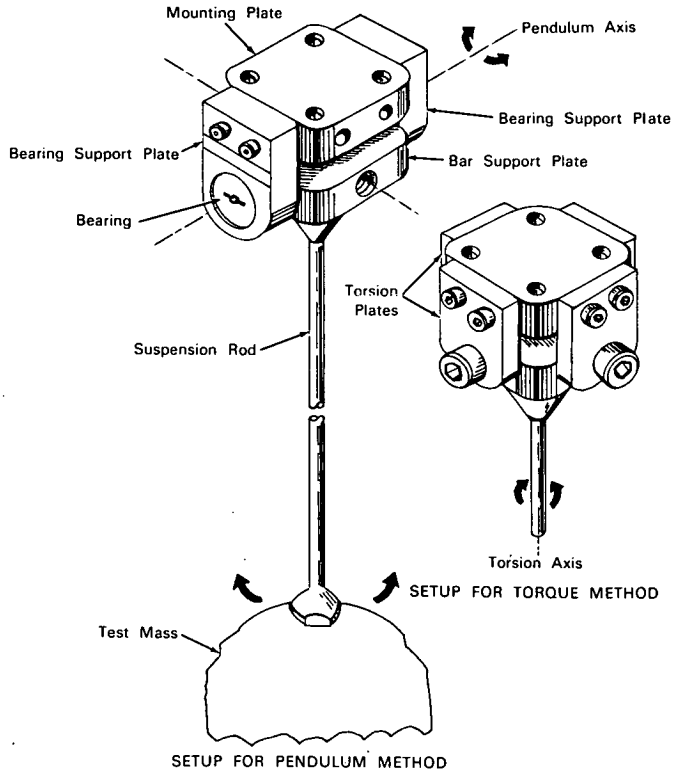
NASA TECH BRIEF

Device Enables Measurement of Moments of Inertia About Three Axes



The problem: Designing a fixture which will permit the measurement of the moments of inertia of an irregularly shaped mass about three mutually perpendicular axes, without requiring remounting of the mass. Such a fixture was required for measuring the moments of inertia of delicate instrumentation packages which could be suspended from only one point.

The solution: A fixture which suspends the test mass at one point and which can be adjusted to allow oscillation of the mass about each of three mutually perpendicular axes for measurement of the respective moments of inertia by the standard pendulum and torque methods.

How it's done: The fixture employs a long thin suspension rod which is rigidly fixed to a bar support plate at one end and to the test mass at the other. For making measurements with respect to one axis by the pendulum method (as illustrated), the bar support

(continued overleaf)

plate is suspended from bearings in two bearing support plates on opposite sides of the bar support plate. These support plates are bolted to the mounting plate which is bolted to a fixed reference surface. To measure the moment of inertia about a transverse axis by the pendulum method, the bearing support plates are detached and bolted to the second pair (perpendicular to the first pair) of opposite edges on the bar support plate and the bearing support plate. Measurement of the moment of inertia of the mass about an axis perpendicular to the first two axes is accomplished by the torque method. For this measurement, the bearing support plates are removed and replaced by torsion plates, which are rigidly bolted to the bar support plate and mounting plate. With this assembly the mass is constrained to oscillate about the longitudinal axis of the suspension rod (as illustrated in the second figure). The test mass remains attached to the bottom of the suspension rod during the moment of inertia measurements about each of the mutually perpendicular axes.

Notes:

1. The fixture can be easily modified to permit measurements with respect to more than three axes.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland, 20771
   Reference: B65-10176

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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