

The Sage Advisor

SCADA & Industrial Automation Newsletter

A Publication of Sage Designs, Inc.

Fall/Winter 2003

High-Speed Ethernet Spread Spectrum Radios from Locus



Video at Remote Sites

In today's world, security systems are becoming an important part of many SCADA systems. With the advent of a plethora of choices for equipment, an end user must filter through 400,000 hits on their web search in the hopes of finding a security camera system that will fit their needs. The first question is whether to go with an analog system or one of the newer web-based systems. The most obvious advantage to the web-based solution is the ease with which you can incorporate the equipment into a new or existing SCADA system.

In general, analog camera systems will be less expensive. The cameras themselves can be as low as \$200 or less. Pan-tilt-zoom (PTZ) options are also inexpensive. The problem is that most of these require an analog signal to operate, which reduces your options for a wireless solution. Web-based systems operate over Ethernet radios and are easy to integrate. An analog system needs a method for storing the images, usually a tape or proprietary digital recorder. A web-based system can use your hard drive to store images or clips of interest.

If you choose a wireless web-based system, the main concern is bandwidth. You may be able to get the performance you need without the blazing speed of Wi-Fi, but you could swamp your radio network and begin to lose SCADA data. One solution is bandwidth management. (See *The Need for Speed* article on page 2).

Industrial Video & Control's PTZ series of cameras provide a number of features to make the best use of a narrower bandwidth, and still provide you with acceptable performance. These high quality, pan-tilt-zoom color cameras can be viewed and controlled from any PC without special software. A simple "click-on-video" feature causes the camera to pan and tilt to the desired view without using joy sticks or arrows, which can be frustrating when the video frame rate is slow on low bandwidth connections. The cameras can be connected to existing radio, fiber, copper or Internet resources. A bandwidth consumption manager can insure that other applications on the network are not slowed by the video. The system constantly saves video for immediate and remote review of process upsets and/or assessment of security intrusions. The system includes motion detection and the ability to produce excellent color video in very low light conditions. All of the video functions can be integrated with your SCADA system for automatic insertion of video into SCADA user interfaces. The camera installation requires just 110VAC and the network connection.

Please visit our web site, www.sagedesignsinc.com for an online demonstration of the IVC PTZ security camera.

Locus, Inc. announces the launch of its newest industrial radio, the OS2400-HSE High Speed Ethernet Spread Spectrum Radio. The OS2400-HSE is a natural choice for customers using higher speed protocols and applications requiring fast throughput of data. The OS2400-HSE is well-suited not only for data transfer, but for voice and video as well. The OS2400-HSE features a 20+ mile range at >10MB/s, or significantly longer with the use of repeater radios.

The OS2400-HSE features unique networking capabilities that will save customers the expense and hassle of maintaining redundant systems. A network of OS2400-HSE radios is *self-healing*; if a Locus radio loses its link, it will search for an alternate route to stay connected to the network. The OS2400-HSE knows if a radio is linked back to the master, as well as the number of repeaters between it and the master, and will select its best option based on those criteria. In addition, multiple masters can be used. To duplicate this fail-safe functionality, other radio brands would have to run parallel, redundant networks. The OS2400-HSE also offers customers a superb Windows® utility, which shows a topographical representation of the customer's network and its health.

The OS2400-HSE features robust authentication and TKIP encryption far surpassing the security commonly available today in industrial radios, and has modes to allow connection to 802.11b access points or allow 802.11b clients access.

The OS2400-HSE operates in the license-free 2.4 GHz ISM band, is DIN rail-mountable and features a rugged, metal enclosure with a profile depth of only 1.16 inches. Like all Locus industrial radios, the OS2400-HSE features antenna diversity, extensive regulatory approvals and a 3-year manufacturer's warranty. All Locus industrial radios are backed-up with helpful, human support for the life of the radio.

Training Classes & Free SCADA Seminars

- | | |
|---------------|--|
| September 18 | Teledesign Systems TS4000 Training Seminar, Milpitas, CA |
| October 14-16 | SCADAPack & Ladder Logic Training Class, Ontario, CA |
| October 17 | Free SCADA Seminar, Ontario, CA |
| October 21 | Free SCADA Seminar, Davis, CA |

Details & Registration Information Inside



Training Seminar

On September 18th, Teledesign Systems will be offering a free 1-day training class on the TS4000 radio modem. The seminar will cover:

- Features of the TS4000
- How to configure the TS4000 for various communication system requirements and architectures
- How to use the TS4000 for site surveys
- How to test and troubleshoot systems

Call to register for this free class.

The Need for Speed

With the advent of security cameras and other bandwidth-hungry devices, it is becoming more important that your SCADA system have speed. In a SCADA-only system, data rates of 9600 bps or lower can provide adequate bandwidth, as the amount of data transferred between an RTU and a central station is measured in the 100s of bits, which can be easily handled by traditional narrow-band radio. However, with the increased use of Ethernet devices in advanced SCADA systems, the need for speed is becoming more prevalent.

If you need to transmit good quality video images over radio from a typical web-server security camera, you may need to consider choosing a high bandwidth radio to provide a high enough throughput. A typical web-based camera will transmit anywhere from less than one frame every few seconds to as much as 30 frames per second. Each image is about 10K bytes (80K bits) in size, which means that in order to transmit 2 frames per second (barely acceptable by most standards), you will need approximately 160Kbps of allowable bandwidth.

In order to make a calculation of your bandwidth requirements, you start with the radio data specification. If you start with a radio that provides 500Kbps over-the-air speed, you must first divide the rate in half, as this rating is for both inbound and outbound traffic combined which will give you your true rate (tr). (Some radios may allow you to split up the bandwidth unevenly, reducing the impact of this issue.) The second consideration is that the throughput rating is only valid above a threshold signal strength, and your true data rate (dr) may drop by half or more at ranges of a few yards to a few miles, depending upon the radios, antennae, and path. Next, if a repeater is used (r), the speed is cut by half; keep in mind that the repeater must both send and receive all traffic, so you cannot split the traffic unevenly in this type of application. Another issue to consider is the overhead used by TCP/IP (tcp). Although the actual amount of data may not be greatly increased, there is some latency added to the system with the TCP/IP protocol; you can assume that this will consume about half of your throughput speed (ts). These four factors together can reduce a data sheet bandwidth of 500kbps by a factor of 16, resulting in a bandwidth of ~30kbps in a final installation.

If you started with a radio offering data rates of 500Kbps over the air, you can easily calculate the true bandwidth from the variables above. In this example, we use a repeater, range and an antenna gain giving you 1/2 of the maximum data rate (a realistic scenario). So, your true speed is:

$$ts = \text{bps} \times tr \times dr \times r \times tcp$$

or

$$512,000 \times .5 \times .5 \times .5 \times .5$$

or

$$32,000\text{bps}$$

which translates to about 1 frame every 2.5 seconds. Also, don't forget that you may wish to share this bandwidth with your SCADA system or other devices. One way to deal with this is to use devices, which have some bandwidth management tools such as the IVC camera. Another way is to up your data rates and avoid the problems in the first place.



Specter Instruments has just announced the release of Version 7 of the popular WIN-911™ Alarm Notification Software. Features include:

- Data Interface Options include OPC and DDE
- Text-to-Speech through OPC Server
- Telephone Interface Card Options offer more choices & better prices
- Wireless & Email Notification
- Runtime Changes: Bypass Alarms
- Dialout Override for Schedule Changes
- Alarm Log Manager lets you view, sort & arrange your alarm history
- Multiple Levels of Security Options
- WIN-411 Option allows you to get reports or status over the phone

With WIN-911™, your operators can concentrate on other tasks while your computer system does the monitoring. WIN-911™ is real-time Alarm Notification Software that works with your existing control software or SCADA system to monitor operations and notify personnel of problem conditions — a process that can save you time, money, and unnecessary anxiety.

WIN-911™ can be used with pagers, cell phones, landline phones and most any wireless communications. Call for more information on this popular software. (WIN-911™ and WIN-411™ are registered trademarks of Specter Instruments.)

Lookout 5.1 Release Offers Better Connectivity and Tools

National Instruments has begun shipping version 5.1 of Lookout™ HMI software. In their ongoing efforts to keep Lookout™ the easiest HMI to configure and use, National Instruments™ has some improved troubleshooting and connectivity tools, including:

Tracer Object — With the introduction of the Tracer object, debugging and maintaining an application has become much easier. This tool is used to log all of the communications between two objects to a log file.

Function Browser of Expression Editor — The function browser is used to quickly find functions and the correct syntax for creating expressions and connections between objects, reducing the development time and increasing productivity.

OPC Client 2.0 Compliant — Lookout™ has had an OPC 2.0 Compliant Server; however, until now, it has not been able to retrieve data from third-party OPC 2.0 servers. With this release, Lookout™ now has an OPC 2.0 Client, allowing you to take advantage of the newest servers available for your devices, and offering more functionality.

As always, National Instruments™ has worked hard to make the new release backward-compatible with earlier Lookout™ process files. An upgrade to 5.1 has been shipped to all users with current support contracts. Upgrades from earlier versions of Lookout™ cost \$395.00 per license for development/runtime systems.

(National Instruments™ and Lookout™ are trademarks and trade names of National Instruments Corporation.)



Free SCADA Seminars

October 17, 2003
 Holiday Inn Hotel & Suites
 3400 Shelby Road
 Ontario, CA

October 21, 2003
 Howard Johnson Hotel
 4100 Chiles Road
 Davis, CA

In these seminars, we will cover a wide variety of products and services for your secure open architecture system. Guest speakers will be on hand to present and discuss products for a modern, secure system.

- See the latest Control Microsystems products — the Wireless Series of SCADAPacks. These products have been designed with open architecture and open protocols in mind, and have been ruggedized for severe environmental conditions. The Control Microsystems' SCADAPack line has been proven in SCADA systems throughout the west and the world.
- Learn about licensed and unlicensed radios and how they can provide reliable communications throughout your SCADA system.
- See a demonstration of the web-enabled PTZ security camera from Industrial Video & Control.
- See the Locus High-Speed Ethernet Spread Spectrum radio, with over-the-air data rates of up to 11 Mbps and range of up to 30 miles.
- See a demonstration of the latest version of National Instruments' Lookout SCADA software, version 5.1 which is powerful, yet easy to configure. Lookout provides all the flexibility and power of the other top HMI/SCADA products, without the complexity that generally accompanies this type of program.

AGENDA

8:30 Coffee and pastries
 8:45 DNP Protocol & Wireless SCADAPack Series Controllers from Control Microsystems
 10:00 Radio Communication in SCADA Systems
 10:30 Break
 10:45 Security Cameras & the Importance of High Data Rates in SCADA Systems with Security Cameras
 11:15 Lookout HMI/SCADA
 12:00 Adjourn

R.S.V.P.

Please fax to 1-888-FAX-SAGE or call toll-free 1-888-ASK-SAGE.

NAME: _____ Phone:/Fax: _____
 COMPANY: _____
 ADDRESS: _____
 Email: _____

I WILL ATTEND : _____ Ontario Seminar on October 17, 2003
 _____ Davis Seminar on October 21, 2003

Others from my company who will also attend:
 1: _____ Email: _____
 2: _____ Email: _____
 3: _____ Email: _____

There is no charge for these events, but we would appreciate a call if you need to cancel your reservation.

Introducing the Wireless SCADAPack Series

Introducing an exciting new innovation from Control Microsystems – **Wireless SCADAPack™ Series**. The industry leading SCADAPack PLC/RTU products are now available with an integrated 900 MHz spread spectrum wireless transceiver. Wireless SCADAPacks consume less panel space and eliminate the need for separate power supplies, cables, and radio mounting brackets. With a footprint identical to a standard SCADAPack, you can easily add to or upgrade your existing system. No FCC license is required.

Wireless SCADAPacks can communicate up to 60 miles under ideal line-of-site conditions when used with high-gain yagi antennas. Sustained data throughput is up to 115,200 baud, depending on the SCADAPack model and communication port. Wireless SCADAPacks support reprogramming of the controller FLASH memory and application programs over the wireless link. Wireless SCADAPacks use 32 bit CRC error detection with automatic recovery. The result is a high-performance, very reliable wireless SCADA system.

Like all members of the SCADAPack Series, Wireless SCADAPacks are certified for usage in Class 1 Division 2 hazardous area environments. The operating temperature range is -40°F to 158°F (-40°C to +70°C).

Customize your Wireless SCADAPack by adding Series 5000 I/O modules to achieve the I/O mix you need. The chart below outlines the basic capabilities of each SCADAPack model. Maximum expanded I/O is shown in parentheses.



	SCADAPack100	SCADAPack LP	SCADAPack	SCADAPack32
Analog IP	4	6 (up to 134)	8 (up to 136)	8 (up to 136)
Universal Digital Input/Output	6 DIO	8 DIO		
Digital Input	6 DIO	8 DIO (up to 520)	16 (up to 528)	16 (up to 528)
Digital Output	6 DIO	8 DIO (up to 520)	12 (up to 524)	12 (up to 524)
Pulse Input	1	2 (up to 66)	3 (up to 67)	3 (up to 67)
Com Ports	2	3	3	4
AGA Flow Runs	0	2	2	10
Data Log Memory	1500 words	192,000 words	192,000 words	384,000 words
Ladder Logic Memory	4K words	12K words	12K words	12K words
PID Controllers	yes	yes	yes	yes
Native Protocol	Modbus	Modbus	Modbus	Modbus
Optional Protocol	DNP 3.0	DNP 3.0, DF1	DNP 3.0, DF1	DNP 3.0
IEC61131-3	Option	Option	Option	Option
C/C++	C option	C option	C option	C++ option

All SCADAPack products feature a 3-year warranty. Control Microsystems offers SCADACare – your answer to Total Customer Support. Excellent technical support combined with sales support and customer service. To discuss how Control Microsystems can help solve your telemetry, SCADA and remote monitoring and control challenges or your specific wireless application, please contact your local sales representative, Sage Designs or visit CMI’s website at www.controlmicrosystems.com.
SCADAPack, TelePACE and SmartWIRE are trademarks of Control Microsystems Inc.



SCADAPack & Ladder Logic Training Class

October 14-16, 2003 - Ontario, CA



Sage Designs is hosting a 3-day training course for Control Microsystems' SCADAPack Controllers and TelePACE Ladder Logic programming. An optional SCADAPack or SCADAPack32 is available at a special price with the course — an excellent way to get started using Control Microsystems' Controllers.

Oct. 14	9:00-5:00 PM	SCADAPack controller operation, Series 5000 I/O, TelePACE introduction.
Oct. 15	9:00-5:00 PM	TelePACE advanced programming techniques and advanced functions.
Oct. 16	9:00-3:00 PM	Controller communications, Modbus Master/Slave protocol, Diagnostics, Modems

Location: Holiday Inn Hotel & Suites, 3400 Shelby St., Ontario, CA. For those needing overnight accommodations, call the hotel directly at 909-466-9600 for reservations and refer to group code 7-SAGE (\$99.99+taxes/night).

Who should attend? Individuals interested in participating in a highly technical, in-depth course on Ladder Logic and how it applies to Control Microsystems' products. Prior Ladders experience is highly recommended.

What should I bring? It is a requirement of the course to bring a Laptop Computer – minimum of Win98 with 15mb free disk space, CD ROM and serial port.

What is provided? Daily breakfast and lunch, coffee, soft drinks and snacks during the breaks.

To Register: Complete the information below and fax to us at 1-888-FAX-SAGE (888-329-7243)

Name <i>(please print)</i> :	Title:
Company:	Phone:
Address:	Fax:
	Email:
City/State/Zip:	

Cost:	3-Day Training Class without a SCADAPack controller	\$ 975
	3-Day Training Class with a SCADAPack P1Demo*	\$ 1,450 (\$475 is taxable)
	3-Day Training Class with a SCADAPack P4Demo*	\$ 1,700 (\$725 is taxable)

* **P1DEMO**, a \$2,270 value, consists of a SCADAPack Controller with extra RAM (#P1-120-01-0-0), TelePACE Ladders, Hardware Manual (on CD-ROM), 5699 I/O Simulator board, AC/2 Transformer, & programming cable. **P4DEMO**, a \$3,020 value, consists of a SCADAPack32 Controller (P4-100-01-0-0), TelePACE Ladders, Hardware Manual (on CD-ROM), 5699 I/O Simulator board, AC/2 Transformer, & programming cable. Demos will be shipped N/C to training facility.

METHOD OF PAYMENT: *All payments must be received by the first day of the class.*

Check one: Course only @ \$975 Course with P1Demo: @ \$1,450 Course with P4Demo @ \$1,700

A check is being mailed with a copy of this form. *Payment must include applicable sales taxes, as indicated above.*

Bill my company on attached PO. *Purchase Order must cover total cost of both course and demo, if purchased, including applicable sales taxes, as indicated above.*

Charge to my credit card. Amount charged will include applicable sales taxes, as indicated above.

Visa Mastercard Card #: _____ Exp. Date (MO/YR): ____/____

Cardholder Name (please print): _____

Cardholder Signature: _____

***** Registration Deadline: Tuesday, September 30, 2003 — Seating is limited. *****



RETURN FAX FORM

Toll-Free Fax: 1-888-FAX-SAGE (1-888-329-7243)
 Check out our web site: <http://www.sagedesignsinc.com>

- I would like additional information about the products indicated below.
- I would prefer to receive future Sage Advisors via email.

Name: _____ Email: _____
 Company: _____ Address: _____
 Phone/Fax: _____

PRODUCTS

- | | |
|---|--|
| <input type="checkbox"/> SCADAPack SCADA-Optimized PLCs from Control Microsystems | <input type="checkbox"/> Web cams for SCADA Security |
| <input type="checkbox"/> Ethernet-ready SCADAPack32 from Control Microsystems | <input type="checkbox"/> Lookout HMI/SCADA Software from National Instruments |
| <input type="checkbox"/> Wireless SCADAPack with Integrated Spread Spectrum Radio | <input type="checkbox"/> SCADAwise.com Applets for Lookout HMI/SCADA Software |
| <input type="checkbox"/> High-Speed Ethernet Spread Spectrum Radios from Locus | <input type="checkbox"/> Spread Spectrum Serial Radio Modems from Locus |
| <input type="checkbox"/> Cellular SCADA Modems | <input type="checkbox"/> UHF/VHF/MAS Radio Modems from Teledesign Systems |
| <input type="checkbox"/> SCADAPack Vision Operator Interface Panels | <input type="checkbox"/> WIN-911 Alarm Notification Software by Specter Instruments |
| <input type="checkbox"/> SCADAServer OPC Server from Control Microsystems | <input type="checkbox"/> SCADALog Data Logging Software from Control Microsystems |
| <input type="checkbox"/> SmartWIRE Remote I/O from Control Microsystems | <input type="checkbox"/> Solar and Low Power Optimized SCADAPack LP |
| <input type="checkbox"/> Short & Long Haul Modems from Westermo | <input type="checkbox"/> Fiber Optic & Ethernet Communications Modules from Westermo |

TRAINING & SERVICES

- | | |
|--|--|
| <input type="checkbox"/> On-Site Lookout Training by Sage Designs | <input type="checkbox"/> Referrals for Integration, Programming & Engineering Services |
| <input type="checkbox"/> National Instruments' Lookout Basics Course | <input type="checkbox"/> Telemetry Radio Surveys |
| <input type="checkbox"/> Ladder Logic Training for SCADAPack RTUs/PLCs | <input type="checkbox"/> Telemetry Radio FCC Licensing |

DEMOS & EVENTS

- | | |
|---|---|
| <input type="checkbox"/> Lookout HMI/SCADA Software Demo (CD-ROM) | <input type="checkbox"/> Win-911 Alarm Notification Software Demo (CD-ROM) |
| <input type="checkbox"/> TelePACE Ladder Logic Editor Demo for SCADAPack RTUs | <input type="checkbox"/> Information on upcoming SCADA Seminars in my area. |

I have a special application or comments (please describe): _____

- I would prefer to receive future Sage Advisors via email. *(My email address is shown above.)*

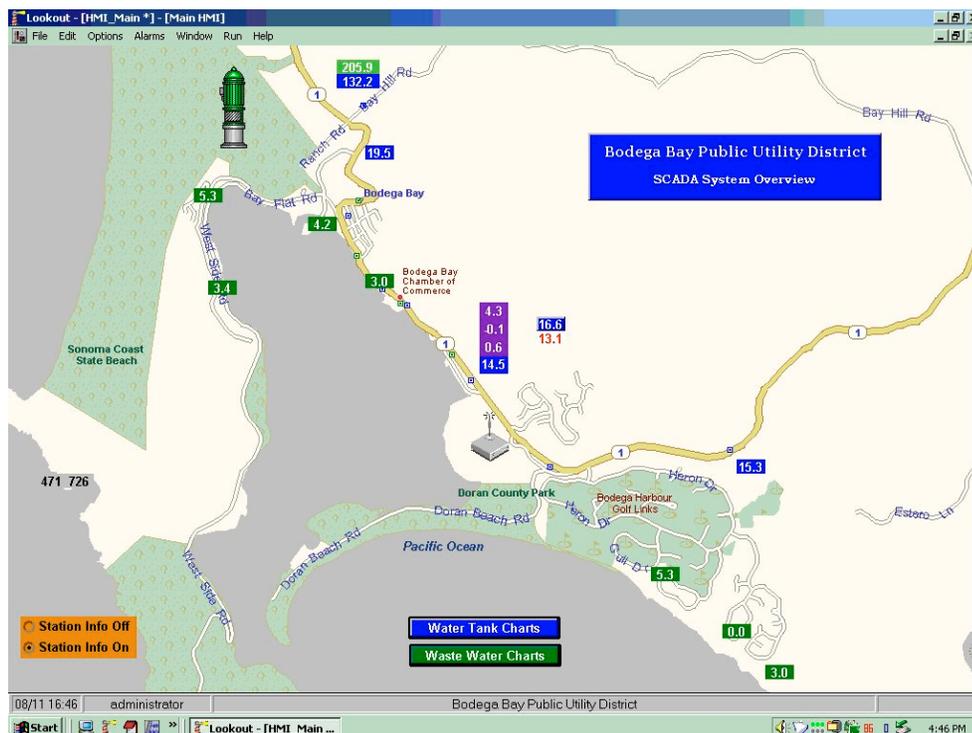
M136-0803

SCADA for the Birds: Bodega Bay P.U.D.

Bodega Bay is a small, Northern California coastal community made famous as the setting for the Alfred Hitchcock thriller, *The Birds*. The same rolling hills that provided the dramatic backdrop for the film prominently figure in the system architecture for the Bodega Bay Public Utility District's SCADA system, as the difficulty of direct polling of many remotes requires that some stations be configured as store-and-forward repeaters.

Originally, BBPUD selected SCADA equipment that they had hoped would be simple enough for their Plant Operator, Oscar Domondon, to configure and program without extensive training. Unfortunately, the system selected proved too complex without a lot of training, and insufficient training options were offered to enable him to manage and expand the equipment. After months of struggling, Bodega elected to scrap the installed equipment and install SCADAPack controllers and Lookout HMI. Oscar attended one of the local three-day SCADAPack & TelePACE Ladders training courses and proceeded to take control of their new system. An addition two days of on-site Lookout training was provided by Sage Designs.

Bodega's water and waste water system consists of 3 well sites, 4 storage tank sites, 7 sanitary lift stations and 3 effluent storage ponds, with varying needs for monitoring and control. Their goals were to upgrade and integrate the SCADA system into a more useful tool for potable water production, distribution and wastewater collection operations, and to utilize the PG&E "Time of Use" window, to minimize power



SCADA by Byrd: Versatility & Power

When simple problems become complex systems, there is a need for tools such as powerful controllers to provide solutions. For example, when the San Diego Wild Animal Park needed to control the level of the water in several ponds within the park, a seemingly easy problem was actually quite complex.

Armed with over 25 years of experience supplying water and wastewater agencies with controllers, Byrd Industrial Electronics was not surprised by the unique set of obstacles presented by the park.

For the Wild Animal Park, the supply of water for the animals and bountiful foliage is produced by a well over a mile away and fills the multi-elevation ponds through a system of control valves. Energy needs require that the well not be accessed during peak hours, indicating that a smart controller with a real-time clock would be required. To add another level of complexity, power would be unavailable to several of the ponds while the monorail was placed into service mode during the morning.

The solution: Control Microsystems' controllers with licensed 450MHz radios interfaced with the Control Microsystems' 5902 modems and small touch screen displays for the operator interface. With the built-in, real-time clock and local control, the Control Microsystems' controllers allow park personnel to monitor the water supply of the five ponds that provide water to the animals and park landscape. The controls are hidden in small valve houses around the park, where visitors would remain unaware of this important contribution to the park.

Located in Upland, CA, Byrd Industrial Electronics has used Control Microsystems' Controllers in numerous industrial control applications for many years. Contact David Holt at 909-985-9191 for more information.

— Larry Weinheimer, Byrd Industrial Electronics

consumption and more efficiently track equipment utilization.

The SCADA equipment consists of SCADAPack, SCADAPack Light and SCADAPack 100 PLCs. Analog inputs are "off-the-shelf" level transmitters, pressure transmitters and flowmeters. Programming was simple using the TelePACE Ladder Logic Editor. Communications are a mix of Ethernet, spread spectrum radio and leased line using Control Microsystems' Bell 202 modems. One of the SCADAPack controllers is programmed as a store-and-forward master, providing communications with sites, which are beyond the reach of the office radio transceiver.

System monitoring is handled by a PC running National Instruments' Lookout™ software package, and is currently under development.

All of the installation and the majority of the programming were handled by Plant Operator, Oscar Domondon. *"We wanted a system that would be easy to set-up and modify for future changes or additions. The controllers that we have now allow us to do that without having to hire a programmer to make changes for us."*

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Your #1 Source

for

SCADA

Control Microsystems' SCADAPack PLCs & RTUs
National Instruments' Lookout HMI/SCADA Software
Teledesign Systems' UHF/VHF/Microwave Radios
Locus Ethernet & Serial Spread Spectrum Radios
Win-911 Alarm Notification Software
Security Web Cams with Alarm Paging
Operator Interface Panels & Industrial PCs
Leased-Line & Dial-up SCADA Modems
Remote I/O Systems

...Everything to meet your SCADA system needs

Seminars & Events

- 09/09/03 **California Water Environment Association, CWEA Northern Regional Training Conference**, Caesar's Lake Tahoe, CA. *Stop by our exhibit.*
- 09/18/03 **Teledesign Systems' Training**, Milpitas, CA. *Call for details.*
- 09/25-26/03 **Advancements in Remote Monitoring, Control & Automation 2003**, San Diego, CA. *Visit the Locus exhibit to see the new Industrial High-Speed Ethernet Radios.*
- 10/02/03 **CWEA Northern Instrumentation, Control & Electrical Conference**, San Ramon Marriott Hotel, San Ramon, CA. *Stop by our exhibit.*
- 10/7-8/03 **American Water Works Association, CA-NV AWWA 2003 Annual Fall Conference**, Sheraton San Diego Hotel & Marina, San Diego, CA.. *Stop by our exhibit.*
- 10/11-15/03 **CWEA/WEFTEC Conference**, Los Angeles Convention Center, Los Angeles, CA. *Visit the Locus exhibit to see the new Industrial High-Speed Ethernet Radios.*
- 10/14-16/03 **SCADAPack & Ladder Logic Training Course**, Ontario, CA. *Call for details or download the registration form from our website, www.sagedesignsinc.com.*
- 10/17/03 **Free SCADA Seminar**, Ontario, CA. *Call for details or download the registration form.*
- 10/21/03 **Free SCADA Seminar**, Davis, CA. *Call for details or download the registration form.*
- 12/3-4/03 **Association of California Water Agencies, ACWA Fall Conference**, South Lake Tahoe, CA. *Stop by our exhibit.*
- 04/27/04 **California Water Environment Association, CWEA Annual Conference**, Fresno Convention Center, Fresno, CA. *Stop by our exhibit.*

Sage Designs, Inc.

SCADA & Industrial Automation Products

150 Shoreline Hwy. #B-28
Mill Valley, CA 94941-3635

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