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Vibration Generator with Accessories

Part Number L1009KIT

User Instructions



INTRODUCTION.

The IPC Irwin Vibration Generator is a robust and versatile piece of equipment capable of delivering a wide range of wave experiments. Included in the design is a spindle locking mechanism to prevent mechanical damage when fitting the accessories and a fast blow fuse to prevent damage to the vibration coil when too higher current is applied.

DESCRIPTION.

The Vibration Generator is basically a loudspeaker where the moving coil of the speaker is attached to a metal spindle which moves up and down within a permanent magnetic field. The coil and spindle are supported by two suspension supports for perfect guidance of the spindle. To facilitate the connection of external equipment (such as the accessories supplied) the top of the spindle has 4mm hole suitable for a 4mm banana connector plug. Electrical connection to the Vibration Generator is via two 4mm, black, banana sockets located at the front of the unit. Also located at the front is the protection fuse and holder (between the two sockets), the fuse fitted is a fast blow type so as to provide maximum protection to the moving coil windings.

The Vibration Generator is designed to operate using a range of waveforms including sine, square, triangle or sawtooth, and at any frequency from 0.1Hz to 10kHz. Spindle movement can range up to 5mm at the low end of the frequency range.

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INSTRUCTIONS.

To operate the IPC Irwin Vibration Generator, you will need to connect a suitable electrical waveform to the two 4mm input sockets, the source of this waveform must be capable of delivering a current large enough to power the movement of the spindle, please see the Specifications section below.

Note: we recommend using our Signal Generator & Amplifier (part no: IPC-4885-W) to operate the Vibration Generator. *Please note that when set to maximum amplitude the duration of the experiments should be limited to no long than 30 minutes so as to protect the drive circuitry of the Amplifier (please also allow a 20 minute cooling off period between experiments).*

When using for the first time carefully unpack the product and check that all the accessories are included (please see the Accessories Section below), then release the spindle lock and manually check the spindle moves freely within the unit.

Initial Function Test: with the spindle still unlocked, connect the unit to your signal source using two standard 4mm plugged leads, then set the signal to sine wave at a frequency of 3-5Hz and turn up the amplitude. You should see the spindle rises and falls at this set frequency and increase in its movement range as the amplitude is increased. **Note:** if you see nothing first check that the fuse holder is tightened properly, secondly check the fuse is intact, if it has blown replace it with a 1A, quick blow, 20mm glass, type fuse.

NOTE: always lock the spindle before fitting any accessories or after use, you may need to move the spindle up or down to achieve this.

EXPERIMENTS.

Vibration on a string – transverse wave – Fit the 4mm plug/fixing screw accessories into the top of the spindle and then attach a thin string into the hole, securing it with the allen screw. Run the string over a fixed pulley and hang a 100g mass on the end using a weight hanger. Now increase the frequency of the sine wave until a vibration is seen on the string, finally adjust the frequency until you achieve a standing wave. Measure the wavelength using a metre rule and make a note of the frequency, then calculate the velocity of the wave for that particular string tension. Now add another 100g mass to the hanger and repeat, then continue to add more 100g masses. Please note that you should compare like with like ie. the same number of nodes on the string. Does the velocity or wavelength change with increasing mass?

Standing waves on a spring – longitudinal wave - Connect the spring vertically between the spindle and a retort stand, then extend the spring to between 200 to 300mm. Now starting from a low frequency increase the frequency until you have a single antinode on the spring. Note the frequency and then increase the frequency further until the next standing wave occurs. Finally plot a graph of the number of antinodes against frequency.

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Standing waves on a spring – transverse wave - Attach a mounting post to the threaded hole in the base of the vibration generator and mount it horizontally in a retort stand. Connect the spring to the spindle and anchor the other end to another retort stand, adjusting the tension so that the spring is extended to between 200 to 300mm. Slowly increase the frequency starting at about 1Hz until you observe the first standing wave. Note the frequency and then increase the frequency to get the second, third and fourth waves.

Resonant Frequency - Plug the resonant strip into the top of the spindle and spread out the three strips, now increase the frequency from 1Hz until one of the strips shows a standing wave (ie. vibrates like an insect's wings). Continue to increase the frequency until another strip show a standing wave, finally compare the frequency with the length of the strip.

SPECIFICATIONS.

Frequency Range	= 0.1Hz to 10kHz
Input Impedance	= 8 ohms DC (3.5 ohms at 50Hz).
Input Current	= up to 1.0 Amp Max. (Fast Blow 1A fitted).
Spindle Amplitude	= 5.0mm at 60Hz (decreasing with increasing frequency).
Spindle Details	= 8mm diameter with a 4mm vertical banana socket in the top.
Dimensions	= 100 (height including spindle), 95mm diameter (max.)
Weight	= 1.4kg (including accessories).

ACCESSORIES.

4mm plug/fixing screw, Resonance Strip (3 sizes), Large Spring/Coil.

Please Note: This Equipment is for Education, Training, or research Purposes Only.

Thank you for choosing this IPC Irwin product, which has specifically been designed for education and we know it will bring you good service long into the future. This is just one product of a wide range of UK designed and manufactured products to enhance a STEM education, please see www.ipcirwin.com website for more details on the products and service we provide to support teaching and learning in science and technology.

IPC Irwin also provide Portable Appliance Testers and a Calibration service, for more details please go to www.ipcirwin.com or call our sales and technical support line on 015395 58555.



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