Honors Physics Mr. McMullen

Name _____ Date_____ Period _____

EXPERIMENT 3.1 Uniform Motion

Purpose

Use graphical methods to analyze the motion of a vehicle.

Concept and Skill Check

You were introduced to the operation of the recording timer in Experiment 2.3. Please review the timer procedures you practiced before continuing with this experiment. In the previous laboratory activity, you were concerned with measurement of time, and you calculated the average period of the timer from your experimental results. In this investigation, the actual time in seconds that it takes for the arm to go up and down and make a dot on the tape is not important. However, it is important to understand that the time interval represented by each successive dot on the timer tape is constant.

In this laboratory activity, a strip of timer tape will be attached to a constant-velocity vehicle as shown in Figure 1. The movement of the attached tape through the timer equals the distance the vehicle travels. Therefore, the distance between two successive dots on the tape is the same as the displacement of the moving body during the time required for the timer arm to go up and down once. If the distance between dots is large, the tape was moving rapidly; if the distance between the dots is small, the tape was moving slowly.

Because the time intervals represented by successive dots are the same throughout the tape, it is possible to use this time period as a standard unit of time. For the purposes of this experiment, you will use the time represented by six successive dots on the timer tape (five full vibrations of the timer arm, or five spaces) as one time interval, Figure 2.

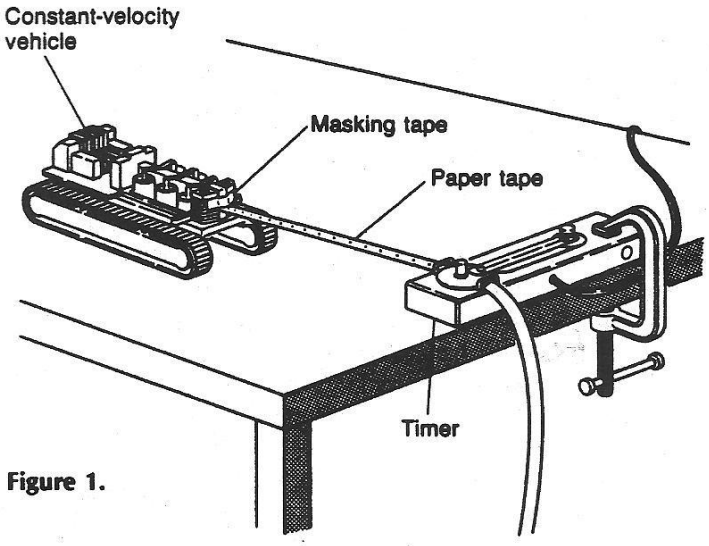

Figure 1.

The distance represented by five spaces between dots on the tape is equivalent to the actual displacement of the moving vehicle during that time interval. This distance divided by one interval of time is the average velocity ($\bar{v}$) of the moving tape, which is equivalent to the average velocity of the moving vehicle during that time interval (t).

$$\bar{v} = \Delta d / \Delta t$$

If the distance is measured in centimeters, the velocity of the vehicle is expressed in centimeters per time interval. If the actual time per interval is known, the velocity of the vehicle is expressed in centimeters per second or, more properly, in meters per second.