# EG-50 Audio Driver

**What is sound?**

Sound is an interesting phenomenon. Nearly every physical event has a unique sound associated with it. Sound travels through a medium in a wave pattern. In air at sea level, sound travels at approximately 343 m/s (767 mph). Sound travels at 1482 m/s (3,315 mph) in fresh water at 20 $^0$C. A problem with natural sounds is that they are difficult to experiment with in a laboratory setting. It is often difficult to capture recordings of natural sounds without distortion. For experimental purposes, an audio generator is a great way to capture sounds.


**Specifications:**

Audio, or signal generators, are devices that produce a wide variety of sounds. The EG-50 Audio Driver is a source of variable frequency waves of four types: sinusoidal, square, triangle and sawtooth. Frequency ranges from 0 - 45,000 Hz (0 - 45 kHz). A five digit LED display presents the output frequency. The entire unit runs on a low voltage of 110 V AC. An included power adapter allows you to plug the device into a wall outlet.

**Operation:**

1. Connect the included power adapter to the unit and plug the EG-50 Audio Driver directly into a wall outlet.
2. Turn the unit on/off using the switch located on the front of the unit.
3. Selecting a wave pattern:
    a) Press the gray start/stop button and ensure that unit shows "off" for the wave pattern function.
    b) Use the gray button under the four types of wave patterns to toggle through four wave functions in order to select the desired wave pattern.
    c) Once the desired frequency is set, press the start/stop button again in order to turn the wave pattern function on.
4. Setting the frequency:
    a) Press the black frequency knob in order to toggle through the 1, 10, 100, 1,000 and 10,000ths place of the LED display in Hz ($s^{-1}$).
    b) Turn the black frequency knob to the right or to the left in order to adjust the unit to the desired frequency.
    c) Once an experiment is in progress, it is necessary turn the wave pattern off by pressing the start/stop gray button, if a change in the frequency is desired. The maximum frequency is 45,000 Hz.
    d) Press the gray start/stop button to resume the wave pattern function at the new frequency.
5. The EG-50 Audio Driver has an output jack located on the front of the unit. This allows for the connection of a banana plug adapter for use in conducting experiments.
6. The back of the unit allows for the use of a small loudspeaker. The black volume knob on the front of the unit allows the user to control the volume level.

**Experiments:**

Many exciting experiments are possible with the EG-50 Audio Driver. A vibration generator is an apparatus designed to demonstrate wave theory. If you have access to a vibration generator, try the following experiment. A ring stand, clamp, banana plugs and a banana plug adapter are required. Connect the ring at the end of the spring to the top of the vibration generator. Set up the ring stand and place the clamp at the very top of the post. Attach the hook at the other end of the spring (loose end) to the clamp attached to the ring stand. Ensure that the spring is pulled tight and is entirely vertical. The vibration generator should be set to the unlocked position. Connect two banana plugs to the front of the vibration generator using the ports. Connect the free ends of the banana plugs to a banana plug adapter. Plug the adapter into the output jack on the front of the EG-50 Audio Driver. Follow the operation instructions above to set the unit to a sawtooth wave pattern. Systematically adjust the frequency in 1,000 Hz increments from 1,000 Hz to 15,000 Hz. With the wave pattern engaged, observe how sound becomes fainter and fainter as the frequency reaches 15,000 Hz. The normal human ear can detect frequencies between 20 Hz and 20,000 Hz. In a classroom setting, have students close their eyes during the duration of the experiment and raise their hands each time they hear sound at each of the frequency settings. Plot the data in a bar graph to show how "sensitive" the students ears' are in detecting sounds at varying frequencies. Data can be plotted to discern if there are differences in hearing based on gender, age, or other variables that are selected.

The EG-50 Audio Driver can be used with an oscilloscope. An oscilloscope is a device that allows one to view electrical waves. With an audio driver attached, a visual representation of the sound wave is possible. After setting up the devices to work in conjunction with one another, try different wave patterns and frequencies. By observing the sound wave, physical science concepts are easily displayed in a classroom setting. Students can learn wave properties, such as, amplitude and wavelength.

An interesting use of the audio driver is with a Chladni plate. A Chladni plate is essentially a metal plate fixed on a vibration generator or speaker. When attached to an audio generator, the plate will resonate with the frequency that is set. By pouring salt onto the plate and adjusting the frequency, observations can be made to show salt "dancing" and forming various patterns. Sand will work instead of salt on the plate as well.

**May we suggest:**
**613-0010 Vibration Generator:** Demonstrate low frequency mechanical oscillation.

**613-0090 Oscilloscope, Dual Trace 20Mhz. 110V Power Supply:** Display sound waves electrically when connected to an audio driver.

**EG-54 Chladni Plates:** Excite vibrations in simple, thin metal plates.

**Warranty and Parts:**

We replace all defective or missing parts free of charge. Additional replacement parts may be ordered. 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.