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CAMPBELL SCIENTIFIC Australia, Pty Ltd

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A Message from Rob

Dear Campbell Scientific Australia Readers,

In my first update as Managing Director I would firstly like to thank you all for your continued interest in our products and solutions. Our business remains strong and we are investigating ways in which we can better service our markets.

I had the chance to meet with some of you at OzWater and customer meetings and the feedback about CSA has been mostly positive.

One area that we hope to improve on is lead times for our products. We have literally thousands of different items we manufacture and supply so it will be a challenge to attain and then maintain improvements.

Supply of cables is an area that suffers from multiple product variants, due to length and connector types. We believe that by manufacturing more cables to order in Australia we can improve variant options and lead times considerably.

We are also asking our customers to provide non-binding purchasing forecasts to help us determine the type and quantity of product to stock in Australia, and also pass on parts requirements down through our supply chains to support local production where applicable. All feedback no matter how insignificant it may appear to you, when compiled from across our broad customer base will help, so we do appreciate any numbers you can provide.

As an organisation with immense knowledge of instrumentation products and their practical use we can also perform product integration tasks including pre-wiring of enclosures for powering and telemetry equipment as needed.

Please feel free to contact our Application Engineers about your specific needs to define your customised solution and how we can help. Finally over the next month we will be installing some new customer management software tools that will assist us to better manage your requests for information, quotes and support. I will comment more on this in our next newsletter.

Regards,
Rob Kurz

ozwater'11
09 - 11 may 2011 • adelaide

In May, Dan and Rob attended Ozwater '11, Australia's premiere water quality conference and exhibition. The event is run and organised by the Australia Water Associate, with this year's theme being "Water for Health: Towards Sustainable Practices". The welcome dinner set the standard for the show, with no shortage of tasty and colourful food.

Over the course of the three day expo, they met many customers old and new as well as fostering new partnerships and discovering new potential markets. They were happy to see long-time customers ALS, Agua and Department for Water Adelaide, all of whom praised the quality and reliability of our products.

There was much interest in our hydrology sensors, especially the up-coming OBS500, a turbidity probe with a motorised cover, only retracting when making a measurement. This probe will prove highly useful in environments where fouling is a problem, as is often the case in coastal monitoring. It was Rob and Dan's first trade show and was an interesting and informative experience for both, with a wide variety of companies and industries on display. Rob and Dan also took the chance to explore a little of Adelaide, experiencing some fine German cuisine in the evening.

The boys would like to thank the AWA for putting on such a fantastic show.

CSA Exhibiting at AFAC / CRC Bushfire Conference
29-31 August Darling Harbour , Sydney
Come and see us at Stand 86
We'll be demonstrating our
FireHawk 500 Quick Deployment Weather Station

Don't forget to check out our latest video tutorials and product highlights on YouTube.
You'll also find videos explaining what you'll learn in our Basic and Advanced CRBasic courses

The Art Of Weather

Campbell Scientific have an embedded culture of supporting fresh thinking in science and this year our UK sister company CSL were proud sponsors of a ground-breaking installation that brought science directly into the realm on the arts.

The Variable 4 project uses changing weather conditions, measured by a Campbell Scientific weather station, to create a unique musical experience which was performed as a 24 hour installation piece on Dungeness Headland in Kent on May 22nd. Here is how Daniel Jones, one of the projects composers, describes the event:

"Variable 4 transforms weather patterns into a living musical composition with the same instability and unpredictability as the elements themselves. Using meteorological sensors connected to a custom software environment we have developed, the wild weather conditions of the Kent coast-land are used to generate new combinations of musical forms, heard through a field of speakers embedded invisibly into the landscape."

Variable 4 takes live weather data from the environment using a research-grade weather station, Campbell Scientific's BWS-200. This information, updated every few seconds, is used to drive a web of compositional processes which result in a dynamic composition which responds in real-time to the current atmospheric conditions.

At the core of this process is a piece of software which plays the role of conductor, navigating across a map of movements which correspond to potential combinations of weather. This motion takes place over the course of minutes and hours.

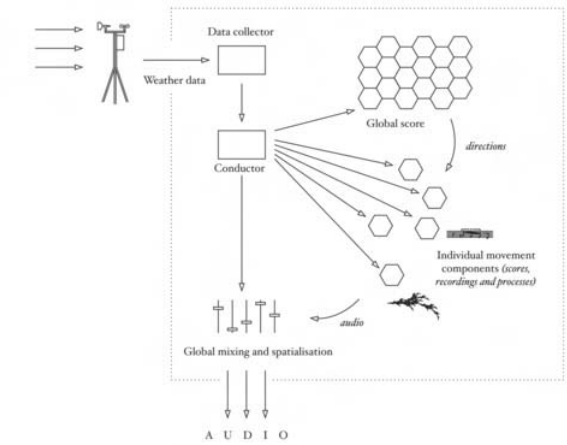
Photo courtesy of Louis Mustill

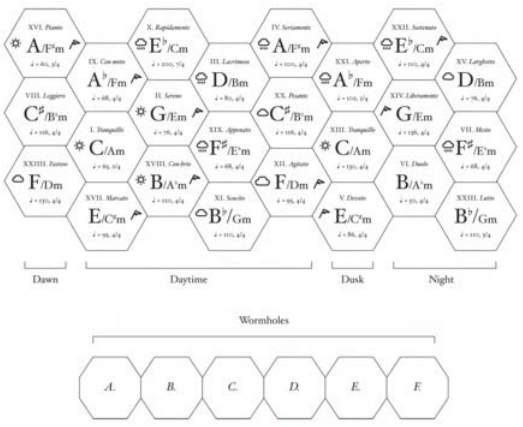
On a more fine-grained level, each movement itself comprises of score fragments and compositional processes, which are altered and recombined by second-to-second changes in the surrounding weather.

Finally, the combined output of these musical elements is diffused over an arrangement of 8 speakers by a spatialisation component, itself also determined by weather data.

Score.

The hexagonal lattice below maps out the 24 movements that make up Variable 4. Each hexagonal tile represents a movement, corresponding to a set of weather conditions: temperature, humidity, wind speed, solar radiation and rainfall. As the piece plays, its position can always be located on this map, constantly shifting between movements according to the changing atmosphere.





We can help you forecast many environmental parameters but....
We're not very good at forecasting your purchases.
Help us help you by letting us know in advance of any possible large orders.

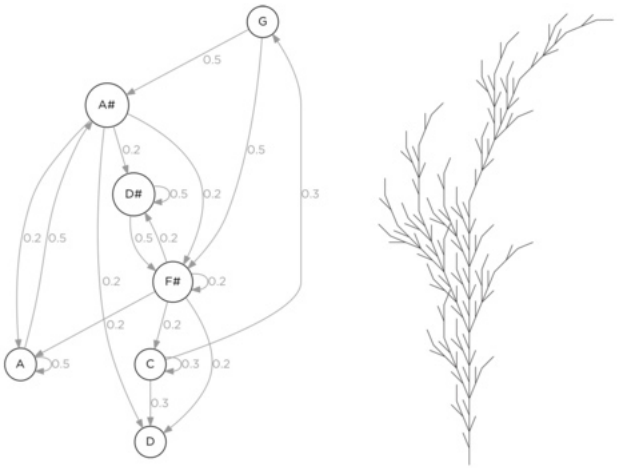
product in action cont.

Each movement also has a key signature, tempo and metre, determined by its related weather state. These are spatially linked according to the circle of fifths (and circle of fourths), a musical relationship common within Western music, making it possible to move between movements without harmonic dissonance. Try moving diagonally north-east from any movement, wrapping from top to bottom, and you will see that you continue to move upwards in key by one fifth per tile.

If the weather changes so quickly that the location is caused to jump between distant movements, the piece enters what we term a 'wormhole': an arrhythmical and often atonal bridge, which serves to join two unrelated musical elements.

Algorithms

Alongside the precomposed parts of each movement are compositional processes, or algorithms: sets of instructions which encode musical behaviours, capable of recombining existing material and generating entirely new sequences of notes. These serve to massively increase the scope of potential patterns produced by Variable 4, and enable us to respond closely to the finer details of the meteorological conditions.



On a movement-wide level, chance procedures are used to move between fragments according to sets of relationships designed at the compositional stage. The dynamic recombinations of these parts generate polyrhythms and composite tonal structures.

At the level of individual notes, a second set of algorithms are used to compose original note patterns. With structures drawn from mathematics, statistics and biology (above), these can continually produce sequences that are surprising even to the composers.

Variable 4 is comprised of 24 musical movements, each of which contains scored, recorded and programmed elements. Every movement also corresponds to a set of meteorological conditions:

* temperature
* rainfall
* wind speed
* humidity
* sunshine hours

If the current weather conditions correspond to a given movement, the piece will gradually begin to transition towards this movement.

On top of this piece-scale layer, multiple elements are operating over shorter timescales which respond to more immedate weather conditions (wind direction, short-time wind speed, solar radiation) to give finer details. These, too, are related to each movement.

The movements are numbered following the Circle of Fifths, and subtitled according to Italian tempo or expression markings which best describe their mood.

Wormholes

In the context of this piece, a 'wormhole' is an arrhythmical and often atonal bridge, which serves to join two unrelated musical movements.

There are six wormholes within the piece, derived from a broad range of source material. Each wormhole is algorithmically manipulated by the current weather conditions on a variety of different levels.

Photo courtesy of Louis Mustill

Composers - James Bulley & Daniel Jones

More details can be found at www.variable4.org.uk or by following the project's Twitter page at http://twitter.com/variable4

Article Reprint Courtesy of CSL

new products

CS120 - Visibility Sensor

The CS120 Visibility Sensor, manufactured by Campbell Scientific at our European headquarters in the UK, uses tried and tested infra-red forward scatter technology and utilises the proven 42 degree scatter angle to report Meteorological Observation Range (MOR) for fog and snow in the range 10-30,000 m. High speed sampling improves the accuracy of measurements taken during mixed weather and during events which return intermittent signals such as rain and hail.

The CS120 contains integrated low power heaters to prevent the build up of dew, and a higher powered heater for anti-icing purposes, all automatically controlled for simple operation in all weather conditions. With a power draw of just 3W during normal operation including the dew heaters, the CS120 is a power efficient instrument ideal for stand alone applications or in combination with automatic weather stations in road, marine aviation and wind energy environments.

CS650 Soil Water Reflectometer

The CS650 reflectometer, a new multiparameter smart sensor for use in soils and other porous media, is now available. The CS650 measures dielectric permittivity, bulk electrical conductivity (EC), and soil temperature, and uses these measurements to estimate soil-water content for a wide range of mineral soils. Innovative techniques allow this new reflectometer to make more accurate water content measurements in soils with bulk EC up to 0.8 dS m-1 without performing a soil-specific calibration. The CS650 has 30 cm rods and a sensing volume of 7.8 liters. This new smart sensor communicates with a datalogger or computer using SDI-12 or RS-232 protocols.

Register Today for the Next CRBasic Training Course

"Very valuable - wish I'd done it earlier"

"Trainer excellent - will be sending more people"

"Same as in the field - excellent subject expert"

"Very happy with what I'm going away with"

"Fantastic presenter"

Our next open training course will be in **Sydney October 24 - 28,** 2011.

Simply complete the registration form and return to tracy@campbellsci.com.au.

Mining

Australia's coal seam gas industry is ramping up but compliance with stringent environment laws will ultimately determine the success or otherwise of development projects. Effective water and brine management has become the lynch pin for reaping the rewards of what appears to be shaping up as a modern day gold rush. Daniel Roebuck sheds some light on why adopting an environmental management system is crucial to long term success and why investment in Best Practise Water Management can even increase profits.

Conventional wisdom places environmental practices as an obstacle and burden to mining operations – an obstruction to the actual running of a business. Nothing could be further from the truth. For a savvy mining operator, an environmental management plan can be a highly useful tool for maximising profit margins, minimising potential liabilities, increasing efficiency and gaining positive publicity.

An Environmental Management System (EMS) in Australia means implementing an international standard of consistent improvement – namely, ISO 14001. A company which complies with ISO14001 in a given review period will be issued a certificate to that end and will enjoy greater relations with other ISO14001 compliant companies. Having a compliant EMS also serves as significant protection from legal issues, often preventing costly and image-damaging litigation.

ISO 14001 is not designed to dictate to Managers how to run their companies; it is a tool for improving efficiency of business systems and environmental performance. Having an EMS can be a competitive advantage in the tender process, leading to increased tender success and increased business success. Having a certified EMS is a requirement to entering some Japanese or EU markets.

Environmental risk categorisation and rating is a part of a successful EMS, improving your organisation's ability to manage and mitigate risk associated with the environmental effects of mining operations and their after-effects. Recycling waste and reusing energy is also a key part of an EMS, allowing organisations to reduce operating costs, increasing profit margins. For example, following the Queensland floods earlier this year, water produced as a result of coal seam gas extraction was allowed to be used for removal of mud and debris from flood-affected buildings given that the water quality passed suitable criteria. This produced goodwill and positive publicity for the participating companies, possibly increasing public support for further mine development.

The essence of the ISO14001 standard is that it is a positive feedback loop – to maintain their certificate, a company must improve its environmental management measurably every year. One method of doing this is to introduce automated data logging of important environmental variables, such as the salinity of runoff, or the suspended solids in tailings dams. Automatically logged data can be used to construct much more detailed models than manually collected data, as it can be collected more frequently with ease. Another advantage is that automated collection allows real-time monitoring of on-site conditions, without waiting weeks for lab analysis of samples.

Campbell Scientific Australia is based in Townsville, Queensland and has been a leader in water quality measurement for 18 years, with hundreds of sites across Australia boasting Campbell sensors and data loggers. The company offers automated, on-site logging of water quality data including turbidity, suspended solids concentrations, water temperature, water depth, electrical conductivity, salinity, pH, oxygen reduction potential and dissolved oxygen.

Dissolved solids concentrations are especially important for water quality in an EMS, as standards are set for the

applications cont.

suitable use for water in tailings dams etc and often have a maximum allowable suspended solids specification for a given application.

For example, the flood water cleanup mentioned earlier allowed CSG water which met criteria of pH, suspended solids and electrical conductivity (often used as a measure of salinity) to be used for that purpose. Different requirements must be met to allow waste water to be used for dust suppression or for revegetation. Campbell Scientific Australia can provide real time monitoring of these criteria, allowing business decisions to be made quickly with instant and historical data available easily. A simple system for a small tailings dam might cost approximately $25000, a negligible cost compared to the overall cost of running a mine.

Real time data logging of water quality is a vital component of an EMS for mining companies and Campbell Scientific Australia's Application Engineers have the expertise and flexibility to make the integration and support of on-site sensors a successful and profitable project.

New Solar Sensors from Kipp and Zonen

Several new Kipp and Zonen sensors are now available for solar-energy research applications. A complete solar monitoring station for research or solar prospecting typically measures global horizontal radiation (GH), direct normal irradiance (DNI), and diffuse radiation.

For monitoring GH, Campbell Scientific offers the CMP6, CMP11, and CMP21 pyranometers. These pyranometers measure solar radiation with a high-quality blackened thermopile protected by two glass domes. Based on differences in accuracy and performance, the CMP6 has an ISO classification of First Class, and the CMP11 and CMP21 have an ISO classification of Secondary Standard. The CMP21 also includes an internal thermistor allowing individually optimized temperature compensation of the measurements. The optional CVF3 Ventilation Unit is offered to keep the domes of any of these pyranometers free from ice, dust, and dew.

To monitor DNI, a CHP1 Pyrheliometer is mounted to the Solys2 Sun Tracker. The CHP1 pyrheliometer measures the direct-beam solar irradiance with a field of view limited to 5 degrees. The limited field of view requires the CHP1 to be continuously pointed toward the sun. The Solys2 Sun Tracker rotates on two axes and uses a GPS receiver to keep the CHP1 aimed at the sun throughout the day.

Diffuse radiation is measured using a CM121 shadow ring with a CMP6, CMP11, or CMP21 pyranometer. The ring is installed so that its shadow completely covers the pyranometer's dome as the sun moves across the sky.

Preserving King Tut's Tomb

Reprint Courtesy of CSI

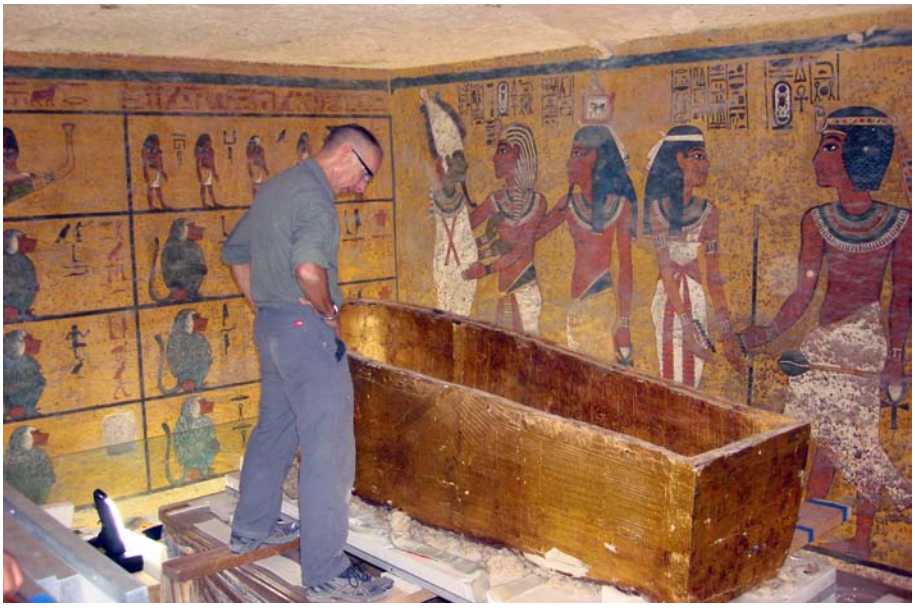
In 1922, when the tomb of Tutankhamen was discovered in Egypt's Valley of the Kings, the tomb was full of treasures, artwork, and other artifacts. In most other tombs that archaeologists discovered, these things had been stolen or vandalized before preservation-minded people could protect them. Tutankhamen's tomb has stayed largely unmolested up to this day, and is now one of the most-visited sites in the Valley of the Kings.

The tomb walls are covered with priceless murals, but as time has passed, the paintings have begun to deteriorate. Since the large number of visitors may be contributing to the problem, Egypt's Supreme Council of Antiquities (SCA) and the Getty Conservation Institute are collaborating on a three-phase plan to evaluate and manage the effects of visitors on the condition of the tomb.

Phase 1 includes measuring the microclimate inside the tomb and in the outdoor area just outside of the tomb. Sensors measure air temperature, humidity, and carbon dioxide, and count the number of visitors.

The data is captured with a Campbell Scientific CR10X datalogger (to be updated to a CR1000 when political conditions permit) and transmitted via cell modem to a land line and then to the project's headquarters at the Getty Center in California. The data are then posted automatically on the project website.

During Phase 2, the Getty and the SCA will analyse the data and determine what effect visitors have on the micro-climate of the tomb, and what effect any changes in the micro-climate have on the deterioration of the tomb paintings. They will then design strategies to manage the tomb environment and to prevent or repair damage to this priceless treasure.



Phase 3 will entail implementing new procedures, and continuing to monitor the micro-climate to gauge the effectiveness of the visitor-management strategies. The caretakers of the tomb will also continue to study ways to preserve the tomb and the murals.

Field Testing the Shippingport Bridge

The Shippingport Bridge spans the Ohio River in Beaver County, Pennsylvania. Constructed in 1961, the main river crossing is a three-span, combined deck/through-truss bridge more than 1,300 feet long. As part of a larger evaluation and rehabilitation project, Lehigh University's Advanced Technology for Large Structural Systems (ATLSS) Research Center performed field-testing of this bridge. The scope of the work included controlled-load testing using a test truck of known geometry and weight, and long-term monitoring of the bridge during normal traffic. The ATLSS then used the collected data to estimate the remaining fatigue life at critical points on the bridge.

Strain gauges and displacement sensors were installed throughout selected spans in locations known to be fatigue sensitive or that would provide insight into the global load distribution characteristics and general behaviour of the bridge. The data were collected using a Campbell Scientific CR9000X datalogger, which then transmitted data via wireless modems to a server located in the ATLSS Centre, 300 miles away in Bethlehem, Pennsylvania. This link was also used to upload new programs as needed.

Reprint Courtesy of CSI

Versatility in a Data Logger

Our two main markets are quite diverse – we have academic and research based customers using our equipment for meteorological applications on the one hand and an industrial customer base measuring stresses and strains on the other.

Whilst these two are our biggest markets there are dozens of other equally diverse uses for our loggers – from automotive testing to aquaculture; from noise level monitoring to renewable energies; from agriculture to vulcanology. Our data loggers are well known for their low power consumption and reliability there is another attribute which is often overlooked – their versatility to measure virtually any electronic sensor type. We don't make a temperature data logger or a humidity data logger. We make generic data loggers capable of measuring all those things, simultaneously if you like, and a whole lot more besides.

Whilst exact specifications vary across the models, typically our loggers offer:

Analogue Inputs - for voltage measurements, single ended or differential, with voltage ranges to optimise the measurement resolution. Typical sensors measured in this way include thermocouples, thermistors, resistive bridge, vibrating wire, and 4-20mA.
Pulse Counter – for measuring switch closure, low level ac sine wave and high frequency pulses. This means we can measure things like rpm, velocity, flow and rainfall intensity via sensors such as anemometers, flow meters and tipping bucket rain gauges.
Digital Ports – for detecting status, reading SDM peripheral and SDI-12 sensors and for controlling external devices.

Don't think though that such flexibility makes a Campbell logger a "jack of all trades, but master of none"; quite the contrary in fact, our loggers offer precise, accurate measurement for every sensor type they interface with.

Versatility doesn't end with the measurement capability either, it extends to the communication types supported, the control functionality and the range of available peripheral devices too. The final consideration is the programmability of our loggers which binds all the functionality together by providing virtually unlimited control to optimise the logger to a specific task.

Reprint Courtesy of Iain Thornton CSL

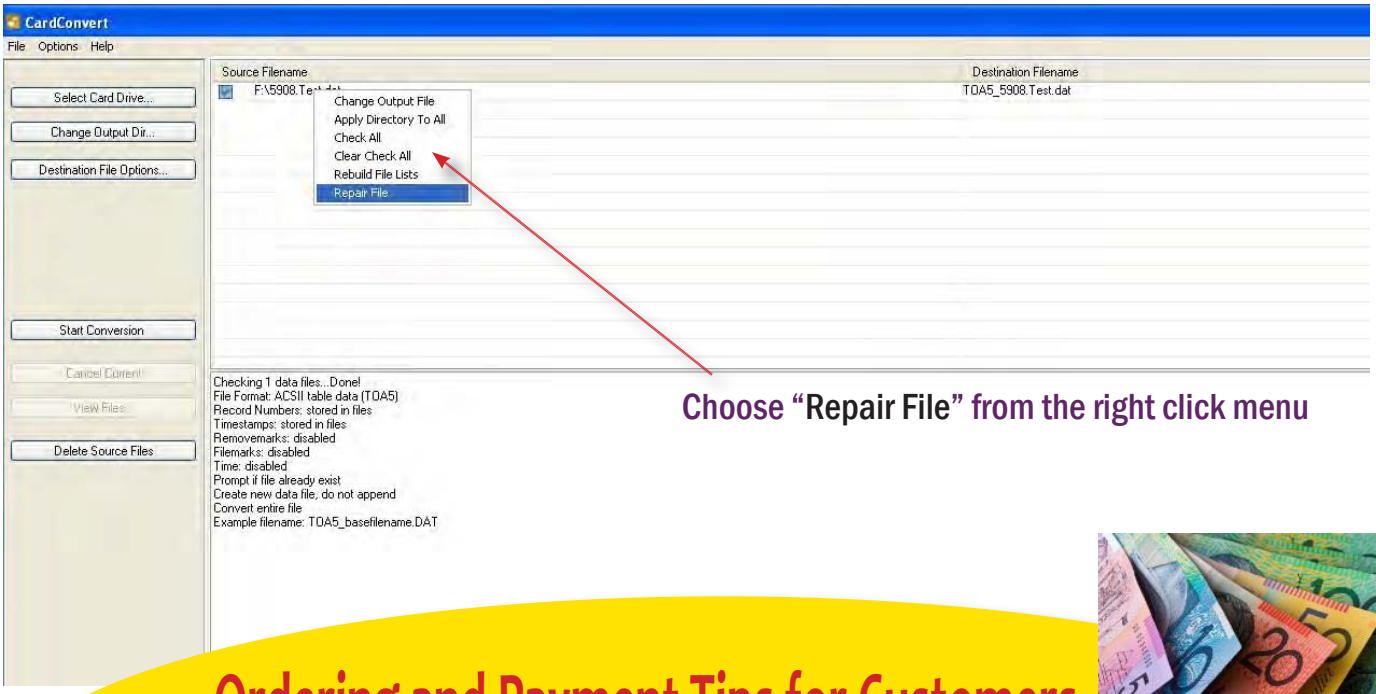
Repairing Corrupted Data in CardConvert

"In some instances, data on a compact flash card can become corrupted. Corruption can occur if the card is subjected to electrostatic discharge or if it is removed when data is being written to the card (e.g., the card is removed from the CFM100 without pressing the Card Control button to stop data storage to the card). This corruption can be at the beginning of the data file or anywhere within the stored data. Using the standard conversion option, CardConvert will stop if it encounters a corrupted frame of data because it assumes it has come to the end of the data file. If corrupted frames of data are found at the beginning of the file, CardConvert will display a message indicating that no data could be found on the card. If corrupted frames of data are found within the data file, you may get some, but not all, of the data that you expect in the converted file.

CardConvert offers a repair option, which will attempt to scan the card for good frames of data and output that data to a new binary file (the original file is unchanged). To start the repair of a file, highlight the suspected corrupt file in the list of Source Filenames and right-click to display a floating menu. Select the Repair File option from the list. The repair process will create a new TOB3 file (the default name is Repair_existingfilename), which can then be converted to an ASCII file using the standard CardConvert process.

When CardConvert comes to what it believes is the end of the data file during the repair process (the end of valid frames), it will stop and display a message. The message prompts the user either to continue searching the file for more good data frames or to stop the repair process. CardConvert displays the last time stamp for data in the repaired file. If you think there should be additional data on the card, you can continue to run the repair process. If it appears that all the data has been stored to the new file, you can stop. The option to continue processing the file allows you to recover all good data on a card with more than one corrupted frame.

Note that CardConvert can repair only TOB2 or TOB3 files. TOB1 files cannot be repaired."



Ordering and Payment Tips for Customers

- **Please include your quote number when you place an order.**
- **Please ensure that bank transfers include the invoice number and/or company name as a transaction reference.**