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WHEN MEASUREMENTS MATTER

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Cover Image - Gold Coast Australia

www.campbellsci.com.au/onlinearchive

Message From Rob

Campbell Scientific Australia (CSA) is backed by Campbell Scientific (CS) Incorporated in the United States. As well as supporting CS products we are also distributors of other world class instrumentation from international manufacturers. Our vision is to supplement our core business with CSA designed and manufactured products. The 2011 release of Hydrosense II has been a tremendous success and we have products currently under development for release next year.

We will shortly reach another milestone when our first shipping container of product from the USA arrives to stock the warehouse shelves at our new larger premises. Until recently our business was unable to sustain such large volume shipments and all goods were air freighted to Australia. This initiative will help maintain prices at competitive levels as well as enable CSA to hold more stock in country.

Last month I was fortunate to meet many of our distributors and customers while recently touring South East Asia. Many Australian companies are active in the region and our products are an important component in a range of turnkey solutions in environmental and compliance monitoring applications. To strengthen our support in the region we have added a distributor, P.T.CERNA Corporation, in the Philippines, details to be available soon on our website. We expect to announce further initiatives in South East Asia and Australia later this year.

As a global organization CS has recently embarked on a strategic analysis of worldwide company operations. As the group has grown, CSA included, product development capability and expertise in specific industries has developed in the regional companies. Often the experiences and needs of our customers spawn ideas for new products or product enhancements, so we encourage your feedback as end users of CS solutions. The annual September group companies' conference will review the findings to date and make recommendations to ensure CS and their customers can benefit from this expanding global presence and knowledge to remain an important provider of measurement instrumentation and services to governments, corporations and small business clients.

Finally Steve Bailey, Gavin Hewitt and myself will be attending the AHA Conference in Melbourne from the 21st August. As Gold sponsors, CSA have been exhibiting for many years now and it's been proven to be a great way to touch base with other key groups working in hydrology applications throughout Australasia. If you're attending please drop by and say hello. You'll find us at Stand 2.

Regards

Rob Kurz
Managing Director

CSA and Rockfield Technologies Reciprocal Training

Over the past month our new training room has been busy. CSA hosted a training day for the team at Rockfield and the Rockfield guys reciprocated with a highly valuable training day for the team at CSA.

Rockfield is an engineering company based in Townsville with clients such as Ergon Energy, Sucrogen, Main Roads, Xstrata, Rio Tinto, Fortescue Metals, ESCO, Hitachi & Cape Flattery Silica Mine.

Rockfield Capabilities:

> **Design** - certified design and design audits (mechanical, civil, structural)
> **Predictive Engineering** - fatigue life analysis and investigative root cause analysis
> **Concrete/Steel Structures** - aged structure analysis
> **Finite Element Analysis & Discrete Element Modelling**
> **Engineering Measurement and Testing** - on-site strain gauging, displacement, thermal, accelerometers
> **Computer Aided Drafting** – 2D and 3D drafting (Solidworks specialists)
> **Geotechnical**

If you would like more information regarding Rockfield and their services you can visit the Rockfield Website here

Wi-Fi Network Link Interface Available Soon

Campbell Scientific's NL240 is a wireless networking peripheral that provides Wi-Fi connectivity to our data loggers and peripheral devices over an 802.11b/g/n network. The NL240 unleashes the IP capabilities of the datalogger, delivers the power of PakBus networking, and unwires your serial-based devices. For on-the-go access, pair up the NL240 with our new LoggerLink Apps on your iOS or Android device (see LoggerLink article at right).

The NL240 is a low-power, industrial device that goes beyond the typical Wi-Fi serial device server. It offers unique and powerful PakBus networking capabilities, but is easy to configure. More importantly, the NL240 provides direct access to all the IP capabilities of the CR800, CR1000, and CR3000 data loggers, such as:

> M2M communication of data and events
> PakBus communication over TCP/IP for remote configuration, control, and data collection
> HTTP and FTP for posting, retrieving, and local hosting of data
> Email client for data and control messaging
> ModBus TCP/IP, DNP3, and NTCIP ESS industrial protocol support

The NL240 can take advantage of the thousands of Wi-Fi hotspots available in cafés, universities, hotels, and airports. Wi-Fi also provides encryption to protect traffic and uses a global set of standards so the same device can be used internationally.

By providing these powerful features, the NL240 can serve a wide range of applications to better meet your networking needs.

For more information please contact Daniel Roebuck at CSA.

New Operating System for CR800, CR1000, CR3000

Campbell Scientific is dedicated to continually improving our products in order to better meet our customers' needs and to keep pace with changes in technology. These improvements are particularly evident when looking at enhancements added to our data logger operating systems over the years. These are some of the great new features available with the upgrade from OS 24 to OS 25:

> Enhanced diagnostics for Campbell wireless sensor networks (CWSNs)
> Support for memory expansion with compact flash cards larger than 2 GB
> Support for the new NL240 Wi-Fi interface

For a detailed list of features added from OS 24 to OS 25, please visit www.campbellsci.com/70_103.

New features have increased the size of OS 25 so that CR800 and CR1000 data loggers manufactured before September 2007 (those with 2 MB of SRAM) will have to be directly connected to a PC running Device Configuration Utility to load the larger OS.* If you have a 2 MB datalogger and remote OS download is necessary (i.e., need to use TCP/IP), you can have your 2 MB datalogger updated to 4 MB. For details and pricing on the OS 25 memory upgrade, contact our office on +61 (0)7 4401 7700.

* All CR3000 data loggers have 4 MB of SRAM and will accept direct or remote downloads of OS 25. CR800s with serial numbers greater than 3605 and CR1000s with serial numbers greater than 11832 have 4 MB SRAM and will accept direct or remote downloads of OS 25.

Learn More Here
campbellsci.com.au/dataloggers

Station Provides Flood Warning & Road Weather Data

Networks using the ALERT protocol are designed to give immediate access to data that indicates the likelihood of flood conditions. ALERT stations typically are set up to acquire and transmit hydrological and meteorological data on a timed and event basis. What many users don't realize is that Campbell Scientific data loggers that are used to run ALERT stations have plenty of capability to spare, and that capability can be leveraged to perform a variety of services.

Douglas County, Colorado, in conjunction with Denver's Urban Drainage Flood Control District (UDFCD), operates an extensive ALERT network to monitor potential flood conditions. In 2008, the county decided that the next ALERT site they set up should also have a camera to monitor stream and road conditions, and a road-temperature sensor to aid the Public Works department with winter maintenance. This would give the station the abilities of a road-weather information system (RWIS).

To accomplish this task, Water & Earth Technologies of Fort Collins, Colorado, worked with Campbell Scientific to design and build the new site as a multipurpose system. The new system has a variety of features:

- The immediacy of an ALERT station
- Real-time and historical weather data for meteorologists
- A cellular router for remote data access and transmission to Weather Underground (WU)
- A camera to send images to WU and to the Public Works department

The Campbell Scientific CR1000 Measurement and Control Data Logger at the heart of the ALERT station was programmed to instruct the RF500M radio modem to transmit precipitation, water level, wind speed and gust, wind direction, and battery voltage to the UDFCD base station in Denver using the ALERT protocol.

In addition to this normal flood-warning role, the CR1000 acts as a web server, using cellular communications to provide other users with near-real-time images of the stream, along with the same type of data sent to the ALERT network, and temperatures for water, air, and road surface. A staff gauge was painted on one of the bridge piers to be visible by the camera, and this can be used to verify the performance of the water-level sensors. As a public service, the CR1000 is also configured to use its Internet communication abilities to send current data and camera images to the Weather Underground website (wunderground.com).

This weather station has no access to ac power, but is able to rely solely on solar power. The programmability of the CR1000 enabled use of power-saving techniques such as turning off the camera at night and powering down hungry sensors when they are not needed.

Campbell Scientific data loggers are great foundations for ALERT systems. And they are flexible enough to meet expanding needs and interesting challenges.

For more information please contact Dr David Hammond at CSA

Oz Flux 2012
Methven, New Zealand

In the first week of July, Dr David Hammond and David Boadle from CSA travelled to Methven, New Zealand, to attend the Ozflux annual conference. The hosts for the conference were Landcare Research New Zealand, the National Institute of Water and Atmospheric Research (NIWA) and CSIRO. It was apparent from the number of attendees at the conference that the Flux research community in Australia and New Zealand is thriving, and it was good to see so many new researchers utilising the capabilities of flux monitoring equipment within their research fields.

After an opening presentation providing updates on the Terrestrial Ecosystem Research Network (TERN) by Helen Cleugh of CSIRO, the conference speakers gave presentations on a wide variety of topics over the course of the 3-day conference. All around Australia and New Zealand Campbell Scientific equipment is being used in flux monitoring applications, whether it's to determine how much CO2 is left behind after mountain ash forest fires, how much groundwater disappears through Evapotranspiration, or to quantify the sources of Methane and Nitrous Oxide in agricultural locations, to name just a few applications, Campbell Scientific flux monitoring systems play a pivotal role by providing accurate, reliable data utilising industry leading sensors and data acquisition devices.

The newest flux measurement offering from Campbell Scientific is the IRGASON integrated open-path analyser and sonic anemometer, specifically designed for eddy-covariance flux measurements. The IRGASON simultaneously measures absolute CO2 and water vapour densities, air temperature, barometric pressure, three-dimensional wind speed, and sonic air temperature. For further information on the IRGASON or any other Campbell Scientific flux monitoring systems, contact either Dr David Hammond or David Boadle at Campbell Scientific Australia on +61 (0)7 4401 7700.

Above: Dave Boadle   *Above: Dr David Hammond*

Turn Your iPhone Into A Pyranometer

Interesting iPhone App by Hukseflux that allows you to measure solar irradiance by covering the forward facing camera on a phone with a diffusing pattern printed on white paper. Once calibrated against a known irradiance this could be useful in the field to test pyranometers are operating correctly.
http://www.hukseflux.com/products/pyranometerApp.html

Calling All Integrators and Consultants

We're going to launch our highly anticipated new website in around 6 weeks time. Are you a Campbell Scientific user who provides integration or consultancy solutions? If so, we would like to list you on our site so that customers looking for services such as yours can make easy contact. If you would like to be included, please email us with your website URL, your company name, a brief description of the services you offer and a high res logo.

Lightning Warning System For OH&S.
State-Of-The-Art Weather Monitoring System

Case Study

McConnell Dowell, an Australian and International engineering, construction, building and maintenance company, is using Campbell Scientific data loggers and sensors within its new state-of-the-art weather monitoring and marine navigation system installed at Hay Point in North Queensland. The main purpose of the system is for Operations Health & Safety, ensuring safe working conditions for McConnell Dowell personnel. Campbell Scientific equipment being used in the system includes three CR800 data loggers, three RIMCO rain gauges, one CS475 radar sensor being used for wave height monitoring, and the Campbell Scientific CS110 and Strike Guard Lightning Warning system.

The lightning warning system provides early warning of the potential for lightning strikes by measuring the local vertical component of the atmospheric electric field at the earth's surface. Combined with the Strike Guard optical-coincidence lightning sensor, which detects actual lightning strikes for up to 32 km from the installation site, a decision making algorithm provides early warning to site operators of the potential for lightning within the vicinity of the construction site. Integrated with the other measured parameters, the data is used to assist in decision making for Occupational Health & Safety.

McConnell Dowell now has the most unique weather monitoring system in Australia for its purpose. James Palmer from McConnell Dowell said 'the system has been of great benefit and vital importance from a safety and commercial perspective, and the equipment is very specialised for the project we have undertaken."

Work on interfacing the Campbell Scientific equipment into a complete turnkey solution for McConnell Dowell was undertaken by Marcom Watson, a Launceston based company specialising in Marine Electronics and Radio Communications and a recommended Campbell Scientific equipment integrator. Brett Victory, managing director of Marcom Watson, and their senior engineer Colin Kew, headed up the system installation in partnership with McConnell Dowell's Radio Communications Marine Navigations and Weather Systems supervisor James Palmer. James said "Brett Victory and the Marcom Watson team have been fantastic. I could not have asked for a more experienced professional and trustworthy team to work with." Dr David Hammond, Application Engineer at Campbell Scientific Australia, said "it was a pleasure working with Brett and the team at Marcom Watson in delivering state-of-art measurement systems they could interface into their custom-built weather monitoring system for McConnell Dowell. The quality of the final turn-key weather monitoring system provided by Marcom Watson is first class".

Marcom Watson is an Australian company originally formed in 1965 to provide product and support services to commercial and professional users of radio communications and maritime electronics.
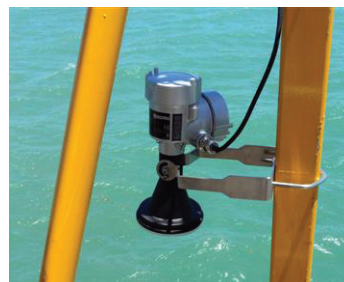info@marcomwatson.com.au
www.marcomwatson.com.au

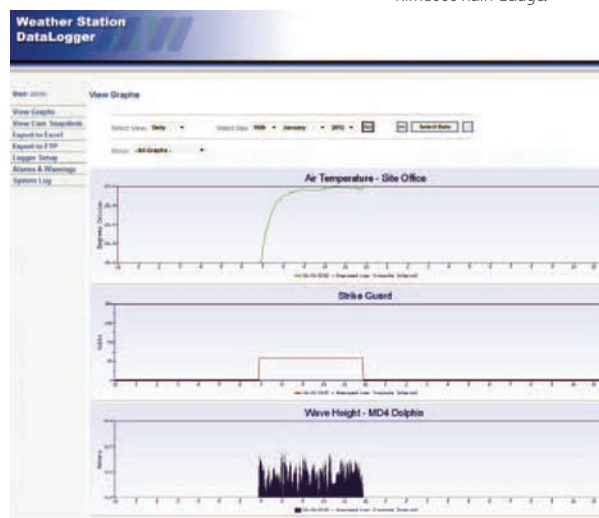*Above: Touchscreen - Real-time weather data with live video images.*

Above: Array of Sensors - Roof Mounted.

Above: Wave Height Sensor.

Above: Airmar PB150 Sensor & Rim8000 Rain Gauge.

Above: Data Logger displaying 24 hour data graphs.

LW110
New Lightning Warning System

Campbell Scientific now offers the LW110, a comprehensive lightning warning system. The LW110 continuously monitors local electric field for a 8 to 11 km radius, and automatically triggers visual and audible alarms when there is potential for lightning. Because warnings are based on measurements of electric field, instead of prior strikes, the system can detect lightning danger before strikes have occurred.

By measuring the electric field at your location, the LW110 removes the guesswork from critical decisions, such as when to seek shelter as a storm approaches and when it's safe to resume activities as a storm passes.

The heart of the new LW110 Lightning Warning System is Campbell Scientific's CS110 Electric Field Monitor. This innovative instrument measures atmospheric electric field using a reciprocating shutter that has minimal maintenance and better performance than the traditional rotating vane field mill.

To provide visual and audible alarms, the LW110 includes either the RA100 Strobe and Siren Alarm or the RA110 Remote Alarm System. The RA100 consists of red, amber, and blue strobes and a siren. The RA110 is similar to the RA100, but it can be installed several miles from the electric field monitor.

The LW110 can be customized to fit your project's specific requirements while retaining its turn-key functionality. Several mounting, power supply, and communication options are available. The LW100 can also include the SG000 Strike Guard Lightning Sensor to monitor actual lightning strikes as far as 32 kilometers away. Furthermore, the addition of meteorological sensors allows one LW110 to serve as both a standard weather station and a lightning warning system.

A variety of applications can benefit from the LW110 Lightning Warning System. Outdoor spectator events such as ball games, golf tours, and soccer matches can use this system to protect players and fans. Public swimming pools and other outdoor venues can also benefit.

Additionally, the system is ideal for industrial facilities. Personnel working in exposed locations or facilities dealing with explosives or fuels can take protective measures when warned of lightning danger. The LW110 can then trigger its alarm to indicate when the danger has passed, allowing work to recommence as soon as possible.

Learn More Here
campbellsci.com.au/lw110

For more information email Dr David Hammond

Need Logger Training?

Sydney CRBasic Training

Basic - October 22-24

Advanced - October 25-26

Register now to avoid disappointment.

This Sydney course will be our last course for 2012. If you would like to register for either the basic 3 day course or the advanced 2 day course, please complete our registration form and return ASAP. Please make sure to indicate if you require an update or a full version of the latest Loggernet software. We are happy to send the software prior to the course so you're up to speed and ready to go on the first day.

Learn More Here
campbellsci.com.au/training

How To Access Stored Data Records Using CRBasic Code

Tip

Nearly every program written for a Campbell Scientific data logger will include one or more data tables as a method of storing measurements or variable states for later analysis or diagnostics. In some cases it can be useful to recall previous stored records during run time for a multitude of operations. Once data table records are written it is possible to perform operations on previous data stored to maintain data integrity, trigger events or prevent double handling of data using an array for operations such as running averages or totals.

Usage

Accessing data table records requires the use of special syntax available in CRBasic, this syntax is uses the form
TableName.FieldName (FieldNameIndex,RecordsBack)

This syntax will access data from a specific Field of a DataTable Record. The TableName is the name of the table where the value to be accessed is stored. The table can be a user-defined data table or the status table. FieldName is the name of the field in the table, and it is always an array even when it consists of only one variable. FieldNameIndex specifies the array variable from which to retrieve data. RecordsBack specifies the number of records back in the DataTable the desired value resides (1 is the most recent record stored).

In the below example the current measured temperature (AirTemp) is stored in a data table named Temperature. These stored records are retrieved to calculate the change in temperature recorded 15 records ago (1 minute storage) compared to the current temperature.

```
Public AirTemp, Tdiff

DataTable(Temperature,True,-1)
  DataInterval(0,1,min,5)
  Sample(1,AirTemp,IEEE4)
EndTable

BeginProg
  Scan(1,min,5,0)
    Therm107(AirTemp,1,1,1,0,_50Hz,1,0)  ' Measure Air temperature
using a 107 thermistor
    ' Calculate 15 min temperature difference
    Tdiff = Temperature.AirTemp(1,1) – Temperature.AirTemp(1,15)

    CallTable Temperature
  NextScan
EndProg
```

This ability to access previous records within a data table allows the calculation of running totals, differences or averages to be achieved without maintaining an array. This syntax can also be used with other data table access options to keep track of fill times, new records or event based recording. A list of available syntax commands are below:

TableName.EventCount Used to access the number of data storage events that have occurred in an event driven DataTable.
TableName.EventEnd Used to determine when the last record of an event is sent to the DataTable.
TableName.FieldName Used to access data from a specific Field of a DataTable Record.
TableName.Output Used to ascertain whether data was written to the Output DataTable the last time that the DataTable was called.
TableName.Record Returns the record number of the record output n records back.
TableName.Tablefull Returns either 1 or 0 to indicate whether a fill and stop table is full or whether a ring-mode table has begun overwriting its oldest data.
TableName.TableSize Returns the size allocation, in number of records, of the selected DataTable.
TableName.TimeStamp Returns one time stamp element of the record output n records back.

In the next example the syntax TableName.Output will be used to detect new records and calculate a running total of rainfall in the previous 1, 12, 24, 48 and 72 hour periods. The rainfall is stored at one hour intervals in the Hourly data table and each record is accessed and added to an accumulator, when the accumulator reaches each multiple of hours the current value is moved to a corresponding variable.

```
If Hourly.output(1,1) = True Then    ' If new Hourly table record
  RainTotal = 0                ' Reset the raintotal variable
  For RainDataPos = 1 To 72   ' 72 hours at one hour per record
    RainTotal = RainTotal + Hourly.Rain_mm(1,RainDataPos)    ' Get
Rain record from RainDataPos
    If RainDataPos = 1 Then RainTotal1Hr = RainTotal
    If RainDataPos = 12 Then RainTotal12Hr = RainTotal
    If RainDataPos = 24 Then RainTotal24Hr = RainTotal
    If RainDataPos = 48 Then RainTotal48Hr = RainTotal
    If RainDataPos = 72 Then RainTotal72Hr = RainTotal
  Next RainDataPos
EndIf
```

The use of data access syntax within your program can greatly simplify coding during testing data tables and allows operations on your data to be performed without maintaining complicated arrays, time intervals or incrementing variables.