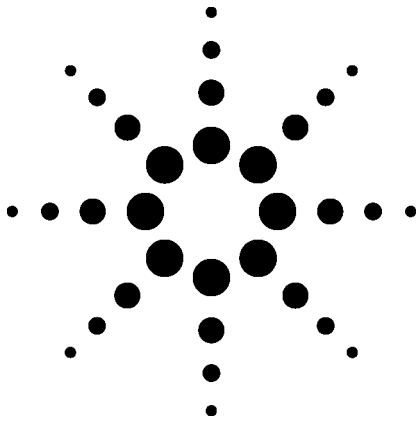# Stepper Motor Vibration Noise Measurement using Agilent USB Data Acquisition

Application Note

Contents

Introduction

There are various office automation (OA) equipments used in the office such as scanners, printers and fax machines.

The stepper motor is essential in the operation of such equipments. The downside of having the stepper motor, however, is the humming noise generated during its operation, which ultimately contributes to environmental noise in the office.

Hence, it is vital and necessary for the manufacturer of the stepper motor to evaluate and identify the magnitude of vibration. This is necessary for improvement as well as to gain market acceptance and recognition.
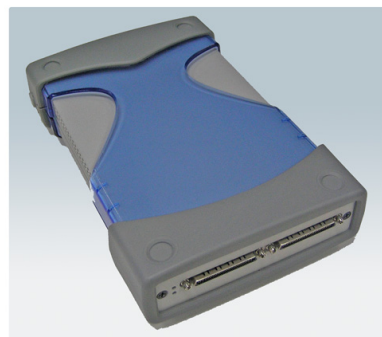
This application note describes the measurement of the stepper motor vibration noise using the Agilent USB DAQ.

Test Measurement Setup

A simple test setup is sufficient to measure the vibration magnitude of the stepper motor at different frequencies. Refer to Figure 1 for the test set up. The devices needed in the test setup are as follows:

• High sampling USB DAQ

• Vibration sensor

This setup would allow the data acquisition process to be faster, simpler and more efficient.
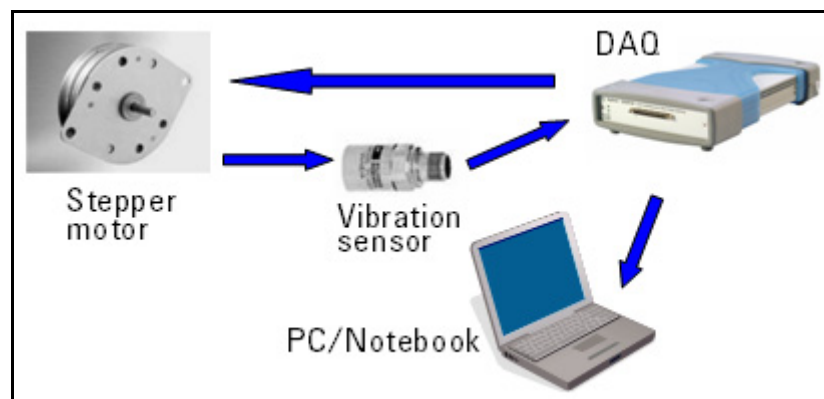

Figure 1 Vibration measurement using USB DAQ device

Agilent Technologies

The stepper motor is driven by frequency input in a specific range, for example 50 Hz to 20 kHz. This depends on the stepper motor characteristics. The stepper motor will rotate producing difference magnitude of vibration.

The vibration produced from the motor will be input to the DAQ through the vibration sensor which is attached to the motor body.

In this test setup, the vibration magnitudes at specified frequencies are characterized. Figure 2 shows an example of the graph of the characterized data.

From Figure 2, it is obvious that the vibration noise of the stepper motor reaches its peak at certain frequencies.

This characteristics data will be very useful for motor manufacturers to know how their products perform at difference frequencies. The manufacturer of OA equipments, can recalibrate the design of the stepper motor and prevent driving of the motor at the specific frequency range. This will help to reduce the vibration noise level as much as possible.

Conclusion

With the obtained vibration noise data using the USB DAQ, the response characteristic can be observed by the stepper motor manufacturers. This will lead to further improvement on the motor structure and efficiency.

The motor manufacturers can identify the motor vibration at specific frequencies and difference positions in the scanner during the design stage. This will help them to minimize the vibration noise level.

Agilent USB DAQ is cost-effective and simple to operate.

Related Agilent Literature

• *System Developer Guide - Using USB in the Test and Measurement Environment Application Note*, literature number 1465-12

Visit www.agilent.com/find/ U2300A for additional information or contact your nearest Agilent sales office or sales representative.
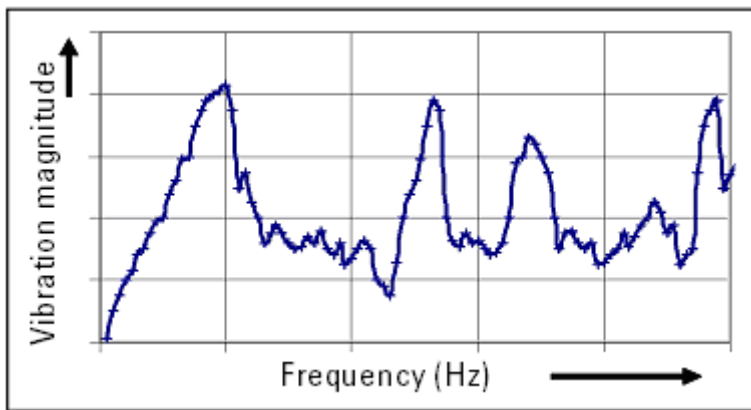

Figure 2 Vibration magnitude characteristic vs driving frequency graph

www.agilent.com
800 123-4567

Agilent Email Updates

www.agilent.com/find/emailupdates
Get the latest information on the products and applications you select.

Agilent T&M Software and Connectivity
Agilent's Test and Measurement software and connectivity products, solutions and developer network allows you to take time out of connecting your instruments to your computer with tools based on PC standards, so you can focus on your tasks, not on your connections.

Visit **www.agilent.com/find/connectivity** for more information.

By internet, phone, or fax, get assistance with all your test & measurement needs.

Online assistance:
www.agilent.com/find/assist

Phone or Fax
United States:
(tel) 800 829 4444
(fax) 800 829 4433

Canada:
(tel) 877 894 4414
(fax) 800 746 4866

China:
(tel) 800 810 0189
(fax) 800 820 2816

Europe:
(tel) (31 20) 547 2111
(fax) (31 20) 547 2390

Japan:
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Korea:
(tel) (82 2) 2004 5004
(fax) (82 2) 2004 5115

Latin America:
(tel) (650) 752 5000

Taiwan:
(tel) 0800 047 866
(fax) 0800 286 331

Other Asia Pacific Countries:
(tel) (65) 6375 8100
(fax) (65) 6836 0252
Email: tm_ap@agilent.com

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2006
Printed in USA, November 13, 2006
5989–5779EN

Agilent Technologies