A newsletter for the customers of
Campbell Scientific, Inc.

The
CAMPBELLUPDATE

January, 2005 www.campbellsci.com Volume 16, Issue 1

Future arrives with the new CR1000

CSI's latest datalogger designed to take on a multitude of applications

The CR1000's capabilities make it a good fit for single datalogger installations or datalogger networks.

The new CR1000 datalogger has the toughest competition in the industry, the CR10X. Look at the CR1000 and you see the resemblance; the electronics are protected and electromagnetically shielded in a stainless steel can. To keep the per-unit cost low for remote stations or large networks, the wiring panel does not have a built in keyboard or display. Yes, the CR1000 is designed to take on the multitude of applications that the CR10X handles—and more.

The CR1000 is truly a new datalogger and not merely an upgrade. Its communications capability and support for intelligent sensors set it apart. Several features that were pioneered in other dataloggers have been enhanced and now hit the mainstream with the CR1000. For example, the CR9000X, CR5000, and CR200-series dataloggers share the CRBasic programming language. PakBus® communications have been available in the CR510, CR10X, and CR200 dataloggers. The CR1000, in conjunction with our datalogger support software, will extend those benefits to more users.

Hardware

The CR1000 has the most versatile blend of measurement and digital input/output capabilities of any datalogger currently manufactured by Campbell Scientific. For communications and data storage there are an RS-232 port, a CS I/O port, and a parallel peripheral port. For measurement and control there are eight differential/sixteen single-ended analog inputs, three switched excitation channels, two pulse inputs, 12 analog grounds, six power grounds, one +5 V terminal, two 12 V terminals, one switched 12 V terminal, and eight digital I/O terminals.

The analog inputs offer incremental improvements from the CR10X. The CR1000 has two more differential channels. A ±5 volt range allows inputs of sensors with a 5 volt output without the use of a voltage divider. On voltage ranges up to ±250 millivolts, a full line cycle integration option provides improved rejection of 50 or 60 Hz noise.

As an indication of the speed, at the minimum scan interval of 10 milliseconds (100 Hz measurements) the CR1000 can measure and store the results from all eight differential channels (800 measurements per second). At

See CR1000 on Page 3

CR1000 training course offers personalized instruction

With the release of the CR1000, Campbell Scientific offers a four-day training course on the CR1000 datalogger and LoggerNet 3.x Datalogger Support Software. This comprehensive, introductory level course is suitable for both the experienced Edlog datalogger user and new users. The first three days emphasize CRBasic programming and introduce PakBus® networking. The optional fourth day provides a more detailed look at PakBus networking.

The training course is taught by Campbell Scientific applications engineers. Class size is limited to 10 attendees to ensure personalized instruction and assistance. Go to http://www.campbellsci.com/training for class schedules, availability, and to register. We will continue to offer CR10X (Edlog) training as demand dictates.

During 2005, CR1000 and CR10X training will be offered on alternating months.

Message from the President

CR1000: A new generation, a landmark product

By Paul Campbell

The CR1000 is a new product resulting from literally millions of dollars of investment in product research and development. Part of that investment started with a sophisticated operating system architecture imported from the CR9000 and CR5000 dataloggers. Substantial investment went into development of an application specific integrated circuit (ASIC), Campbell Scientific's first, that expands pulse count, control port, and serial communications capabilities while maintaining accurate and orderly timing of measurements with hardware-driven task sequencing. In years to come, the benefits of this ASIC will be made available in additional models of dataloggers. The packaging of the instrument also represents an advance, with a stainless steel clamshell containing the more sensitive circuitry for environmental and radio frequency protection, similar to the stainless steel can of the CR10X.

New attributes of the CR1000 operating system and LoggerNet 3.x support software include a CRBasic program editor with support of all CR1000 functions, and Campbell Scientific's PAKBUS® packet switched network communications protocol. Applications with serial or string data structures will be quicker and easier to implement in the future using CRBasic. In combination with other PAKBUS dataloggers and peripherals such as the NL100 Network Link Interface, the RF400 Spread Spectrum Radio, and the MD485 Multidrop Interface, doors will open for new applications. Sophisticated data structures, such as video images, can now be transmitted over complex networks. Different PCs running LoggerNet may be able to interrogate the same CR1000 at the same time. Autorouting will allow roaming nodes, which may be useful if a datalogger is on a moving vehicle. Autorouting may also provide for communications redundancy with self-recovery should a link fail in a network designed with alternate communication paths. When using these advanced capabilities, you may want to consider some application engineering services and/or training from Campbell Scientific.

As with any new instrument, some commitment of your time and attention will be needed to learn how to use it effectively. When you start on that next project, and if the CR1000 is the right fit, allocate some time or consider one of our structured training courses. Such an investment up front will surely pay dividends in the long run. We also have utility software to help with conversion of old applications, should you want to run them on a CR1000.

Application engineers at Campbell Scientific have been busy with product testing and learning the nuances of this landmark product. They are now ready to assist customers with specifications, system integration, sales, and training.

Just as the CR10 in 1987 and the CR10X in 1996 established standards of excellence among datalogger products, I am confident that the CR1000 will do the same with a respectable raising of the bar for performance and value.

CS Africa: Sub-Saharan affiliate offers sales, technical support

Campbell Scientific Africa (CS Africa) was initially formed as Visiocon in 1993 by John Annandale, Mike Savage and Johan Visagie. Our name changed to Campbell Scientific Africa when we became a Campbell Scientific affiliate in 1997.

CS Africa is based in a student town, Stellenbosch, located in the heart of South Africa's wine region. With Mike Savage in Pietermaritzburg and John Annandale in Pretoria, CS Africa can provide local representation throughout South Africa. Regionally, CS Africa serves customers in sub-Saharan Africa with sales and technical support.

In addition to Campbell Scientific products, CS Africa supplies complementary products from manufacturers including LI-COR, Kipp & Zonen, and Apogee Instruments.

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The CAMPBELL UPDATE

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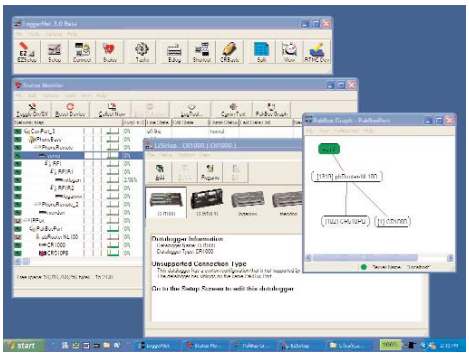
Printed January, 2005

Programming flexible with CR1000

The CR1000 is programmed in CRBasic, a flexible programming language capable of creating both straightforward "measurement-and-store" programs as well as those that perform sophisticated control. If you have programs already written for CR10X dataloggers, you can convert them to CRBasic with the Transformer utility provided with PC400 and LoggerNet.



The CR1000 is supported by a variety of Campbell Scientific software products, including LoggerNet, shown above.

Many datalogger programs can be created using the Short Cut program builder to pick the sensors and outputs. Short Cut 2.2 offers a quick and easy way to build measurement and control programs for the CR1000. Short Cut produces CRBasic code that is straightforward and documented. The datalogger program created by CRBasic is used by both the datalogger and PC; a DLD file is no longer required. This means you can use Short Cut to generate the code for your sensors and final storage, and then load it directly into the CRBasic Editor in LoggerNet or PC400 if refinement or advanced programming is needed. Short Cut is now bundled with PC400 and LoggerNet—the latest version can also be downloaded at no charge from our Web site.

See PROGRAM on Page 4

CR1000

Continued from Page 1

the same scan interval, it could measure and store results from 13 single-ended channels (1300 measurements per second).

Digital I/O ports

Campbell Scientific designed an application-specific integrated circuit (ASIC) for the CR1000. Initially, the custom ASIC was evaluated as a way to save some costs in the signal conditioning circuitry for the pulse inputs and power supplies. As we proceeded with the ASIC design, we found more ways we could use it. For example, the ASIC controls the measurement sequence and timing, freeing up the CPU for faster processing and data storage. Pulse count inputs and all digital I/O ports have the ability to count pulses using 24-bit counters that handle the maximum input frequencies. Earlier dataloggers had 16-bit counters that needed special treatment for higher frequencies. The ASIC also handles serial communications on the CS I/O, the RS-232, and the digital I/O ports. The hardware will support timing between signal transitions and between transitions of different signals, similar to SDM-INT8 functionality. This edge timing is not supported in the first release of the CR1000 Operating System, but will be available later for download.

Pulse count inputs count switch closures, "high frequency," and low-level AC signals. The digital I/O inputs count switch closures and "high frequency" signals without additional signal conditioning. Digital I/O ports can also be used to count low-level AC signals with the addition of the LLAC4 module.

In addition to serial communications offered by the 9-pin CS I/O and RS-232 ports, the eight digital I/O terminals can be configured as pairs (transmit and receive) for up to four communications (COM) ports. These COM ports support serial communication from 300 to 115200 baud, and can be used to:

- Collect data from "smart" sensors
- Communicate between dataloggers
- Connect to another modem or network link
- "Pass through" communications from a modem on the CS I/O or RS-232 port to a digital camera or other device connected to a COM port

The peripheral port is a parallel communications port introduced with the CR1000. The CFM100 CompactFlash® Module will be the first peripheral supported by the port. The CFM100 will expand the CR1000's memory using Compact Flash media.

CR1000 Enhancements Over CR10X Datalogger

Hardware

- Two additional differential analog input channels (four single-ended)
- Range on all analog input channels increased to ±5 V
- 50/60 Hz rejection uses full cycle integration
- Pulse inputs have 24-bit counters; maximum input frequencies do not require special configuration
- Switched 12 V does not require use of control port
- Custom ASIC chip gives the eight control ports the capability for:
  - Pulse counting: all eight ports support direct input of high frequency signals or switch closures, low level AC possible with LLAC4
  - Pairs of ports can be configured as COM ports with the capability for serial communications:
    - 300 to 115200 baud
    - Smart sensor input, no SDM-SIO4 needed
    - Short distance wired network (up to 50 feet)
    - CR1000-to-CR1000 communications
- RS-232 communication interface port (not isolated) in addition to CS I/O
- Parallel interface port for CompactFlash Storage Module
- Standard memory equivalent to CR10X-2M, 4 M optional
- Four times the processing speed
- Lower quiescent current
- Battery-backed clock is accurate to 3 minutes per year

Operating System

- CRBasic programming language
- PakBus® communication protocol
- Table Data Storage

CSI a natural for remote wind assessment systems

Campbell Scientific dataloggers are often found at the heart of remote wind assessment systems because they are so dependable. Wind assessment systems typically monitor wind speeds at several heights, producing a profile of wind data. Two new products make our dataloggers even better for monitoring wind: the Campbell Scientific LLAC4 4-Channel Low Level AC Conversion Module, and the IsoTruss 82 Meter Ice Rated Tilt Up Tower.

Anemometers such as the NRG Maximum #40 or the RM Young 05103 Wind Monitor are the sensors of choice for wind profiling at heights below 100 meters. These sensors produce a low level ac signal in which the frequency is proportional to the speed of rotation. The CR1000's two pulse channels can read this signal directly. However, the LLAC4 converts the ac signal to a 0 to 5 V square wave that can be measured on the CR1000's eight control ports. Thus, the CR1000 can monitor up to 10 wind profiling sensors, using its pulse channels, control ports, and two LLAC4s. For less demanding wind assessment systems, CR200-series dataloggers can be equipped with an LLAC4 to monitor up to four wind speed sensors.

The CR200-series datalogger can also operate as a wireless sensor. The CR205 resides at the height of each wind sensor and becomes a self-contained measurement system. CR205s at each wind monitoring height report their data to a CR1000 at the base of the tower. The CR1000 uses one of our telecommunications options to transmit data to a PC.

IsoTruss has developed a composite fiber, guyed, tilt-up tower that can reach 82 meters or higher. Campbell Scientific has teamed up with IsoTruss to offer rugged wind profiling systems, including towers, mounts, sensors, dataloggers, and telecommunications equipment.

An 82-meter (270 ft) IsoTruss tower fitted with one CR1000, two LLAC4s and nine wind speed sensors profiles wind at the mouth of Spanish Fork Canyon, Utah.

Program

Continued from Page 3

Upgrading Software

Software support for the CR1000 is currently provided by LoggerNet 3.x and PConnect 3.1. The CR1000 will also be supported by forthcoming releases of PC400 1.2, PC200W 3.0, and PConnectCE 2.0.

You can upgrade (replace existing licenses) to LoggerNet 3.x from PC208W, PC400, or earlier versions of LoggerNet at a discounted price. Upgrades for our other datalogger support software packages are also available at a discounted price. Patches are available on our Web site to update within a version (e.g., PConnect 3.0 to 3.1).

Utilities—DevConfig and Transformer

LoggerNet and PC400 include utilities for converting programs from Edlog to CRBasic, configuring devices, and troubleshooting your network.

Transformer

For customers with existing CR10X programs (mixed-array only), we've created the Transformer software utility to convert a CR10X program (.csi or .dld file) to a CR1000 program (.cr1 file). To use Transformer, browse to a CR10X file, specify an output file name for the new CR1000 file, press 'OK', and a .cr1 file is created. The CR10X program and the new CR1000 program are displayed side by side. This provides the ability to see and compare the structure of the CRBasic program with the Edlog program. Comparing the files is a beneficial tool to become familiar with CRBasic programming. In addition, double clicking on an Edlog instruction highlights the corresponding CR1000 instruction. Even customers who prefer to write their CRBasic programs from "scratch" may find Transformer helpful when learning about CRBasic program structure and how Transformer converted the CR10X instructions.

Transformer will convert most of the Edlog code, but because of the differences in programming languages, not all Edlog instructions can be converted using Transformer. Instructions that do not have an exact match, require further input from you, or are suspect are listed in an Action log. Items in the Action log should be reviewed, and the entire program modified and tested as needed to achieve the desired results. The Action log interacts with the CR10X and CR1000 programs to make it easier to identify specific instructions that need to be reviewed and modified. Suspect instructions are highlighted in the CR10X and CR1000 programs when a user double clicks an instruction in the Action log. You can print or save the Action log and use it as a checklist to ensure changes have been completed.

Once the file has been converted, Transformer allows you to launch the CRBasic editor and edit the new CR1000 file. For areas of the program that need to be modified or have instructions added, CRBasic Help contains instruction definitions and descriptions as well as instruction examples. Updated manuals will also be a valuable tool in making necessary modifications or additions to a CR1000 program to achieve the desired results.

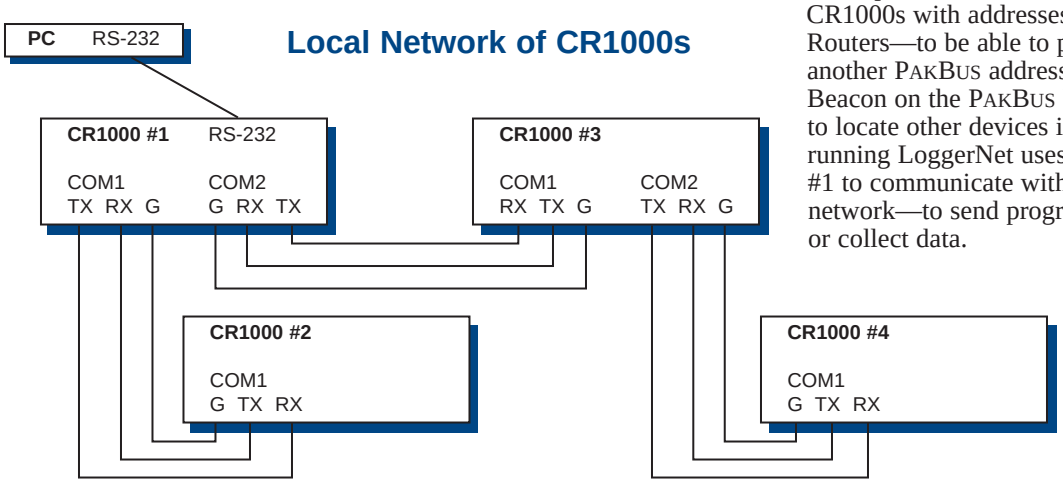
DevConfig

The Device Configuration Utility, or DevConfig, helps you configure PakBus® devices. Using a direct RS-232 connection from the PC, it detects the settings in any CR1000. DevConfig provides an easy-to-use interface to organize the PakBus® settings and includes help for each setting. DevConfig also lets you store the settings for reuse in other dataloggers. Once your network is up and running, you can fine-tune the settings from the graphical display in PakBusGraph, another utility that's accessible from the toolbar of LoggerNet. DevConfig is bundled with PC400 and LoggerNet, and is available from our website at no charge.

PakBus® features and the CR1000's capabilities

The following example discusses PakBus® features and the CR1000's control ports communication capability. Without additional communication peripherals, it is possible to set up a small local network of CR1000s using the RS-232 serial port on one CR1000 and some 3-conductor cables. Let's say there are four CR1000s and the distance between any two hardwired CR1000s is less than 25 feet. The figure illustrates the network configuration and wiring. COM1 TX and RX are digital I/O ports 1 and 2; COM2 TX and RX are digital I/O ports 3 and 4. The TX from one datalogger is connected to the RX at the other end and visa versa.

Before placing them in the network, the CR1000s are connected directly to the PC and configured with unique PakBus addresses (1, 2, 3, and 4 in the drawing) and with the appropriate COM ports set for PakBus communication. The CR1000s with addresses 1 and 3 are set up as Routers—to be able to pass on messages meant for another PakBus address. The Routers are also set to Beacon on the PakBus Ports—they send out beacons to locate other devices in the network. Thus, the PC running LoggerNet uses the RS-232 port of CR1000 #1 to communicate with any of the CR1000s in the network—to send programs, monitor measurements, or collect data.



One of the many ways to use your CR1000s: clustering them in a small local area network and using their control ports and PakBus to communicate with each other.

Adjustable mounting platforms highlight new, lightweight tripods

We are pleased to add three new aluminum tripods, the CM110 (10 feet), CM115 (15 feet), and CM120 (20 feet), to our tripod offerings. These lightweight tripods have been designed to provide an adjustable mounting platform for sensors, sensor mounts, and enclosures. They are light enough to carry to remote sites and are roughly half the weight of our CM6 or CM10 steel tripods. A tilt-down mast, hand tightened leg locks, and new brackets for the ENC-series enclosures facilitate quick deployment of the tripods.

Several accessories are available for purchase to complement the tripods. A canvas tote bag accommodates all of the components for one tripod into a package roughly the size of a ski bag. A guy kit is offered for the CM110 (a guy kit is included with the CM115 and CM120). A five-foot extension kit converts the CM110 to a CM115, or a CM115 to a CM120.

We also offer a new line of mounts for sensors, enclosures, and solar panels. The mounts will fit the aluminum tripods, steel tripods, and UT towers.

The CM110 tripod can be guyed (as shown) for use at higher wind speeds. A CM204 crossarm is shown atop the tripod.

The CS100 is less expensive than previous barometric pressure sensors and features a three-year warranty.

CS100 measures barometric pressure

We have added the CS100 Barometric Pressure Sensor to our product line. The CS100 is manufactured by Setra as its 278 barometer. The CS100 has comparable specifications to the CS105 and CS115, is less expensive, and has a three-year warranty. The standard CS100 measures pressures from 600 to 1100 mb. For higher altitudes, a 500 to 1100 mb version is available.

Although the CS115 Druck RPT410F Barometer no longer appears on our price lists, we will continue to offer it for a short time to existing customers.

CR1000 enhanced by PAKBUS® communications

The CR1000 datalogger improves on the CR10X hardware in many ways, but many enhancements stem from the PAKBUS® communication protocol that is part of the CR1000's operating system. Like our other Table-based operating systems, packet-based communication in the CR1000 is more robust than the communication protocol used in the mixed-array dataloggers. With final storage organized into independently sized and collected tables, you only have to collect the data you need rather than collecting all of the data and then "splitting out" the intervals of interest. Moreover, the resulting data files use date-time stamps and record numbers that import easily into other software, making subsequent analysis easier.

To these table-based advantages, PAKBUS adds unique device addressing and a powerful routing protocol, making peer-to-peer communication more straightforward and robust. Peer-to-peer communication is exploited in various ways. For example, it allows multiple "satellite" dataloggers to send their data to a "master" datalogger enabling collection from one master device. In applications involving measurement and control, peer-to-peer communication enables a "measurement" datalogger to control another datalogger over RF or other shared communication medium without a PC. Unique addressing also enables the CR1000 to initiate and control the data transfer to the PC via "one-way-data" instructions. At the PC end, LoggerNet can collect any missing records, or "holes," since the last record arrived.

Another feature in PAKBUS dataloggers is support for simultaneous communication with multiple hardware devices. This means you can be monitoring a datalogger over a direct link with a PC, PDA, or keyboard/display while the datalogger is controlling other dataloggers over an RF link and simultaneously dispensing information over the phone. These unique addressing, routing, and multi-tasking communications free the CR1000 and other PAKBUS dataloggers from depending on the PC for triggering alarms and routing messages.

When you need the more sophisticated features of PAKBUS, you'll want LoggerNet and a more thorough understanding about PAKBUS networking. The CR1000 Operator's Manual is a good place to start, but also check our Web site for the "PAKBUS Networking Guide," which explains PAKBUS networking and offers examples of hardware configurations.

TX312 GOES Satellite Transmitter available

A new High Data Rate (HDR) GOES satellite transmitter, the TX312, is offered on our price lists. The TX312 uses the GOES satellite system to provide one-way communication from a Data Collection Platform (DCP) to a receiving station. Supported transmission rates are 100, 300, and 1200 bps. The TX312 is compatible with Campbell Scientific's CR10X, CR1000, CR510, CR23X, or CR5000 dataloggers. The TX312 is undergoing NESDIS certification, and is expected to be completed soon.

Because clock accuracy is critically important for GOES satellite telemetry, the TX312 includes a robust, TCXO-based real-time clock and a GPS receiver. The GPS receiver automatically corrects clock and oscillator drift. The real-time clock's precision allows independent operation for up to 28 days without GPS correction. A new GPS antenna is both jam resistant and submersible for greater reliability under field conditions.

CR1000 easily added to your network

A CR1000 can be easily added to your existing mixed-array or PAKBUS® network. The PC software switches to PAKBus mode when you attach a datalogger to a virtual "PAKBUSPort" (virtual in that it isn't really a piece of hardware). If you use the EZSetup Wizard in PC400 and LoggerNet, you'll find that there's a separate PAKBUSPort included for each CR1000. This means you can add a single CR1000 to the end of any telephone, RF, TCP/IP, RF400, or similar link configured for transparent communications and use the CR1000 "right out of the box" without modifying default settings. For adding multiple CR1000s to a network, see our PAKBUS example on Page 5. To take advantage of PAKBUS communication protocol's capability, you'll need to change the operating systems in your network to PAKBUS. Contact an applications engineer for details.

Take advantage of the power of PAKBUS® and features of the CR1000

The CR1000 is programmed using CRBasic or Short Cut, stores data in tables, and uses PAKBUS® communication protocol. A simple explanation follows; for more details read the software article above.

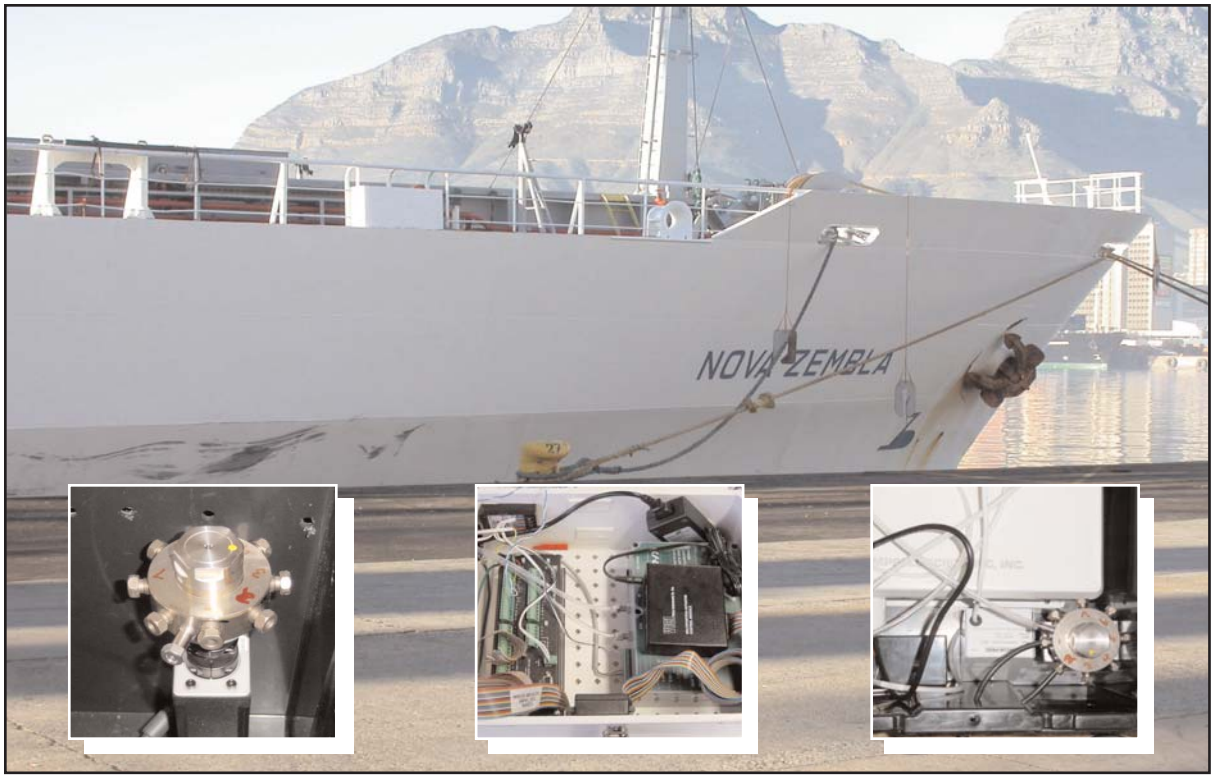
Data are stored in tables and every record (line of data) is timestamped. Data can be stored on a specific interval, based on measured conditions, or as a combination of both. Each table has a header that contains the name of the table, the program that created the data, and the values output, among other things.

Upgrades will be available to the CR1000 Operating System as new features are added and minor bugs resolved; check our website for the latest OS. New operating systems can be sent to the CR1000 over telecommunications links without upsetting their PAKBUS settings. This makes it easier than ever before to keep your remote dataloggers up to date.

PAKBus

PAKBUS is a packet switched network protocol. In addition to PC to network communications, PAKBUS provides great capabilities for transferring data between dataloggers. Each datalogger in a PAKBUS network requires a unique numerical address, allowing data packets to be routed through the network.

We hope you'll take advantage of the power of the new PAKBUS protocols and the features of the CR1000.



The instrumented citrus transport ship sits at the dock awaiting departure. Inset photos: the rotary valve, datalogger, CO_2 analyzer, and tubing.

CR10X measures on-board CO_2 levels and temperature

South African Citrus Research Institute monitors exports

South Africa's subtropical climate is favorable for citrus fruit production. South Africa annually exports roughly one million tons of citrus fruit, comprised primarily of oranges, grapefruit, and lemons, to various overseas destinations. During shipment, the carbon dioxide (CO_2) and temperature levels surrounding the fruit play a vital part in preserving its freshness. A typical shipment from Maputo, South Africa to the USA takes about two weeks. During transit, many shipping companies promise to keep the CO_2 and temperature within acceptable tolerances.

To confirm this, the South African Citrus Research Institute initiated a project to measure CO_2 and temperature levels during a routine shipment to see whether the prescribed levels are continuously maintained. To reduce the cost of the study, the challenge was to measure CO_2 levels at eight points within the citrus cargo hull without using eight CO_2 analyzers. CS Africa developed the monitoring system using a CR10X datalogger, a VICI 8-port rotary valve (stepper motor controlled), a LI-COR LI-820 CO_2 analyzer, hundreds of meters of tubing, and a vacuum pump.

A standard measurement cycle consisted of setting the rotary valve to the first port with a CR10X control port, initiating the vacuum pump, drawing a sample for 60 seconds through the connected tube, taking a CO_2 reading with the LI-820, then stepping the valve to the next position with a CR10X control port. This sequence was repeated until all eight lines were measured. Temperature was also simultaneously logged using thermocouples.

To accommodate the client's limited budget, CS Africa could not use an expensive vacuum pump; instead, we effectively modified an inexpensive air pump. The first instrumented shipment showed the measurement system worked as planned for the two week travel time. Beginning on day two, the CO_2 level not only exceeded the prescribed limits, they exceeded the LI-820's measurement range of 5000 ppm. To determine what the CO_2 levels are throughout the shipment, a 20,000 ppm optical bench has been fitted for the next trip.

APPLICATION AT A GLANCE

Application type:
Monitoring perishable goods during overseas shipment

Project area:
Transatlantic vessel at sea between South Africa and the United States

Author:
Johan Visagie and Charl LeRoux, Campbell Scientific Africa

Contracting agencies:
South African Citrus Research Institute

Datalogger(s):
Campbell Scientific CR10X

Measured parameters:
Carbon dioxide (CO_2) levels, temperature

CR1000KD: Take it everywhere

Check the status of your CR1000, display or plot sensor readings, and enter numeric data

The CR1000KD is used to check datalogger status, display or plot sensor readings and stored values, and to enter numeric data or change port/flag state. One CR1000KD may be carried from station to station in a CR1000 network.

The CR1000KD displays 8 lines x 21 characters (64 x 128 pixels) and has a 16-character keyboard.

The display allows you to view your data in numeric form or view a plot of your data to determine trends. The CR1000KD is powered by the datalogger's power supply. An SC12 connects the CR1000KD to the CR1000WP; the two connectors on the SC12 allow connection of additional peripherals. The CR1000KD is ONLY compatible with the CR1000-series dataloggers; it is NOT compatible with any other datalogger.

The CR1000KD supports the use of custom menus. This allows the user to set up choices within the datalogger program that can be initiated by a simple "toggle" or "pick from a list" in the CR1000KD display menu. Examples of custom displays include "Initiate Sensor Calibration Sequence" vs. "Bypass Sensor Calibration Sequence."

2005 price lists are now ready

Our US and International price lists for 2005 are available, effective 1 January 2005. You can receive our price lists via email by contacting one of our applications engineers.

Many prices did not change. However, for the first time in several years, some of our software prices have increased.

Price changes in hardware are primarily due to changes in manufacturing and cost of parts. Throughout the year, our price lists will periodically incorporate new products. To see a synopsis of changes at any time during the year, visit the "What's New" page on our website.

Availability, service will continue for CR10X customers

Although the CR1000 datalogger may replace our CR10X for many applications, existing CR10X customers who do not need the new CR1000 capabilities and prefer to program their datalogger using Edlog instead of CRBasic can still purchase a CR10X. Campbell Scientific will continue to offer the CR10X as long as we can obtain the parts to build them. As with all of our dataloggers, we will also continue to service the CR10X as long as parts are available.

CAMPBELL SCIENTIFIC CALENDAR

Date	Event	Location
February		
2-4	Fish Farming Trade Show	Greenville, MS
10-12	Golf Industry Show	Orlando, FL
16-18	Wildland Fire 2005	Albuquerque, NM
March		
1-4	Rural Water Association of Utah	St. George, UT
April		
5-7	Electric Power	Chicago, IL
11-14	Western Snow Conference	Great Falls, MT
May		
15-18	WindPower 2005	Denver, CO
17-19	Central Region Conference on Data	Overland Park, KS
June		
13-15	International Bridge Conference	Pittsburgh, PA
21-24	Air and Waste Management Association	Minneapolis, MN
July		
17-20	ASAE Annual International Meeting	Tampa, FL
19-21	StormCon	Orlando, FL
30-8/3	American Phytopathological Society	Austin, TX

visit our web site for additional listings and training class schedules

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