the program’s help file or the user’s guide for the program. You can also contact Vernier if you have questions.

## Using the Guide and Bar Tape with a Vernier Photogate

The Bar Tape Guide is attached to the detector side of the photogate. As you look at the label on the Vernier Photogate, the detector side is on the right. You can also identify the detector side by the size of the opening. The detector has a smaller opening than the source side. Place the guide on the inside of the photogate and secure it with two O-rings. (Photogates manufactured prior to 2004 are smaller in circumference than those manufactured after 2004. Use the 1 3/16 inch O-ring on the older photogates.) Thread the Bar Tape through the Bar Tape Guide. Attach the Bar Tape to the object.



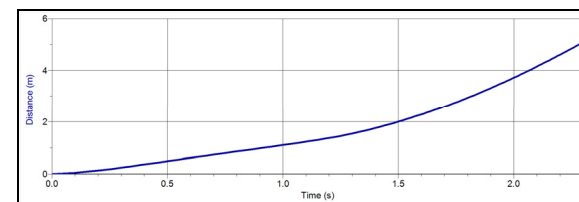
## Performing Experiments with the Adapter Kit

The Bar Tape Accessory Kit can be used in several ways. The first option is to use it like you would a ticker tape timer. The tape is fed through the adapter which is placed on the photogate. The second method does not use the adapter. Instead the Bar Tape is converted into a small Vernier Picket Fence. Each method is described below.

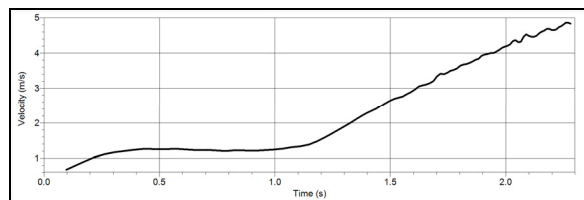
## Using the Kit Like You Would a Ticker Tape Timer

Attach the Bar Tape Guide to the detector side of the photogate as described above. Thread the Bar Tape through the adapter and attach it to the object whose motion you are studying, e.g. toy car. The tape can be secured to the object with a piece of cellophane tape or with a piece of double-sided tape. You will probably want to trim the tape to a shorter length as appropriate for your experiment.

The graphs below show data collected with a toy car. The car had two speeds. From the velocity graph you can see the car’s initial acceleration, a fairly constant speed, and then a second acceleration for the second gear.

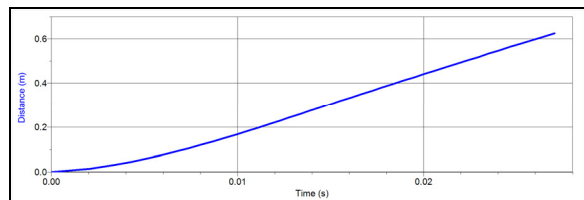


Position data for a toy car

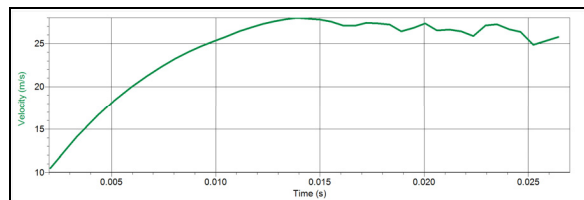


*Velocity data for a toy car*

The graphs below show data collected during the launch of an air-powered rocket.



*Position data for the launch of an air-powered rocket*



*Velocity data for the launch of an air-powered rocket*

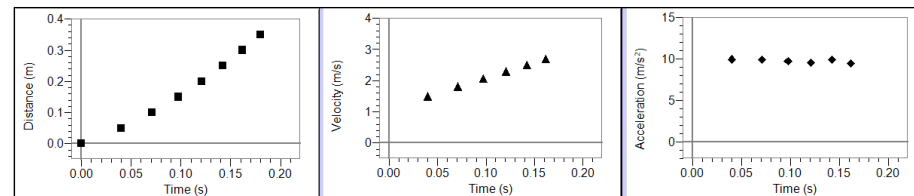
### Using the Bar Tape Like a Small Picket Fence

Another one of our photogate accessories is the Vernier Picket Fence. This is a 38 cm long piece of plastic that can be used to measure the acceleration due to gravity. The Picket Fence consists of alternating opaque and transparent bands. The bands are 5 cm in length. Smaller picket fences can be made with the tape included in this kit.

1. Cut off a short section of the Bar Tape (about 9 cm) and attach it to a piece of clear plastic.



The miniature picket fence will produce very nice motion graphs when dropped through a photogate. The graphs on the next page were all made this way.

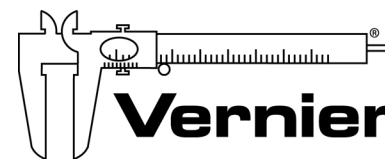


2. Attach a short section of the Bar Tape (10–20 cm) to a piece of clear plastic and mount it horizontally at the top of an air track glider. Mount your photogate so that the Bar Tape interrupts the beam as the glider passes. This will allow you to produce motion graphs of the glider motion.

Vernier Software & Technology has two additional products for motion timing with a photogate.

- Picket Fence (order code PF) is 38 cm long and has opaque bars every 5.00 cm. It is designed specifically for free fall experiments.
- Cart Picket Fence (order code PF-CART) has two sides: A single 5 cm wide bar and a set of 13 bars with 1 cm spacing.

Extra Bar Tape can be ordered (order code TAPE).



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