

## Benchtop DMM helps root out faults in data-collection system prototypes

### Application Note

#### Electronics Case Study

Although product developers at Intermec Inc., a world leader in automatic data collection and mobile computing, use a host of test, measurement, and data-capture instruments, the one mainstay in the development lab is a benchtop DMM.

Doyle Davis, hardware design engineer with Intermec, uses the Fluke 8846A Digital Multimeter with 6.5-digit precision to debug prototype boards. "I rely on the instrument's high precision, storage capabilities, dual display, and ease of use," he says. For a number of applications at Intermec, Davis says that the instrument is front and center on the engineering test bench and a valuable complement to a Hydra data-logging instrument, also from Fluke.

#### Curbing erratic behavior

"I was providing sustaining support on a customer issue in which a board was behaving erratically, and I was able to use the Fluke 8846A to take several sample measurements on a particular node at selected intervals. I knew how the board was supposed to work. After setting up the instrument, I came back to find 2,000 stored samples. On outputting these to a PC, I could see a cyclical nature in the signal I was measuring—and I knew the signal was not cyclical in nature. As a result, I was able to correlate that with the known function of the board and zero in on the problem."



For the purpose, Davis found that offline analysis of data was useful. "With the 8846A, I could take data from my readings and plot it on a Microsoft Excel chart." The Fluke 8846A eliminates the need for proprietary software by allowing users to plug in a flash memory storage device to the instrument's USB port and store measurements in a comma-delimited text-based file (CSV). After downloading measurements, the user transfers the USB memory device to a PC and opens the file in any program that reads CSV format.

Davis says that the simplicity of setup with the 8846A makes the instrument valuable as a



**Tool:** Fluke 8846A Digital Multimeter

**Profile:** Doyle Davis, Intermec

**Measurements:** Microamp accuracy, logging/download, ac voltage+frequency dual display, trend plotting and temperature

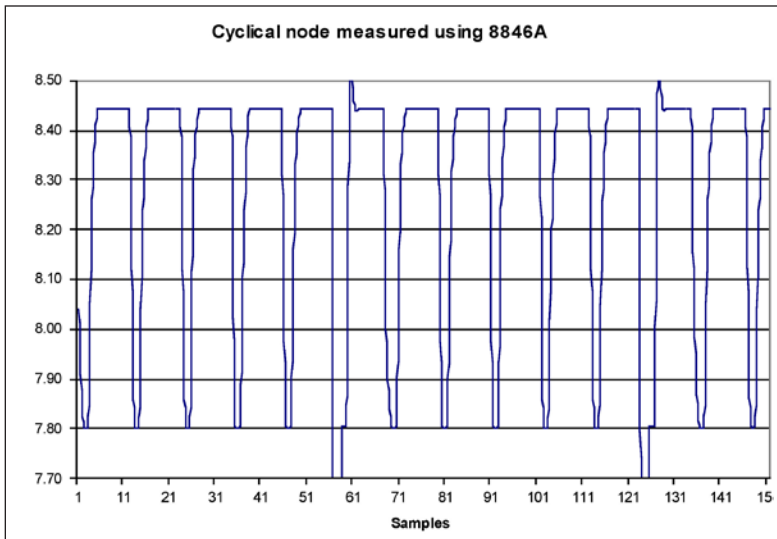


Figure 1. The 8846A simplifies offline analysis of collected readings

productivity tool. “It’s a ‘time-constraint thing.’ Typically I won’t have time to set up profiles for known-good boards and then come back to check a profile against the readings from a unit that is exhibiting a fault.”

In addition, he adds, the 8846A has an intuitive user interface. “I haven’t had to break out the manual yet. Even more complex functions such as trend plotting are routine with the instrument.”

In a number of applications, Davis says that he wants to see microamp accuracy in his current readings. “A lot of our equipment doesn’t give you accuracy down to that range, but I need that accuracy to give me insight into how well a system is working. For example, if stray current is the culprit, I need to know.” With its 100 microamp range and 100 picoamp resolution, the 8846A offers Davis the level of accuracy he needs to make the measurement without needing another instrument on the bench.

### Dual-display measurements

Davis routinely depends on the 8846A’s dual-display capability. The instrument allows him to measure two different parameters of the same signal from one test connection and show both on the graphical display. “In my case, I find it useful to take an ac voltage measurement and display it on one half of the display, and then show frequency on the other half.”

Unlike the character-based displays used on today’s DMMs, the 8846A displays both text and graphics. Is this capability critical? “Work-arounds are common in the lab. If you don’t have the instrument you need, you use the instrument you have. Except, in this case, two instruments would have

otherwise been required—both a DMM and a scope—and both would have had different set-up properties. It comes down to this: you can spend your time setting up multiple instruments, or you can spend your time solving problems.”

Davis says that the combination of high-precision 6.5-digit resolution and a graphical display make it possible to see signal problems that would otherwise escape undetected. “Together, they give me better insight into how the system is working and can help me track down stray current or other anomalies like drift or glitches.” He adds that 6.5-digit resolution is invaluable when making low current, low voltage readings.

### Mercury rising

Davis says that heat can be a problem in data-collection applications. “We do a lot of thermocoupling of our devices. When we charge a battery that is internal to a unit, and do so at a high rate of charge, the unit generates a lot of heat, and we need to ensure that this heat is not transferred into the battery. As a result, we thermocouple several components of the board and check the heat profile.”

Before he discovered the 8846A, he used Fluke’s Hydra data logger for this purpose. “At times, the two instruments complement each other nicely. But, in some cases, I need to make a single measurement,

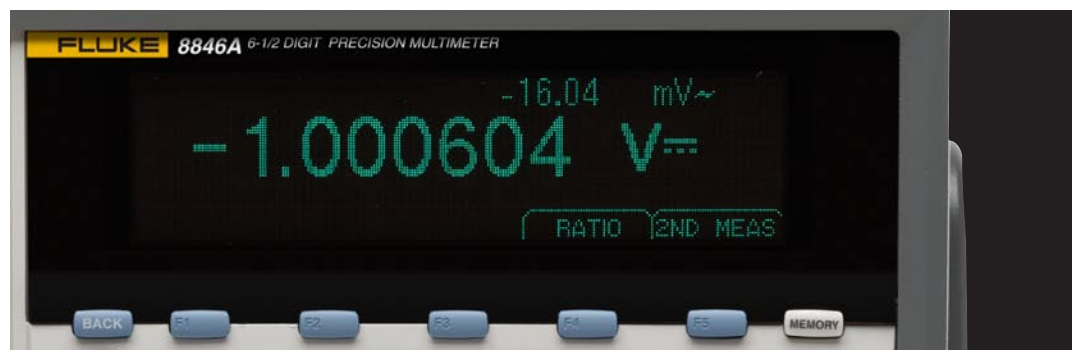
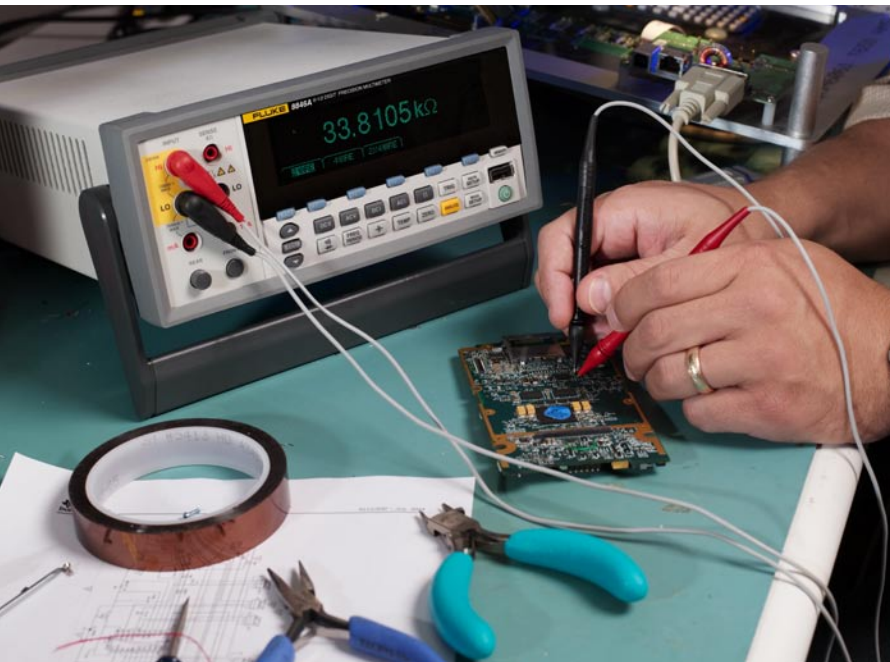


Figure 2. The Fluke 8846A enables different parameters of one signal to be viewed simultaneously.



and it's not necessary to go through the lengthier setup of a data logger. My goal is to simplify my life by using the DMM in those cases."

While low current, voltage accuracy and temperature are key concerns for Intermec product developers, the 8846A is also built for advanced measurements of capacitance and period, and it provides functions such as statistics and histograms, trend plotting, and limit testing.

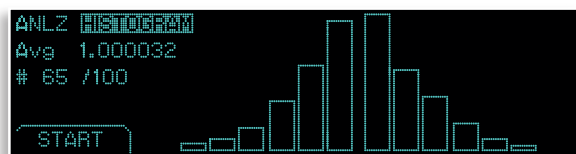
Says Davis: "I could use a scope for graphical applications, or a data logger for making interval-based measurements over time. But there's only so much space on the test bench, and only so much time in my day."



Handle even the most demanding measurements with high accuracy and 6.5 digit resolution.



Use the built-in TrendPlot paperless chart recorder to graphically identify the extent of drift and intermittent events in analog circuits.



View results in Histogram mode to reveal stability or noise problems in analog circuits.

**Fluke.** *Keeping your world up and running.™*

**Fluke Corporation**  
PO Box 9090, Everett, WA USA 98206

**Fluke Europe B.V.**  
PO Box 1186, 5602 BD  
Eindhoven, The Netherlands

**For more information call:**  
In the U.S.A. (800) 443-5853 or  
Fax (425) 446-5116  
In Europe/M-East/Africa +31 (0) 40 2675 200 or  
Fax +31 (0) 40 2675 222  
In Canada (800)-36-FLUKE or  
Fax (905) 890-6866  
From other countries +1 (425) 446-5500 or  
Fax +1 (425) 446-5116  
Web access: <http://www.fluke.com>

©2006 Fluke Corporation. All rights reserved.  
Printed in U.S.A. 10/2006 2788379 A-EN-N Rev A