Electricity Exhibits

Mighty Current (AC-DC)

See how different kinds of current, either from a battery or from a wall plug, affect an audio speaker, cone, a meter needle, an oscilloscope trace, and a light bulb.

Hand-Cranked Generator

Learn how you can transform mechanical energy into electrical energy. You'll discover there's a connection between your own strength and the amount of electricity needed to power fluorescent and incandescent light bulbs.

Invention Central (Electricity Bench)

You can safely experiment with electricity at the Electricity Bench. Learn all about alternating and direct current, resistance, voltage, and conversion with an assortment of electrical components. Add meters, switches, light bulbs, and capacitors to create your own personal gadget. The exhibit has a panel that defines each component and electrical terms.

Light and Optics Exhibits

Optics Lab

The Optics Lab allows you to experiment with different lens arrangements by making a slide projector, telescope, microscope, and opaque projectors. Different lenses will focus light at either short or long distances, depending on their shape. This lets designers create the different optical instruments that exist today.

Mixing Colors

Mixing colors of light isn't exactly like mixing colors of paint! Experiment with a bright beam of light, and use your fingers, prisms, blocks, and slits to mix colors of light in fascinating and surprising ways!

Mystery Shadows

You're probably used to thinking of shadows as gray or black, so you'll be surprised to learn that they appear as different colors based on the angle at which the light is mounted! Create different colored shadow shapes with your fingers and marvel at the unique colors that result!

Light and Optics Exhibits

Optics Man

Look deeply into this piece by artist Alan Christian and discover something new about yourself!

NOT PICTURED:

Soap Film Rainbow

Use the tools provided to create a soap-film window, and enjoy the rainbow of colors you see as the gravity pulls the window down. Use a white light source, and then switch to a yellowish light and notice the changes in color. You've discovered a unique rainbow.

Color Banner

Discover how different light affects the look of some of the most common colors.

Weather Exhibits

Seasons Lab

This computer exhibit runs a scientific model of the large-scale causes of Earth's seasonal temperature variations. In the computer program, you can change two key variables: the shape of the Earth's orbit, and the tilt of the Earth's axis. The model computes a host of data about an earth with these conditions and then "runs" the model for a one-year cycle. On a spinning, revolving globe, the model displays the temperature changes, hours of daylight, or solar energy associated with the tilt and orbit shape selected.

Orrery*

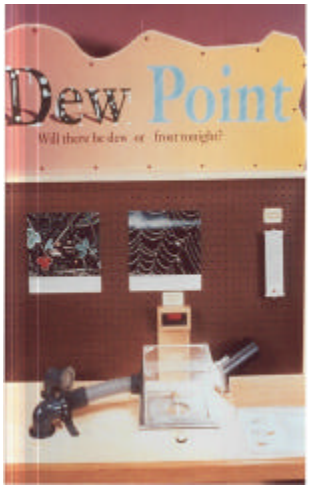
In the Orrery exhibit, chains and gears are housed under transparent covers to simulate the motions of the moon and the earth around the sun. This exhibit will help you better understand the Earth's seasons.

Coriolis Fountain

You'll combine straight-line motion with circular motion in this exhibit. Watch as straight jets of water are expressed into the turning top piece of this exhibit. The water streams will appear to bend as the top spins.

Snow Chamber

You can make a cloud by blowing moist air into a cold chamber. Then, add tiny grains of dry ice to further cool your cloud and watch as your ice crystals magically turn into snow flakes!



Dew Point

This exhibit demonstrates how measuring the water content of the air allows prediction of dew and frost and explains the relationship of the dew point to the weather.

NOT PICTURED: ***Coriolis Globe:*** Fluid within a large rotating globe simulates wind patterns.

Oscillators, Resonance, and Waves Exhibits

The Sound Lab

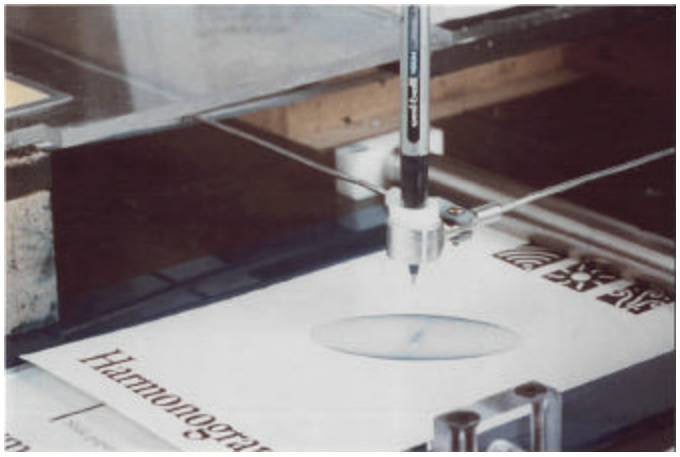
The Sound Lab allows you to look at various sounds from instruments or your own voice and determine their frequencies. You may also pass sounds through pop bottles that act as sound filters or resonators, or pass them through an electronic filter.

A flute can produce a pure note of one frequency. Trumpets, on the other hand, produce sounds that are combinations of frequencies. If you look at the flute's wave form on the oscilloscope, you see a rounded wave; the trumpet's wave form looks more angular.

When you whistle, your pursed lips make an air column inside your mouth vibrate, the same way that air vibrates inside a flute. Trumpets use the buzzing of your closed lips to get the air to vibrate inside the horn.

Bottles or any closed pipe resonate sound. The frequency of sound that each resonates depends on the overall length of the cavity. Shorter lengths resonate higher pitches; longer lengths resonate lower pitches. This can be demonstrated by blowing over an empty pop bottle to produce a sound, then partially filling the bottle with water and blowing again.

An interesting quality of resonators is that they can be used to filter sound. If you play a trumpet sound into the bottle, for instance, the only frequency that's passed or amplified is the frequency that the bottle or resonator is tuned to.



Patterns of Movement

Swing by the **Harmonograph** and take home a swinging design. Watch as a pen controlled by two pendulums draws unique patterns based on the movement of the pendulums and their interaction with each other.

Oscillators, Resonance, and Waves Exhibits

Lissajous' Figures

Build on your knowledge of the patterns created when two waves are added together by plucking the tops of metal rods and observing the beautiful patterns they create. You'll see Lissajous' Figures appear---an ellipse, a pretzel, and a few surprising shapes.

Lariat Chain

This popular piece by artist Norman Tuck consists of a bicycle-like moving chain controlled by an overhead wheel. Nudge the chain with your finger, and watch the waves travel up and down. You won't be able to resist this playful exhibit.

Ripple Tank

Colliding water waves show how waves add and subtract to produce interference patterns.

Musical Ratios

This exhibit combines the sounds of an organ and the mathematical magic of an adding machine! Study musical ratios by tapping two keys on the keyboard and watch their sound waves appear on the computer screens. Then watch as the sum of the two waves creates a fascinating Lissajous' figure on a third screen.

NOT PICTURED:

Waves on a String*

A moving mirror projects the differing wave forms of a bowed or plucked cello string.

Pendulum Exhibits

Pendulum Lab*

The motion of a pendulum is said to be periodic because it repeats itself again and again. The plots of the position versus time and the velocity versus time are periodic and can be represented by periodic sine waves. The same values of position and velocity are reached again and again as time goes on and the pendulum continues to swing back and forth through these values. Comparing these plots shows an interesting relationship between the pendulums position speed at certain times. The pendulum reaches maximum speed as it passes through zero degrees of displacement, the lowest part of its swing, and its minimum speed, zero, at its maximum angle of displacement, the highest part of its swing.

Peg and Pendulum

One can think of the behavior of a pendulum in terms of energy. We call the energy of motion kinetic energy: stored energy that can be converted into motion is called potential energy. At the maximum displacement (highest part of the swing) the pendulum has run out of kinetic energy but has a maximum stored potential energy. At the bottom of the swing, zero degrees of displacement, the potential energy is at a minimum and all the energy is once again kinetic. This exchange of kinetic and potential energy occurs throughout the motion, but at any given time the sum of the two is always a constant. Energy is always conserved. An interesting consequence of the conservation of energy is that if a pendulum is released from a certain height, it will return to that height even with a peg in the way. This exhibit allows you to recreate Galileoś experiment demonstrating conservation of energy.