

P1906 LINEAR VIBRATION APPARATUS

FEATURES

- ◆ Vibration of a Spring Mass System
- ◆ Vibration of a Double Cantilever Beam
- ◆ Demonstration of Simple Harmonic Motion of a free body
- ◆ Demonstration of Hookes Law applied to a spring

INTRODUCTION

The P1906 Linear Vibration Apparatus provides the student with an introductory course of instruction and experiments on the subject of linear vibration. The practical experiments with their direct relationship to common design situations give an insight into vibration phenomena and a consideration of basic theory. They are suitable for classroom demonstrations or individual work by students from technician to graduate level and a full range of accessories is provided to enable all recommended experiments to be carried out.

DESCRIPTION

Comprises a drive unit and vibration generator with experimental accessories.

The drive unit consists essentially of an oscillator and a power amplifier designed to provide a sinewave power output suitable for driving the vibration generator.

OSCILLATOR

The circuit provides a stable sinewave input to the power amplifier, consisting of three operational amplifier stages of a switch, and two integrators. A sinusoidal input to the power amplifier is established, which contains approximately 4% distortion from a pure sinewave. A feedback loop then stabilises the waveform level about zero.

POWER AMPLIFIER

The amplifier comprises a differential input amplifier, a buffer stage with split level output and a push-pull output stage. It can be driven from an external oscillator and may be regarded as an operational amplifier with a voltage gain of +1 and minimal phase shift from DC to 10 KHz.

A differential input reduces the effect of unbalanced voltage lines whilst the application of heavy negative feedback enhances the performance of the amplifier, modifying the output impedance to suit the low impedance load of the vibration generator.

VIBRATION GENERATOR

The vibration generator functions by the interaction between a steady magnetic field, produced by a permanent magnet and an oscillatory current flowing in the moving coil.

A force is produced perpendicular to the lines of flux and conductors carrying the current.

In this way a test load mounted on the moving coil drive spindle can be vibrated at any frequency set on the frequency dial, whilst the amplitude of vibration is proportional to drive current.

PRINCIPLE EXPERIMENTS

1. BAIL CHATTER TEST

A vibration test illustrating simple harmonic motion theory.

2. SPRING RATE TEST

A demonstration of Hookes Law.

3. SPRING-MM SYSTEM TEST

A test to verify the mass/frequency relationship of a vibrating spring-mass system.

4. DOUBLE CANTILEVER BEAM

- A determination of the cantilever's natural frequency.
- A determination of the natural frequency of a loaded cantilever.

These are the main experiments which may be performed and the graphs shown as Figs. 1 to 3 are typical of the results that can be obtained.

TENDER SPECIFICATION

A 1 kg thrust vibration generator - stroke 2.54 mm and combined oscillator/drive amplifier unit, 3 Hz to 50 Hz in one range, with experimental accessories; amplitude indicator with drive assembly, double cantilever with 12 magnetic load units, suspension gantry with measuring scale and spring mass system with 6 load units, all contained in an aluminium carrying case.

SERVICES

Single phase 110 or 220/240V 50 or 60Hz supply.
State voltage on ordering.

PHYSICAL DETAILS

| | Nett Weight | | Length | | Width | | Height | |
|------------------------|-------------|-----|--------|------|-------|------|--------|------|
| | kg | lb | m | in | m | in | m | in |
| Vibrator & Accessories | 1.0 | 2.2 | 0.09 | 3.75 | 0.09 | 3.75 | 0.35 | 13.7 |
| Control Unit | 4.1 | 9 | 0.26 | 10.2 | 0.19 | 7.5 | 0.19 | 7.5 |

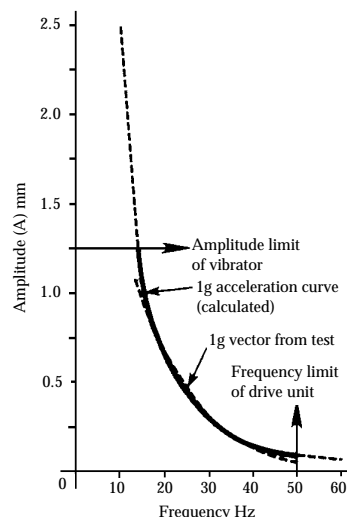


FIG. 1 BALL CHATTER TEST

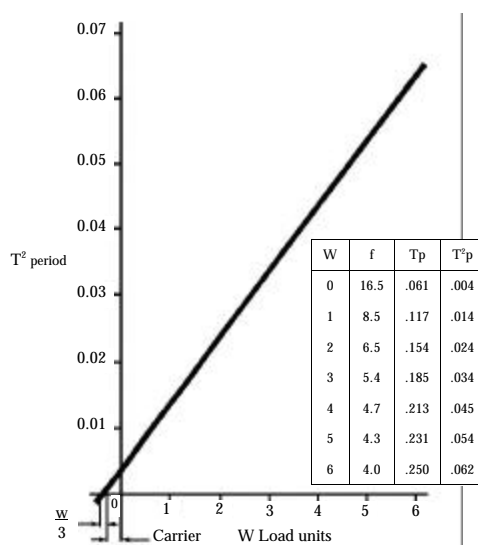


FIG. 2 SPRING-MASS TEST

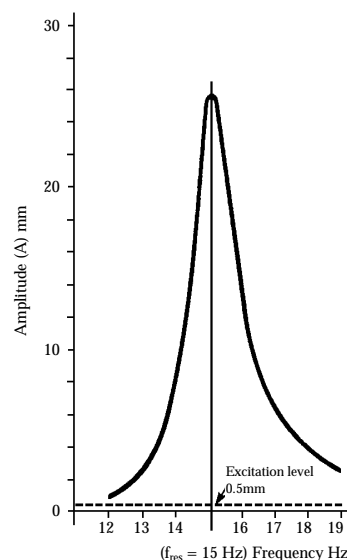


FIG. 3 DOUBLE CANTILEVER TEST

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