

## 613-0012 (55-115) Wave Monitor



**Introduction:** Waves are a curious phenomenon. While a wave is fairly easy to generalize, determining exactly what it is and defining it is far more difficult. In brief, any disturbance that propagates through space an time is a wave, but what does this mean? Waves in water are fairly easy to understand; a disturbance throws water in a certain direction, and the water sloshes up and down as long a sufficient energy remains to move it. Waves impart a *restoring force* that helps the wave travel and lets the medium find equilibrium. However, many waves can propagate in a vacuum. Can a vacuum be distorted?

While it is difficult to visualize waves that travel without a medium, electromagnetic radiation such as light and radio do so. This is not to say that a vacuum itself vibrates in response to these waves. Instead, they are simply able to travel through a vacuum because of their inherent properties.

There are two major types of waves: longitudinal and transverse.

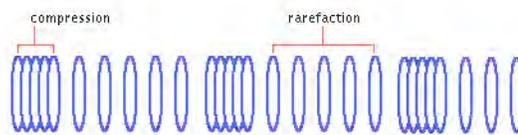


Figure 1: Longitudinal wave

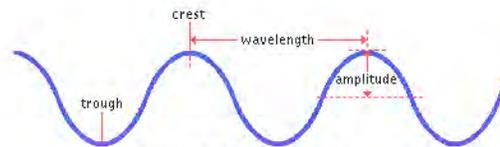


Figure 2: Transverse Wave

Transverse waves can exhibit sinusoidal forms; that is, the shape is a sine wave. These waves are very easy to study because the travel unchanged, each wave being equal to the next. These types of waves are a long procession of identical crest and troughs, which do not affect each other.

Longitudinal waves are different. These waves actually meet and alter one another. In effect, transverse waves can be visualized thus: picture a “packet” of energy. This packet is passed from one wave to another in the same way a line of laborers passes a bucket. In transverse waves, two waves will meet and exchange energy. The first will dissipate, while the second continues on until it passes energy to another wave.

**Description:** Your wave monitor can be used with a ripple tank or as a stand-alone unit. To use with a ripple tank, you will need a small vibrator with banana plugs.

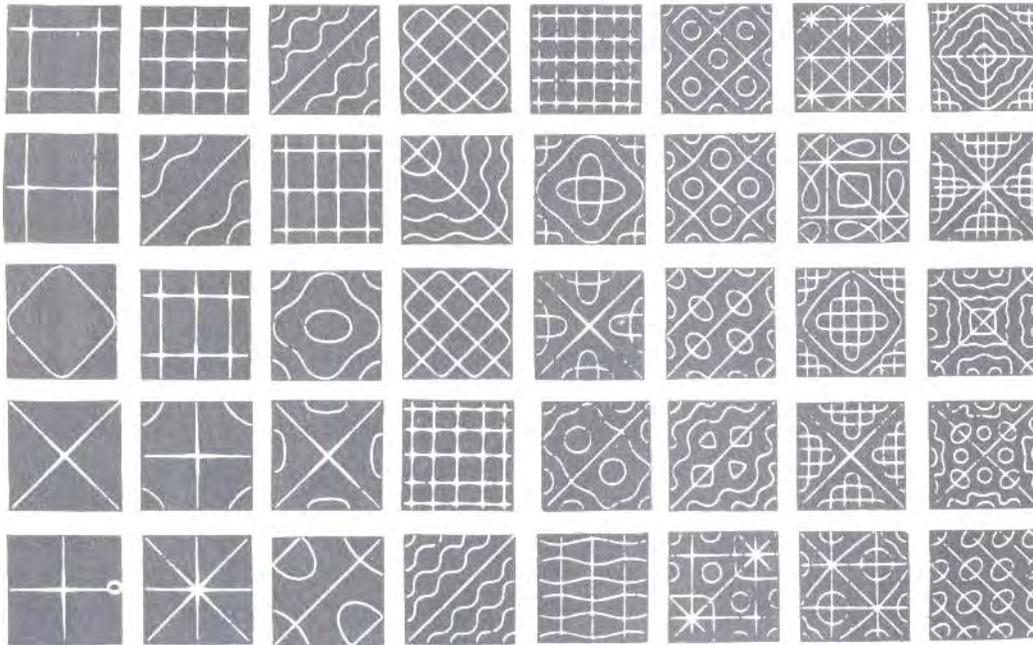
One possible way to use the wave monitor would be as a stroboscope. The unit comes equipped with a bright LED on a gooseneck arm. On the back of the monitor you will find two corresponding jacks labeled LED. The Wave Monitor can generate flashes from 0.5 to 100 Hz, with a resolution of 0.1 Hz. This is sufficient for most stroboscope applications. If you require a more advanced stroboscope, we invite you to consider our **50-005 Digital Stroboscope**.

If you have access to a ripple tanks and a compatible vibrator, your wave monitor can be very useful. Hook the vibrator into the jacks on the back of the unit marked ‘vibrator’. You can also attach the LED at the same time. In this way, you can use the vibrator to agitate a ripple tank, and the LED will flash at the same frequency. By doing this you can clearly show the wave patterns in the tank.

The Wave Monitor is powered from a standard wall socket through an AC adaptor. It is enclosed in a sturdy housing that protects the innards from shocks. An on/off switch is on the front of the unit, as well as a regulator knob. Turn the knob clockwise to increase the frequency, and counterclockwise to decrease it. An LED readout will display the current frequency, in Hz.

Below the regulator knob are two buttons. The left hand button will double the flash frequency, whereas the right hand button will double the vibration frequency. This function is useful for ripple tank demonstrations.

A second way to use the Wave Monitor would be to connect it to a set of **Chladni Plates (613-0055)** using a **Vibration Generator (613-0010)**. Originally these plates were set to vibrate with a bow from a string instrument. When the plates are coupled to the vibration generator and sand or salt is spread across the vibrating surface, complex waveform patterns can be created and “frozen” depending on the frequency and the shape of the plate that is used.



#### **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.

#### **May we suggest:**

**613-0075 Hand Cranked Wave Model:** Demonstrate transverse waves with our low friction, easy to use model. Simply turn the crank to generate longitudinal and transverse waves.

**611-1625 Portable Stroboscope:** The 5-digit LED digital readout on this economical stroboscope gives the exact number of flashes per second. Charge it and take it anywhere you want to clock rotational velocities. Try it with a spinning fan! Features include: Xenon flashlamp, Solid state design, Three modes: RPM, Hz and mSec. Can use internal or external signal source. Can be fine-tuned.