

Sending out the Right Signals – ‘Automation and Control’, August/September 2005

The electronics sector in Canterbury has produced a number of winning enterprises and their technologies. Christchurch-based Geoff Anders reports on one company that specializes in on-farm products.

EDAC (Electronic Data Acquisition and Control) is one of Canterbury’s many electronics manufacturers. The company began as a contract manufacturer for the local technical sector and has progressed into developing its own products.

EDAC currently specialises in ‘on-farm’ technology. The nucleus for this was a dialler product they made more than ten years ago that sends recorded phone (landline) messages in response to events at remote sites. Many of the diallers are still in use.

Today, EDAC’s SMS300 is a similar concept that uses the cellphone networks to send text messages so a landline is not required. Messages can be sent in either direction via GSM or CDMA networks.

The SMS300 is a rugged component designed to survive in indoor industrial conditions or outside when mounted in an IP67 enclosure. It needs a power supply, cellphone coverage, contract and antenna.

The power supply (12-28V AC/DC) can be by solar panel or mains with battery backup. EDAC has PB20 battery backup units available that are designed to support the SMS300 for up to 24 hours.

In addition, an externally-mounted antenna can be chosen to suit site conditions.

Messages can travel in either direction for monitoring and control and the unit can be interrogated at any time for the status of inputs. It has eight inputs which can be used to monitor sensors or equipment. They are ten-bit and may be analog or digital with a scan rate of less than one second.

Engineering units can be specified to suit sensors and have scaling and zero offsets for each input. High and low alarms and resets are similarly configurable, while analog inputs may be 0-5V or 4-20mA. Alarms can be set to directly activate outputs and/or send a message. Configuration is via RS-232 or SMS (Short Message Service) and a supplied configuration utility. Four relay outputs – 2A, 50V AC/DC – are available that can be remotely or automatically controlled in response to message or inputs.

The unit has a capacity of sixteen phone numbers able to be programmed up to international format so messages can be sent worldwide via any network linked to the host network. Messages can be sent to any combination of these numbers. Each alarm message can be up to twenty characters and each also carries a similar size site identification tag. Shorter messages may be configured. The modem can operate in ‘through mode’ to provide a wireless serial link to an external device such as a PLC or

PC and messages received can be forwarded via the serial port. Inputs and outputs can be logged to internal memory or a web-based database.

The SMS300 has a real-time diagnostic interface that, when connected to a laptop via the serial port, shows the condition of all I/O as well as network status and RSSI (Relative Signal Strength Indication, as on your cellphone).

Ideally suited to many industries, the SMS300 is a compact communications device that allows wireless remote alarm monitoring and control via cellular networks in real-time. Applications include monitoring tank levels, temperature, humidity, flow, pressure, load, light levels, almost any parameter that can be measured by an industrial sensor. Site security status can also be monitored in various ways.

From industrial or agricultural use of individual SMS300 units or clusters of them, right down to opening the gates and cranking up the heating of your mansion, there are obviously many uses for this technology.

e-Frost and e-Harvest

EDAC also manufactures the e-Frost and e-Harvest.

e-Frost, as its names implies, is a frost detecting unit that sends a warning to a mobile phone, heating device or web-log – while the e-Harvest is a dry matter analyzer. For the uninitiated, ‘dry matter’ is a critical measurement of a crop as it governs the time it is harvested to be at its best as well as determining its market value. The unit is portable and simple to use with no operator bias. The process is fully automated and is controlled by a microprocessor ensuring accurate and repeatable results with no burning or degradation of the sample. The unit has a fully integrated heater, fan, measuring and control components.

Resistance Bridge Calibrator

Electrical resistance bridges are used in many applications, of which temperature measurement is amongst the most demanding. This can require the measurement of resistance ratios with errors of less than one parts per million. Whilst being potentially extremely accurate, all such bridges pose a problem in verifying their accuracy and traceability. High-accuracy bridges, particularly, are susceptible to mechanical shock, and the travel involved in sending them to a calibration facility may render a calibration useless. An inability to calibrate on-site also means production downtime during calibration.

Rod White of Industrial Research Ltd has developed an innovative measuring technique that enables every resistance bridge user to calibrate their bridges in-house. Manufacture of the Resistance Bridge Calibrator (RBC) was taken up by EDAC in partnership with IRL. The RBCs are available in two standard versions (RBC100 and RBC400) to suit the most common thermometry bridges, and special models can be made to order.

RBCs are able to measure bridge accuracy to better than 0.1ppm. A supplied Windows application interprets the results and produces performance graphs and charts.

The instrument itself uses four high-accuracy metal film resistors with temperature coefficients of less than 0.3ppm/degrees Celsius (please read that figure again!). A matrix of eight switches allows the four resistors to be compared in up to 70 different ways, effectively giving 66 independent measurements of the bridge response. Resistance values are chosen to ensure that all of a bridge's functions and components are working correctly. As the bridges measure resistance ratio, the calibration does not need to be traceable directly to national standards for electrical resistance (the ohm), so an RBC allows a bridge to be calibrated on-site at any time. Testing takes only an hour or so.

The calibrator is manually operated and completely passive, so needs no power input, although there is a battery powered display to show each resistance combination as they are cycled during a test.

RBCs are now in service in national standards and calibration laboratories worldwide.

At the 2003 Westpac NZ Hitech Awards, EDAC received several highly commended awards.