FLUKE®

Changing the face of electrical practices

Application Note

Dr. John Matthews' next electrical puzzle could be anywhere. Inside the conduits buried in the ceilings of a giant office complex. High atop a Georgia utility pole. On a lakeside dock.

Matthews, a part time professor in the Department of Electrical and Computer Engineering at the Georgia Institute of Technology, in Atlanta, Georgia, tracks down electrical mysteries as surely as Sherlock Holmes pursues shadowy suspects. Both deal in deduction and sometimes in the unknown.

In his private practice as a consulting electrical engineer, Matthews, and his associate, Dr. Tammy Gammon, specialize in power quality issues and analysis of electrical system failures. His expertise in forensic engineering, tracking down the cause of electrical systems failures, takes him around the country. His studies often carry him to Fluke Corporation.

Matthews holds a Bachelor of Science in Electrical Engineering degree, a Master of Science in Electrical Engineering, and a Doctor of Philosophy in Engineering degree. His private consulting practice has acted as engineer of record for more than 3,000 building projects, from office buildings and commercial complexes to industrial plants and hospitals.

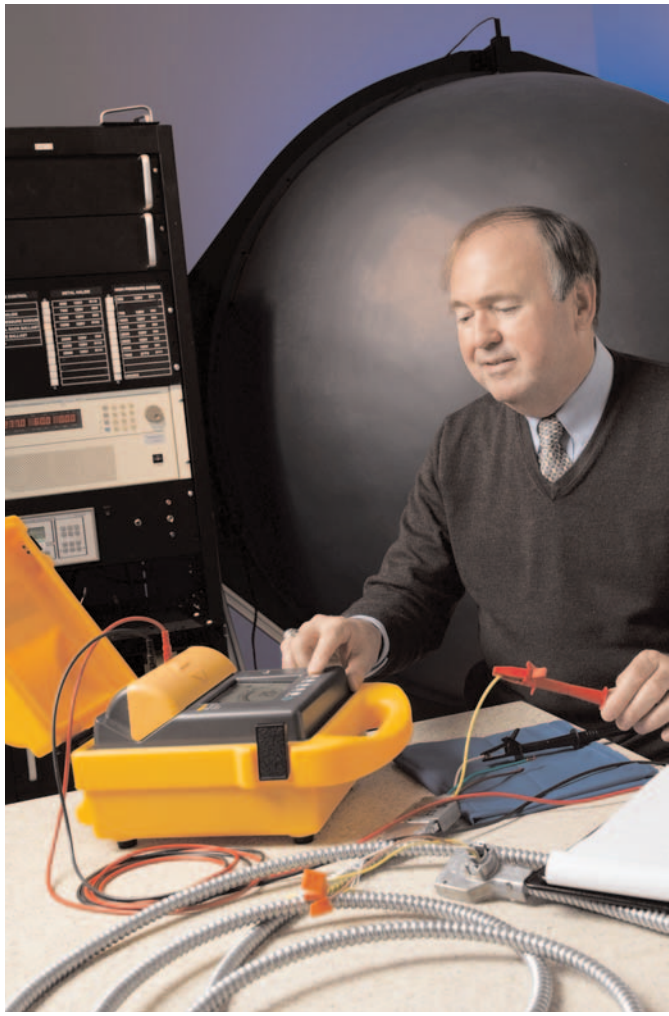
Matthews became familiar with Fluke early in his career, using Fluke measurement instruments in his electrical system testing programs. He later collaborated with Fluke Product Planner Chuck Newcombe and the IEEE, as Atlanta prepared in the early 90s for the additional power supply burden of the 1996 Olympics.

"The Atlanta IEEE chapter, in cooperation with Georgia Power, was very forward-thinking in making sure Atlanta didn't go dark," Newcombe recalled. Matthews and the group used Fluke equipment and others "to prove the systems were stout" enough to handle the surge in demand.

"It has been an excellent collaboration," Matthews said recently, during a brief stop at his Georgia office between trips. "Talking with Fluke experts about the technical problems I see has been tremendously helpful. Having someone to talk with about application questions goes beyond anything I've experienced with any other company. It has been a tremendous relationship."

Fluke actually turned to Matthews when it was designing its Model 41 power harmonics analyzer. When engineering new products, Fluke routinely seeks out industry experts and end users to help decide what functions and capabilities to include. Matthews reviewed the analyzer's functions and advised on its ergonomic key layout and information display. When Fluke's educational arm provided equipment to Matthews' Georgia Tech power lab, his students set about finding new ways to combine electrical engineering and computing.

"Fluke sent us a graphic multimeter and a power analyzer," he said. "We've used them over the years. When students want to do power quality measurements, they tie the analyzer to a computer and use the data to make engineering decisions about the power quality systems"



"Our customers never fail to amaze us with the new ways they devise to use our equipment," Newcombe said.

Still, it is the unsolved case, not the classroom, that gives Matthews' Fluke equipment its greatest workout. In a major study of ground currents related to stray voltage, Matthews used

a Fluke Hydra™ data logger on a Georgia dock for weeks on end to record ground currents and corroborate them with utility voltage loads. Working with the local utility district, Matthews unwound the puzzle.

"We knew what was going on, but how to control it varies so much from case to case," he said. "There is no one answer. Each situation depends on so many factors: the geography, the types of soil, and the configuration of power lines. Not enough research has been done on the issue. Ground currents don't seem to follow predictable laws. At this point, understanding the flow of current through earth is not a predictable science."

Matthew's latest collaboration with Fluke stretches in yet another direction. A beta tester for the new Fluke 1550B digital MegOhmMeter, Matthews has been putting the instrument through a range of paces.

The 1550B is designed for digital insulation testing of switchgear, motor generators and cables from 250 to 5,000 volts. Automatically calculating dielectric absorption and polarization indexes without setup, the 1550B records everything from cable or insulation capacitance to current leakage, with a 99-minute timer for timed tests. Its ability to store test data in up to 99 user-named locations allows quick recall, and its graphical interface makes its data easy to interpret.

"I've used the 1550B three ways," Matthews said. "To conduct cable insulation tests inside metal conduits; to test the insulation on older flexible, modular wiring components; and to test the dielectric of capacitors in metal halide lighting ballasts. It's spectacular, a great product."

The 1550B comes with Fluke's powerful Quicklink software package that Matthews is looking forward to exploring more.

For now, he is preparing for the road again, with more electrical mysteries to solve. His Watson — his Fluke equipment and Fluke's technical advisors — are ready to assist.

Fluke. *Keeping your world up and running.*

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