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# TechniTalk

Spring 2015

## Welcome to the Techni Measure Newsletter

Whether you are reading this for the first time or have been following our series of publications, we hope that our twenty fifth edition of **TechniTalk**, continues to inform readers of new products, whilst providing technical suggestions on how or where these products might be used. If you are reading this for the first time and want to be added to our contact list for future copies, or you would rather receive this publication electronically in the future, please let us know.

## Techni Measure Limited

The most important news for us this year is the formation of Techni Measure Ltd, to continue the family Partnership business that was established by Frank & Betty Ramage back in 1971. Peter and Ian continued the business, following their father's death in 1985, and sister Patricia joined the Partnership in 1990.

The recent change has been brought about by the retirement of both Peter Ramage and Patricia Newton, leaving Ian Ramage, who has been with Techni Measure for the last 35 years, to continue the family business along with his eldest son Andrew, and son-in-law Steve Brown. We are pleased that all our suppliers are supporting us in this endeavour, and we look forward to building on the strong foundation that has been built up over 44 years of business.



Our address at Alexandra Buildings and contact details remain the same, although to help with the transition from Partnership to Limited Company, we have set up a new bank account and VAT number.

Our regular customers may have noticed a slight change to our company logo, and we have also introduced a completely new computerised ERP system for our order processing and customer records. This Enterprise Resource Planning software will enable us to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources. It will enable us to be more efficient in the future and therefore allow us more time to help our customers. If anyone is in the area, please call in and see us.

# Product News



## Triaxial Vibration Logger

Dytran Instruments has introduced the 4400A vibration logger system, which they are calling the VibraCorder. Utilising a built-in triaxial DC accelerometer with a MEMS capacitive sensing element, and housed in an IP-64 anodised aluminium case, this system is designed to record critical vibration data onto a removable memory card, which can then plug in direct to a laptop or PC for data download.

Tailored for zero to 1kHz frequency applications, the 4400A offers several recording regimes such as free run, triggered event and auto stop, with sampling rates up to 3200 samples per second. The full-scale vibration range is  $\pm 16g$ , and the model 4400A1 has a  $\pm 200g$  range, with a maximum shock level specified as 1,000g. The supplied SDHC card stores the data and plugs into a computer for download into the supplied Windows compatible analysis software. This software also allows filtering, oversampling, time synchronous averaging and FFT calculations. Power is supplied by the built-in replaceable 9VDC battery, which allows up to 24 hours recording time. The variable capacitance accelerometers are configured orthogonally for X, Y, Z outputs, and the temperature range of the sensor is from  $-40$  to  $+85$  °C. Mounting is accomplished using two screws or by the built-in magnet on the base of the 61 x 51 x 28mm enclosure, and the total weight of the unit is just 160 grammes. Applications would include Noise, Vibration and Harshness testing (NVH), as well as seismic monitoring, ride quality and sports measurements.

*This device is very competitively priced so please ask for further details on this new VibraCorder system, or for any advice you may need on any suitable applications. We have the products and expertise to solve most vibration measurements.*



Dytran Instruments has recently published their new product selector guide, which includes many of their new products released over the past few years since the introduction of their full catalogue. This 67 page catalogue, suggests products for several different types of applications, as well as showing specifications and introducing their Sensor Select 100 programme that aims to keep one hundred of their most popular models available in stock for fast delivery.

## Strain Gauge Clamp



**TML have introduced a novel device for applying pressure to a strain gauge, whilst the adhesive is setting during installation. The magnetic Presseee with a built in magnet, part number PM-19, can be used on appropriate flat metal specimens over 1mm thick, is very easy and quick to apply, and also allows for the gauge placement to be viewed through the clear view central area.**

With a pressing surface of 19mm diameter, the Presseee can be used with any linear strain gauges up to 6mm long or cross and rosette gauges with backing dimensions up to 15mm diameter. The internal magnet holds the clamp to the surface whilst a spring mechanism provides the clamping force necessary for the adhesive. The unit can operate in temperatures from 5 to 50 degC, and weighs 30 grams. TML can also supply two other strain gauge installation clamps. The Gauge Mate A is also a magnetic clamp that can be used on flat metal specimens 1mm thick or over, and the Gauge Mate R is designed for round specimens from 5 to 32mm diameter. These two clamps are shown in the current TML strain gauge catalogue, and for further details of the PM-19 Presseee, please ask. All of these designs provide the force needed for most of the TML two part mix strain gauge adhesives, but they can also be used for cyanoacrylate adhesives if fitted quickly.

*We would be pleased to discuss any application where these strain gauge clamps could be used, and if you have any questions regarding strain gauge installation in general, we would be pleased to offer our advice.*

## Strain Gauge Adhesives



TML, our strain gauge supplier, has recently announced that the packaging for several of their strain gauge adhesives needs to be changed. This is in line with changes in shipping arrangements and means that it is no longer possible to deliver the same larger 100gram tubes of adhesives that have been possible in the past. This change affects mainly our polyester adhesives but also some of our coating materials. In fact the very popular N-1 neoprene rubber coating can no longer be delivered at all.

The various changes are shown in a new leaflet that we have produced but a summary follows of the main differences. The old P-2 and RP-2 100g tubes are now supplied in a new 25g tube size. The old PS 200g is now also 25g and the C-1 phenol adhesive is down from 50g to 25g. Both the EA-2 and A2 epoxy adhesives are also reduced from 50g down to 25g tubes. The popular NP-50 room cure high temperature adhesive is down from 50g to 25g, but has become NP-50B to denote a change in setting time. Gauge installations should now be left for about 24 hours before use. The various hardening agents have also been reduced in size accordingly, but the various cyanoacrylate adhesives remain unchanged. Apart from the N-1, TML have also deleted from their range the two epoxy resin coatings and the 3 Bond 1521B, and the K-1 quantity is reduced from 90g to 25g. Otherwise the rest of the coating supplies remain the same. Since the method of overseas shipping has had to be altered as well, the prices have changed significantly, so please ask before purchase.

*For more complete information about these changes, please ask for a copy of our TML Adhesives & Coatings leaflet.*

## Tactical Grade Navigation



**The 3DM-RQ1-45 is a compact, ruggedized, tactical-grade all-in-one navigation solution with integrated GPS and magnetometers, high noise immunity, and exceptional performance. It takes advantage of some of the latest MEMS sensor technology, exhaustive calibration, and a custom made Kalman Filter to deliver capabilities to rival units which cost many times more.**

The Inertial Measurement Unit (IMU) outputs include direct measurement of acceleration, angular rate, and atmospheric pressure. Sensor measurements are also processed through a sophisticated estimation filter algorithm to produce high accuracy computed outputs with compensation options for magnetic and linear acceleration anomalies, sensor biases, auto-zero update, and noise offsets. Dual on-board processors run a sophisticated Extended Kalman Filter (EKF) for excellent position, velocity, and attitude estimates (PVA), as well as integrated GPS outputs. The 3DM-RQ1-45 comes built inside a ruggedized aluminium enclosure weighing 205 grams, and is designed to meet DO-160G for deployment in harsh environments. The LORD MicroStrain MIP Monitor software can be used for device configuration, real time measurement monitoring, and data recording. Alternatively, the MIP Data Communications Protocol is available for users who want to develop customized software solutions. Applications for this device would include GPS aided navigation systems, unmanned vehicle navigation, satellite dish and antenna pointing, and health and usage monitoring of vehicles.

*We would be please to discuss any application where this sensor could be used, and if you have any questions regarding inertial measurement in general, we would be pleased to visit you to discuss any possible application.*

## New DC Accelerometers



**Dytran Instruments have recently released a new range of lower cost DC accelerometers to complement their ever-growing range of MEMS type sensors. This 7300A series of accelerometers offers nearly the same low noise outputs as their titanium bodied models, but in a more cost effective package. These sensors are designed to operate with a differential output, however can be used single ended but with a lower output sensitivity.**

The Dytran 7300A series accelerometers are packaged in a lightweight (12 grams) blue coloured anodised aluminium housing, with a vertical height of 8.9mm and a body size 22.9 x 22.9mm square. Mounting is via two 4.2mm diameter holes, and a 4-pin radial connector interfaces the signal and power. A separate mating cable assembly is available. The sensors are case isolated and are epoxy sealed, and have an operating temperature range from -55 to +125 degC. The 7300A series comes in eight different ranges from +-2g through to +-400g, with sensitivities from 2V/g through to 10mV/g for the highest range. The frequency response also varies depending on range from zero to 400Hz, and up to 2.5 kHz for the higher ranges. Most of the 7300A accelerometers have a 5000g shock limit, but the 2g and 5g range sensors are limited to 2000g. These types of accelerometers are used for low frequency dynamic and steady state acceleration events, such as modal and structural analysis, ride quality, road load and tilt and inclination measurements.

*Please ask for further details of these DC accelerometers, or supply details of any application you may have, so that we can advise on the best accelerometer solution.*

## Who's Who ?

Another new face at Techni Measure is Steve Brown (son-in-law of Ian Ramage) who joined full time in January as Operations Director. He comes with over 10 years experience of running his own business along with consulting and working alongside other businesses of all sizes from small family companies to FTSE100 corporations. He brings with him technical, infrastructure and business knowledge to the company. With a largely technical background Steve is quickly getting to terms with our extensive product line up whilst overseeing the updating of our systems.



## Techni Measure on Show...

Exhibitions booked so far for the rest of 2015 are listed below. We would be pleased to meet with anyone there to discuss possible applications for our wide range of products and if you need further information, please let us know.

**2nd September** - EMEX by BSSM at Heriot Watt University, Edinburgh

**30th September – 1st October**  
SENSORS & INSTRUMENTATION at Birmingham

**21 – 22nd October** - ENGINEERING DESIGN SHOW at Coventry

**4 – 5th November** - ADVANCED ENGINEERING (Auto) at Birmingham  
Please remember that if it is not possible to attend any of these shows and you need a demonstration or explanation of any of our products, we will always be pleased to visit you instead.

## Tech Note

### What is Time of Flight Measurement ?

In our previous Newsletter we introduced our new range of laser displacement sensors, and described how the triangulation system works. This article aims to explain how the time of flight laser sensors operate, which are used for longer distance measurements.



The basic principle of time of flight is easy to explain simply, but in practice, for accurate measurements, it is not as straightforward as it seems. The laser beam is projected from the instrument and reflected from a target surface to a collection lens. This lens is typically located adjacent to the laser emitter and focuses an image of the spot on a linear array camera (CMOS array). Put simply therefore, the time for the light to be sent and to return can then be used to determine the distance it

has travelled based on the speed of light. Modulated beam systems also use the time light takes to travel to a target and back, but the time for a single round trip is not measured directly. Instead, the strength of the laser is rapidly varied to produce a signal that changes over time. The time delay is indirectly measured by comparing the signal from the laser with the delayed signal returning from the target.

One common example of this approach is “phase measurement” in which the laser’s output is typically sinusoidal and the phase of the outgoing signal is compared with that of the reflected light. Phase measurement is limited in accuracy by the frequency of modulation and the ability to resolve the phase difference between the signals, so some modulated beam rangefinders work on a range-to-frequency conversion principle, which offers several advantages over phase measurement. In these cases, laser light reflected from a target is collected by a lens and focused onto a photodiode inside the instrument. The resulting signal is amplified up to a limited level and inverted, and used directly to modulate a laser diode. The light from the laser is collimated and emitted from the centre of the front face of the sensor. This configuration forms an oscillator, with the laser switching itself on and off using its own signal. The time that the light takes to travel to the target and return, plus the time needed to amplify the signal, determines the period of oscillation, or the rate at which the laser is switched on and off. This signal is then divided and timed by an internal clock to obtain a range measurement. The measurement is somewhat nonlinear and dependent on signal strength and temperature, so a calibration process is performed in the sensor to remove these effects.



Modulated beam sensors are typically used in intermediate range applications, for distances from a few centimetres to tens of meters on uncooperative targets. With cooperative targets, like reflectors, the range can be extended to several hundreds of meters.

We would be pleased to offer advice on which sensor would be the best choice for any given application. Shiny targets can present a problem, but there are solutions, and we would be pleased to offer a trial demonstration when possible.