

Membrane Aero-phone

(Square Wheels pp. 45-48)

Materials and Assembly:

Using a balloon or latex glove, straw and cylinders of different sizes, you can make a musical instrument that sounds surprisingly like a saxophone. When you blow into the instrument, the stretched balloon acts as a vibrating membrane to produce the sound.

1. Select a cylinder (PVC or cardboard) and (a balloon or latex glove) and use one of the green straws.
2. Using scissors cut a small opening on the end of the balloon or on one of the fingers of the latex glove. This hole should be just small enough for a straw to be inserted. Tape the straw securely to the, so that air will not escape around the opening.
3. Tape the open end of the balloon or latex glove to the cylinder.
4. When blowing into your instrument make sure that there is tension on the balloon. Remember this is your vibrating membrane.

To Do and Notice:

Blow on the straw, and listen to the sound. If the instrument doesn't produce a saxophone-like sound with relatively little effort, check to be sure that the membrane has some tension in it and is not limp.

What's Going On?

When you blow through the straw, pressure builds up in the space between the membrane and the cylinder. This pressure lifts the stretched membrane, allowing air to be released into the cylinder. The membrane springs back into place, sealing the cylinder again, and the whole process repeats itself again. All of this happens many times each second. (The vibration you see on the membrane)

The frequency, or pitch, of the sound you hear when you blow into the instrument depends in part on the rate at which the membrane bounces back and forth on the end of the pipe. (The vibration of the balloon membrane is actually very complex, and only certain patterns of vibration resonate with the tube to produce sounds that you hear.

The length of the pipe is important in determining which sound waves are resonant and, therefore, which frequencies are heard.

SWIM- tubes of different lengths, balloons, straws and tape