

## DMMs Work – VMMs Work Smarter



*Just as the word processor replaced the typewriter, the VMM can replace the DMM, combining instrument reliability and versatility with PC flexibility.*

The VMM, or virtual multimeter, gives you a smarter way to take measurements. Just as the word processor replaced the typewriter, the VMM can replace the digital multimeter (DMM). Although DMMs have traditionally been used for measurements, they lack flexibility. The VMM, however, is the inside instrument that plugs directly into your laptop computer. The DAQMeter™ DAQCard™-4050, a VMM, gives you the best of both worlds – instrument reliability with computer flexibility.

VMMs have the meter features you expect: full 5½ digit resolution; ±20 mV to ±250 VDC; 20 mVrms to 250 Vrms AC; 200 Ω to 20 MΩ resistance measurements; 10, 50, and 60 Hz reading rates; and current measurements and autoranging.

### Get the VMM features you require:

5½ digits with AC/DC coupling
±20 mV to ±250 VDC
20 mVrms to 250 Vrms AC
200 Ω to 20 MΩ resistance measurements
10, 50, and 60 Hz reading rates
Auto-ranging

*VMMs give you the multimeter features you require as well as smart functionality.*

### VMMs Have the Inside Edge™

You can use a VMM exactly like a stand-alone meter. Using buttons, you can select your measurement type. A VMM also has the added advantage of plugging directly into your laptop computer, making it more portable than a stationary DMM that plugs into a wall outlet.

*The VMM is the inside instrument – it is a multimeter that plugs directly into your laptop computer.*

#### Other VMM features include:

**Internet-Ready** – the data VMMs acquire is available to you and those who need to see it anywhere in the world.

**Report-Generating** – VMMs link to report-generating software to create reports from your measurements.

**Data Logging and Trending** – VMMs automatically log data so you have a record of your measurements and can even view trends over time. The next time you wonder what that reading was an hour ago, your VMM has already logged it.

**Automated** – you can automate VMM operation to fit the measurement application. If you need to automatically increase the rate at which readings occur or sweep through reading types, the VMM does this with ease.

**Expandable** – VMM functionality is inherently expandable. For example, you may need to turn your voltmeter into a power meter. Because the VMM plugs directly into the PC, you can easily convert your VMM into hundreds of instruments, including oscilloscopes, power meters, a function generator, and more.

**Integrated** – VMMs easily become components of larger systems. For example, you may need a system to test electronic components that measures impedance as well as transient response. In this case, you combine your VMM with a virtual scope, such as the DAQScope™, creating a system that exactly meets this need. Importantly, this system is portable.

**Convenient** – VMMs have the advantage of always being with you. Because your laptop is designed to be taken with you, you are always ready to take measurements. VMMs run simultaneously with other software programs, so you can take measurements at the same time you perform word processing. Stand-alone and hand-held voltmeters are extra baggage when not in use – and certainly don't write your reports.

### Make Your Next Meter a VMM

Choose a VMM the next time you need a meter – you retain all of the instrument-grade features you need and obtain greatly enhanced convenience and functionality. Instead of toting around 10 different instruments for 10 different measurements, you have them in one package – your PC. With virtual instruments, you have hundreds of instruments at your fingertips. The VMM can replace the DMM because it is a much smarter way of making measurements.

The DAQCard-4050, a VMM, offers the same standard functionality as a traditional DMM. In addition, National Instruments has many types of VMMs based on our extensive line of plug-in DAQ hardware that also offer multiple channels, high-speed scanning (up to 1 MS/s), and control capabilities. ▶

**For more information on VMMs, check DAQInstruments kit on the reply card.**

## New Family of DAQ Boards Offers High-Speed Digital I/O

A new family of high-speed, 32-bit, digital I/O boards is available from National Instruments. The functionality of the DIO-32HS boards makes them an excellent choice for use as logic analyzers, digital pattern generators, and monitors. Available for both the ISA and PCI bus (AT-DIO-32HS and PCI-DIO-32HS, respectively), the DIO-32HS boards can perform high-speed pattern generation and handshaking at rates up to 20 Mwords/s as well as single-point I/O.

### New ASIC Delivers DIO Functionality

The new DAQ-DIO ASIC powers these new high-speed DIO-32HS boards, delivering functionality previously unavailable on a DAQ board. Now, you can get single-point I/O, wired-OR outputs, selectable power-on states, high-speed

*The functionality of DIO-32HS boards makes them an excellent choice for use as logic analyzers, digital pattern generators, and digital monitors.*

pattern generation, handshaking, and triggering in a single DIO board. In addition, the DAQ-DIO ASIC combines

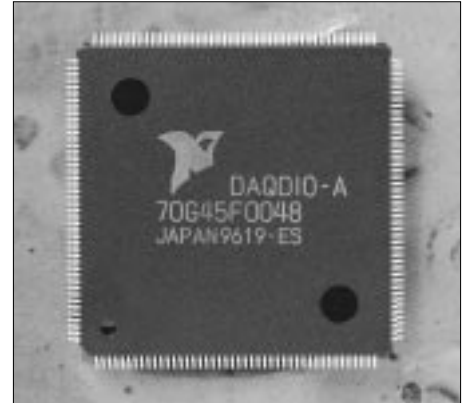
multiple components, giving advantages that include fewer parts per board, lower power consumption, and increased reliability.

### Single-Point I/O

The DIO-32HS boards deliver 32 individually configurable I/O lines. You do not have to configure an entire port as all input or output. Each I/O line is TTL/CMOS-compatible and works in both standard and wired-OR modes. In wired-OR mode, outputs are high-resistance, or tristated, when logic high. An advantage of wired-OR outputs is that you can connect several lines together without damaging the onboard drivers. Wired-OR outputs are also needed if you want to connect to open-collector drivers, directly to ground, or to switches connecting to ground. When configured as inputs, the DIO-32HS data lines are terminated with diodes. This dampens line reflections in long cable applications. In addition, the DIO-32HS boards have a selectable power-on state. You can set either a high or low level for the I/O lines, even as the computer powers up.

### Advanced Pattern Generation

The DIO-32HS boards are capable of advanced, high-speed pattern generation. You can simultaneously read and write



*With the DAQ-DIO ASIC, boards have fewer onboard components, lower power consumption, and increased functionality over the 8255.*

digital patterns, perform start and stop triggering, and even execute pattern detection. The pattern generation capabilities of the DIO-32HS boards are ideal for automated test applications, such as memory or microcontroller testing. You can also use pattern generation to monitor digital data. With pattern detection, you can even capture data before and after a specific pattern is acquired. This pattern-detection trigger delivers logic analyzer triggering features on a DAQ board.

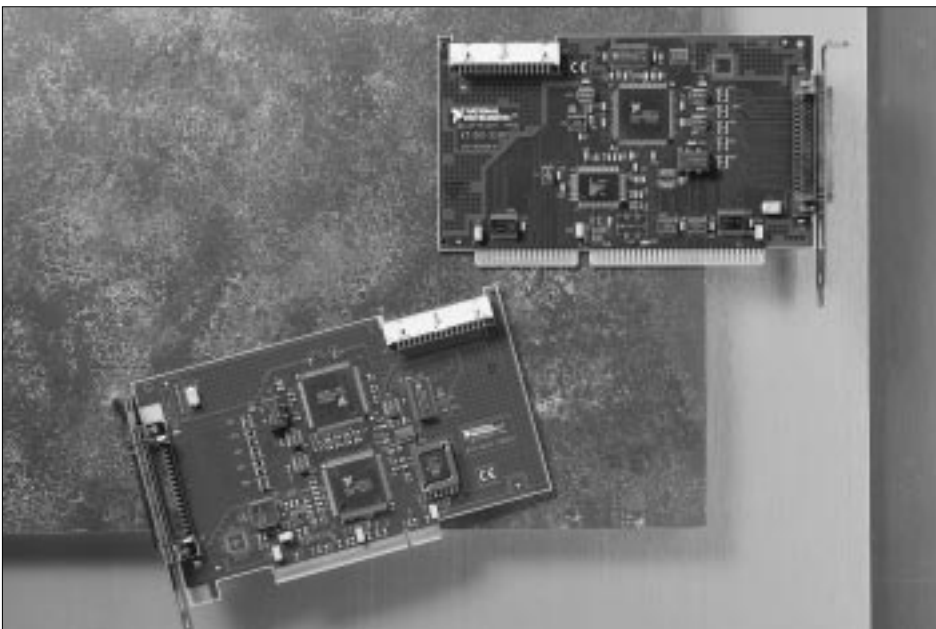
### Flexible Handshaking

The DIO-32HS boards can communicate using six different handshaking protocols. You can customize each of these protocols with programmable delays and polarities to gain maximum flexibility and compatibility with existing digital communications devices. In addition to the four handshaking protocols available on our DIO-32F board, the DIO-32HS emulates the handshaking protocol used by 8255-based devices and offers a new burst mode capable of PCI bus-mastered data transfers at speeds up to 20 Mwords/s.

### More Products on the Horizon

For portable, high-speed, digital I/O solutions, we will have a PCMCIA version of the DIO-32HS available in the third quarter of 1997. ▸

**For a data sheet on the DIO-32HS boards, check this option on the reply card.**



*The PCI-DIO-32HS performs high-speed pattern generation and handshaking at rates up to 20 Mwords/s.*

## ThermoMap™ – Thermal Mapping of ICs Using LabVIEW and IMAQ Vision

by Dino J. Farina, President, Image Therm Engineering, Inc. and Jacki Duffy, Marketing Coordinator, Temptronic Corporation

**The Challenge:** Performing thermal mapping of semiconductor devices to reveal hot spots for electronic component design engineers and failure analysts.

**The Solution:** Developing the ThermoMap system, a micron-resolution thermal imaging system using a liquid-crystal sensor with a GPIB interface and LabVIEW and IMAQ Vision software.

As the semiconductor industry designs and builds components and integrated circuits (ICs) at higher levels of complexity and capacity, the thermal design efficiency and defect detection of these devices becomes more critical. Image Therm Engineering, Inc. (Waltham, MA), a National Instruments Alliance Program member, was chosen by Temptronic Corporation

*Image Therm Engineering developed the ThermoMap system with LabVIEW and IMAQ Vision software because they provide rapid prototyping capabilities.*

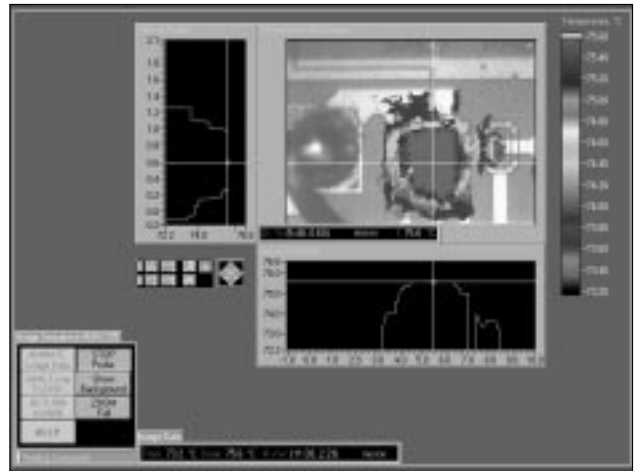
(Newton, MA) to develop ThermoMap, a nematic liquid crystal (LC)-based thermal mapping system specially designed for electronics components and ICs.

Image Therm Engineering developed the ThermoMap system with LabVIEW and IMAQ Vision software because they provide rapid prototyping capabilities, GPIB and RS-232 communications interfaces, and powerful image processing algorithms in a platform-independent, integrated development environment. The result is an accurate, high-resolution, easy-to-use system for electronic component design engineers and failure analysts.

The ThermoMap system tightly integrates the proven thermal hot-spot detection capabilities of Temptronic's Liquid Crystal Thermal Analysis Kit and their GPIB and RS-232-enabled

ThermoChuck® and ThermoSocket® precision temperature control products with a highly automated, visual software environment that simplifies the set up, acquisition, processing, and thermal analysis of electronic components and ICs. The development time required to build a robust technique for accurate thermal map construction was significantly decreased with the aid of the rapid prototyping and image processing capabilities of IMAQ Vision software and the graphical user interface (GUI) tools of LabVIEW. ThermoMap is designed to operate on current desktop computers running Windows (486 and Pentium-class PCs), with Mac OS and Sun OS versions available on request. The system includes a plug-in image acquisition board, National Instruments GPIB interface board, CCD camera, user manual, and software.

**ThermoMap System Measurement Methodology**  
The ThermoMap system frees users from many of the tedious tasks involved with thermal imaging. The ThermoMap measurement methodology begins with applying power to the device under test (DUT) and bringing the thermal stage/DUT to a temperature level that is just below the level that reveals the smallest hot-spot with the LC material used. Next, a digital image of this scene is "snapped" by ThermoMap and stored as the background data image. ThermoMap then automatically adjusts and controls the temperature of the stage/DUT and acquires images of the device that show the outline of the hot-spot(s) growing as the temperature is raised and stabilized in increments as small as 0.1° C steps. Once all of the images are acquired, ThermoMap processes the image sequence using its proprietary hot-spot detection algorithm and builds a color-coded thermal map of the device.



*Temptronic's ThermoMap system, developed with LabVIEW and IMAQ Vision, performs thermal analysis of ICs.*

With the ThermoMap built-in display capabilities, users can animate the acquired image sequence to verify the proper hot-spot growth pattern.

### Conclusions

At Temptronic Corporation, a pioneer and worldwide leader for 26 years in localized thermal test technology, we have received a very favorable response to the ThermoMap system from the semiconductor industry. Customers, who have been impressed by its power and ease of use, are requesting it for failure analysis, hot spot detection, and the temperature measurement/analysis of various electronics devices and ICs. At Image Therm Engineering, we are currently developing an enhanced version of the ThermoMap software for Temptronic with capabilities for capturing even more complex thermal phenomena and more powerful display and analysis features. ▶

**For more information, contact Bill Hanna, Temptronic Corp., 55 Chapel St., Newton, MA 02158, tel (617) 969-2501, fax (617) 969-2475, e-mail sales@temptronic.com**

## Perform Your Distributed Test with the GPIB-ENET



*Using the GPIB-ENET, users can perform tests without leaving their desks or review data from anywhere in the world using the Internet.*

With new connectivity opportunities available, GPIB test system developers can now take full advantage of networks for expanding their instrumentation systems. Using the GPIB-ENET TCP/IP Ethernet-to-GPIB controller, test system developers are broadening the scope of computer control across networks to integrate a variety of GPIB-based measurement systems into a single test application.

### Computer Networks Create Flexible Test Systems

Computer control of instrumentation continues to grow in popularity because industry-standard computers deliver a flexible, low-cost platform for deploying test systems that users can easily customize to include new instrumentation and connectivity to other systems. Today, most computers come equipped with an Ethernet interface and the necessary software for easily incorporating the

computer into a network. Computer networks, which have simplified the task of integrating several I/O sources into a single system, have become a standard mechanism in many corporations.

This vast network infrastructure opens new doors for accessing instruments and entire instrumentation systems. Using a networked computer and the GPIB-ENET TCP/IP Ethernet-to-GPIB controller, users can monitor and control test systems from their home, office, or from locations around the world, gaining complete and concise information on the status of their automated test systems. By developing a server application to manage a test system, users can share information with key decision makers; offer controlled access to a variety of users; and archive data or download customized reports that monitor or trend key aspects of the entire system.

GPIB-ENET Spans the Distance Network connectivity solves many basic system requirements, such as size, distance, access because of environmental conditions, and integration of a large number of instruments and multiple test systems. Using the compact GPIB-ENET, users can easily span large distances or integrate GPIB test systems located in different areas of a company into a single application. Users can also manage GPIB test equipment over the network and share these resources among several users and test departments. With the GPIB-ENET, users can test in hazardous environments

and use multiple GPIB-ENET controllers to control hundreds of instruments with a single computer. Plus, using the Internet Developers Toolkits for LabVIEW and LabWindows/CVI, users can even build remote monitoring applications through the Internet using any standard web browser.

The GPIB-ENET delivers the same GPIB controller capability as a plug-in board, but across an Ethernet link. Users can use the same NI-488<sup>®</sup> functions and NI-488.2<sup>™</sup> routines with a PCI-GPIB or AT-GPIB/TNT board to interface with instrumentation. The NI-488.2M<sup>™</sup> software performs all necessary GPIB-to-Ethernet conversions to send information across the Ethernet link; the GPIB-ENET performs all necessary Ethernet-to-GPIB conversions to communicate to GPIB instruments. The GPIB-ENET, which works with a wide range of operating systems, including Windows NT, Sun Solaris, and HP-UX, offers a flexible, cost-effective solution for sharing resources or creating expandable distributed test applications.

Developing distributed test systems is becoming easier and more affordable because users can now take full advantage of powerful high-level software, their skills in interfacing with GPIB instrumentation, and industry-standard computers teamed with both corporate and World Wide Web networks. ▶

**For an application note on GPIB-ENET, check this option on the reply card.**

## TECH NOTE

## Using "Ping" to Verify that the GPIB-ENET Is Alive on the Network

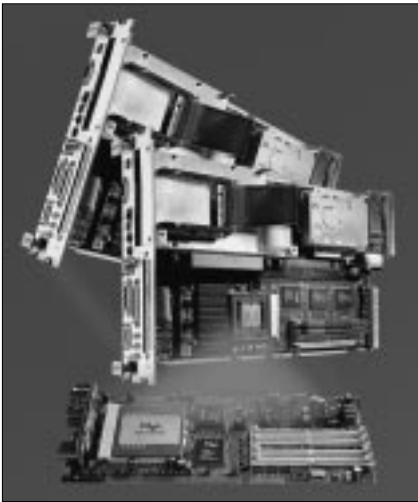
Once users have configured their GPIB-ENET with the correct IP address, they can easily verify that their GPIB-ENET is active on the network by using a utility called ping. Contact your network administrator to determine the location or path of this executable utility on your system. Ping is a network utility

that sends a packet to a device/host on the network and then waits for it to be echoed back, indicating that the specified device/host is active. Type in the command `ping IPaddress` where *IPaddress* is the IP address assigned to your GPIB-ENET. If your network administrator assigned your GPIB-ENET

a *hostname*, you can also type in `ping hostname`. The utility either returns a message that verifies that the GPIB-ENET is alive or indicates that the specified host is not available. ▶

**For an application note on GPIB-ENET, check this option on the reply card.**

## New Embedded Pentium Pro VXI Controller Available



The new VXIpc-860/200 is the highest performance VXI controller available.

The new 200 MHz Pentium Pro-powered VXIpc™-860/200 is the latest addition to the VXIpc-800 Series Pentium-class line of embedded VXI controllers from National Instruments. The VXIpc-860/200 exceeds the performance of the 200 MHz Pentium VXIpc-850/200, replacing it as the highest performance VXI controller available. The VXIpc-860/200 is expected to be shipped to customers in the second quarter of 1997.

### About the VXIpc-860/200

The VXIpc-860/200 comes in the same configurations and with the same options as all of the current VXIpc-800 Series. However, the 200 MHz Pentium Pro processor represents a new level of performance for VXI control, delivering approximately 35 percent more performance than the

VXIpc-850/200. The Intel Pentium Pro features a true 32-bit internal architecture, dynamic execution, 8 KB/8 KB non-blocking level 1 cache, and an integrated 256 KB level 2 cache. A comparison of the relative processor performance of the VXIpc-800 Series is described in the table below using Intel's ICOMP 2.0 processor rating.

All VXIpc controllers feature a modular, PCI-based local bus design so system developers can use interchangeable daughterboards to upgrade their controllers to new microprocessors. As with the previous versions of the VXIpc-800 Series, the VXIpc-860/200 uses the MITE, MANTIS™, and TNT4882C™ custom ASICs to deliver superior VXI and GPIB performance and higher reliability. Because the VXIpc controllers use the MITE ASIC with integrated direct memory access (DMA), VME64, and built-in PCI, they can achieve data transfer rates of more than 30 Mbytes/s.

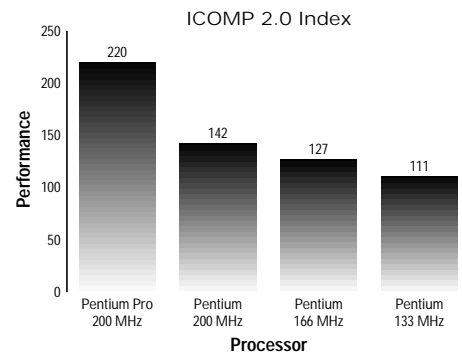
The VXIpc-860/200 also delivers superior slave performance, which is important for instruments with integrated bus-mastering capability or direct memory access (DMA). VXI instruments with DMA, such as the VXI-MIO Series, transfer data directly to the VXI controller rather than relying on the VXI controller to move acquired data. For instance, the VXIpc-860/200 can accommodate up to eight VXI-MIO-64E-1 modules running at the full analog acquisition rate of 1 MS/s for an overall 16 Mbytes/s slave throughput rate to the VXIpc-860/200.

The VXIpc-860/200 comes with either Windows 95 or Windows NT installed.

Because Intel designed the Pentium Pro for optimum performance when using 32-bit operating systems, users developing 16-bit applications will see negligible speed improvements when upgrading to this technology. Therefore, DOS/Windows 3.11 is not an option for the VXIpc-860/200.

The VXIpc-860/200 is completely compatible with the VXIplug&play Systems Alliance specifications. The VXIplug&play-compliant VXIpc-860/200 comes with NI-VXI/VISA™ and NI-488.2 installed and configured on the hard drive. Programs written using previous versions of the VXIpc-850 Series or any VXIplug&play-compliant controller can run unmodified on the VXIpc-860/200. Customers can also order LabVIEW or LabWindows/CVI installed and configured on the VXIpc-860/200. ▸

**For the 1997 VXI Solutions Product Guide, check this option on the reply card.**



The ICOMP index provides a simple relative measure of microprocessor performance. It is a collection of benchmarks for helping end-users decide which Intel microprocessor best meets their needs.

## Upgrade Your VXIpc™-850 to the Pentium Pro

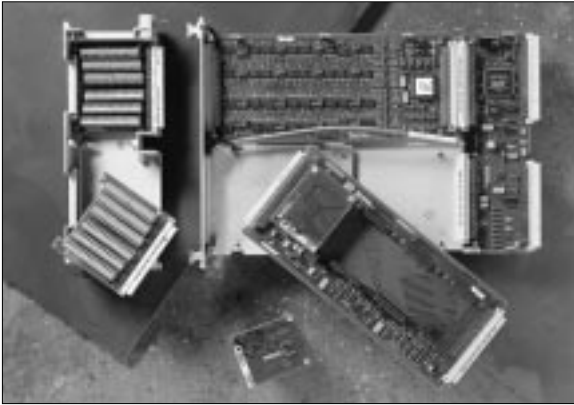
With the modular VXIpc-800 Series design, users can upgrade to newer, faster processors in the future simply by replacing the CPU daughterboard where the processor and system memory reside. Current VXIpc-850 users can upgrade to an Intel Pentium Pro VXIpc-860 using this same procedure, with one exception – end-users must send in their existing unit to our factory.

The VXIpc-860 CPU daughterboard requires minor hardware changes to existing VXIpc-850 Series motherboards. Although these changes are minor, National Instruments should perform the upgrade to ensure the highest quality. Because the VXIpc-860 also requires new NI-VXI™ driver software for Windows 95 or Windows NT, we will update this software on hard drives when the unit is delivered for the upgrade. End-users must

back up any programs they have written before they send the unit to our factory to preserve their work.

Upgrading to a Pentium Pro requires a few more steps than upgrading to a faster Pentium in the VXIpc-800 Series. However, when comparing the price of the upgrade with the price of a new embedded VXI controller, the VXIpc-860 upgrade costs substantially less to realize Pentium Pro performance. ▸

## Performing VXI Signal Conditioning Inside the Box



Based on SCXI architecture, the VXI-SC Series takes advantage of VXI instrumentation features.

VXI systems that measure transducers, such as strain gauges, RTDs, thermistors, or thermocouples, pose many challenges. These sensors typically require amplification and filtering because they produce low-level signals where unwanted noise and improper grounding can adversely affect measurements. A VXI signal conditioning system used as a signal “front-end” to an analog acquisition module can cost-effectively solve these challenges to improve measurement accuracy.

The VXI-SC Series signal conditioning system from National Instruments, when used with a VXI-MIO instrument module, provides a low-noise, high-performance alternative to expensive dedicated VXI instrumentation. This system also easily and accurately interfaces to a wide variety of transducers for a completely integrated VXI measurement system.

### Integrated VXI Signal Conditioning

Based on the popular SCXI architecture, the VXI-SC Series takes advantage of VXI instrumentation features to deliver a state-of-the-art signal conditioning that combines the best elements of both technologies. The VXI-SC Series uses the VXI standardized system initialization to ease startup configuration; the VXI local bus for slot-to-slot communication with the VXI-MIO; and the VXI trigger bus for multi-module synchronization.

The key to the VXI-SC Series is the VXI-SC-1000 Signal Conditioning Carrier. This single-slot, VXI-SC-1000 carrier accommodates up to two VXI-SC plug-in modules, so you can customize the signal conditioning system to your application. The VXI-SC plug-in modules include the VXI-SC-1102, a low-voltage multiplexing amplifier module, and the VXI-SC-1150 for sensors that require excitation.

With the modular design of the VXI-SC-1150, you can mix current and voltage excitation. The VXI-SC-1150 holds up to four Signal Conditioning Mini Pods (SCMP). Each SCMP sources current or voltage for 8 channels, resulting in a total of 32 channels of excitation for each VXI-SC-1150. You simply choose the current or voltage SCMPs options needed for your application and install them on the VXI-SC-1150.

**The VXI-SC Series Architecture**  
A complete VXI-SC Series signal conditioning system consists of a VXI-MIO Series module – either the VXI-MIO-64E-1 or the VXI-MIO-64XE-10 – and a VXI-SC-1000 residing in an adjacent VXI slot with a VXI-SC-1102 and/or a VXI-SC-1150 (complete with SCMPs) plugged into the VXI-SC-1000 carrier. For example, a VXI-SC-1000 with two VXI-SC-1102 plug-in modules can condition 64 transducers while consuming a single VXI slot.

The analog signals from the transducers are routed to the VXI-SC plug-in signal conditioning modules using a 96-pin DIN connector available on each VXI-SC module. You have two wiring options. You can use an SH96-96 cable with a TBX-96 or a TBX-1303 DIN rail-mountable connector block to connect to the transducers to each VXI-SC plug-in module. The second option uses the VXI-TB-1000 front terminal block carrier with a VXI-TB-96 or VXI-TB-1303.

The signals from the transducers are then conditioned and multiplexed through the VXI-SC-1102 onto an analog bus located on the front panel of both the VXI-MIO and the VXI-SC-1000. The conditioned signals pass to the VXI-MIO using an analog bus plug that bridges the VXI-MIO and the VXI-SC-1000. ▀

**For the 1997 VXI Solutions Product Guide, circle this option on the reply card.**

Use the enclosed information reply card to order these articles and application notes. Order numbers are listed after the literature descriptions.

### Hot Off the Press

“New Options for PC-Based Data Acquisition,” by David Potter, *Wireless Design & Development*, November 1996. A882

“Activating the Internet for Virtual Instrumentation,” by John Pasquarette, *Evaluation Engineering*, February 1997. A897

“Data Acquisition Meets Virtual Reality,” by Dave Wilson, *EDN Products Edition*, January 16, 1997. A908

“Saturn In-Vehicle Testing Using ComponentWorks and SCXI,” by Dave Robins, *User Solutions* article, January 1997. A948

### WORTH READING

“How the Internet Changes Data Acquisition,” by Ed Baroth, *Evaluation Engineering*, February 1997. A1004

“Getting Jitter Under Control,” by David Evans, *Test* (U.K.),

January/February 1997. A1010

“Ensure System Accuracy by Analyzing Instrumentation-Amp Settling Time,” by Ed McConnell, *EDN*, February 17, 1997.

A1016

## Extended Development Support Is Now Available!

Are you working on a project that requires you to program one of our hardware products at the register level? Perhaps you are designing a GPIB device using a National Instruments GPIB ASIC. Or, maybe you need to program your National Instruments DAQ board at the register level to squeeze as much time as possible out of your control loop. We recognize the fact that your design characteristics may require that you use our products at the very lowest level. We also realize that you may need expert help from time to time to keep your project on schedule. To help you get the answers you need in a timely manner, National Instruments introduces Extended Development (EXD) support.

EXD support puts you in direct contact with a support engineer who is a development expert with the National

Support ←					→ Consulting		
Customer Support					Customer Education		Alliance Program
Electronic Automated Support	Software Subscription Program	Basic Support	Future Support Options	Extended Development Support	Product Training	Startup Assistance	System Integration

*The National Instruments Support and Service Continuum.*

Instruments product you are using. EXD support is currently available for DAQ, VXI, and GPIB hardware; the Lookout Object Developer's Toolkit; and National Instruments Device Servers. EXD support engineers can provide guidance, answer questions, and solve problems pertaining to the use of any of the products listed above. EXD support is especially geared towards answering the tough questions that arise during low-level development with these National Instruments products.

EXD support is available for purchase on a per-incident basis, where an incident

is defined as the reasonable amount of time necessary to answer/solve one of your low-level development questions or difficulties. Depending on your familiarity with our products and the scope of your project, you can purchase an EXD contract for one, six, or twelve incidents during a year-long period. If you are involved in a low-level development project, we encourage you to call, e-mail, or fax our Customer Support Department and ask to be transferred to an EXD support engineer in your product area. ▶

## New Course Teaches Users about ComponentWorks™ and ActiveX

National Instruments is pleased to announce the new hands-on ComponentWorks Basics course. This course covers the fundamentals of using ComponentWorks ActiveX custom controls, the analysis library, and instrument driver DLLs to simplify data acquisition, analysis, and presentation.

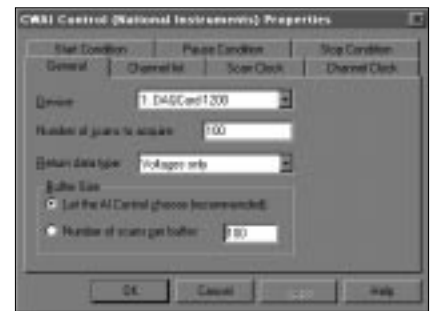
The three-day, hands-on ComponentWorks Basics course prepares users to unlock the potential of the product so they can create sophisticated applications for data acquisition and analysis. Targeted for the beginning ComponentWorks user, the course introduces the features of the ComponentWorks custom controls and illustrates how users can apply these features in practical applications. The course also describes how ComponentWorks fits into the Visual Basic environment; provides in-depth discussion of the properties, methods, and events for ActiveX controls; and discusses how to build applications combining data acquisition, analysis,

and presentation. Hands-on exercises reinforce the concepts presented during the lecture.

Having completed the course, users will be able to use ComponentWorks to:

- Acquire or generate analog and digital signals with a DAQ board
- Perform hardware-timed, finite-scan, or continuous analog acquisition
- Use software, analog, or digital triggering for DAQ applications
- Analyze and process acquired data with Analysis Library functions
- Create an instrumentation GUI
- Use DLLs to control GPIB instruments
- Fully integrate the acquisition, analysis, and presentation capabilities of ComponentWorks

Additional topics introduce techniques to use ComponentWorks in other OLE control container environments (such as Microsoft Visual C/C++ or Borland Delphi) and with the Internet. Before



*ComponentWorks Basics introduces the features of ComponentWorks custom controls.*

taking this course, users should have experience using Windows and Visual Basic or have previous programming experience and have taken the National Instruments Visual Basic Primer course. ▶

**For more information or to register, contact our Customer Education Department at (512) 794-0100 in the U.S. or your local branch office.**

## VXI Technology – New VAR with National Instruments

VXI Technology (Irvine, CA), a leading manufacturer of high-density VXIbus instruments generally serving the government, aerospace, transportation, and communication industries, recently signed an agreement with National Instruments to become a value-added reseller of our VXI controllers, interfaces, and LabVIEW and LabWindows/CVI software. With this deal, VXI Technology can offer customers fully configured systems, including software, controllers, chassis, and integration services. Now, VXI Technology and National Instruments can combine expertise to help customers build complete VXIbus solutions. ▶

## Second Edition of LabVIEW Book Available

With more than 100 new pages, Gary Johnson's second edition of *LabVIEW Graphical Programming* is updated to LabVIEW 4.0 and beyond. This expanded version contains the latest techniques and recommended practices for LabVIEW development, extensive coverage of many third-party LabVIEW add-on products, and discussion of LabVIEW toolkits. An updated DAQ chapter includes the latest high-level counter/timer applications and synchronized analog input/output examples. Also included is an improved version of a simple DAQ application. Motion control applications in LabVIEW, along with extensive coverage of IMAQ image acquisition products, are included in this new edition. The second edition of *LabVIEW Graphical Programming* comes with a multiplatform CD that has 35 MB of utilities, examples, and reference materials.

**For a copy of *LabVIEW Graphical Programming*, contact McGraw-Hill at [www.ee.mcgraw-hill.com](http://www.ee.mcgraw-hill.com), fax (614) 755-5645. The ISBN number is 0-07-032915-X.**

## New Seminar Covers PC-Based Production Test

National Instruments is offering a new free seminar titled "New Technologies and Strategies for Production Test." This seminar shows how you can reduce costs and improve time-to-market with PC-based test systems. In today's competitive environment, you need a test strategy that scales your development investments across research and development, production, validation, and service. Using industry-standard technologies, such as Windows NT, LabVIEW, LabWindows/CVI, VXI, and the Internet, we will show you how to develop systems that make test a strategic advantage for your company. ▶

**For more information, visit our web site at [www.natinst.com](http://www.natinst.com), or call us at (512) 794-0100.**

## Editors Honor Our Software in 1996

The editors of *Electronic Engineering Product News* (EEP<sub>N</sub>) selected VirtualBench software as their PC-based Instrument Hardware and Software Product of the Year for 1996. Our ComponentWorks software was runner-up for the award. Editors selected the award winners based on technological advancement, price/performance, application potential, and other criteria.



Editors at *Test and Measurement World* also named ComponentWorks as one of their Best in Test products for 1996. In addition, BridgeVIEW™ was given a Product Recognition award by *Control Engineering* magazine. ▶

## Student Wins Computer in HiQ Contest



*Chris Chapo of the University of California at Berkeley (far left) receives a computer for his winning HiQ Notebook. Presenting his prize are Owen Golden, National Sales Manager for National Instruments, and Bill Harrold, District Sales Manager.*

Congratulations to Chris Chapo of the University of California at Berkeley for submitting the winning HiQ Notebook during the recent HiQ 3.0 Beta Notebook contest! Chris created his winning Notebook for use in teaching a chemistry lab course last fall. Students use the Notebook to perform the laboratory analysis; Chris then uses it to check their work. He leverages the benefits of HiQ by combining graphics, analysis, Word objects, and audio to study the concentration of chlorophyll in leaves.

Thanks to everyone who participated in the contest and for their feedback in the HiQ 3.0 Beta Program. Visit our web site at [www.natinst.com/hiq](http://www.natinst.com/hiq) for more information on the final contest results and to review selected Notebook entries. ▶

**To learn more about Chris' application, e-mail him at [chapo@uclink4.berkeley](mailto:chapo@uclink4.berkeley)**

## Trade Show Software Winners Announced

Michael J. Pryzbylo, Supervisor of Test Engineering for Fujitsu (Anaheim, CA) recently won a LabVIEW software package from a National Instruments drawing held as part of the Nepcon West trade show (Anaheim, CA) Feb 25-27. Erick Smith, Sr. Systems Engineer for Motorola (Dearborn, MI), also won a LabVIEW package; Smith participated in a drawing held as part of the SAE trade show (Detroit, MI) Feb 24-27. ▶

# NIWeek™ 97 Sessions Packed with Technical Information

**B**ased on your feedback, we are packing NIWeek 97 with even more technical information. This year, we have expanded the conference to six tracks, including a Hands-On Track and an Advanced Track. These technical sessions range from basic introductions to in-depth training on our hardware and software products. You will gain critical information for your current and future applications.

## Keynote Presentation

On the first day, Dr. James Truchard, President and CEO of National Instruments, will focus on how virtual instrumentation is breaking down the barriers in our world of test, measurement, and automation. In addition, key users will share how they broke down their particular barriers. On the second and third days, Carsten Thomsen, Vice President of Engineering, and Jeff Kodosky, Vice President of Research and Development, will give you a sneak peek at what our engineering staff is cooking up in our labs.

## Technical Presentations and Workshops

National Instruments developers and engineers will discuss the most innovative emerging hardware and software technologies in the industry. Find out how they will impact your application development, as well as how to get started and put the polishing touches on your system.



*NIWeek 97 gives participants an opportunity to learn about how other users are using virtual instrumentation as well as the latest technologies from National Instruments.*

## New Advanced Track

The new advanced track gets into the nitty-gritty details, so you can find out how to squeeze the most out of your system.

- Advanced G Programming Techniques
- Turning VIs into OLE Automation Servers
- Internet Enabling Your Application
- Developing DLLs
- Concurrent Mixed Signal Acquisition
- High-Speed Digital I/O
- Developing Device Servers for Automation Systems
- Improving Performance with DAQ Events
- Event Handling with LabWindows/CVI



- BridgeVIEW Hands On
- Test Executive Hands On
- Internet Tools Hands On
- HiQ Math Hands On
- LabVIEW Hands On (for educators)
- LabVIEW Signal Processing Hands On

## New Hands-On Track

The Hands-On course gives you the opportunity to try out the latest tools for building instrumentation. Come find out firsthand how they can help your application development.

- IMAQ Hands On
- Lookout™ Hands On

## Technical Working Groups

These feedback sessions give you the opportunity to talk directly with our engineers and management. Let us know what we are doing right as well as how we can better serve your needs.

- LabVIEW Products
- Test and Measurement Products
- Industrial Automation Products
- Data Acquisition Products
- Visual Programming Products
- IMAQ/Analysis Products

## Poster and User Session

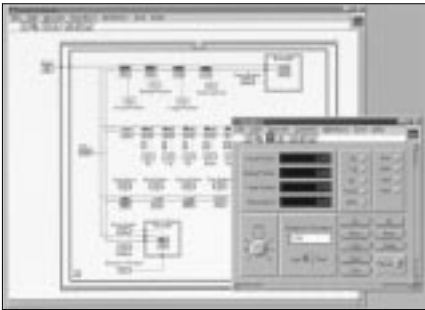
These sessions highlight the entries in our Best Applications of Virtual Instrumentation Contest. You will gain application knowledge from your colleagues who have been successful with virtual instrumentation. ▶

	Technical Presentations	Technical Workshops
<b>Application Software</b>	Automating Report Generation Application Connectivity with OLE/ActiveX Virtual Instrumentation Simplified	Diagramming Techniques User Interface Techniques Memory Management Techniques in G How to Manage Large Application Development in G
<b>Test and Measurement</b>	Introduction to VXI New Instrumentation Buses Test Management with the Test Executive	How to Develop Instrument Drivers Acoustics and Vibration Measurements Open Test Development with LabWindows/CVI Building Applications with Visual Basic
<b>Industrial Automation</b>	Introduction to OPC Introduction to CANbus Software Control Techniques	How to Build Distributed Control Systems How to Build Networked/SCADA Systems Control Techniques Using Counter/Timers Control Techniques Using Analog Output
<b>Data Acquisition/ Image Acquisition</b>	Building Vision Applications Understanding the PCibus Noise Reduction, Ground Problems, Isolation	Techniques for High-Speed Storage and Control Techniques for Multichannel Acquisition Remote Acquisition and Control Rapid Development of DAQ Applications

*Technical presentations and workshops offered at NIWeek 97.*

**To register for NIWeek, call (512) 794-0100, e-mail [niweek@natinst.com](mailto:niweek@natinst.com), or visit our web site at [www.natinst.com/niweek](http://www.natinst.com/niweek)**

## LabVIEW Interface Introduced for Multi-Axis Motion Control Cards



**P**MC Corp., an Alliance Program member, has introduced a LabVIEW interface to their DCX-AT digital motion and I/O control card for installation in an AT/ISA-bus or for stand-alone operation. Onboard capabilities include multitasking, complex contouring, S-curve velocity

profile, and continuous path motion with cubic spline interpolation.

The PMC product family features a modular design. The architecture of these programmable motion control cards works with a variety of application-specific, multi-axis control configurations. The DCX-AT is configurable to provide one to six axes of servo and/or stepper motion control, with six dedicated I/O lines for each axis of control and 16-96 undedicated digital I/O lines. You can join several DCX-AT cards, providing up to 96 axes of control and 1,536 undedicated digital I/O lines.

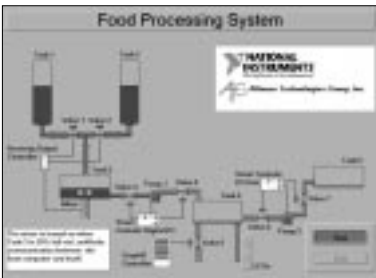
Precision MicroControl adds direct LabVIEW support to its powerful Motion Control Application Programming Interface (MCAPI) for Windows for

complete control of their entire hardware line. With built-in VIs, you can control standard motion functions such as setting acceleration and deceleration parameters, controlling onboard undedicated analog I/O channels, and reporting the position of the control card.

Precision MicroControl joins existing Alliance Program members nuLogic and Compumotor in offering LabVIEW capability for their motion control products. ▸

**For more information, please contact PMC Corp. at tel (760) 930-0100, fax (760) 930-0222, e-mail [pmcinfo@pmccorp.com](mailto:pmcinfo@pmccorp.com), or web [www.pmccorp.com](http://www.pmccorp.com)**

## New LNS Toolkit for LonWorks Available for G and LabWindows/CVI



**A**lliance Technologies Group (ATG), an Alliance Program member, has announced the LNS Toolkit for G and LabWindows/CVI. With the LNS Toolkit,

a PN-NSS or PCC-10, and an appropriate transceiver, you can configure and access nodes on LonWorks™-based control networks.

Using the LNS Toolkit, you can easily access and define node properties, read and write network variables, bind network variables, read and write from/to node memory, send explicit messages to nodes, and much more. The LNS Toolkit also includes routines to convert SNVT data to and from its human-meaningful value and to its binary value. The SNVT routines free developers from worrying about tedious data conversion, concentrating instead on

performing the required operations on the SNVT values.

The LNS Toolkit works with LabVIEW, BridgeVIEW, and LabWindows/CVI operating in Windows 95 or Windows NT. ATG plans to release the toolkit in the summer of 1997. ▸

**For more information, contact Alliance Technologies Group, 1335 Wilhelm Road Suite B, Mundelein, IL 60060, tel (847) 247-9284, fax (847) 247-9724, e-mail [lms\\_info@atgroupinc.com](mailto:lms_info@atgroupinc.com), or web [www.atgroupinc.com](http://www.atgroupinc.com)**

## ORC Division of EDS Joins Alliance Program

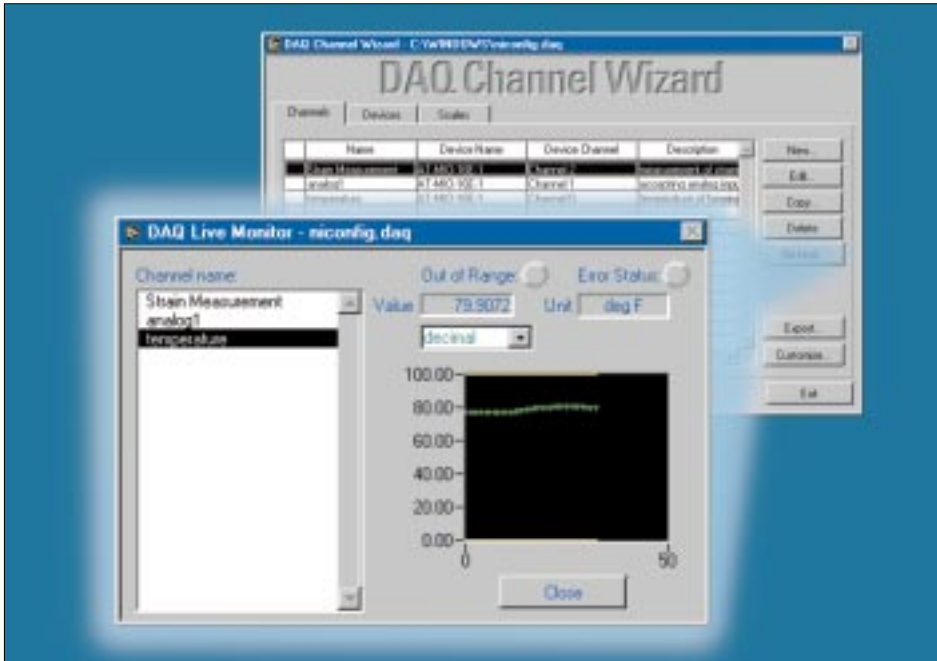
**N**ational Instruments is pleased to welcome Ohio Resource Center (ORC), a division of EDS, to the Alliance Program. With more than 90,000 employees in 41 countries, EDS, a world leader in information technology services, works side-by-side with their clients, applying consulting services, information, and technology expertise to enhance business performance. EDS Regional Support Centers around the world support customers such as GM, establishing new engineering and manufacturing clients within the geographic region of each Support Center.

The ORC bridges the gap between software and the mechanical and electrical disciplines. As an SEI CMM level 2 certified organization, it is also a facility with established, repeatable project management processes in place. As a member of the Alliance Program, the ORC Analysis, Reliability, and Testing (ART) Team provides custom, integrated solutions for their clients' data acquisition and control needs. The ART Team has created a variety of PC-based systems by applying their experience in C, C++, and Visual Basic with numerous National

Instruments products, such as LabVIEW, LabWindows/CVI, and plug-in DAQ boards. This knowledge and experience combined with the ORC SEI CMM level 2 certification make EDS a complete system solution provider. ▸

**For more information, contact Devendra Mohan, Advanced Engineering SE, EDS/Ohio Resource Center, 4100 Springboro Pike, P. O. Box 24593, Dayton, OH 45424, tel (937) 455-2834, fax (937) 455-2490.**

# LabVIEW 4.1 Makes Data Acquisition and Analysis Easier than Ever



## Technical Support

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LabVIEW 4.1 makes data acquisition and analysis easier than ever, giving users the tools they need to configure DAQ systems in minutes using the new DAQ Wizards. See our cover story to learn more.

For Customer Education schedule, see insert.

This newsletter represents a commitment from National Instruments to the environment.

## Trade Shows

Look for the National Instruments booth at these upcoming trade shows:

Int'l Automotive Manufacturing  
Detroit, MI May 13-15

Sensors Expo  
Boston, MA May 13-15

Industrial Automation Seminar  
Mexico City, Mexico May 13-29

SAE Noise & Vibration  
Traverse City, MI May 20-22

Bode DATA  
Santa Clara, CA May 20

### Bode DATA (continued)

Irvine, CA May 22

St. Louis, MO June 24

Indianapolis, IN June 26

Seattle, WA July 22

Portland, OR July 24

Salt Lake City, UT August 19

Denver, CO August 21

Eptech 1997 Vancouver  
Richmond, BC, Canada May 21

Canadian Electronic Technology Shows  
Mississauga, ON, Canada May 29

Nepcon  
Boston, MA June 10-12

### IEEE MTT-S

Denver, CO June 10-12

IFT Food Expo  
Orlando, FL June 15-18

ASEE  
Milwaukee, WI June 16-18

TechNet  
Washington, DC June 17-19

FieldComms  
Boston, MA June 17-19

ISA Mexico  
Mexico City, Mexico June 17-20

MACWORLD Expo  
Boston, MA August 6-8

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