CAMPBELL SCIENTIFIC®

WHEN MEASUREMENTS MATTER

UPDATE

First Quarter 2012

CS120 Visibility Sensor Arrives *p. 3*

Just So

President's Message

It dates me, but I remember when computers were without a graphical user interface (GUI). I have always had some difficulty reconciling modern man's development of GUIs with our history, especially as artistically expressed by Rudyard Kipling over 100 years ago in one of his ***Just So Stories***.

> *". . . till they had done and drawn all the sound-pictures that they wanted, and there was the Alphabet, all complete. And after thousands and thousands and thousands of years, and after Hieroglyphics and Demotics, and Nilotics, and Cryptics, and Cufics, and Runics, and Dorics, and Ionics, and all sorts of other ricks and tricks (because the Woons, and the Neguses, and the Akhoonds, and the Repositories of Tradition would never leave a good thing alone when they saw it), the fine old easy, understandable Alphabet—A, B, C, D, E, and the rest of 'em—got back into its proper shape again for all Best Beloveds to learn when they are old enough."*
>
> ***'How the Alphabet Was Made'***

Scientists extol the virtues of graphics as capitalizing on the capacity of the human mind to immediately comprehend meaning from an image that, if left to words, would be incomplete or require more time to fully explain. A combination of text and images offers the most visual communication. To that end, Campbell Scientific, Inc., recently upgraded its website with an introduction on the home page of six graphics that represent, in broad terms, the markets we serve.

Weather observation with automatic weather stations was one of the first markets served by Campbell Scientific, with dataloggers, sensors, and systems that included digital recording beginning in the 1970s. We continue to offer new products for weather observation, and one of those included in this newsletter is the CS120 Visibility Sensor developed by the Campbell Scientific group company in the UK. The weather symbol also relates to some of our work in biogeochemistry, supporting customers who measure the exchange of gases at the earth's surface to better understand carbon and nitrogen cycles.

Water is related to weather, usually through precipitation and evaporation, but in its own right has some needs apart to measure level, flow, temperature, turbidity, and a host of other parameters. This basic resource will be stretched even more in years to come, and the key to careful planning, use, and peace between competing interests begins with measurement.

Energy, and in particular renewable energy, is maturing and expanding with developments of wind and solar farms to harvest electrons. While siting relates directly to climate and weather conditions, some of the technical challenges have to do with machines and materials and how they perform or withstand certain conditions of wind, sun, and frozen precipitation.

Machines are nearly as old as the alphabet, and one of the benefits of modern electronics is using them to test the performance of modern, sophisticated machines. Whether it's endurance testing, noise from brakes, hot spots from an exhaust, or the pressure pulse from actuating a solenoid, Campbell Scientific dataloggers help make measurements that improve our understanding and the design of machines.

Structures can bridge obstacles and space to support machines and surfaces, divert water, and perform other functions. With longer and more complex structures built where they must withstand ice, floods, wind, corrosion, and the dynamics of earthquakes or extraordinary loads, monitoring is needed to characterize risks and deterioration. Sensors that measure strain, pressure, or change in position provide useful assistance to warn of a problem before a catastrophic collapse.

Earth is the last symbol introduced on our new website. Campbell Scientific offers sensors and systems to measure soil moisture, electrical conductivity, and temperature, all important parameters affecting plant growth. Our understanding of soils and concrete used in construction is enhanced with measurements of water content, slope stability, and other dynamics.

The application engineers at Campbell Scientific are organized into groups that correspond to the above market identification. This helps us better understand your problems and how we can help you solve them. When you contact Campbell Scientific, it is helpful if you can identify where you fit in this market schema. That way, it is more likely that an application engineer that understands your world can serve you.

CAMPBELL SCIENTIFIC UPDATE

Executive Editor	Neal Israelsen
Managing Editor	Lex Shakespear
Assistant Editors	Linda Worlton Patrick Burt Anthony Bodily Brian Clark
Contributors	Paul Campbell Dana Worley

CS120 Visibility Sensor Arrives

New Product

Visibility is an important meteorological measurement, especially for road, airport, and marine applications. Instruments to measure visibility have, until now, been expensive and fragile, with lots of design obstacles. Recently, engineers at Campbell Scientific Europe have developed a high-performance visibility sensor that overcomes these difficulties, at a competitive price.

The CS120 uses infrared, forward-scatter technology to develop accurate estimates of meteorological observable distance (MOR). Its design uses the proven 42° scatter angle. The design includes a sturdy body shaped to avoid interfering with airflow, resulting in a clean, undisturbed sample volume. The optics face downward to reduce contamination by dust or dirt and blockage by snow. The sensor even checks the source and detector lenses every second and adjusts its calibration to compensate for contamination.

Low-power heaters to prevent dew and higher-power heaters to de-ice are built into the body, adding reliability to the measurements. The heaters are automatically controlled, simplifying use in all types of weather.

Since the sensor is used in various weather conditions, it incorporates high-speed sampling, assuring accuracy when mixtures of rain, snow, and hail make measurements more complicated. And the light source is monitored and corrected every second for stability to compensate for variations in temperature and for sensor age.

The CS120 can be used in stand-alone applications or as part of a system. The core sensor is power-efficient, drawing just 3 W during normal operation, including the dew heaters. In addition, the heaters and sampling rates can be adjusted to further save power. This makes it ideal for remote locations. It can be calibrated in the field with the optional calibration kit.

Besides reporting measurements, the sensor reports its own status. It features two user-configurable alarm outputs for solid-state output to audio or visual alarms.

Learn More Here
campbellsci.com/cs120

Remote Sensing LiDAR System Now Available

New Product

We now offer the ZephIR 300, a continuous-wave, remote sensing LiDAR system. It provides wind measurements across ten user-defined heights from 10 m to 200 m. The ZephIR 300 can be used throughout the life cycle of a wind project, including site prospecting, wind-flow model verification, power-curve assessment, permanent wind-farm anemometry, and operational wind-farm analysis.

Continuous-wave technology offers unique benefits for the wind industry. One benefit is the ability to provide fast sample rates (50 data points per second across a full 360° scan). This is especially advantageous for complex and rapidly changing air flows. Another benefit is the ability to make accurate measurements across the entire wind turbine rotor diameter, down to just 10 m above ground level. The ZephIR 300 provides a wind speed accuracy of better than 0.5% as measured against a calibrated moving target, and a wind direction accuracy of better than 0.5°.

The ZephIR 300 uses an infrared beam to illuminate natural atmospheric aerosols such as dust, pollen, or water droplets. When the infrared beam hits these aerosols, some light is backscattered into a receiver. Wind affects the motion of these aerosols, and changes the backscattered light's frequency. This frequency shift is measured by a photo-detector, and from these measurements, wind speed and direction are calculated.

To ensure accurate measurements, the ZephIR 300 is calibrated to an industry-approved standard, and rigorously tested via IEC-equivalent power-performance measurements.

The ZephIR 300 is a rugged device, and is designed to operate autonomously in remote locations. It features a wide operating-temperature range of -40° to +50° C and has an IP67-rated enclosure, sealed against moisture and ingress. The ZephIR 300 is compatible with Campbell Scientific dataloggers, allowing easy integration of meteorological mast data with remote measurements obtained by the ZephIR 300.

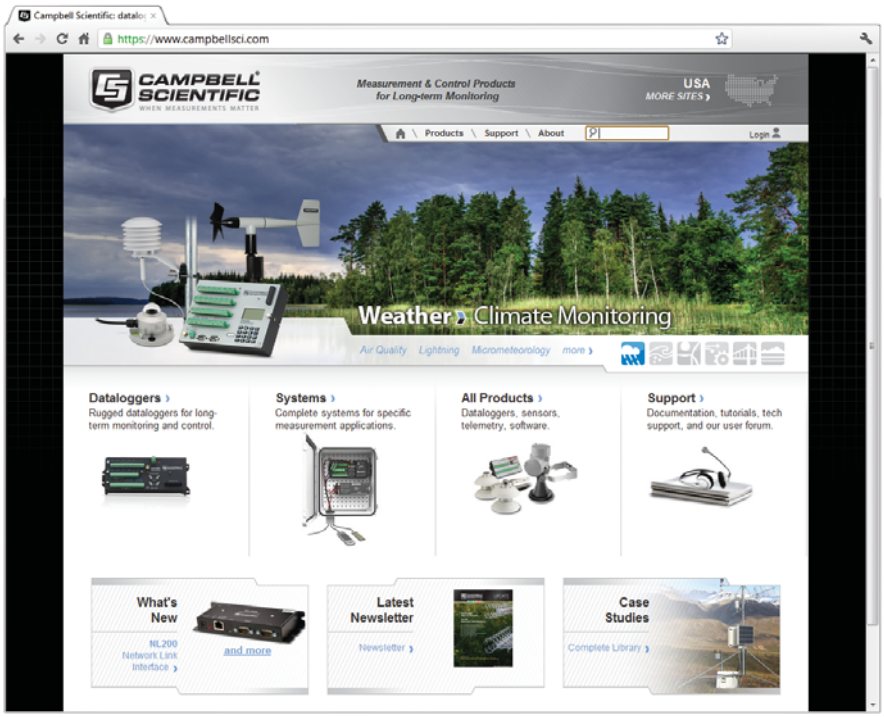
Learn More Here
campbellsci.com/zephir-lidar

Campbell Scientific Gets a New Look

Company News

If you recently visited our website or saw us at a trade show, you probably noticed that we've made a few changes. Not only have we tweaked our logo, but we've adopted new colors and redesigned many of the materials used to deliver information to you. This includes our website, newsletters, exhibit panels, and more. Some changes have already been implemented; others are forthcoming.

This change has come about as we've worked with the Campbell Scientific offices around the world to come together under a single image. We are also taking advantage of the opportunity to streamline many of our behind-the-scenes processes to help customers worldwide have access to the latest information. Over the next several months we'll be syncing up all of the websites and completing the effort. We still have more to do, but are liking what we see and hope you do too.



Three Operating Systems for RF500-Series Radios

Updated Product

Campbell Scientific now offers a choice of three operating systems (OS) for our RF500M UHF/VHF radio modem and RF500B UHF/VHF base station. This choice allows these RF devices to be used with most of our dataloggers (both current and retired), and better supports various communication needs.

The PakBus® OS is considered the standard for the RF500M and RF500B. It uses polling (RF-TD) to quickly and efficiently move data through a network. Additionally, each station can be individually dialed by LoggerNet. The PakBus OS is compatible with our current generation of PakBus dataloggers, as well as with retired dataloggers that have a –TD or –PB datalogger OS.

The ALERT (Automated Local Evaluation in Real Time) OS for our RF500M and RF500B allows for transmission, repeating, and reception of binary ALERT-formatted data. It is a derivative of the PakBus OS, and therefore supports both ALERT and PakBus communications, providing true two-way communication with a station. The ALERT OS is compatible with our CR200(X) series, CR800 series, CR1000, and CR3000 dataloggers.

Our newest option, the Dial OS, works with mixed-array and most PakBus dataloggers. With this OS, each station can be dialed by LoggerNet for downloading data and sending programs. The Dial OS also allows stations to create point-to-point networks for sharing of measurement and control tasks.

Learn More Here
campbellsci.com/rf500m-support

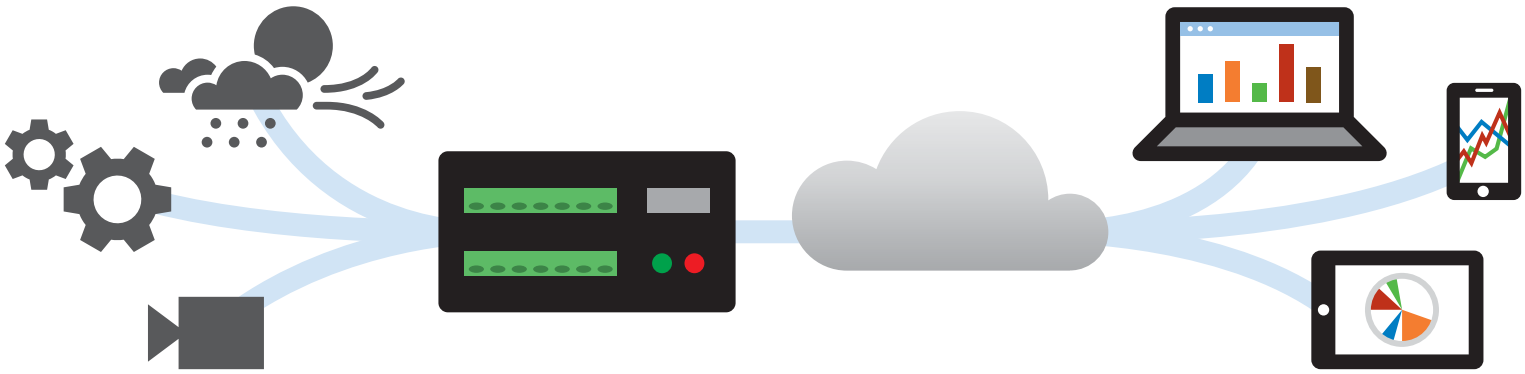
SP85 Solar Panel Replaces SP70

New Product

Our biggest solar panel just got bigger. The new SP85 solar panel has an 85 W typical peak power; its predecessor, the SP70, had a 70 W typical peak power. This new solar panel recharges the large-capacity battery used in systems with large power requirements, such as eddy-covariance systems. An external regulator (either the CH200 or 18529) connects the SP85 to the battery. Two SP85 solar panels can be attached to one 18529 regulator to provide 170 W of power.

Learn More Here
campbellsci.com/sp85

New Software—RTMC Pro 4.0 and CSI Web Server 1.0



New Product

In our last newsletter we reported on the web API supported by CR1000, CR3000, CR800, and CR850 dataloggers, and hinted that we were working on some exciting new features for RTMC Pro and our PC-based web server. In December, we released RTMC Pro 4.0 and a new web server that we've named CSI Web Server. There are many small enhancements that have been made to RTMC Pro 4.0, but the changes we're most excited about are CSI Web Server, Web Publisher, and a new HTTP datalogger data source.

CSI Web Server for Elegant, Interactive Data Displays on the Web

Our previous PC web server, RTMC Web Server, is a nice product, but it has some limitations. For one, RTMC Web Server is not interactive; thus, components that enable control of the datalogger or data displays that are set up for browsing historical data do not work.

CSI Web Server is fully interactive, and it's also secure—CSI Web Server uses basic access authentication with a user name and password to control what a user can do on a website. Multiple user accounts can be set up, providing full access, no access, read/write access, or read-only access. This enables the creation of a website that allows any visitor to the site to view the data, but only certain users who log in can make changes using the control components.

CSI Web Server supports HTTPS, uses HTML 5, and runs as a service. Since it runs as a service, you're guaranteed more up time for your web server displays.

Creating Websites With Web Publisher

The new Web Publisher makes it easier than ever to publish your RTMC Pro project to a web server. After your project is created in RTMC, launch Web Publisher from the toolbar, enter the IP address, user name, and password of the device that is set up to run the web server, specify a directory in which to publish the files, and press the Publish Website button. Web Publisher generates Javascript and other files for the project and saves them to the specified directory. You can then press the View Website button to see the data display in action.

HTTP Datalogger Data Source

RTMC Pro has a new data source that can be used to populate components—an HTTP datalogger source. This means that an RTMC project can be set up to display data directly from a CR800, CR850, CR1000, or CR3000 datalogger that is connected to the Internet*, without that data first having to be collected using LoggerNet.

A Winning Pair—Web Publisher and HTTP Datalogger Data Source

When you couple the new HTTP datalogger source with Web Publisher, you really have something exciting. You can generate a data display using RTMC that can run directly on the datalogger. Gone are the days of writing tedious WebPageBegin/WebPageEnd and HTTPOut statements in CRBasic to create web pages for your datalogger to display. We think this is really something to cheer about!

The Details

RTMC Pro 4.0 includes CSI Web Server and Web Publisher. Upgrade pricing is available for users who have an earlier version of RTMC Pro. CSI Web Server and Web Publisher can be purchased separately. Upgrade pricing is also available for users who would like to upgrade from RTMC Web Server to CSI Web Server.

Your Data—Anytime, Anywhere

These new tools allow you to quickly get your RTMC data and control displays deployed to the Internet, using a PC or a datalogger as the web server. Once on the Internet, your data is accessible using a PC, smart phone, or tablet—virtually any mobile device that can run a modern web browser**. You can control gates, cameras, or other instruments attached to the datalogger, or simply check on the weather, all from the comfort of somewhere other than parked in front of your PC. Download a free trial of RTMC Pro 4.0 with CSI Web Server 1.0 from our website and give it a try!

**To use the HTTP datalogger data source or use the datalogger as a web server, the datalogger must be connected to the Internet with its IP stack enabled (e.g., using an NL115, NL120, NL200, or cellular IP).*

***Requires a browser that supports HTML 5.*

Learn More Here
campbellsci.com/rtmcpro

Remote Monitoring Conserves Irrigation Water

Case Study

Alfalfa is a thirsty crop. It uses more than 20 percent of all of the irrigation water in California. The primary way of watering alfalfa is by flood irrigation. This normally results in heavy runoff, which wastes water and sends nutrients from the field into the water supply. To overcome this problem, a group of researchers from MBK Engineering, Indian Institute of Technology, and UC Davis recently sought to develop a more efficient way to flood irrigate.

Alfalfa fields are divided by low berms into long bays called "checks". Each check is flooded from the highest end, and the water flows in a sheet to the lower end. It is difficult to estimate when to shut off the water to prevent runoff. During the course of the project, the current practice for determining when to cut off the water supply was compared to a more automated method using dataloggers and sensors. The checks tested in this project are about 220 m (720 ft) long and 15 m (50 ft) wide.

The conventional method for determining water shutoff time requires the irrigation personnel to make several trips to the field. When testing the outcome of this practice,

6,000 to 10,000 l (1,600 to 2,600 gal) was wasted from each check every time.

For the new, more automated method, the research team designed a system in which three water sensors were buried, spaced in a row (following the direction of the water flow) toward the lower end of the check. As the water sheet proceeded down the field, a CR3000 Micrologger® recorded the arrival of water at each sensor, and used a cell modem to transmit that information to the irrigators.

The irrigation personnel then calculated the speed of the water's progress over the check, and used a water-advance model to calculate when to cut off the water supply and avoid runoff. In all of the irrigation exercises in this project where the new method was used, there was no runoff.

The experiment demonstrated the effectiveness of a system to measure and control flood irrigation for optimal efficiency. Since the field test, researchers have been working on a wireless system that can be left in the field for several years, monitoring up to 99 sensors within a 2 mi radius.

Learn More Here
campbellsci.com/ca-irrigation

SDM-CANHelper Simplifies CANBus Network Interfaces

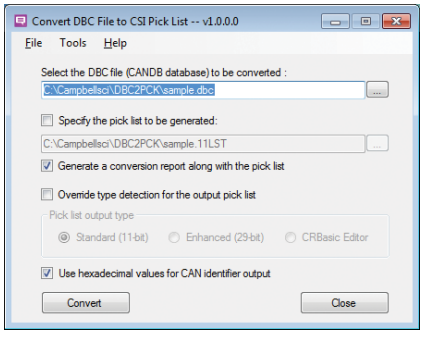
New Product

Good news for our automotive monitoring and testing customers! It just got easier to use an SDM-CAN Datalogger-to-CANbus Interface with our dataloggers.

SDM-CANHelper is an add-on program for our RTDAQ Real-Time Data Acquisition Software. This add-on program walks users through the process of configuring their SDM-CAN, connecting the SDM-CAN to the datalogger, sending an appropriate program to the datalogger, and setting up their datalogger to collect specific values from the CANbus network.

SDM-CANHelper is available, at no charge, from www.campbellsci.com/downloads. Users must have a valid installation of RTDAQ on their computer to install the SDM-CANHelper program.

Learn More Here
campbellsci.com/canhelper



SCADA Systems Help Connect Water Supplies

Case Study

In 2010, Trenton and Amalga, two northern Utah towns separated by only a few miles, created a plan to design and build an interconnection between their two municipal water systems. The interconnect system would automatically allow water from Trenton to flow to Amalga and vice versa, allowing the two towns to share water during emergency situations. To accomplish this, the towns worked with JUB Engineers of Logan, who contracted with Intermountain Environmental (IEI), also of Logan, to install a supervisory control and data-acquisition (SCADA) system to allow each town to view the status of their water system and control the interconnect system as needed.

Each town has separate water sources, pump tanks, and distribution systems, so the challenge was to connect them in a way that would easily allow sharing of water. Intermountain Environmental used the CR1000 Measurement and Control System (manufactured by Campbell Scientific) and VTScada software (by Trihedral) as the foundation for the SCADA system. The outcome was independent systems in each town.

The systems connect with numerous sensors via a Campbell multiplexer to monitor parameters such as flow and pressure from water sources into tanks, flow and pressure from tanks into the towns, tank level, and flood conditions at the building housing the system. The CR1000 uses a Campbell SDM-CD8S dc device controller to control pumps and valves, with each town controlling the valves to allow or disallow the water flowing to the other.

VTScada allows the town water managers to view the status of pumps, water levels, and door and hatch alarms. The software can send out alarms, and allows users to access their system information and control devices over the Internet as if they were sitting at the main PC at the town hall.

Each town received similar equipment and the systems are independent of each other. The CR1000 was used as a remote terminal unit (RTU) at each site and also as the programmable logic controller (PLC) at each base station. The dataloggers communicate with each other using Campbell's RF450 spread-spectrum radio. At each town hall there is a master station that consists of a CR1000 and an NL120 Ethernet interface. LoggerNet and VTScada run on Windows 7 PCs and communicate with the CR1000 master unit over Ethernet connections.

The system has been in operation since May of 2011.

Learn More Here
campbellsci.com/utah-scada

UL-Listed Data-Acquisition Systems

New Product

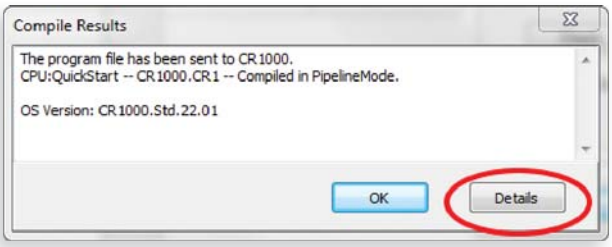
Campbell Scientific now offers UL-listed data-acquisition systems bearing the UL508A listing for enclosed, industrial, control panels. These preconfigured systems use ac power (solar-powered systems are not covered by the UL508A standard), contain one of our current dataloggers (e.g., CR800, CR850, CR1000, CR3000), and are housed in a 14 by 16, 16 by 18, or 24 by 30 in. enclosure. The UL listing pertains to the preconfigured system as a whole, rather than to the individual components.

To receive the UL508A listing, a preconfigured system is inspected to ensure compliance with Underwriters Laboratories (UL) requirements for grounding, overcurrent protection, wiring, labeling, and documentation. The system is then labeled with a UL mark, indicating compliance to USA and Canadian standards, and shipped with documentation per the UL standards.

Details, Details, Details!

Tips and Tricks

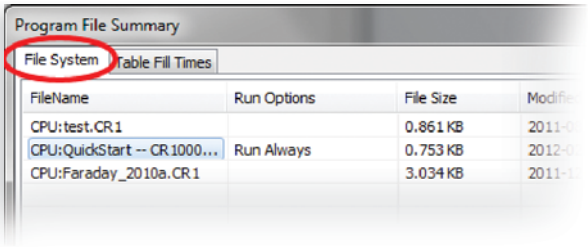
When you send a program to your datalogger through LoggerNet's Connect screen, you get a familiar Compile Results box.



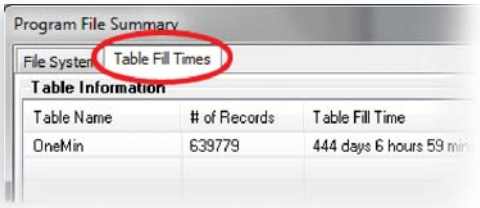
There is really good stuff here. First, check to make sure the datalogger compiled the program without any errors, messages, or warnings. The CRBasic editor can't catch them all. Next make at least a mental note of the operating system (OS) version running in the datalogger. Is it fairly up to date? OS version 24 is the latest and greatest.

LoggerNet 4.1 introduced a Details button. You are probably familiar with the old saying, "The devil is in the details," but there's no catch here—just a lot of information you might find useful. Let's take a moment to get acquainted with it. Pressing Details brings up the Program File Summary window. It has a lot of information about the files and tables stored on your datalogger.

The File System tab lists the files stored on the datalogger.



The Table Fill Times tab lists the tables in the datalogger, along with the maximum number of records each table can hold, and the estimated time it will take each table to fill.



So, remember! Before you okay-away a pop-up window, check the details. You never know who might be hiding there!

Devilishly yours,

Tip

Upcoming Trade Shows

Visit our website for training class schedules and additional listings.

MARCH

12-15	WSWS	Reno, NV
14-16	TRWA 43rd Annual Convention	Fort Worth, TX
25-28	GEO Congress 2012	Oakland, CA

APRIL

20	RMATA Exhibit	Mesa, AZ
23-27	USSD Annual Conference	New Orleans, LA
29-02	APWA Snow Conference	Milwaukee, WI
30-04	NWQMC	Portland, OR

MAY

15-17	ASES 2010	Denver, CO
15-18	ALERT Conference	Reno, NV
20-24	EWRI Congress	Albuquerque, NM

JUNE

03-06	Windpower 2012	Atlanta, GA
03-10	9th Int'l Wetlands Conference	Orlando, FL
10-13	WEDA	San Antonio, TX
10-13	IBC 2012	Pittsburgh, PA
19-22	Air & Waste Management	San Antonio, TX

JULY

10-12	Inter Solar 2012	San Francisco, CA

AUGUST

05-10	ESA 9th Annual Meeting	Portland, OR
20-22	StormCon	Denver, CO

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www.campbellsci.com
info@campbellsci.com
435.227.9000

815 W 1800 N
Logan, UT 84321