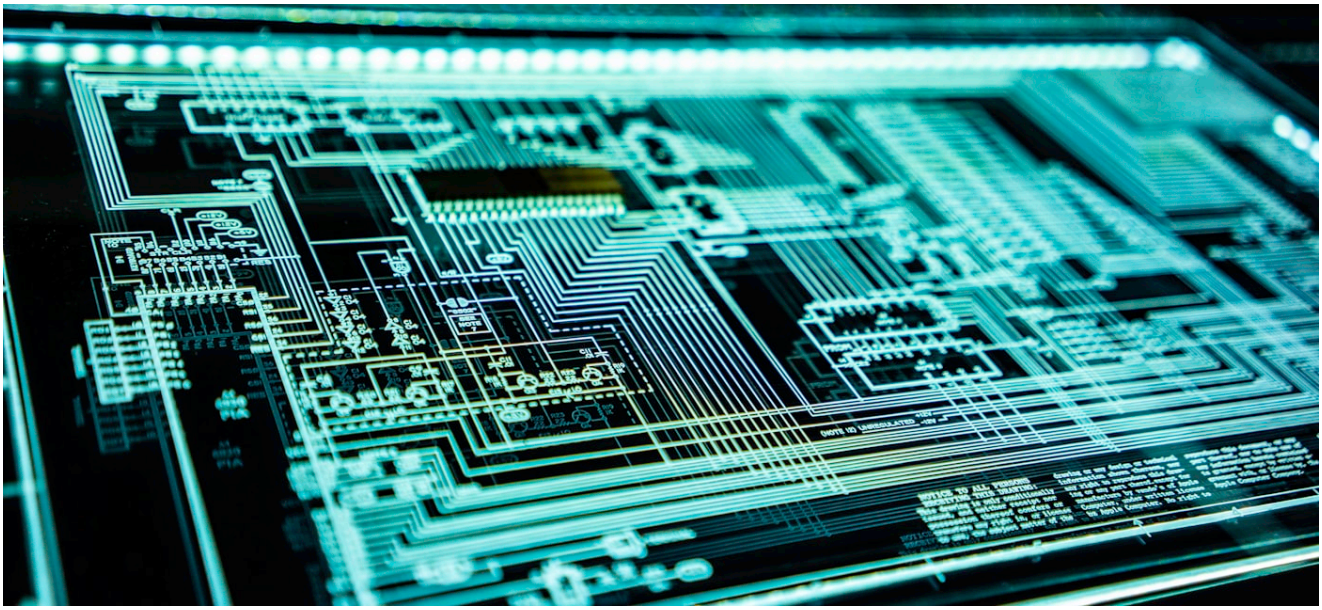
How to Measure Vibrations with Your Smartphone: A Pocket Seismograph Tutorial

Learn how to measure vibrations with your smartphone using Pocket Seismograph. Step-by-step guide to interpreting waveforms and logging sessions.

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How to Measure Vibrations with Your Smartphone

Learning **how to measure vibrations with a smartphone app** is easier than you might think. Pocket Seismograph turns your iPhone into a capable vibration measurement device in seconds, using the same MEMS accelerometer that your phone uses for screen rotation and motion tracking. This tutorial walks you through everything — from setting up your first session to interpreting the waveforms you see on screen.

Before You Start: Understanding What Your Phone Measures

Your iPhone's accelerometer measures acceleration forces in three axes: X (left-right), Y (up-down), and Z (forward-backward). When Pocket Seismograph displays a waveform, it typically shows the combined or individual axis data as a scrolling trace — similar to what you'd see on a hospital heart monitor, but for ground movement.

The measurements are expressed in units of g-force or m/s². One g equals approximately

9.81 m/s² (Earth's gravitational acceleration). A gentle hand tap on a desk might register 0.05–0.1 g, while a small nearby earthquake might show 0.001–0.01 g at the phone's location, depending on distance and ground conditions.

Step 1: Download and Open Pocket Seismograph

First, download Pocket Seismograph from the App Store. It's completely free and requires no account. Once installed, open the app. You'll immediately see the live seismograph waveform begin scrolling.

Step 2: Position Your iPhone Correctly

Where and how you place your phone dramatically affects what you measure. Here are the best practices:

- **Place it flat on a hard surface.** Tables, floors, and countertops all work well. Avoid soft surfaces like beds or sofas, which dampen vibrations.
- **Don't hold the phone in your hand.** Your hand introduces constant noise from muscle tremors and movements. Set the phone down for accurate readings.
- **Use a stable, coupled surface.** The more directly the surface is connected to what you're measuring, the better. Place the phone directly on a concrete floor rather than a rubber mat, for example.
- **Minimize air conditioning and HVAC sources.** These create constant low-level vibration noise. Move the phone away from vents if you want cleaner readings of other sources.

Step 3: Start a Recording Session

Pocket Seismograph begins recording automatically as soon as you open it. The live waveform starts scrolling immediately. To properly log a session with timestamps, start your measurement and let it run for the desired duration. The app logs everything continuously.

For best results when monitoring a specific event:

1. Open the app and let it stabilize for 30 seconds to establish a baseline
2. Watch the waveform at rest — this is your noise floor
3. Introduce or wait for the vibration source you want to measure
4. Observe the change in waveform amplitude and character
5. The session is automatically timestamped in the log

Step 4: Interpreting the Waveform

Reading a seismograph waveform takes a little practice, but the basics are intuitive:

Amplitude (Height of the Wave)

Larger amplitude means stronger vibrations. A flat, near-zero line means the environment is quiet. Sharp spikes indicate sudden impacts — like a door slam or a truck hitting a bump.

Sustained high amplitude suggests ongoing vibration from a nearby machine or traffic flow.

Frequency (How Fast the Waves Oscillate)

High-frequency vibrations appear as rapid, closely-spaced oscillations on the trace. Low-frequency vibrations appear as slow, wide oscillations. Earthquakes typically show longer-period (lower frequency) waves, while machinery tends to produce steady, higher-frequency vibrations.

Duration

How long the waveform remains disturbed tells you about the vibration source. A brief spike could be a footstep or impact. A disturbance lasting 10–30 seconds may indicate a passing vehicle. Minutes of sustained vibration typically mean active nearby machinery.

Step 5: Common Measurements and What to Expect

Here are typical vibration patterns you might observe:

- **Footsteps (nearby):** Short, rhythmic spikes, 1–2 Hz cadence, amplitude 0.01–0.05 g
- **Heavy truck passing outside:** 5–15 second event, broad waveform, 0.005–0.02 g
- **Elevator in the same building:** Low rumble starting and stopping, 0.001–0.005 g
- **Washing machine on spin cycle:** Steady oscillation at 10–20 Hz, up to 0.1 g or more
- **Small earthquake (felt locally):** Sustained wave lasting 10–60+ seconds, building then fading

Tips for Better Measurements

Reduce Background Noise

The biggest challenge in vibration measurement is separating the signal you care about from background noise. Try measuring during quiet periods — late at night for traffic, or when HVAC systems are off. This gives you a better signal-to-noise ratio.

Compare Multiple Locations

Move the phone to different spots and compare readings. You might discover that one corner of a room has significantly more vibration than another, revealing where building resonances exist or where a machine is transmitting energy.

Use the Time Log

The timestamped session log in Pocket Seismograph is your best friend for tracking patterns. Log the same location at the same time on different days to see if vibration levels are consistent, worsening, or improving.

Real-World Applications

Once you're comfortable with the basics, here's what you can accomplish:

- **Earthquake awareness:** Leave the phone on your nightstand in earthquake country.

A genuine tremor will register as a distinct, longer-duration waveform compared to street noise.

- **Construction monitoring:** Place the phone near a wall in a building adjacent to construction. Document vibration levels over time as a record.
- **Appliance troubleshooting:** Place the phone on top of a washing machine, refrigerator, or HVAC unit. Unusual vibration signatures can indicate mechanical issues worth investigating.
- **Science experiments:** Challenge students to identify mystery vibration sources by their waveform signatures.

Get Started Today

The best way to learn is to experiment. Download Pocket Seismograph for free and spend 15 minutes placing your phone in different spots around your home or office. You'll quickly develop an intuition for reading vibration waveforms and understanding the mechanical world around you.

Pocket Seismograph makes the science of seismology accessible to everyone — no expensive equipment, no training, no internet required. Just your iPhone and curiosity. Get it free on the App Store and start measuring the invisible vibrations in your world today.

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