

# Customer Demand Draws Suppliers Into LXI Camp

BY PAUL G. SCHREIER, EDITOR, LXI CONNEXION

**T**he number of vendors supplying LXI instruments continues to grow. The first to make introductions, as you might expect, were the larger instrument houses. Now, however, many other companies are getting into the action.

## Powering LXI

A look at the list of all LXI products reveals that power supplies are one of the largest categories. Recently, Magna-Power added LXI as an option for its entire line of supplies, whether the units have traditional front panels or blank panels with software-only control. The company usually has dealt in high-power supplies ranging from the XR Series (2 to 6 kW), PQ Series III (3.3 to 10 kW), TS Series III (5 to 45 kW), and MS Series III (30 to 75 kW) to the MT Series IV (100 to 150 kW).

Customer demand led the company to develop LXI versions of them all, reported Adam Pitel, director of business development. He explained that all the products previously had Ethernet links, but customers often want to drop a new power supply into existing configurations. LXI seems to be a trend among power supplies, and this puts his company in a competitive position with the very large companies who have LXI-based supplies.

In addition, Magna-Power is moving into the lower power market with its associated higher quantities. LXI reduces system development time and provides other advantages such as the capability to drop in a supply and use its autoconfiguration features.

And while the LXI interface has only been available for a relatively short time, Mr. Pitel explained, "One of our customers is using LXI standards to minimize setup for a project currently in the R&D stage. His company purchased two LXI power supplies with intentions to buy dozens more after R&D is complete. Using the VXI-11 discovery protocol, he plans to simply drop in the future supplies and minimize communications setup."

In addition, the IVI driver has received a positive response. A user can write a customized control interface with the language of his choice without being burdened with the details of the underlying communications mechanism. The same program/code can be used to

communicate with the power supply over RS-232, GPIB, or Ethernet. The IVI driver's DCPwr API also allows users to apply the same code across multiple models and even multiple manufacturers.

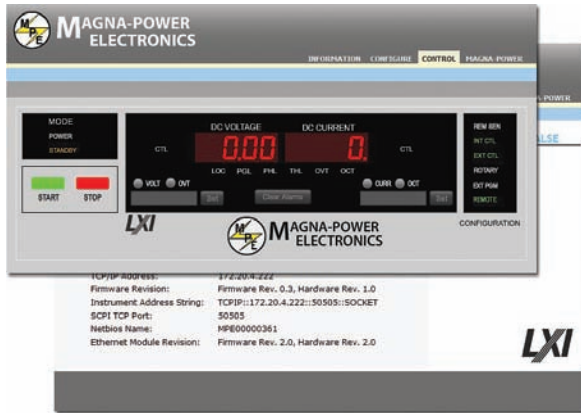
Magna-Power also wanted a way to update its LXI Web pages on the fly. So, in addition to a standard LXI Ethernet implementation, the company included an embedded Web server. Mr. Pitel noted that with any browser-enabled Ethernet-controlled instrumentation there's a need for dynamic presentation; that is, real-time communications between the instrument and the browser-based software. Provisions for this type of control are not built into Web browsers, which instead use third-party plug-ins such as flash, Java, or Microsoft's Silverlight.

"We wanted our LXI implementation to require zero installation and have a universal form of control available to anyone on the network. In addition, we needed to minimize the memory requirements on our power supplies' embedded Web server. Accordingly, our choice of flash, with its 99% market penetration, assured that virtually anyone can access our instruments' Web servers. Flash also allows us to do things graphically that, on other platforms, would be very costly in terms of storage."

## LXI Coming in Low-Cost Versions

Another power supply manufacturer, Thurlby Thandar Instruments (TTi), now has two LXI models among its linear programmable supplies: the first was the PL-P Series 90-W lab supplies and more recently the QPX1200L, a 1.2-kW unit featuring PowerFlex regulation that offers combinations between 60 V/20 A and 20 V/50 A. A linear output stage within the PowerFlex regulator gives it an output noise of <3-mV rms and a transient recovery time typically 10x better than conventional switch-mode units.

Sales Director Mark Edwards explained that the company adopted LXI as a standard interface on new developments because of the availability of LANs and the lower infrastructure cost for customers. The company



## MAGNA-POWER'S SOFTWARE USER INTERFACE WITH FLASH IMPLEMENTATION

decided to add LXI compliance to provide what it expects will become the industrial norm for a LAN interface, one that is proving popular for fully automated test systems and semiautomated test procedures.

Customers still are not completely clear about the benefits that LXI compatibility offers, he said. Hopefully, this will improve

as they start using LXI products from a range of manufacturers, which all provide the same protocols for the interface.

Implementing a LAN-based test system is less expensive than a GPIB system, especially when comparing the costs of LAN vs. GPIB ports and cables. However, TTI continues to maintain a GPIB interface on new products because some traditional engineers with legacy test systems still prefer an interface that they have used for many years.

But as a wider range of LXI products becomes available, the company expects to see more test systems being developed that use only the LAN interface. Presently, most new test systems still offer traditional RS-232, GPIB, or USB interfaces mixed with LAN or LXI instruments. In every reported implementation of the LXI interface, said Mr. Edwards, customers have found the implementation of the products uncomplicated.

"We at TTI produce low-cost products with often limited amounts of onboard processing. The implementation of LXI compliance compared to a simple LAN interface can add significantly to the per-unit cost and required development time," he continued. "For that reason, we've developed a communications board that we hope will enable us to implement LXI interfaces on all new instruments, even for those selling below \$700."

## Large Acquisition Memory for LXI

One of the most recent scope manufacturers to join the LXI ranks is Yokogawa Corp. of America with the DL9000 Series of digital-sampling and mixed-signal scopes and the SB5000 Vehicle Serial Bus Analyzer, which can analyze FlexRay, an emerging bus technology used by advanced electronic control units (ECUs) and electronic vehicle control applications. The DL9000/9100/9200 units provide four analog channels, four math channels, bandwidth of either 500 MHz or 1 GHz, and either 2.5 or 6.25 Msamples/channel of onboard memory. The DL9700 Mixed-Signal Scopes add 16 or 32 logic channels, and all have 6.25 Msamples/channel of memory.

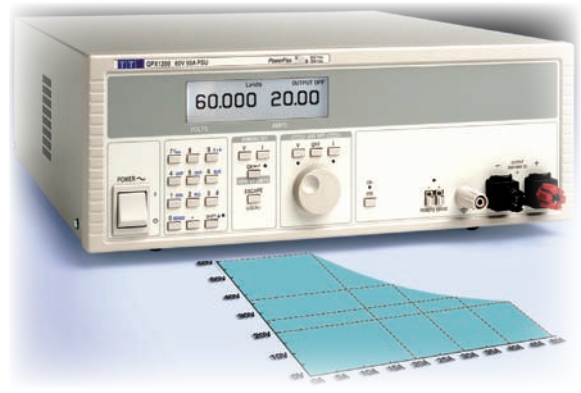
In recent years, explained Joseph Ting, product manager for high-frequency instruments, the available acquisition memory in waveform-measuring instruments, including oscilloscopes, has been increasing at an exponential rate. Memory itself has never been a limiting factor, he added. Rather, until recently, the display and data-processing engines of the instruments didn't have the computing power to maintain the waveform and display update rates in combination with long memory. This trend of larger acquisition memory also causes increased demands for the transfer of waveform data to host computers, and legacy interfaces such as GPIB no longer are viable or practical.

LXI has emerged as a new standard for instrument communications, one that provides high speed, low cost, relatively simple migration from legacy interfaces, and ease of use. Yokogawa has concluded that LXI is the most suitable next-generation instrument communications and automation technology platform. In addition, the company has seen an increase in customer requests for LXI support in its instruments.



**TEGAM's 1830A RF POWER METER**

DL9000 family scopes can provide high-speed waveform acquisition in combination with advanced waveform-analysis features. For example, they feature real-time analysis capabilities such as digital filtering, FFTs, histograms, trending, serial bus decode, switched-mode power supply analysis, user-defined math, and automatic waveform-parameter measurements. By using the scope's high-speed analysis capabilities and then LXI to transfer analysis results to a host computer, the performance of an automatic test system can be increased while simultaneously reducing software development cost. If such functions are implemented in software on a host computer, it will take far more time and cost to develop and debug the software.



**TTI's QPX1200L POWER SUPPLY WITH COMMUNICATIONS BOARD**

For instance, Mr. Ting explained, when ADC or DAC engineers evaluate the characteristics of a data converter, they often convert pre- and post-converted digital bits to analog data. In many cases, they use a logic analyzer to capture these digital bits and then must write their own analog-conversion routines.

In contrast, a DL9000 mixed-signal unit operates as a simple logic analyzer and provides a virtual D/A function that converts digital data from the logic inputs to corresponding analog data in real time. By using this feature with LXI, a converted waveform from digital data can be viewed and analyzed much faster than through a logic analyzer with additional software. It reduces test, development, and debug time.

## New Instrument Types in the LXI List

While you can find a number of traditional multimeters in the LXI format, perhaps the only dedicated LXI RF power meter is TEGAM's Model 1830A, which comes with LXI and USB compatibility. Thermistor RF power sensors are universally recognized as the most accurate means to measure and transfer RF power. This unit works with all types of thermistor sensors and a power range from -30 to +14 dBm, a frequency range from 100 kHz to 40 GHz, meter uncertainty of  $\pm 0.05\%$  of reading  $\pm 5 \mu\text{W}$ , and four-digit calibration factor resolution.

As for the decision to add LXI functionality, TEGAM's President Adam Fleder said, "Several factors drove this decision. When you design any new box instrument today, you must consider a range of interfaces: GPIB, RS-232, USB, and LXI. The lowest-cost interfaces to implement these days are Ethernet and USB.

"We evaluated the applications for this product against the development costs and found that most users weren't interested in paying more to include GPIB," he continued. "RS-232 also is not available on most computers these days so it was unattractive."

He added that an RF power meter has some unique requirements and is more complicated to operate than a standard DMM or signal generator. These meters are used in conjunction with RF power sensors, each of which has a multipoint calibration factor correction table that must be loaded and managed. With the LXI interface, users can directly and remotely access the

meter's internal functions without writing or loading software on a PC.

Likewise, the calibration tables for sensors can be uploaded without additional effort. You simply click on a link in a browser and select the tables on the computer. You could be sitting with the 1830A on a bench, or you could be updating a table for a customer in Singapore. Tegan used the same capability to load new firmware into the instrument and can remotely add functionality through the LXI interface anywhere in the world where there is an Ethernet connection.

Another unique capability, said Mr. Fleder, is the addition of an HTTP server to implement an internally hosted, fully guided, and self-documenting calibration procedure. It tells the technician which equipment is needed, has diagrams that show how and when to connect it, and then updates the instrument's internal calibration settings. To Tegan's knowledge, this is the first commercial implementation with this capability. This internal automation simplifies what once was a manual process or has been automated with external equipment.

## **Movement Into Other Classes?**

All of the LXI instruments discussed in this article are Class C so they don't benefit from the Ethernet precision timing protocol or the wired trigger bus of Class A and B units. Can we expect these instruments to soon appear in upgraded versions? Likely not.

For instance, TTI feels that the Class C standard more than meets the expectations of customers for general-purpose instrumentation. Further development of Class C would add requirements and cost, leading manufacturers of low-priced units to resort to a LAN interface without LXI conformance.

Magna-Power decided to stay with Class C because the certification is consistent with the offerings from other power supply manufacturers. Tegan didn't consider Class A or B for its power meter because this instrument has a fairly low data rate without any need for tight synchronization. However, the company indicated that it certainly would develop a Class A or B design when the application requires it.

## **ABOUT THE AUTHOR**

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