CAMPBELL® SCIENTIFIC
WHEN MEASUREMENTS MATTER

UPDATE

Second Quarter 2013

Innovative Dynamic Vibrating-Wire Measurements p. 2

Innovative Technology Allows Dynamic Vibrating-Wire Measurements

New Product

Campbell Scientific is excited to announce the release of the CDM-VW300 and CDM-VW305, our new dynamic vibrating-wire analyzers. The new analyzers promise to broaden the potential market of vibrating wire sensors, which allows us to serve our customers better. Vibrating-wire technology is used in many sensors, including strain gages, pressure transducers, piezometers, tiltmeters, crack meters, and load cells. These sensors benefit a wide variety of structural, hydrological, and geotechnical applications because of their stability, accuracy, and durability.

Traditionally, vibrating-wire sensors were limited to static measurements. Sensors such as bonded-foil strain gages were used for dynamic measurements, but they did not match the long-term performance found in vibrating-wire sensors. Often, structures equipped with vibrating-wire sensors also used other sensors to make the dynamic measurements. Campbell Scientific 's CDM-VW300 and CDM-VW305 dynamic vibrating-wire analyzers change all of that. These new analyzers can measure standard single-coil vibrating-wire sensors at rates of 20 to 333 Hz, allowing them to be used for dynamic measurements. Now that vibrating-wire sensors can make both static and dynamic measurements, structures that at one time included two sets of instruments can use a single set of instruments. This reduces the expense of the equipment and the installation, while providing higher quality data.

Besides adding dynamic measurement capabilities, the new analyzers use the innovative spectral interpolation method that was originally developed for our AVW200-series analyzers. This method features superior noise immunity and measurement resolution compared to the time-domain period-averaging approach. The spectral interpolation method also provides diagnostic information about the measurement.

The CDM-VW300-series analyzers allow one datalogger to monitor many vibrating-wire sensors. Each CDM-VW300 can simultaneously measure two vibrating-wire sensors, and each CDM-VW305 can simultaneously measure eight sensors. The analyzers connect to the datalogger via the SC-CPI Datalogger-to-CPI Interface, and multiple analyzers can be connected to and controlled by a single SC-CPI and datalogger combination. Measurements on all of the channels across all of the analyzers are synchronized to each other and to the datalogger.

Vibrating-wire sensors are an important long-term monitoring tool in the structural, transportation, and geotechnical applications. With the dynamic vibrating-wire capability, those same trusted sensors can be used to collect both static and dynamic data with the same high precision and long-term stability that was previously limited to static measurements. While saving costs, the CDM-VW300 series opens up new possibilities for future measurements.

Learn More Here
campbellsci.com/cdm-vw300

Structural and Geotechnical Instrumentation Training

Training

Four times a year, Campbell Scientific offers a hands-on course in structural and geotechnical instrumentation for practicing engineers, technicians, scientists, and students. The course is taught in beautiful Logan, Utah, with ready access to national parks, skiing, mountain biking, and other outdoor recreation opportunities.

This full–week, immersive experience helps professionals understand what goes into designing, building, and maintaining integrated instrument networks for geotechnical, structural, mining, and construction applications.

Hands-on programming, networking, sensor wiring, and calibration sessions reinforce the concepts taught. Attendees will be able to network, explore new developments, earn continuing education credits, and ask project-specific questions.

Course fees are $1000 per participant, and include use of hardware, software, sensors, and daily lunch. Competing courses cost $1400 for one and a half days of content and no hands-on training. Attendance is limited, so register early. The next class begins August 12, 2013.

For more information or to register for the course, email sdustin@campbellsci.com.

Learn More Here
campbellsci.com/training

New LoggerNet Release Coming Soon

Product Update

We're currently putting the finishing touches on our next release of LoggerNet, Campbell Scientific's full-featured datalogger support software. Here are some of the new features you'll find in this version.

Global Device Settings
Configuring your datalogger network for communication and data collection is relatively straightforward, but if you require options that are different than LoggerNet's default settings it can be time consuming to change those values when new stations are added. The Setup window now offers the ability to define different default values for options such as scheduled data collection and retry intervals, default file names and file formats, and clock check settings. Once new defaults have been defined, they are used for all newly added stations and also can be copied to existing stations. This feature can save time, especially when setting up larger networks.

2400 Hour Midnight Time Stamp for Table-Based PakBus Dataloggers
Our mixed-array dataloggers had the option of saving data in the datalogger with a time stamp that reflected midnight as either 2400 of the previous day or 0000 of the new day. Our table-based PakBus dataloggers store the time stamp in only one format—seconds or subseconds since January 1, 1990. When stored to a file, this is reflected as midnight at 0000. We have often had requests for a midnight at 2400 hour option for these dataloggers.

In this new release, while the datalogger and the LoggerNet server still store the data internally as they always have, the Setup window now has an option to save the collected data file with a midnight time stamp of 2400. This can help those who have mixed networks of older and newer dataloggers more easily integrate the data from those systems. It will also help those who are using the collected data with third-party systems that require a 2400 midnight time stamp.

Support for Pooled-Modem Devices
LoggerNet now supports serial-port modem-pooling devices and Ethernet terminal servers (IP connections to a bank of modems). Our traditional modem setup in LoggerNet provided only one route to a datalogger that was communicated with via phone modem. For instance in LoggerNet 4.1, to define a phone connection to a datalogger you set up a COM port, add a local phone modem and remote phone modem, and then add one or more dataloggers. With this configuration, if there are problems accessing the COM port or local phone modem (because of a modem failure or another call being made on that resource), a call to the datalogger must be postponed until the problem is resolved. With modem pooling where multiple COM ports and local modems are available, LoggerNet can now choose a different route to that datalogger. Route choice is based on availability and past performance.

Traditional modem setup is still available and is the best option to use if you have access to only a few phone lines and are calling only a few dataloggers. If you have phone modem links set up in your existing LoggerNet network, those modems will continue to work without any changes. With this new feature you have the option of sticking with what works or taking advantage of the additional benefits modem-pooling devices have to offer.

Subnets and Groups
If you have a large network of dataloggers configured in LoggerNet, quickly finding a particular datalogger in that network can be difficult. In LoggerNet Admin we have added the ability to define subnetworks for the original network map and groups within those subnets.

Subnets and groups are defined in LoggerNet's Setup screen. Once they are set up, the networks can be used in the Setup, Connect, and Status windows. New controls on these windows let you choose whether to view the entire network or a portion of the network. You also can view only the datalogger stations themselves or all the devices in the communication route to the dataloggers.

Subnets and groups are most useful to customers with very large networks; thus, this feature is available in LoggerNet Admin only.

Calendar-Based Schedules for Task Master
The Task Master is used to schedule tasks to be run by LoggerNet. These tasks can be the execution of batch or script files, a call to collect data from a datalogger, or sending a file to an FTP server.

Traditionally, tasks have been performed on a clock-based interval (scheduled task types) or triggered by a datalogger-associated event (add after task types; e.g., after scheduled collection, a failed call, or a call-back). With this new release, we have implemented a calendar-based schedule for the scheduled task type. When setting up a calendar-based schedule, you can choose a combination of hours of the day, minutes of the hour, days of the month, days of the week, and months of the year to define when to run a task.

With this flexible schedule you can:

- Run a Split report the last day of every month
- Collect data from a datalogger every Monday, Wednesday, and Friday
- Collect data on a faster interval between the hours of 8 a.m. and 5 p.m., while the normal schedule continues during off hours

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New VP Promotes Campbell Culture

Company News

In March 2013, Larry Shirk was appointed vice president of manufacturing by the board of directors at Campbell Scientific. In his new position, Larry not only assumes manufacturing management responsibilities, but he also takes on broader responsibilities as a corporate officer.

Larry's previous positions, both at Campbell Scientific and with other employers, have equipped him with the knowledge and experience to meet the challenges of his new role. Company president Paul Campbell expressed the board's confidence in Larry's appointment by saying, "Larry has been with the company for many years, and those who know Larry recognize that this is a natural step for both the company and Larry."

Larry began working at Campbell Scientific in 1987, when he was a student at Utah State University. In his first position, he worked in manufacturing and operated the wave solder machine. He became enamored with electronic manufacturing processes, leading to his next position in 1991 as a manufacturing engineer. In 1993, Larry received his CPIM (Certified in Production and Inventory Management) designation from the American Production and Inventory Control Society (APICS). After working here for ten years, Larry decided to explore other electronic manufacturing opportunities. These opportunities included working as a production manager and director of engineering at an electronic manufacturing service (EMS) company that handled medical, military, and other types of products. Larry was broadly exposed to manufacturing processes and systems, and he developed an appreciation for the diversity of electronic manufacturing.

Larry missed, however, the Campbell culture. He said, "I missed the value system and culture that Campbell Scientific has developed, which is based on individual accountability, respect, responsibility, and an unprecedented attention to customer service. The company values and respects the individual in and out of the company. The individual, in turn, provides that back to the company. It's a win-win situation for everyone."

In 2007, Larry returned to Campbell as the quality manager. He established a calibration lab and consolidated the in-house calibration standards.

Because of his experience in manufacturing engineering, Larry was asked to augment the manufacturing engineering role in production. Today, Campbell Scientific has a manufacturing engineering group that is advancing its capability in providing support for the sustainment of legacy products, new product introduction, manufacturing-process implementation and support, product-test development, and continued process-improvement efforts.

"It is imperative that we sustain our corporate culture and that we continue to provide great service and products to our customers, as well as a fantastic work environment."

As the new vice president of manufacturing, Larry feels an increased responsibility to maintain and sustain the Campbell culture. He said, "We have unique products, and we're a global company. We help people all over the world make educated decisions with the instruments we design and manufacture. It is imperative that we sustain our corporate culture and that we continue to provide great service and products to our customers, as well as a fantastic work environment. It's a win-win situation. That's really why I'm here."

New LoggerNet Release Coming Soon

Continued from page 3

Note that calendar-based data collection from a datalogger occurs along with the data collection schedule configured in the Setup window. (It does not run in place of that schedule.) The data file and data collection pointers are the same as those used for scheduled data collection and the Collect Now collection from the Connect window.

There's More!
So far we've highlighted just a few of the new features in our next release of LoggerNet. A full list of features and changes is in the readme.txt file, found in your *C:\Program Files\Campbellsci\LoggerNet* directory, but here's a sampling of the additional changes:

- Ability to access the datalogger's settings table from the Connect window
- An editable date/time field so that the datalogger's clock can be manually set from the Connect window
- A Boolean value icon on the numeric displays to toggle between true/false
- A running program summary added to File Control that clearly indicates what program is running in the datalogger and what program will be run upon power up if the datalogger should experience a power failure
- Unicode support for both labels and text strings
- Maximum file size setting for data files
- More statistics for table-based dataloggers in the Status window

The Final Details
This release will be versioned as LoggerNet 4.2. Anyone who has a current license of LoggerNet 4.0 or 4.1 will be able to apply an update, free of charge, by downloading a patch from our website. To receive an email alert when the software is available, sign up for product updates from our Campbell Scientific Customer Center by editing your Subscription Settings.

Learn More Here
campbellsci.com/loggernet

New Instrument Mounts Available

New Product

Vertical Mounting Poles

The new CM500 series provides vertical, 2 in. IPS poles for mounting sensors, enclosures, or other instruments. The CM500 has a 3 m (10 ft) length, but 0.6 m (2 ft) of its length is typically embedded in concrete. The other models have a 2.4 m (8 ft) length and include a j-bolt kit to secure them to a concrete pad. The j-bolt kit allows customers to easily control the pole's placement ensuring that the pole remains in a vertical position. The poles are constructed from galvanized steel, 304 stainless steel, or 316L stainless steel. The 304 stainless-steel pole is more attractive and more corrosion-resistant than the galvanized poles, and the 316L stainless-steel pole is more durable in salty environments.

Radiation Shields

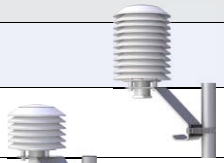
The 41003-5A and 41303-5B naturally aspirated radiation shields are versions of the 41003-5 and 41303-5A that include a band clamp for mounting them directly to a CM500-series mounting pole or a 2 in. IPS pole or larger. The 41003-5A is a10-plate shield that typically houses an HC2S3 temperature and relative humidity probe. The 41303-5B is a 6-plate shield that can house an HMP60 or CS215 temperature and relative-humidity probe or a 107, 108, or 109 temperature probe. Naturally aspirated radiation shields allow air to pass freely through the shield, keeping the probe at or near ambient temperature.

Crossarms

Campbell Scientific has recently added the CM203, CM202SS, and CM204SS crossarms to our product line. The CM203 is a 1 m (3 ft) aluminum crossarm that provides a rugged, weather-resistant sensor mount for one sensor. The CM202SS and CM204SS are stainless-steel versions of our CM202 and CM204 aluminum crossarms. Stainless steel is less conductive than aluminum, which is preferable for our LW110 Lightning Warning System.

Adjustable Inclination Mount

The CM230XL can be adjusted to any angle from horizontal to vertical. The mount is primarily used with directional (Yagi) antennas, but can also be used with sensors that need to be pointed at a specific target (e.g., SI-111, SR50A). The new CM230XL provides the same functionality as the CM230—our other adjustable inclination mount. However, the CM230XL is longer, which places the antenna or sensor farther from the mast or crossarm.

Vertical Mounting Poles			
Model	*Length*	*Material*	*Image*
CM500	3 m (10 ft)	Galvanized steel	
CM505	2.4 m (8 ft)	Galvanized steel	
CM510	2.4 m (8 ft)	304 stainless steel	
CM515	2.4 m (8 ft)	316 stainless steel	
Crossarms			
Model	*Length*	*Material*	*Image*
CM203	1 m (3 ft)	Aluminum	
CM202SS	0.6 m (2 ft)	304 stainless steel	
CM204SS	1.2 m (4 ft)	304 stainless steel	
Adjustable Inclination Mount			
Model	*Length*	*Material*	*Image*
CM230XL	47 cm (18.5 in)	Aluminum	
Radiation Shields			
Model	*Plates*	*Material*	*Image*
41003-5A	10	UV stabilized, white thermoplastic plates	
41303-5B	6	UV stabilized, white thermoplastic plates	

Climate Reference Network

Case Study

As concern over changing climate conditions in the world was growing in the late 1990s, the U.S.A. had thousands of weather measurement stations collecting data. However, it was determined that many of the stations were inconsistently sited and managed, were aging, and were in danger of losing credibility. The best of those stations, called the Historical Climate Network, collected good data as far back as the 1930s.

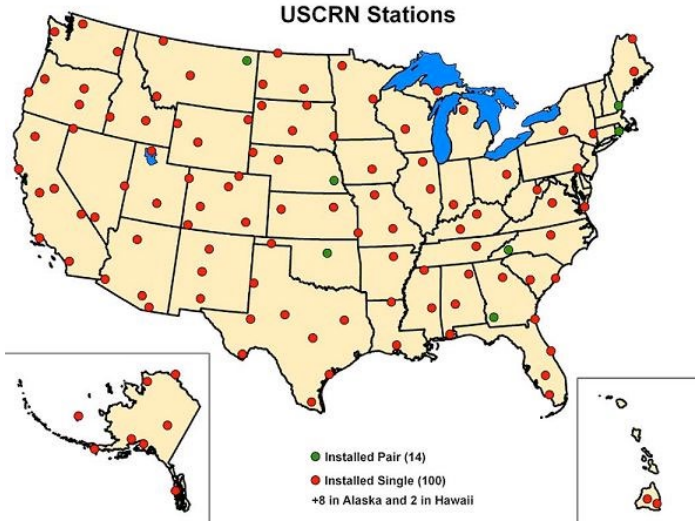
To provide reliable information to those evaluating the potential effects of climate change, the network of temperature-measurement stations needed to be improved. Huge amounts of historical climate-observation data needed to be verified, and a program was required that would provide continuous, homogenous weather measurement far into the future.

The task to stabilize the nation's existing observation capabilities, and to develop, implement, and operate climate-observing programs over the long term was given to the National Oceanic and Atmospheric Administration (NOAA) and its Atmospheric Turbulence and Diffusion Division (ATDD). The mandate included building a new network of high-quality weather stations that could be counted on for consistent measurements for 50 years or more. The agency also had to compare data from the existing Historical Climate Network with data from the new stations to verify that the historical data was reliable. The goal was to provide a trustworthy, continuous stream of data from the 1930s into the twenty-first century to detect climate change.

NOAA established the U.S. Climate Reference Network (USCRN) with the intention of it being the nation's premier climate-monitoring network. The first two experimental stations were installed in 2001. To be sure the network would collect high-quality data for decades to come, ATDD tested many components to determine the best equipment for long-term, high-quality measurements in remote sites. They chose Campbell Scientific's CR3000 Micrologger® as the core of each of the more than 114 stations in the network. Communication is via Campbell's SAT HDR GOES transmitter, and the NL115 Ethernet Interface and CompactFlash Module is also from Campbell Scientific.

The two primary variables for the USCRN, air temperature and precipitation, are both measured with triple-sensor configurations. Each station features three aspirated, 1000 ohm, RTD temperature probes and a rain-and-snow gage with three sensors. These instruments are installed inside a small, double-fence intercomparison reference fence to maximize precipitation catch efficiency. Secondary variables include wind, solar radiation, infrared radiation, soil moisture, soil temperature, relative humidity, and snow depth.

USCRN stations are installed in pristine locations that are not expected to be developed for at least 50 years so that measurements will not be affected by buildings or roads. This means they are hard to reach for maintenance and repair, so the proven ruggedness and reliability of the Campbell gear makes it ideal for this application.



Learn More Here
campbellsci.com/uscrn

South Korea: Preventing Road Damage from Freezing Conditions

Case Study

Korea Expressway Corporation (KEC) was established in 1969 to construct and manage expressways throughout South Korea. KEC's goal has been to increase the length of their expressways so that all residents throughout the country can reach an expressway within 30 minutes. The attainment of this goal is affected by two significant financial considerations: the cost to build new roads and the cost to maintain the surface of existing roads.

KEC repairs and repaves damaged road surfaces as part of its commitment to managing and maintaining its expressways. To reduce the cost related to repairing and repaving, KEC developed a systematic maintenance and management strategy that includes the conversion from post-maintenance management to preventive maintenance management.

As part of its preventive maintenance management, KEC focused on preventing paved roads from freezing during the winter. The road moisture from freezing conditions, as well as the temperature difference during the change from the cold winter season to the warm spring season, are especially harmful to roads. These seasonal factors can significantly increase the cost for repairs to, and repavement of, road surfaces.

To find a way to prevent expressways from freezing and to minimize winter's effect on road surfaces, KEC worked with the Ministry of Land, Transport, and Maritime Affairs (MLTM); Incheon National University; and the Korea Institute of Construction Technology (KICT). Their combined efforts and support resulted in KICT's development of an antifreezing layer that could be embedded under the road.

The next step was to test the antifreezing layer on paved roads throughout South Korea. Forty-five testing sites were selected to be supplied with a field measurement system. B&P International provided the Campbell Scientific measurement equipment for all of the testing sites. The multitude of equipment included 45 CR1000 dataloggers, 45 AM16/32B relay multiplexers, and 615 CS616 water-content reflectometers.

At each test site, B&P laid down the antifreezing layer and equipped it with a datalogger and sensors. The layer was then paved over with asphalt. For three years, the sensors at the test sites were monitored using CR1000s connected to a central PC running Campbell Scientific's LoggerNet with RTMC (real-time monitoring and control) software. The Campbell monitoring system enabled KEC to accomplish two objectives: to continuously monitor the 45 test sites; and to assess, over time, the effectiveness of the antifreezing layer in preventing winter damage to KEC's expressways.

Learn More Here
campbellsci.com/korea-road

CAMPBELL SCIENTIFIC UPDATE

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Tips and Tricks: Get Active!

Tips and Tricks

I love springtime! The weather is warmer, the birds are chirping, the snow is melting. It makes me want to get on my walking shoes and get active. Your PakBus network also needs to be active and the Network Planner is just the place to set that up.

I hope you all have been taking advantage of this great tool. The Network Planner is a graphical PakBus network design tool. It automatically specifies the best hardware and software settings for your particular setup. You place stations and peripheral devices in your network. Then you specify links (which devices you want to talk to each other).

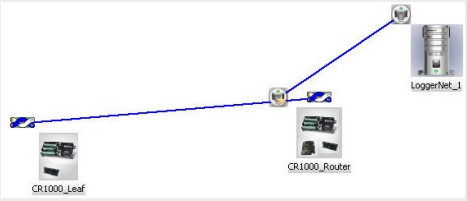
This is the Link tool: 

Finally, you set up activities between stations. This is the Activity tool: 

It is important to set up those activities because that is how the Network Planner decides on the specific settings to use.

Example 1: No Activity Setting

In this example, we set up a simple network without specifying any activity:

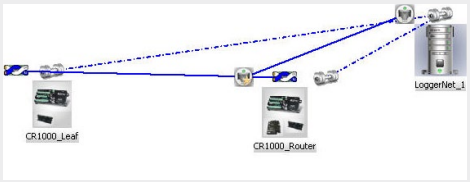


The Network Planner then decided that 90 seconds would be an appropriate verify interval. That means that every 90 seconds or so the datalogger would initiate communication to verify that the communication path still existed, which uses more battery power and creates more signal traffic, eating up bandwidth.

Setting Name	Setting Value
PakBus Address	4
Security Level 1	0
Security Level 2	0
Security Level 3	0
PakBus Encryption Key	
Station Name	CR1000_Leaf
Is Router	0
Beacon Interval SDC7	0
Verify Interval SDC7	90
Neighbors Allowed SDC7	Begin Range End Range
Baud Rate COMSDC	115200 Fixed
Name Servers	Domain Name Servers
PakBus/TCP Password	

Example 2: 60 min. Activity Setting

In this example we set up a one-hour scheduled collection activity:



This gave the Network Planner better information to work with. So, it set the verify interval to a more appropriate 5,400 seconds (or 90 minutes). When our hourly scheduled collection is running smoothly, we don't need to verify the communication paths. It is only if there is a problem and we go more than the 5,400 seconds without communicating that the datalogger would initiate a verification.

Setting Name	Setting Value
PakBus Address	4
Security Level 1	0
Security Level 2	0
Security Level 3	0
PakBus Encryption Key	
Station Name	CR1000_Leaf
Is Router	0
Beacon Interval SDC7	0
Verify Interval SDC7	5,400
Neighbors Allowed SDC7	Begin Range End Range
Baud Rate COMSDC	115200 Fixed
Name Servers	Domain Name Servers
PakBus/TCP Password	

Remember, tell the Network Planner how much activity your network needs. Otherwise, you'll end up doing wind sprints instead of taking a leisurely walk around the block.

Still sweatin',

Tim

Learn More Here
campbellsci.com/videos