614-0800 (50-035) Hand Stroboscope

Warranty and Parts:
We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.

Description:
Our 50-035 Hand Driven Stroboscope is used to investigate continuous motion in such a fashion to make an object appear as if is stationary. For example, if pointed to a fan and spun at the same speed, the fan appears to be not spinning at all. Works great with ripple tanks.

Assembly: Using a screwdriver, unscrew the Phillips screw and set the washer aside. Insert the handle through the center hole in the stroboscope. Insert the washer onto the Phillips screw. Put the Phillips screw back in using the screwdriver. Test the unit by spinning the disc. If the disc spins without unscrewing, it is on tight enough. If it begins to unscrew when you spin it, it is not tight enough. To permanently have the unit together, please use Loctite™ or Krazy Glue® on the threads of the screw prior to tightening.

Operation:

1) **Hold the unit so that the disc is as far away from you as possible.**
2) **With the other hand, place your finger in the large hole in the disc and spin at a constant rate while looking through the disc at your intended target.**
3) **When the rotational speed is correct, the rotational motion will appear to slow down or even stop.**
4) **The frequency of rotation is the number of rotations of the stroboscope per second multiplied by the number of slits in the stroboscope. If the flash frequency is such that *n* stationary images are seen, then the speed of rotation being measured is N= (speed of flashes per minute)/ *n*.**

Changing the Frequency:

1) **To modify the frequency of the strobe, you can cover every other slot or every third or fourth slot.**
2) **With 12 slots to begin with, your choices are 12 slots open, 8 slots open, 6 slots open, 4 slots open, 3 slots open, 2 slots open or 1 slot open.**

Procedure:

The principle of the stroboscope can be demonstrated with a slowly blinking light, such as a spotlight on the street. If you blink your eyes at the same rate as the light, you can make it seem to yourself as if the light is always off, by having your eyes closed whenever the light is on. Or you can make it seem as if the light is always on. By controlling the way you look, you can make something that moves in a repetitive way "stand still."

The hand stroboscope lets you do this for things that move more rapidly than the eye can blink. It is a disk with several equally spaced slits. As the disk is rotated in front of the eye, the eye catches a glimpse of the moving object, which can appear to be stopped. For example, you may look at a rotating fan with a white spot painted at one position. If you make the spot seem to stop by looking at the saw through a hand stroboscope of 6 slits, turning at 35 revolutions in 5 seconds, you can calculate: .,

$$\frac{35 \text{ revolutions}}{5 \text{ seconds}} \text{ X } \frac{6 \text{ slits}}{\text{revolution}} = 42 \text{ slits per second}$$

therefore the fan is rotating at 42 revolutions per second.

(a) Could the fan also be rotating at 84 revolutions per second? at 21 revolutions per second?

(b) If the spot on the fan appears to move slowly backward when seen by a stroboscope, is the stroboscope rotating a little faster or a little slower than the rate that will hold the spot still? Explain.

(c) A television camera looked at the Crab pulsar (which pulses every .033 seconds) through a stroboscope. If the strobe had 8 slits, at what rate should it rotate to make the pulsar seem always lit up?

(d) Use a hand stroboscope to measure the rotation rate of a circular saw and the vibration rate of a bell.

(e) What do you see if you look at a fluorescent light through a stroboscope? (The effect can sometimes be seen by looking at a rotating object, such as an electric fan or the gears on a rotary hand drill, under a fluorescent light.)

BENCHMARKS AND STANDARDS

Benchmarks for Science Literacy	National Science Education Standards
Physical Setting 4F.2	**Physical Science**
Something can be "seen" when light waves emitted or reflected by it enter the eye just as something can be 'heard" when sound waves enter the air.	**Transfer of Energy: Light interacts with matter by Transmission, Absorption, or Scattering. To see an object, light from that object must be emitted by or scattered from it and then enter the eye.**

Other Items that may be of interest to you

614-0701 Cylindrical Spectroscope This device is made of optical glass. The optical glass has been carefully machined into a compound prism and convergent lens. Spectrums of many different kinds can be seen through this spectroscope.

654-0010 Refracting Telescope Kit Set of 10- Experiment with each element of a simple 16-power refracting telescope and see how the lenses work when put together without using an optical bench. Galileo's first telescopes lacked precision and clarity. Nevertheless, he made astonishing discoveries with his crude instruments. This simple lab enables students to build a telescope that is similar to Galileo's. Use the telescope and see how it is similar to a pinhole camera . Materials to make 10 telescopes are provided.