

The All-New ADRE® System

Completely redesigned, fifth-generation system is better than ever



Dateline: 1980

In the summer of 1980, two important introductions occurred for our customers. The very first issue of ORBIT was published and ADRE was first introduced. In fact, that premier issue of ORBIT prominently announced on its front cover, "Bently Nevada Introduces ADRE."

Here's an excerpt:

Bently Nevada begins the new decade with the introduction of ADRE ... the answer to the tedious, time-consuming chore of acquiring and reducing data collected on the operating parameters of rotating equipment.



1980 - ADRE I/II





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1986 – ADRE 3



1993 – ADRE for Windows®



THE PRODUCT'S STRENGTH HAS STEMMED FROM THE TREMENDOUS AMOUNT OF USER FEEDBACK INCORPORATED IN SUCCEEDING GENERATIONS OF ADRE.

That was 25 years ago, and the ADRE System has come a long way from its beginnings as a rather bulky suite of equipment comprising analog tape recorder, digital vector filter, multi-channel amplifier, spectrum analyzer, external floppy disk drive, real-time clock, printer, and an early HP desktop computer (well before Microsoft® and the PC revolution had become industry standards). While portable in theory, perhaps a better description for this system was "luggable" since it weighed several hundred pounds and required numerous large cases. That probably explains why most of our own machinery diagnostics engineers drove pick-up trucks in those days. It also explains why they preferred to gather data on tape and return to their office to "post process" the data in their ADRE System rather than transport all the gear to site.

Today's ADRE System is smaller, faster, and vastly more capable than that early system. Through five succeeding generations of hardware and software enhancements, it has steadily improved – and while it has always been our desire to provide the functionality of all the above instruments in a single package, that remained an elusive goal. Today, however, technology has enabled us to deliver a product that is truly self-contained, redefining "portability." Finally, you can leave that tape recorder, scope, spectrum analyzer, and signal conditioning apparatus behind.

YOU TOLD US YOU NEEDED...

- more channels of data collection
- "stand-alone" operation
- combined multi-function capability in a single system
- real-time data presentation
- extended frequency ranges
- flexible signal inputs
- multiple sampling rates
- large data storage capacity
- quick configuration
- fast remote/network operation
- graphical correlation tools
- high-resolution, high-capacity tape-less recording
- true unattended data logger capabilities
- total remote access, control, and configuration via WAN and LAN
- true client/server functionality with simultaneous multiple client access

...THE ALL-NEW ADRE SYSTEM DELIVERS THESE AND MUCH MORE

It's All About The User...

The legacy of the ADRE System spans decades, with thousands of users around the world. In fact, many of the machinery diagnostic case histories we've featured in ORBIT over the last 25 years have used the ADRE System as the underlying tool to capture and analyze the data. The product's strength has stemmed from the tremendous amount of user feedback incorporated in succeeding generations of the ADRE System. Whether machinery OEMs using the product on their test stands, field engineers gathering data, or our own machinery diagnostics personnel troubleshooting machinery at customer locations globally, the ADRE System has always been about users telling us what they need, and then our engineers designing and enhancing the system around this feedback. This latest generation is no exception.

BECAUSE THE 408 DSPi IS A TRUE SERVER, ANYONE WITH PROPER ACCESS PERMISSIONS, ANYWHERE IN THE WORLD CAN VIEW, CONFIGURE, AND CONTROL THE INSTRUMENT.

Over two years ago, the GE Energy team began to work on creating a new ADRE System based on the feedback they had been receiving from both internal and external users. These users provided what seemed to be an endless list of needs and desires. However, a common theme was clear: better usability and better performance.

To address these needs, and much more, we're pleased to introduce ADRE Sxp software and 408 DSPi (Dynamic Signal Processing Instrument) hardware. Below, we summarize a few of the important new capabilities contained in this latest generation of the ADRE System:

- **LAN/WAN Connectivity and Client/Server Architecture**

The new ADRE System's unique client/server architecture and LAN/WAN connectivity frees users from the logistical constraints that traditional data collection units were tied to. Now, multiple users can view and control data from anywhere in the world through local or wide area networks (LANs or WANs), all in real-time. We have specially engineered the 408 DSPi's Ethernet communications to be compatible with corporate IT structures and firewalls, allowing it to securely reside on your network while making its data available to everyone that needs it. The potential for time and travel cost savings are enormous. Because the 408 DSPi is a true server, anyone with proper access permissions, anywhere in the world can view, configure, and control the instrument. It even supports multiple simultaneous clients – each viewing completely dif-

ferent data. The ADRE System truly was created with all users in mind, enabling many powerful usage scenarios:

- A 408 DSPi could be located on a test stand in the United States where a machine was being readied for a customer in China. The customer in China could view data in metric units while the test stand engineer viewed the same data in English units. Or, the customer might be viewing real time slow-roll data to see if runout was within acceptable limits while the test stand engineer examined an archived bode plot to verify the machine's amplification factor.
- A 408 DSPi could be deployed at an unstaffed facility, connected to the company's LAN or WAN, and data from the machine(s) could be collected for days, weeks, or months. The ADRE System can be fully configured and controlled remotely, as well as providing complete remote access to all archived and real time data.
- A 408 DSPi could be connected to a machine and process control system while a plant was undergoing a routine outage as part of a service for a Bently Nevada® machinery diagnostics engineer to provide start-up data collection and analysis assistance. The engineer could return to the office and remotely access all data when the start-up commenced, avoiding stand-by charges at site. When finished collecting data, site personnel could disconnect the instrument and ship it back. If necessary, the machinery diagnostics engineer



An integrated user interface and 130+ GB storage capacity allows the 408 DSPi to be used in stand-alone mode for days, weeks, or months.

could collaborate in real time with the machinery OEM, other colleagues, and the customer – all accessing the same system using their individual copies of ADRE Sxp software.

- A 408 DSPi could be connected to a machine located in a remote part of the plant and connected to the plant's LAN. The engineer could return to the comfort of his own office, launch ADRE Sxp software from his desktop, and fully access and control the ADRE 408 DSPi hardware.

• **Stand-Alone Operation**

The places you gather data don't always represent the most hospitable environments for using a laptop computer. Heat, cold, humidity, dust, bright sunlight, noise – they can all make it tough when your data collection instrument can't be easily separated from its display software. We've taken special care to provide a user interface on the ADRE 408 DSPi hardware that allows it to be used independent of a computer connection for the majority of your configuration and data collection needs. Rugged buttons and icons, a bright fluorescent display, status LEDs, and intuitive menus make the instrument easy to use in stand-alone mode. Its LAN/WAN connectivity and client/server architecture, as discussed above, mean you can leave the instrument unattended for days or weeks at a time while connecting when needed to reconfigure, manu-

ally trigger special data capture, view real time or archived data, and collaborate with colleagues.

• **New Data Types for More Industries**

The ADRE System's strength has always been its purpose-built focus on data acquisition for rotating and reciprocating machinery. We've retained all of that in this newest version, but we've also expanded the hardware and software capabilities so that it can be used for general purpose data acquisition of nearly any parameter encountered in the field or test stand. If the signal is available as a proportional voltage or current – static or dynamic – the ADRE System now has the ability to gather it and the software tools to display and interpret it.

• **Scalability**

The new ADRE System is completely scalable. 8-channel dynamic sampling cards, 3-channel phase reference (Keyphasor®/speed) cards, discrete input cards, and a special accessory slot (for future enhancements) allow you to configure your hardware with only the channel capacities and types that you require. A single ADRE 408 DSPi chassis is capable of collecting data from up to 32 dynamic channels. In the product's next release, you'll be able to interconnect up to four (4) 408 DSPi units in a master/slave configuration for up to 128 channels of dynamic/static data



The ADRE System's architecture is highly scalable, using modular I/O cards to match your requirements for input types and quantities. Up to 32 dynamic inputs can be used per chassis.

inputs, or up to 112 channels when 6 phase reference inputs are added.

- **Storage Capacity**

The ADRE 408 DSPi comes with a standard internal data storage capacity of more than 130+ Gigabytes, allowing it to collect large amounts of high-resolution data for hours, days, or even weeks without ever needing to be connected to an external PC. In the event you need additional storage, the 408 DSPi has a convenient connection to standard external hard drive arrays for practically unlimited data capacity.

- **"Single Instrument" Functionality**

As noted earlier, we've specifically approached the ADRE System's design with the objective of eliminating your need to pack multiple other instruments such as oscilloscopes, spectrum analyzers, tape recorders, signal amplifiers, and speed/phase signal conditioners. The 408 DSPi combines the functionality of all these instruments into a single, compact, portable package – without sacrificing power, speed, or functionality.

- **Expanded Frequency Span**

The new 408 DSPi has a frequency span of 50 kHz across all channels simultaneously. In contrast, some platforms make frequency span a function of channel count, forcing the user to choose between data quality and data quantity.

- **Real Time Data Streaming and Processing**

The 408 DSPi can handle enormous real time data throughput. The design philosophy underlying the new ADRE System was to provide real time processing, rather than extensive reliance upon post processing to provide the data of interest to the user. In other words, the system provides not just "raw" data streaming in real time, but processed data as well. You can view all of the information as it happens, whether the parameters of interest are highly processed (such as RMS amplitudes from a tracking filter) or not (such as overall unfiltered vibration amplitude). However, this real-time capability does not preclude you from using the ADRE System to further post-process data. You always retain the option of further manipulating and processing data in any way you want.

- **Rack Mounting**

Test stand and R&D applications often require instruments that can be mounted in conventional 19" EIA racks. To address these needs, the ADRE 408 DSPi can be ordered with a convenient and rugged rack-mounting kit for permanent or semi-permanent installations.

- **Backward Compatibility**

Data you have already collected and archived with previous generations of ADRE Systems are compatible with our latest system. Your ADRE for Windows databases



The all-new ADRE System replaces spectrum analyzer, oscilloscope, tape recorder, signal amplifiers, and external speed/phase input conditioners in a single, compact instrument without sacrificing any functionality.

learn more online at

<http://www.gepower.com/o&c/ADRE>

are easily migrated into the new ADRE Sxp software platform, providing complete continuity and current/historical data access from a single environment.

- **Balancing Software Compatibility**

A very common use for the ADRE System is complex, multi-plane balancing of turbomachinery under various load and speed conditions. Bently BALANCE® software is designed specifically for addressing these complex tasks, and is fully compatible with ADRE Sxp software. You can seamlessly transfer data collected with your ADRE System to our balancing software, without the need for tedious manual typing and data entry.


Great Software – The Key To Usability

In a recent interview, a renowned CEO from one of the most innovative and successful technology companies in the world stated that the key to their success was in creating great software products that make the interface between the user and their hardware intuitive, friendly, and extremely usable. We feel the same way. Usability and ease of operation is what makes the new ADRE Sxp software the perfect complement to the power of the 408 DSPi hardware. Imagine being able to go from “out of the box” to data collection in minutes. With the new ADRE System’s amazingly easy-to-use Sxp software, it

has never been easier or faster to install, configure, and start collecting data – and, we’ve accomplished this without sacrificing functionality. ADRE software is more powerful than ever with the most extensive array of plot types, reporting capabilities, import/export abilities, and analysis tools that we have ever offered in this platform. The result is a system that delivers both usability and capability, without compromising either one.

The Wait Is Over

Prior to release, we have been discussing this all-new ADRE System with customers at tradeshows, meetings, and user groups – as well as our own services personnel. From all of them, the feedback has been the same: “when can I get one?”

As of July 2005, the wait is over. We’re so proud of this product that we know one demonstration is all you’ll need to understand what all the excitement is about – and to want your own ADRE System. Learn more in our informative 12-page brochure by accessing it on our website, by using the Reader Service Card attached to this issue of ORBIT, or by contacting your local sales professional who can provide you with literature, arrange a demonstration, and answer your questions. 

Physical	
Weight @ 32 channels	7.5 kg (16.5 lbs) per 408 DSPi Unit (32 channels w/power supply)
Environmental	0° C – 50° C; 0 to 95% relative humidity (non-condensing)
Mounting	Benchtop or optional 19" EIA rack mounting kit
Channel Status LEDs	Per channel: Over-range, NOT OK
Power Requirements	110 – 240V 50-60 hz
Inputs	
Number of Dynamic Channels	8/16/24/32 per chassis – expandable to 128 (4 chassis linked together [†])
Throughput Rate	Up to 50 MB/sec per channel
Transducer Inputs	Proximity/Velocity/Acceleration/Phase Reference/Speed
Differential Inputs	Selectable: True differential or single-ended
Process Inputs	Programmable: 4-20 mA; 0-10 vdc; -12 to +12 vdc; -25 to +25 vdc
Voltage Input Range	Programmable lower and upper values from -25 vdc to +25 vdc
Gain Selections	Auto Gain between -25 vdc and +25 vdc
Input Impedance	> 700 k Ω
Signal to Noise Ratio (Dynamic Range)	110dB
Frequency Span (All Channels)	Up to 50 kHz – All Channels Simultaneously
Speed Range	1 – 120K RPM
Speed/Trigger Input Sources	Proximity probes, optical sensors, magnetic pickups
Speed Input Capacity	3/6 physical, 6 simulated (internal)
Trigger Sources	Multiple "OR" voting of Speed/Time/Amplitude/External Contacts
Keyphasor multiplier/divider/conditioner/power	Integrated (per speed input)
AC/DC coupling	Yes; Configurable per channel
Channel Bandwidth	Up to 50 kHz (simultaneous, all channels)
Software	
Required Software	ADRE Sxp, real time and post-processing
View Data From Multiple Runs Simultaneously	Yes – Unlimited
Keyphasor Dynamic Display	Per Keyphasor
Instrument Mode Display Update	100 ms/sample (max)
Communications	Integrated 10/100/1000 Mb Ethernet TCP/IP
LAN/WAN support	Yes; specially designed for firewall management
Remote Operation via LAN/WAN	Yes
Security	Administrative/Read Only/No Access
Signal Conditioning	
A to D Resolution	24 bit
Filtering	High-/Low-Pass: selectable; Bandpass: 2-, 4-, 6-, 8-pole selectable
Tracking Filters	Realtime; up to 6 nX per channel
Tracking Filter Bandwidth	Configurable: 1.2/12/120 CPM; constant bandwidth auto-switching
Auto Switching Tracking Filters	Selectable
Sub-Synchronous nX Tracking	Configurable: 0.1 to nX (in .01X increments)
nX Vectors	Configurable – up to four different vectors
Sampling	<ul style="list-style-type: none"> • Simultaneous Processed and Raw Data (All Channels) • Multiple Simultaneous Sampling Rates (Synch and Asynch) • Delta Sampling for RPM, Time, or Amplitude^{††} • Synchronous Sampling configurable for 2 Rates Per Channel • Continuous and Discrete (configurable) • Realtime simultaneous synchronous and asynchronous
Synchronous Sampling Rates	16/32/64/128/256/360/512/720/1024 samples per revolution
Anti-Aliasing	FIR Filter (passband @ 50 kHz, - 100 dB @ 64 kHz)
Waveforms	4 per channel simultaneously (user-configurable) + RAW
Spectral Resolution	Configurable – up to 6400 lines (all channels simultaneously)
True Zoom Capabilities	Yes
Recording	
Data Storage Capacity	Internal: 130+ GB; External: unlimited via external drive arrays
Pre- and Post-Event Data Capture	Yes; configuration dependant
Vector-to-Waveform Storage Ratio	n:1 configurable
Continuous Digital Recording	Yes; internal
Outputs	
Speed/Trigger Outputs	3/6 Digital and Analog Conditioned

[†] Multi-chassis interconnection not available until after first release. All required hardware is currently in place.

^{††} Delta amplitude sampling not available at initial release.