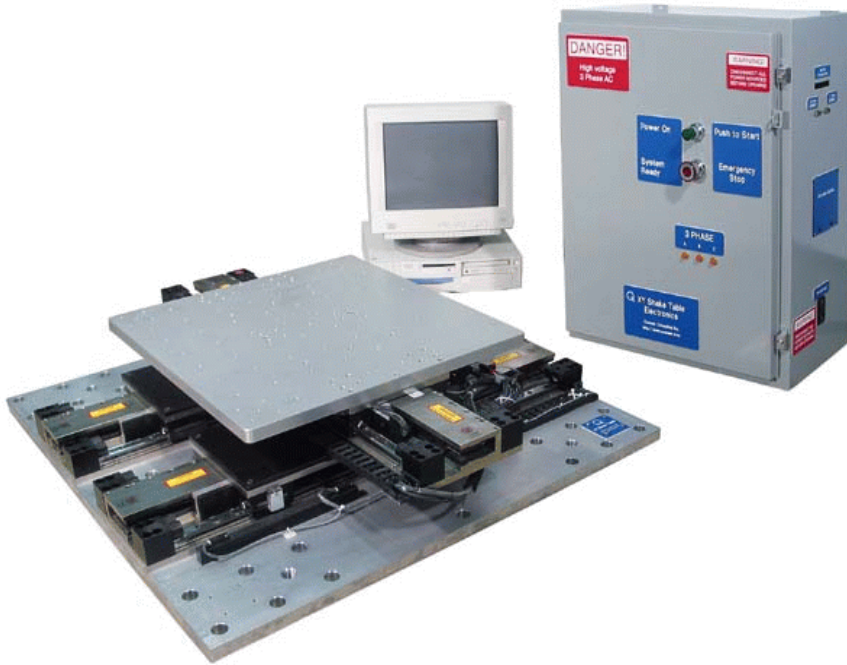




QUANSER  
INNOVATE. EDUCATE.

# Shake Table III

## Small x-y Shake Table for Structural Dynamics



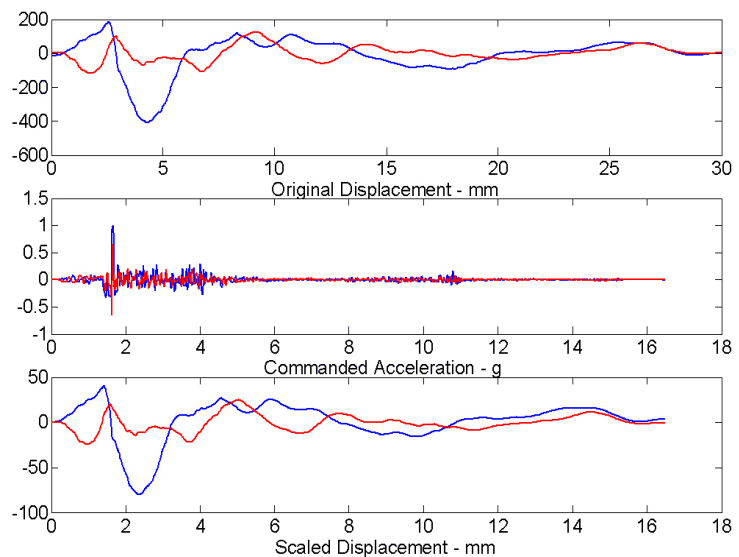
There is a 100 percent chance of an earthquake today - they are very common occurrences on this planet. So today, somewhere, an earthquake will occur. It may be so light that only sensitive instruments will perceive its motion. It may shake houses, rattle windows, and displace small objects, or it may be strong enough to cause property damage, injury, and death.

Modern civil engineering structures, particularly tall buildings and bridges, are susceptible to severe vibrations induced by winds and earthquakes. Recent technological advances can now allow engineers to design intelligent structures capable of counteracting such undesirable vibrations by incorporating active, semi-active and passive control systems in the design of modern structures. Systematic

experimental programs using shake tables are underway globally to assess the efficacy, reliability and safety of control systems.

To support these efforts Quanser has developed a cost-effective, small scale Shake Table that can support structural dynamics research for earthquake loss reduction, such as:

- ◆ Structural integrity testing of complete models and isolated building components;
- ◆ Smart materials and structures;
- ◆ Structural control technology;
- ◆ Damage detection;
- ◆ Seismic engineering of buildings
- ◆ Structural component testing
- ◆ Actuator and sensor dynamics
- ◆ Actuator saturation effects
- ◆ Output feedback design
- ◆ Digital control implementation
- ◆ Base isolation and energy dissipation devices
- ◆ Retrofit solution and procedure testing



### **Scaling real earthquake data and playing it back is easy!**

Quanser's proprietary scaling software will automatically scale real earthquake data to fit the maximum table capabilities or to user defined parameters. Shown here is the original earthquake data with a peak displacement of 394 mm and a duration of 30 seconds. The software has scaled the data to a maximum displacement of 80 mm and a duration of 16.5 seconds to achieve a peak acceleration of 1g.

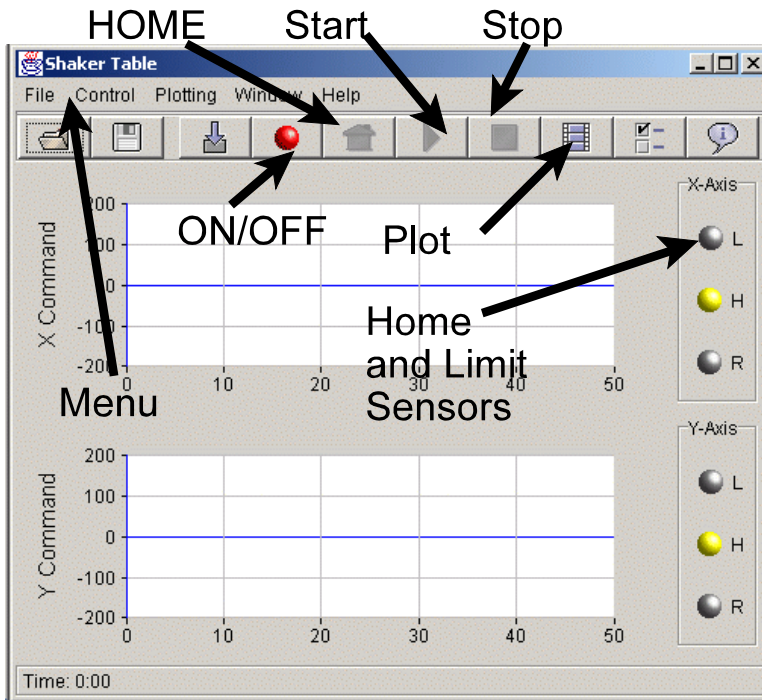
The Quanser Shake Table III System consists of a robust and versatile x-y Shake Table, a dedicated power supply coupled with the powerful Tremor™ software, which provides researchers with tremendous control flexibility.

**Hardware**

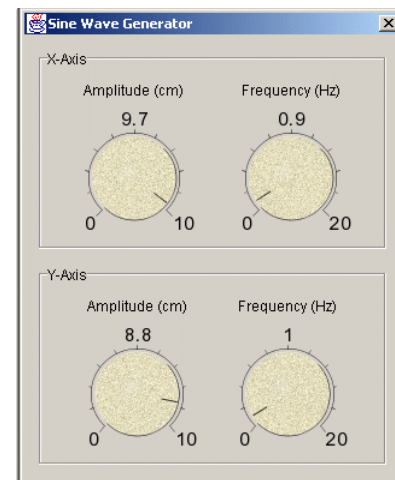
The Shake Table III is designed with a high grade aluminum platform, powered by direct-drive linear motors controlled via high quality sensors, sampled at a rate of 1 kHz. The Shake Table III has unparalleled frequency and position control throughout its operating range.

**Software**

Our Tremor™ software has been designed with a user friendly Graphical User Interface allowing all parameters to be easily defined and adjusted. This provides tremendous flexibility in displaying system inputs and the dynamic response of the components being tested. In addition, all the data captured from experimentation can be immediately transferred to MATLAB for numerical analysis.



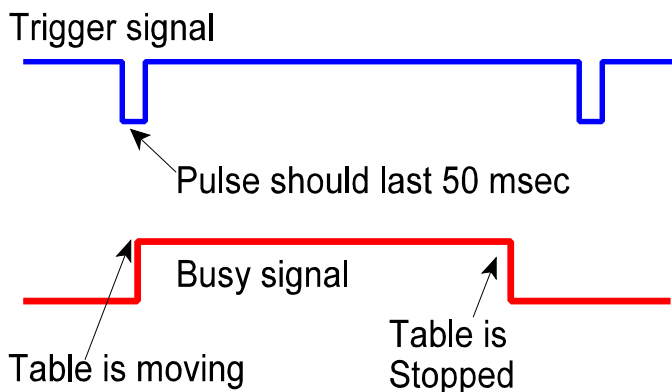
*These features provide the capability of*



*performing high quality research on a small scale to identify and test structural response reduction strategies which can then be passed onto larger scale facilities for verification.*

**Tele-Operation**

To create greater opportunities for research and student learning, overcome limited lab space, collaboration with peers or demonstrate a research concept to colleagues - consider the power of using this Shake Table in conjunction with the Quanser WebLab™ software.



- ◆ Real-time off-site research
- ◆ Real-time multi-lab interaction
- ◆ Rapid sharing and collaboration
- ◆ Tele-operation, tele-participation and tele-observation.

The Synchronization feature allows you to synchronize motion profiles with other data acquisition systems and computers in your lab such as acceleration and strain measurements

## Design Feature Summary

Multi-axis	Operating in two dimensions, the Quanser table avoids the need to superimpose data from multiple experiments onto each other.
Max payload	120 kg. (264 lb.)
Displacement	Maximum 160 mm (7.3 ") in both x & y direction.
Velocity	Maximum 600 mm/sec
Peak Acceleration	x axis - no load: 2.8 g, max. load: 1.9 g y axis - no load: 5.0 g, max. load: 1.7 g
Peak Forces	x axis 7200 N (1600 lbs) y axis 3600 N (800 lbs)
Frequency Range	0-20 Hz. at 1 kHz. sampling rate 8 $\mu$ s latency Shake Table III offers infinite control in the frequency range of 0 to 2 Hz. With 1kHz. sampling. Operation in this range make the She Table III well suited for deep surface-wave testing.
Direct drive linear motors	Encoder resolution: 7 $\mu$ m Reduced parts for improved reliability. Provide billions of cycles without performance degradation. Avoids the use of hydraulics and associated equipment.
Payload area	Large surface area – 63 cm. x 63 cm. ( 25 " x 25 ") High grade 25 mm. (1 ") aluminum base. Matrix of threaded bolt holes with 76 mm. (3 ") spacing.
Highly flexible and long life cables	No risk of cable damage.
Power Requirements	240 VAC 3 Phase
Data Acquisition	Quanser MultiQ3
Software Control	<p><b>Tremor™</b> software developed for the Shaker III to allow a turnkey solution with amazing flexibility and real-time control capability.</p> <ul style="list-style-type: none"> <li>• Highly intuitive and user-friendly Graphical User Interface (GUI).</li> <li>• Fully <b>MATLAB</b> compatible</li> <li>• Collect data from your experiments, replay, visualize and analyze the data with ease (*.m &amp; *.mat file formats are supported for export and analysis)</li> <li>• Simulate real live events with actual earthquake signature data easily downloadable from multiple databases on the Internet.</li> <li>• <b>Tremor™</b> is compatible with <b>WebLab™</b> software, Quanser's telereality software tool that enables you to work seamlessly from a remote location anytime, anywhere.</li> <li>• Operate independent or synchronously with limitless number of Quanser Shake Tables.</li> <li>• Synchronize motion profiles with multiple tables and/or other data acquisition systems.</li> </ul>