



## The M1600W Modal Shaker

The Model M1600W Modal Shaker is a small permanent magnet vibration exciter, stably constructed and easy to transport. It is intended primarily for Modal excitation, but of course can be used for transducer calibration, experimental or educational use. Its frequency range up to 4,500 Hz is wide enough for most applications and its motion has very little out of axis motion, allowing less than 5% transverse acceleration up to 4.5KHz. The vibration table has a single threaded hole (1/4-28 NF) which enables one to mount most stingers or mechanical adapters. The shaker is a nice compact unit weighing 20Kg (44 pounds), standing 193mm (7.5 inches) tall by 180mm (7 inches) in diameter. The shaker armature has a hole through design with an aluminum top. The moving weight of the armature is about 90 grams, giving minimum mass loading effects especially when using the stinger apparatus..

The shaker design employs an AlNiCo permanent magnet completely encased in a low carbon steel bowl to create a magnetic field in the gap of 13000 gauss. Moving in this field is a three inch diameter electromagnetic coil, approximately 20 mm (3/4 inch) long. The static resistance of this coil is about four ohms. The shaker is put into motion by powering the coil with an electronic signal creating a magnetic field that pushes and pulls on the field of the permanent magnet. As the signal moves from positive to negative the position of the shaker armature likewise moves up and down. To create an efficient shaker, the mechanical gap between the coil and the magnet is kept to about three hundred microns.



### **Exciter Construction, features and uses**

The hole - thru design of the Model M1600W permits easy use of tension wire stingers as well as more traditional push-pull stingers. A chuck and nut assembly is furnished for typical sized stingers and several stingers are available as part of an accessory kit.

The magnetic field is generated by a AlNiCo permanent magnet. The magnetic field is conducted to the desired air gap by building the shaker in the shape of a magnetic bowl out of soft steel parts. The air gap is approximately 10mm (3/8inch) high and slightly over seventy six millimeters (three inches) in diameter. The width of the air gap is about 1.8mm (.07inches).

The magnetic field density in the gap will measure about 11,500 Gauss. A Beryllium Copper flex lead attaches the coil to the power input to provide extremely long fatigue life. The coil wire is edge wound completely by machine resulting in a uniform coil that is less prone to localized heating, a major cause of armature damage. The coil wire is supported on a Kaptan/Nomex structure bonded with high temperature epoxies. The result is a coil assembly with a high temperature limit of about 250 degrees C. The clearance of motion from the inside of the armature assembly to the magnet pole piece assembly is from 0.010 to 0.015 inches (0.25 to 0.38 mm). The shaker is cooled by natural convection cooling provided by the motion of the armature or an optional blower can be used. Can be used with any excitation signal: Random, Burst Random, Sine or Swept Sine Wide, useable Frequency Range. Extremely light moving element for excellent motion through resonances.



### **OPERATIONAL SPECIFICATIONS**

**FORCE RATING:** 200 N Sine Vector (140N Random) with Compressed Air cooling (Compressor Included)

**MAXIMUM STROKE:** 19.2mm, 0.75 inches Peak-to-Peak

**MAXIMUM ACCELERATION:** 80 G Vector Bare Table

**FUNDAMENTAL AXIAL RESONANCE:** >5,000 Hertz

**MOVING MASS:** 90 Grams

**FREQUENCY RANGE:** DC-4,500 Hertz

**COIL RESISTANCE:** 4 Ohms

**MAXIMUM INPUT CURRENT:** 5.0 Amps (rms)

**MAXIMUM INPUT VOLTAGE:** 50 Volts (rms)

**COOLING:** Convection or blower

**SPECIMEN ATTACHMENT:** ¼-28 UNC

**FIELD:** Permanent Magnet 13000 Gauss

**SUSPENSION:** Two fiberglass Spider Assemblies

The Modal exciter will be supported by a trunnion for easy positioning for structural excitation.

A compatible amplifier would be included in the supply.



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