

## **613-0008 (55-130) Doppler Demonstrator**

**Introduction:** Many students have heard of the Doppler Effect, and some can describe its effects. When asked about it, most students will say it is the reason a car's engine has a different sound when it is coming and going away. The Doppler Effect is named after Christian Doppler, an Austrian physicist who proposed the idea in 1842.

The reason behind this is simple: when an object makes a noise, it is not simply a single event, but a series of pulses. The timing of the pulses is called the *frequency*. When an object is moving towards the observer, the pulses are compressed. This is because when the object moves, it covers a distance. This distance is subtracted from the distance the sound pulse moves during the same time, effectively shortening it. More pulses closer together produce a higher pitch.

By the same token, when the object is moving away, it covers a certain distance in the time it takes the pulses to be generated. The pulse will also move a certain distance in the same time period, and these distances are added together. This has the effect of spacing out the pulses more, thus lowering the pitch.

**Operation:** To use your Doppler demonstrator, you will need the following items:

- String
- A mounting point on the ceiling for the string
- 4 AAA batteries
- To install the batteries, remove the 4 screws on the bottom of the unit and hook them up accordingly.
- With the string, turn the demonstrator into a pendulum. You will want to hang the unit at about head height. Note the position of the unit when it is at rest. You will want your students to stand about 1m directly in front of this position.
- Activate the unit with the switch. It will produce a distinct, but constant, pitch. Pull it upwards and allow it to swing like a pendulum.
- As the unit falls, your students will hear a higher pitch. As it rises, the pitch will become lower.

### **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.