

Compact ScopeCorder PACKS JUST ABOUT EVERYTHING

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When I look at my digital camera, I'm amazed at how the mechanical engineers managed to fit a lens, motor, battery, memory card, flash, USB connector, circuit board, and controls into a package that easily fits in my hand. The DL750 ScopeCorder from Yokogawa represents an equally impressive packaging job in an instrument that is also a useful measurement tool. The ScopeCorder allows users to trigger and capture instantaneous electrical events or make prolonged trend measurements of physical sensors such as thermocouples or strain gages. It is popular with engineers who make automotive, aerospace, electrical power, and electromechanical measurements.

In recognition of the instrument's reliability and versatility, the editors of *Test & Measurement World* have named it the winner of the 2008 Test of Time award. The annual Test of Time award honors a product that continues to provide state-of-the-art performance for at least five years after its introduction (www.tmworld.com/awards).

Yokogawa created the DL700 ScopeCorder in 1997 for electro-mechanical applications that couldn't be addressed with an oscilloscope or a data-acquisition recorder alone. In 2002, the company unveiled the DL750 model, which is billed as having triple the analog accuracy at half the physical size (355x250x180 mm) of its predecessor.

The DL750 packs a large display on the front, a hard drive inside, and a printer on top. Three USB ports, an Ethernet port, a SCSI port, a video port, a GPIB port, 16 digital inputs, and a ZIP drive, floppy drive, or PC Card drive populate the unit's left side panel, with space for the power plug. On the right side, the DL750 has room for 8 two-channel input modules. It even has a voice recorder for documentation.

In between the inputs and communications ports, the 22-lb DL750 has up to 1 Gsample of memory. You can allocate the memory to any channel or combination of channels.

The instrument has all the input modules you'd expect—temperature, strain, acceleration, and voltage. It packs speeds of up to 10 Msamples/s with 12-bit resolution and 1 Msample/s at 16-bit resolution. Most modules provide 1000 V of signal isolation. How did Yokogawa engineers design the DL750? Product manager Joseph Ting explained.

"It is a tremendous challenge to fit our electrical technology, physical controls, I/O, and other hardware functions into the DL750 mechanical package. Although we used

both computer and mechanical modeling for various aspects of the mechanical design, we ran into the computational limit of the PC mechanical simulator for thermal investigation. To verify the performance, we created transparent boards and mechanical models, then investigated the flow and speed of air with smoke, and we verified temperature distribution using internal heating elements. From this, we were able to optimize the position, size, and rotational speed of the blower."

Mechanical design challenges weren't the only problems that Yokogawa engineers had to solve. The DL750 had to acquire up to 1 Gsample of data running all 16

channels at 10 Msamples/s. To accomplish that, engineers designed their most complex ASIC up to that time. Ting explained that when designing the unit's GigaZoom engine, which lets you zoom in on any portion of the instrument's 1 Gsample of memory, engineers had to overcome timing problems and debug complex internal logical contradictions inside the circuit block.

Because of those efforts, the DL750 ScopeCorder can capture and analyze data in real time with functions usually reserved for digital oscilloscopes. Functions include channel math (such as sine, cosine, log, and integrals), digital filtering, spectral analysis, and go/no-go limit testing. With all of its capabilities, the DL750 ScopeCorder, according to Ting, is going to have a long life and has yet to reach its sales peak. **T&MW**



The DL750 ScopeCorder from Yokogawa packs up to 16 analog inputs, 16 channels, and just about every I/O port imaginable into a portable, large-screen instrument. Courtesy of Yokogawa.