FLUKE®

Great displays make the invisible, visible

Our guides to hidden worlds

Application Note

We rely on test instruments to help us see and evaluate phenomena—such as voltage, current, temperature, vibration, waveforms, radiated energy and more—that would otherwise remain invisible.

A key player in this process is the test tool display. It's up to the display to present the data, quickly and clearly. And the displays have to keep doing it, in heat or cold, surviving hard use and even abuse, for years . . . even decades. A good display can make the difference between a tool that's tough to use, and one that's a pleasure.

As in much of technology, there's a lot more to creating a great display than meets the eye. No detail is too small. Even the design, or "font," of the numbers and letters you see on the display screen is important. Can the contrast be enhanced, to create darker numerals on a brighter background? Will the display consume too much battery power? Will it hold up to workplace abuse? And what new display technologies are available to make Fluke displays even better?

Joe Ferrante, Fluke's expert on instrument displays, weighs all these questions and more. With a background in visual design and user interaction, he knows what techs look for in a display.

The process begins with one-on-one discussions with Fluke users. How do they use the tools? What do they need to see? Users have different and higher expectations for the displays on their tools (which they use to do their job) than they do for the displays on their cell phones. "It's amazing to see them do that segmentation right there in their heads," he said.

"What I'm doing constantly is a quality check," Ferrante said as he held up two digital multimeters (DMMs). "You can definitely see a difference between these two. Here's a slightly darker background, and a lighter background." The distinction was subtle, but the brighter background was clearly easier to read. Screen brightness and contrast are among the many factors that enhance readability, a fundamental characteristic of a good display.

See what?

But there's much more to designing a display that's easy to read. Often it's a game of tradeoffs. A larger display might be great, but demand too much battery power from a handheld portable tool. And there's a limit to the size you can install on a tester that must also be compact and easy to handle.

The design process begins with one-on-one discussions with end users. Ferrante also considers the amount of data the test instrument needs to show. A ScopeMeter® portable oscilloscope must be able to display up to four waveforms at once. Its liquid crystal display (LCD) can show 256 colors, and features a full-time backlight that makes it extra vivid. Thermal imagers exact even higher demands. The Fluke Ti32 Industrial-Commercial Thermal Imager has a full VGA display (480x640 pixels) and a rapid refresh rate capable of keeping pace as the user scans the test site.

Display of a Fluke ScopeMeter® portable oscilloscope.

Two views of test site using the Fluke Ti32 Industrial-Commercial Thermal Imager.

Viewing angle is another factor that Ferrante takes into account. You can read LCD displays from many viewpoints—what Ferrante calls the "viewing cone"—but one angle is optimal. He has a machine that checks viewing angle. "With DMMs we call out a six o'clock orientation," Ferrante said, tilting the meter in his hand, back and away. "Most guys will hold it like that, so we need that six o'clock bias. If we know an instrument is on a tilt stand, we might ask for something closer to zero."

A small detail? There's no such thing. "One of the things I know we do better is the actual layout of the screen and design of characters," Ferrante said. "What I try to do is stick with the rules of graphic design, so our characters are superior in size, weight, and proportion."

Are you tough enough?

No matter how readable it may be in the office, no display is doing its job if you can't read it where you work—or it's broken or just worn out. LED (light emitting diode) backlights keep test tools readable even in pitch-black conditions. Because these LEDs cause a significant power drain, on most tools they time out automatically after two minutes to preserve battery life.

Users work in the toughest conditions, and they expect their test tools to work with them. "One of the other big things we have to be cognizant of is operating temperature," Ferrante said. "We always pick LCDs that have the widest operating temperature." A tool could wait in a technician's vehicle through a January night in Anchorage or a Phoenix summer day—then go to work in minutes.

To protect against physical damage, a layer of polycarbonate plastic covers the display. Durability is proven at the Fluke Product Evaluation and Testing Laboratory, where a heavy steel ball is dropped head-on into the screen. The rugged Fluke 28 II Industrial Multimeter, which has to come back working after a 10-foot drop test, uses a special display mounting system to prevent such a fall from causing damage.

If your test tool survives enough of such on-the-job mishaps, your next question may be "how long will this thing stay on the job with me?" The issue of longevity raises the question, "How stable is the technology?"

"A lot of bench-top equipment gets turned on and left on 24x7x365," he said, "and there are some bench meters that are still going at 20 years-plus." First-generation Fluke DMMs are still on the job, 30 years after they first dropped into a toolbox. LED technology is extremely stable. But Ferrante said the organic light emitting diode (OLED) displays used by some competitors may not enjoy such a long life. "Because it's organic, its operating life is limited," he said. "If you kept your meter for five years, one of the colors in that display would likely drop out."

Into the future

Ferrante stays on the lookout for new display technologies. Some don't make it, but others will be coming soon to a Fluke test instrument near you.

A promising technology called electronic ink (electrophoretic ink or E Ink), used in e-readers like the Amazon Kindle, stands out for its great light-dark contrast, legibility indoors and out, and low power consumption. But because its refresh rate at low temperatures was too slow to keep pace with the fast-changing data Fluke tools must track, E Ink washed out.

Special display mounting system on the Fluke 28 II Industrial Multimeter protects against falls.

High-end bench instruments like the recently introduced 9640A RF Reference Source and 1594A/1595A Super-Thermometers are moving to full-color displays. The new 754 Documenting Process Calibrator has a backlit full color display, but its wide-screen LCD uses only two colors: black and white. The result is blacker letters against a brighter background, for improved legibility. The data display and controls layout are largely unchanged, so techs familiar with its predecessor can pick up the new model and go right to work.

Black-and-white wide-screen LCD improves legibiity on the Fluke 754 Documenting Process Calibrator-HART.

Want to take the display with you, for safer, easier viewing? Their detachable wireless displays have won numerous industry awards for the Fluke 381 Remote Display Clamp Meter and the Fluke 233 Remote Display Digital Multimeter.

Detachable wireless display on Fluke 233 Remote Display Digital Multimeter.

And what else is on the way? Ferrante just smiles. But keep your eyes open—you can't miss it.

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

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