

The Evolution of Fluke Power Quality Tools

Application Note

By Chuck Newcombe

One could argue that Fluke has been in the power quality testing business for 64 years. That's because John M. Fluke Senior's first product was known as a VAW (volt, amp, watt) meter. It measured RMS voltage, RMS current, and real power using vacuum tube technology and John's innovative design. A version of that original product, introduced in 1948, was available for over 20 years—until the early 1970s—as the model 102.

The company grew, not on the strength of power quality measurements, but on a wide variety of related electrical tools, including differential and digital voltmeters, power supplies, precision calibration equipment, and finally, the handheld digital multimeter (DMM) introduced in 1977. To John's frustration, we could never make a case for introducing follow-on power quality testers during his lifetime. The meter that would become known as the second VAW meter was introduced ten years after his death.

The second VAW Meter—the 40 Series

The introduction of the two-channel ScopeMeter® tools in the early 1990s allowed a savvy technician to make single-phase power measurements and evaluate transient conditions on power systems, but the setups to do so could be daunting tasks, requiring careful navigation of the menu features to achieve the desired results.

In 1994 Fluke introduced the 40 Series Power Harmonic Meters. The development of these two products, the 40 and 41, was made practical by the availability of powerful digital signal processing technology.

These meters could calculate power parameters for power line frequencies, and also for variable speed drive outputs, with a minimum of fuss on the part of the operator. It all happened automatically, without complex setups. A later model extended its abilities to handle 400 Hz power on commercial aircraft and in military applications.

These handheld devices measured voltage, current, and watts like John Fluke's original 1948 meter, but they could do so much more. The full-featured model 41 displayed peak values, crest factor and waveforms of the three quantities, plus volt-amps, power factor, total harmonic distortion, and up to 31 individual harmonic values for voltage and current. It could do so for fundamental frequencies ranging from 5 Hz to 90 Hz. And, it had eight memories each for voltage and current test data, and a serial interface for download to a computer program that was also provided.

The problem was, it could only measure a single phase of power at a time, while most industrial and commercial facilities used three-phase power. That meant that a technician had to take three sets of measurements, depending on stable conditions to allow the time to hook up and record each phase separately.



Fluke 1760 Three-Phase Power Quality Logger

Even with these shortcomings, the 41 tool enabled technicians all over the world to quickly identify emerging harmonic problems being caused by non-linear electronic loads such as computers. In the mid-1990s, I presented multiple seminars on four continents during the beginning phases of an education program that today provides comprehensive training for power quality testing. That program includes seminars, application notes, and case studies.

Taking advantage of the ScopeMeter® product platform

Just three years after the introduction of the 40 Series, in 1997, Fluke introduced the ScopeMeter model 123. And just four years later, in 2001, the

model 43 Power Quality Analyzer (PQA) was introduced using elements of the 123 platform. The 43, which performed single-phase measurements of primary power frequencies much like the 41, added the ability to measure up to the 51st harmonic and could also record transient voltages. This model began a product evolution process that continues to this day.

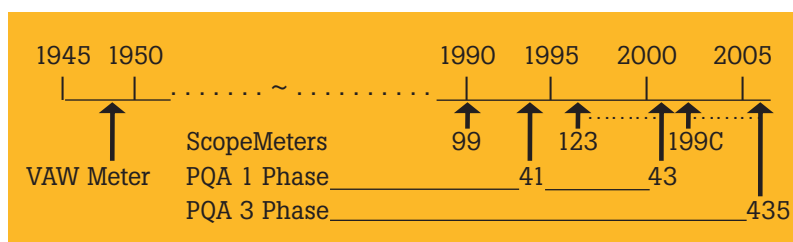
The company introduced the ScopeMeter 199C in 2002. One big claim to fame was a large quarter VGA color display.

Just four years later, the PQA 435 was introduced, using the 199C platform. It offered full three-phase connectivity, with 4 voltage inputs and 4 current inputs. Combined with the clarity of color to display multi-channel data, it was now possible to simultaneously and clearly display results for all three phases at once.

Even more power quality test options

Today, after the acquisition of some European and US companies, the Fluke Power Quality program includes eight families of products, from the single-phase 43B to the three-phase 435, to the top-of-the-line 1700 Series Power Quality Recorders and Loggers. And there are many accessories, such as current clamps and flex probes, available. Companion software is also provided to help technicians document and report detailed test results.

Were he around today, I'm sure John would be proud of Fluke's power quality testing presence.



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