

Inertial Balance Kit

Simple



MF1964-001

Description:

The IEC 'Inertial Balance' is a simple mechanical device that uses the Inertia of a body to measure its Mass. One part of the unit is 'G' clamped to the edge of a table and a platform is supported by spring blades so it is free to oscillate in the horizontal direction. A heavy mass is tied to a thread so that it can be supported to either:

- 1) Hang through the platform hole to be driven in a horizontal direction, or
- 2) Hang through and rest on the platform so that it becomes part of the mass of the platform itself.

Kit Contents:

- 2 platforms. One clamps to the bench and the other carries the mass and oscillates.
- 2 support blades (spring steel) with screws and wing nuts for assembly to platforms.
- 1 cylindrical heavy mass for hanging in the oscillating platform.
- 1 length of thread to support the mass up from the oscillating platform.

Physical Size: Bag of Parts

Weight: 1.8kg

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Assembly:

- Take one of the platforms and place the two spring blades on the inside faces so that they protrude from the slots provided at the corners. Use the screws and wing nuts provided to hold the blades in place. Do the same with the other platform on the other end of the spring blades.
- Position the plain platform at the edge of a table with the other platform free to oscillate sideways in mid-air. Use a 'G' clamp (not provided) to hold the plain platform firmly to the table.
- Tie the thread through the hole provided in the heavy mass so it can be supported, by a light cord, slightly up from resting on the platform during the experiment. A rod protruding from a retort stand is normally used to anchor tie the light cord.

Note:

Sometimes, during storage or packing, the spring strips can become curved. Please straighten them by hand by simply stressing them back the other way to remove any unwanted curve.

First Prove that Gravity is not Relevant to the Frequency:

- With the mass resting on the moving platform, the mass becomes part of the platform and is supported against gravity while oscillating side to side. Measure the frequency.
- Repeat the experiment but, using a retort stand and rod to anchor the thread about 600mm above the mass and support the mass up slightly so that it does not quite rest on the platform. With this arrangement, the mass is supported against gravity by the thread whilst being moved sideways by the platform.

Note:

Either platform can be used as the oscillating platform, but one of the platforms has a short side to make it easier to clamp to a table top. Please notice the short side in the picture provided.

The Full Experiment:

(use your physics text book for the experiment details)

In outer space, where there is no gravity, a different method is needed to 'weigh' objects. The 'Inertia' of the object is used to determine its mass. A mechanical device is used so that various known masses cause it to vibrate at different frequencies. These mass / frequency relationships are plotted as a graph which is found to be a straight line. This graph becomes the 'calibration' of the instrument so that when an unknown mass is used, the frequency of vibration of the instrument is determined, probably by using a timer or stopwatch, then the mass of the object can be found from the graph.

Important Note:

If a graph is to be created as part of the experiment, several objects of different but known mass must be attached to the moving platform to provide say 3 or 4 different oscillation rates. Providing the mass is taped down so it definitely cannot move at all during vibration, any number of say 100gm slotted masses or similar can be used as the "known masses".

Designed and manufactured in Australia