SC RESEARCH PROJECT

Flicker • Medical Equipment • Photovoltaics • ASDs • Battery Chargers • Ballast Interference • Revenue Meters • Ballasts • EMI

1996 1995

Electric Power Research Institute • Power Electronics Applications Center

System Compatibility
researchNEWS

Vol. 2, No. 1 EPRI Power Electronics Applications Center March 1995

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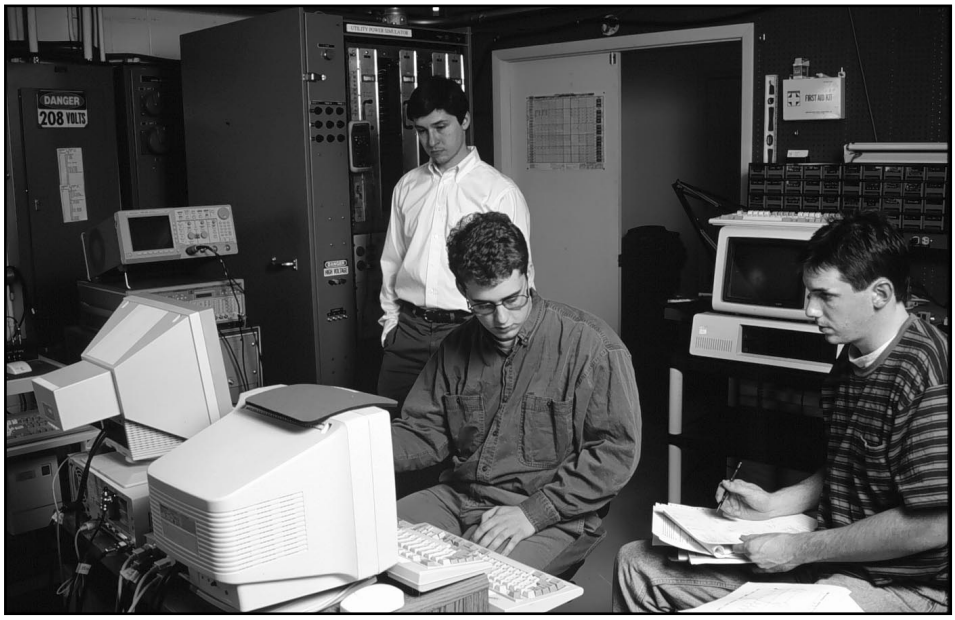


Two students from North Carolina State University (sitting) test the reaction of a local area network (LAN) to sags, surges, and electrical fast transients in the PEAC laboratory. PEAC engineer Doni Nastasi watches the computer monitors as the LAN is subjected to a Ring Wave surge. Results of these tests will be used in phase two of the PC project, which will investigate the immunity and emissions of a typical computer network.

PC systems 'crashed' in tests

For most of us, a crashed computer means frustration, lost work, and slowed production, but for PEAC project manager Mark Stephens, computer crashes are part of a day's work.

Crash testing computers is just one aspect of PEAC's System Compatibility Research Project: Task 2, Personal Computers. Stephens overviewed the testing of 36 personal computer (PC) power supplies to characterize their power quality performance. Task 2 research is focusing on determining the compatibility of PC power supplies with the utility power system and their ability to regulate dc output during various voltage disturbances.

"We learned a lot from the personal computer project," said Tom Key, manager of the System Compatibility Research Project. "We found design trade-offs in the PCs that didn't make sense when you took into account the electrical environment. When we looked at ride through, we found some PCs had parts and components for good ride through, but because of circuit design and built-in protection, they would trip and have poor performance. And we found harmonic problems in $2,000 computers that could be solved for $6, but nobody is doing it."

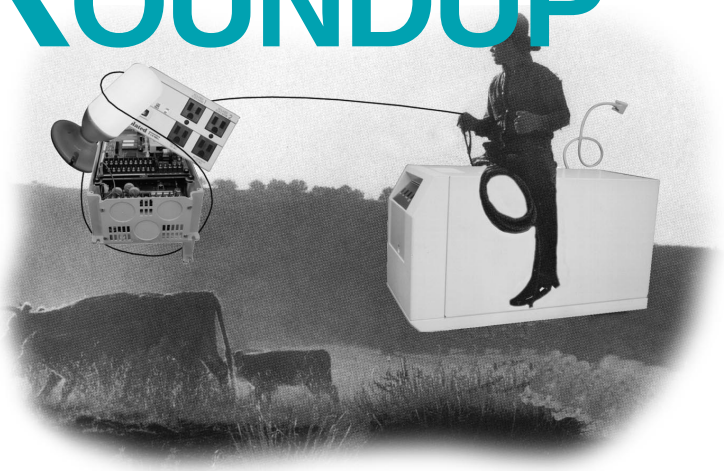
Fortunately, PEAC's testing of PC power supplies is the first step in bringing about design changes, Stephens said, and computer manufacturers are already taking note of some of PEAC's discoveries. "Based on some of our low-voltage testing, one of our participating manufacturers went back and specified a redesign of its power supply," Stephens said. "Other power supply models tested rode through the low-voltage test. This type of power supply not only kept failing, but it was damaged."

In the long run, Stephens said, customers and end users are the big winners when manufacturers make design changes in response to test results. However, influencing design objectives can be complicated because most computer manufacturers do not manufacture power supplies. Instead, they write a specification and give it to a third party for design and fabrication. Sometimes computers with the same model number may not all use the same power supply. That's why PEAC is testing the most commonly used PC power supplies.

Test results also prompted PEAC to contact the Information Technology Industry Council, formerly the Computer and Business Equipment Manufacturers Association (CBEMA), to share information that may lead to updating the CBEMA curve. The CBEMA curve defines the electrical boundary in which most office machinery can operate.

And, according to Stephens, the shape of the CBEMA curve is going to change, and PC power supply designs will likely change with it.

SC ROUNDUP



Howdy, and welcome to the System Compatibility Research Project (SCRP) Roundup. For you greenhorns out there, the SCRP was inaugurated in 1994. Spurred on by utility hankering to understand appliances and such to become more competitive and better suppliers of electricity, the Electric Power Research Institute gave PEAC the charge of corralling immunity and emissions problems—what we call system compatibility, SC for short—for member utilities. Now those PEAC engineers have been working extra hard to find solutions to those pesky SC problems. So saddle up. It's roundup time at PEAC!

Task 1: Adjustable-Speed Drives

In recent months, PEAC performed initial baseline characterization tests of adjustable-speed drives, completed the single-phase sag testing setup, and began testing. The scope of work was modified to investigate the effects of unbalanced single-phase sags in three-phase systems and also to include the effects of voltage imbalance on current balance. Contact Dr. Arshad Mansoor at (615) 974-8378.

Task 2: Personal Computers (I)

Test results of PC power supplies compelled one of our participating manufacturers to re-specify a PC power supply design. But if you want the rhapsody in full, see the article on page 1. Contact Mark Stephens at (615) 974-8308.

Task 4: Electric Vehicle Battery Chargers

PEAC completed a scope of work based upon *SC-320: Test Protocol for System Compatibility of Electric Vehicle Battery Chargers for Residential Applications* (now that's a mouthful). That particular test protocol was refined and will be sent out to participating sponsors. Contact Doug Dorr at (615) 974-8348.

Task 5: Programmable Logic Controllers

PEAC completed a scope of work, lassoed sponsor approval for task goals, and drafted a test protocol for this task. PEAC and Duke Power worked together to create a mock textile mill test setup. Testing will begin soon. Contact Mark Stephens at (615) 974-8308.

Task 6: Electronic Ballasts (II)

Engineers will start testing these lighting products soon. They're currently seeking greater utility participation to expand the numbers and types to be tested and to address manufacturer concerns during the expansion of the test protocol. Contact Philip Keebler at (615) 974-8346.

Task 7: Transient Voltage Surge Suppressors (II)

If you've been keeping up with the SC news, you know that PEAC and surge master François Martzloff constructed what we like to call the upside-down house (see SC Research News Vol. 1, No. 1). This test setup hangs from the rafters of the PEAC laboratory to represent typical wiring and grounding configurations in residential and commercial buildings. PEAC developed computer models based on the new test setup and began to surge test those TVSSs. Contact Dr. Arshad Mansoor at (615) 974-8378.

Task 9: Uninterruptible Power Supplies

PEAC has completed the first phase of this task. Fifteen tests were conducted on nine models of UPSs, including tests to determine UPS reactions to undervoltages, overvoltages, interruptions, sags, frequency deviations, overloads, and short circuits. Phase two of the task will be in full gallop by the end of the year. Contact Doug Dorr at (615) 974-8348.

Task 10: Lamp Flicker

PEAC is supporting the new IEEE Flicker Task Force and presented a comparison of flicker standards at the first Task Force meeting in New York as one of the many results of conducting tests to determine how ballasts respond to voltage fluctuations. Task engineers have completed a method to measure ballast-lamp gain factor and a computer program to control voltage variations to the ballast-lamp under test. Contact Tom Key at (615) 974-8336.

Task 11: Ballast Interference

By surveying utilities and lighting manufacturers, PEAC has collected information—cases of ballast interference—to finely direct the task. Currently, PEAC is conducting a survey to determine the most frequent and consequential ballast interference problems according to utilities and manufacturers. Contact Philip Keebler at (615) 974-8346.

Task 19: Matching Appliances to the Electrical Environment

With help from electric utilities, PEAC is matching electronic appliances to the electrical environment to greatly cut down those SC problems. So far, PEAC has collected the results of two power quality surveys. This information can be filtered to profile an electrical environment at a particular location, such as a commercial office. Contact Doug Dorr at (615) 974-8348.

Sponsored by EPRI and its member utilities, the System Compatibility Research Project is a progressive research effort to improve compatibility between the power system and end-use equipment and devices. By sponsoring a task of the project, utilities choose which equipment and devices will be characterized. Utilities can finance their sponsorships through either a *Tailored Collaboration Agreement* or *Cofunding Agreement* with EPRI. All testing is conducted at PEAC's Power Quality Test Facility or at other test facilities within the Power Quality Testing Network.

For more information, contact Steve Rector, EPRI-Knoxville, or Gene Sitzlar, SC Research Project Coordinator, at 615-974-8288 or fax 615-974-8289.

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