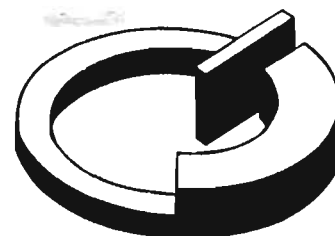


THE AUSTRALIAN METROLOGIST



Published by the Metrology Society of Australia. ISSN 1321-6082

FROM THE PRESIDENT

I was flying over the Timor Sea, returning from Indonesia. The trip included visits to a number of dimensional metrology laboratories in Jakarta, Bandung and Surabaya, all on the island of Java.

The reason for the visit was a joint project between the National Measurement Laboratory, CSIRO, and the Indonesian government. The aim of this project is to gain international recognition for Indonesia's measurement system and develop a laboratory accreditation organisation similar to NATA.

I reflected on the differences I had noticed in technique and procedure between the Indonesian dimensional laboratories, often from the same city. Differences such as these occur in Australia too, but to a much lesser extent. I surmised that the reason was the relative isolation of Indonesia's laboratories from the international measurement system and from each other.

The lack of a NATA equivalent meant that the exchange of information between laboratories, with assessors acting as information carriers, had not occurred. Thus, each laboratory had developed its own, unique, style.

As I pondered on matters metrological, I watched the progress of my aircraft on the map displayed at the front of the cabin. My thoughts turned to measurement, navigation and Global Positioning Systems. Precise positioning on the Earth's surface, often within tens of metres, is now possible using GPS receivers that pick up signals from orbiting satellites. Four satellites are required to compute the four dimensions of X, Y, Z (position) and Time. Receivers are made for aircraft, ships, ground vehicles, and for hand carrying by individuals. A GPS receiver was undoubtedly being used on this aircraft.

Remarkably, for GPS to work accurately, corrections using Einstein's General Theory of Relativity are required. Einstein developed this theory in 1916, well before the invention of satellites, space travel and rocket engines. Imagine what economic

rationalists and accountants would have said if Einstein had applied for a grant to pursue what was at the time an obscure and abstract theory! As a physicist, I find it very satisfying that only seventy years later, General Relativity is being used in this most practical and useful way.

Accurate measurements have been essential to the general acceptance and development of General Relativity. (Actually, make that any physics theory.) An early prediction of General Relativity was that a light ray passing close to the sun should be deflected by 1.75 seconds (0.0005 degrees). Classical theories predict only half that amount.

Fortunately, in 1919 a solar eclipse was set to occur between the Gulf of Guinea and Brazil. A British expedition, led by Sir Arthur Stanley Eddington (an interesting character, but that's another story) set out to measure the positions of stars near the sun's edge during this eclipse. The measurement uncertainties achieved with the measuring instruments of the day were good enough to support General Relativity. Measurements of this type are continuing today.

Thoughts of expeditions, sailing and navigation led me to gaze at the sea below and imagine what it may have been like in times past. To be more precise, two hundred years ago, in June 1789. At that time, I may have seen a small dot heading bravely towards Timor. This would have been an open boat commanded by William Bligh and carrying 18 men, all formerly of the *Bounty*.

Most of us know the story of the mutiny on the *Bounty* and how Bligh and his loyal men were set adrift in a small boat in the Pacific Ocean. What is often not appreciated is that by extraordinary seamanship, which entailed sailing 5823 km (3618 miles) and suffering severe hardships, Bligh brought the craft safely to the island of Timor, near Java, on June 14, 1789.

To navigate this distance, using only hand held instruments in an open boat, says a lot for Bligh's skill but also for the metrological qualities of his navigation instruments. Even so, I bet Bligh would have loved a GPS system. (continued p 3)

THE AUSTRALIAN METROLOGIST

The Australian Metrologist is published four times per year by the Metrology Society of Australia Inc., an Association representing the interests of metrologists of all disciplines throughout Australia. Membership is available to all appropriately qualified and experienced individuals. Associate membership is also available.

Membership Enquiries

Contact either your State Coordinators or the Secretary, Mr Colin Wagg on (03) 9329 1633 or fax (03) 9326 5148, or write c/o:

71-73 Flemington Road
North Melbourne VIC 3051

Membership Fees

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Contributions

Articles, news, papers and letters, either on disk or hard copy, should be sent to:

The Editor
The Australian Metrologist
c/o 71-73 Flemington Road
North Melbourne VIC 3051
Fax (03) 326 5148
Phone (03) 329 1633

The deadline for the next issue is 15 August

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The deadline for positions wanted/vacant is five days before publication.

Letters to the Editor

Letters should be limited to 200 words. Authors will be contacted should editorial changes be considered necessary.

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Management Committee

President	Dr John Miles	(03) 9542 2964
	CSIRO Division of Applied Physics	
Vice-president	Dr Barry Inglis	(02) 413 7211
	CSIRO Division of Applied Physics	
Secretary	Mr Colin Wagg	(03) 9329 1633
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	Dr Grahame Harvey	(02) 888 3922
	National Standards Commission	
	Mr Ron McBain	(03) 9850 3919
	Quality Calibration Services	
	Mr John Mitchell	(03) 9329 1633
	NATA	
	Mr Horst Sieker	(03) 9555 0671
	ACM Laboratory	
	Dr Jane Warne	(03) 9669 4122
	Bureau of Meteorology	
Marketing	Mark Pilkington	(03) 9295 8700

State Contacts

NSW		Barry Sutcliffe	736 8222
		Marian Haire	888 3033
		Ilya Budovsky	413 7201
Postal	C/O	Mr Barry Sutcliffe	
		NATA	
		7 Leeds Street	
		Rhodes NSW 2138	
Queensland		Brian Phillips	3216 6299
		Bill Chappell	
		Damian Ousley	3836 0410
Postal	C/O	Mr B Philips	
		Survey and Optical Instruments Pty Ltd	
		Unit 3, 36 Achievement Crescent	
		Acacia Ridge Qld 4110	
South Australia		Brenton Watkins	268 6077
		Jeffrey Tapping	362 1240
Postal	C/O	Mr R Duncan	
		Duncan Tool & Gauge	
		10 Allan Street	
		Melrose Park SA 5039	
Western Australia		Denis Baylis	333 8832
		Paul Edwards	451 0883
Postal	C/O	Mr P Edwards	
		NATA	
		Suite 5, Technology Centre	
		2 Brodie-Hall Drive	
		Bentley WA 6102	

Editor John Mitchell

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FROM THE PRESIDENT (Continued)

On reaching Timor, and then Java, Bligh and his men would have been confronted by a profusion of different animals and plants. Seventy years later, a British naturalist named Alfred Russel Wallace sailed from Brazil to Java and Borneo (still no GPS) and noted fundamental differences between the animals of Asia and those of Australia.

During this research Wallace formulated his theory of natural selection and communicated his ideas to Charles Darwin, whose own similar theory of evolution was then in manuscript.

Darwin, of course, is well known as the father of evolution and for the voyage of the *Beagle*. One of the

most important observations made by Darwin on this voyage was that animal populations of various species have easily become isolated in different habitats on various islands and have differentiated into new species.

Island chains provide a particularly good example. For example, the finches of the Galápagos Islands have evolved into 14 species, each with distinctive form and habits, following an invasion of the islands by a single species from the American mainland.

Thinking of isolation and evolution on island chains leading to differentiation led me back to the dimensional laboratories of Indonesia and how they have perhaps undergone the same process.

John Miles

THE AUSTRALIAN METROLOGIST

STANDARDS MATTERS

Behind the Scenes at ME/27

Committee ME/27 - Engineering Systems Metrology Surface Quality is a technical committee of Standards Australia involving standards for length and engineering metrology. There are three MSA members on ME/27. Mr Richard Duncan, the acting chairman, Dr John Miles representing CSIRO Division of Applied Physics and Mr Jack Deller representing the MSA.

An important decision at the March 1996 meeting was that in future, and wherever possible, the relevant ISO standard would be adopted as an Australian Standard. This will save a lot of unnecessary duplication and confusion in the fields of length and engineering metrology and make our Australian Standards more acceptable internationally.

The committee agreed that the following ISO Standards were suitable for adoption as an Australian Standard. The Project Manager, Mr Peter Hardy, is preparing copies of these ISO Standards as draft Australian Standards for Public Review and Postal Ballot.

ISO 3650 to supersede AS 1457-1989 "*Gauge Blocks and Accessories*:"

ISO 13385 to supersede AS 1984-1977 "*Vernier Callipers*"

ISO 463/9493 to supersede AS 2103-1987 "*Dial gauges and Dial Test Indicators*"

ISO 9121 to supersede AS 2101-1978 "*Internal Micrometers*".

John Miles

QR/9

Three MSA Members are currently sitting on the QR/9 Committee, Jack Deller, Horst Sieker and Richard Duncan. It is anticipated that Jack Deller, who was representing Defence, will now be the MSA's official representative.

What Committees are You On?

There is obviously a significant number of standards which deal with measuring instruments. As well, many product standards have sections dealing with testing and measurement. Unfortunately, these are sometime drafted by people with an inadequate understanding of measurement. The MSA can make a real contribution in ensuring the technical validity of these documents.

To help the MSA coordinate involvement in relevant standards committees, we would appreciate hearing from you about your committee memberships.

Similarly, if you think that the MSA should be represented on a particular Standards committee, let the President or Secretary know.

EMPLOYMENT SURVEY

Thankyou to everyone who responded to the employment survey. You may recall that in issue 7, we presented the interim raw data (interim as a number of responses were still trickling in) and said that an analysis would be provided in the next issue.

Unfortunately, putting it all together has not been a trivial exercise. Indeed, to do an exhaustive analysis would fill two TAMs alone. So at the risk of disappointing many members, we have held the post mortem over until the next issue.

One aspect which is worth a quick mention is the age distribution of our membership. It is probably not surprising to many but the average age of MSA members (all grades) is approximately 49.

While this mean is derived from survey results of just over 25% of the membership, it indicates one of two things. Either the MSA has attracted metrologists of mature years or, if this sample is representative of the metrological population, metrology is not being embraced by young people as a vocation. This is a challenge to the profession in the medium term.

As has been highlighted by some of the retirements reported in TAM, hundreds of years of experience has gone from the profession in the last few years and it is becoming an imperative that as much knowledge be passed on to future generations of metrologist as possible before it is lost.

One other aspect which stands out like the proverbial sore thumb is that in excess of 95% of the membership is male. This is another area in which the MSA needs to undertake promotion of the profession.

RECEIVED YOUR CERTIFICATE?

It appears that some members have not received their membership certificate. Whatever grade of membership you hold, if you have not received a certificate as yet, please contact the Secretary.

THE AUSTRALIAN METROLOGIST

MEMBERSHIP NEWS

Fellowships

As reported in the December issue of *TAM*, we are now accepting applications for membership of the Society at the level of Fellow. Three Members sought an upgrade and have now been accepted by the Management Committee. In addition, two metrologists applied for fellowship and have been accepted. Congratulations to the following:

Mr Phillip Ciddor	NSW	Dimensional Metrology
Dr Stephen Dain	NSW	Photometry/Radiometry
Dr James Gardner	NSW	Photometry/Radiometry
Dr Barry Inglis	NSW	Electrical Metrology
Mr Douglas Quinn	Qld	Electrical Metrology

Upgrades

Just a reminder to Associates as well, if your circumstances have changed or you have now acquired the necessary experience since joining, you too can seek an upgrade to Member. If you are not sure about your chances, give a member of the Membership Qualification Committee a ring and have a chat about it. You won't get shot for asking.

Mr Errol Atkinson has now been upgraded from Associate to Member.

New Members

We are pleased to announce that the following metrologists have been granted membership since the sixth issue. Welcome to the MSA.

New South Wales

Mr Charles Greenaway
Dr Edwin Morris
Mr William Wright
Dr Yi Li
Mr Raj Bhat
Dr James Gardner
Mr John Peters
Dr Richard Brittain
Ms Marian Haire
Mr John McLaughlin
Dr Stephen Dain
Ms Ruimin Yin
Mr Paul Henderson
Mr Frederick Emms
Mr John Sumner
Mr Jim Miles
Mr Florian de Celis
Mr Kip Stavrou
Dr Mar Ballico
Mr Rick Pacey
Ms Lynette Skene

Queensland

Mr Shane Brann
Mr Brian Williams
Mr Steven Wright
Mr Alexander Blades
Mr John Brown

South Australia

Mr Long Bui
Mr Dean Burgess
Mr Peter Rostig
Mr Peter Hunter
Mr Ian Maxted
Mr Raymond Baker

Tasmania

Mr Barry Fidock

Victoria

Mr Andrew Korcok
Mr Leigh Mackinnon
Mr George Moutsios
Mr Patrick Kenny
Mr Robert Britton
Mr Ridley Nugara
Mr Brenton Greenslade
Mr Nicholas Elliot
Dr David Fotheringham
Mr Paul Huysing

Western Australia

Mr Ian Brown
Mr Hilary Bulner
Mr Louis Hoekzema
Mr Michael Jongepier
Mr Stephen Gilligan
Mr Robert Crawford
Mr Philip Dickson

International

Dr Lawrence Christian (New Zealand)
Prof Paul de Bievre (Belgium)
Mr Huy Van Ngo (Vietnam)

With these new members, our total membership is now as follows:

Australian Capital Territory	2
New South Wales	98
Northern Territory	3
Overseas	3
Queensland	38
South Australia	35
Tasmania	6
Victoria	145
Western Australia	18
Total	348

THE MSA WELCOMES DR RAGHU KACKER

Dr Raghu Kacker, an internationally respected mathematical statistician with the Statistical Engineering Division of the Computing and Applied Mathematics Section at NIST, USA, will be visiting Australia in July 1996. Dr Kacker is here for a Statistical Society of Australia meeting. He has extensive **industrial** experience in measurement and instrumentation systems.

Continuing in the tradition of providing speakers of international reputation, such as Professor Paul De Bievre, the MSA is proud to announce that Dr Kacker has agreed to speak at two MSA functions, one in NSW and the other in Victoria.

Dr Kacker's interests are in the design of experiments, quality engineering, real-time industrial measurements, errors, uncertainty, calibration and traceability. He is a Fellow of the American Statistical Association and a Member of the NSCL.

He will speak on Industrial Calibration Systems and address issues such as:

- How often a measuring instrument needs to be checked and when does it need to be re-calibrated?
- What is the uncertainty remaining after calibration in product measurements?
- How should one deal with the differences between measurement and calibration conditions?

He will also propose an industrial calibration system that can substantially reduce errors in product measurements, evaluates the uncertainty in product measurements, and is broadly applicable.

Details of the places and times of Dr Kacker's talks may be found in the NSW and Victorian event programs elsewhere in this issue.

The MSA looks forward to welcoming Dr Kacker to Australia in July and thanks him for giving us some of his valuable time.

John Miles

ISO 9000 - NOT ALL PLAIN SAILING!

ISO 9000 calibration requirements sometimes cause the uninitiated interesting problems. Another example was reported in the April issue of QW.

Devonport Naval Base in Plymouth originated in 1690 although most of the ship repair and overhaul is now in the hands of the private sector. The certification process apparently had its ups and downs but the most interesting one for the metrology community was that involving the riggers.

One particularly awkward situation was calibration, where it was difficult to convince rigging staff that a traceable measurement was necessary. After all, they had managed for over 300 years to estimate length by clenching their fists and pushing the tips of their thumbs together for an accurate foot. This method achieved an accuracy of about 10 per cent which seemed to be good enough.

In an attempt to demonstrate the variability of tape measures, two of 15 metres were compared and found to be over a centimetre different. This was not accepted as an error and the riggers succeeded in pulling the short tape to match the long one, claiming that the difference was due to one tape requiring a firmer pull! To the rigging staff, the task of signing a piece of paper to confirm that they had completed a piece of work to an instruction proved to be an enormous chore.

While such anecdotes do provide a bit of light relief, it does raise the serious question of just what is appropriate and reasonable in calibration and traceability?" In this example, there was presumably a case for uniformity of measurement (or repeatability) but the need for traceability in an absolute sense may or may not have been so important.

Leaving this case aside, calibration and measurement keeps metrologists employed. But it does the profession no justice to insist on unnecessary or inappropriate levels of calibration. Unfortunately, it is frequently the non-metrologist implementing the calibration system who gives metrology a bad name.

Have you paid your membership subscription yet?

If you have forgotten, it is not too late.

You can't remember if you have paid? - contact the Secretary.

THE AUSTRALIAN METROLOGIST

STATE EVENTS

QUEENSLAND

On the 20 February in the Makerston Room at the Abbey Hotel, the Queensland State Group held its Annual Dinner and Planning Meeting. The attendance was good with nineteen members and two member's wives, Mrs Carmol Darling and Mrs Jocelyn Gardner.

Ian Cowling, on behalf of the co-ordinators, presented the Co-ordinators report covering the activities since the inaugural meeting in August 1994. He reviewed the technical visits, meetings on metrology training and paid tribute to all who had participated in the activities. Ian also extended thanks to Nigel Lane for his efforts in the preparation of all the minutes of meetings.

A financial statement covering the State expenses was tabled along with the Treasurer's report from the second Annual General Meeting held in Sydney.

Roy Hood and Brian Phillips spoke enthusiastically of the National Conference and of the second AGM. Doug Quinn reported on the salient points of the combined State Co-ordinators' Meeting held in the evening of the 29 November following the first day of the conference.

Following the election of three new Queensland Co-ordinators, Brian Phillips, Bill Chappel and Damian Ousley, the planning of our 1996 activities was extensively discussed and several recommendations made.

Consideration of the regional State Members was an important agenda item, but this time it was agreed, regrettably, that the contingency of distance detracted from offering greater participation.

Metrology Training was a continuing topic and it is pleasing to members that the periodic discussions had resulted in our Queensland Group being invited to join the Queensland Metal and Engineering Training Board. Mr Damian Ousley of the Trade Measurement Laboratory was elected as the delegate on the Board and Members look forward to many positive outcomes.

Another project, the Queensland Members Database, was tabled being the February 1996 issue. Co-ordinators are concerned that all members' change of employment and contact details are communicated to State Co-ordinators who will relay the data to the Society Secretary in Melbourne. Members' copies will be available in the near future.

In regard to membership promotion, our prospective membership now stands at 38 members and we are mailing membership applications on a periodic basis.

The group was pleased to have Max Purss and Tim Hart attending for the first time.

Upon receipt of the *Guidelines for State Groups*, the three new Co-ordinators will meet to finalise the years programme - which augers well for another active year.

Roy Hood

Next Meeting

Date: August - date to be announced

Venue: SIMTARS - proposed

WESTERN AUSTRALIA

The Western Australian Chapter of the Metrology Society held its inaugural Meeting on 7 February 1996 at ADI Limited's Calibration Centre. Mr Dennis Bayles, Manager of the length and angle metrology laboratory and Mr Phil Dickson, Manager of the electrical calibration laboratory, acted as our hosts and presenters for the night.

The meeting was attended by an eager group of over twenty members and visitors.

Following a short discussion of MSA business, Paul Edwards, the State Coordinator, introduced Dennis who began by outlining ADI's activities in Perth and its calibration capabilities. After this, the meeting divided, one group disappearing into the dimensional metrology laboratory with Dennis and the other group with Phil into the electrical laboratory.

Dennis, assisted by his able technician Tegan Lord, provided us with a tour of the laboratory's facilities demonstrating traditional measuring equipment and then a programmed calibration of engineer's square on the co-ordinate measuring machine.

Phil provide demonstration of RF and microwave calibration as well as AC, DC and resistance measurement.

We thank ADI, and in particular the Calibration Centre Manager, Mr Tom Kerr, and his staff, Phil, Dennis and Tegan, for their time and use of their facilities to get the WA Chapter off the ground.

Paul Edwards

South Australia

The last meeting of the South Australia Branch was an evening spent on the Internet at the Levels Campus of the University of South Australia. There was a very good turnout of members who enjoyed an evening (made better by the fact it was free) "surfing the net". While not directly metrological, it can be a very useful tool for us all. More from SA in the next issue.

THE AUSTRALIAN METROLOGIST

NEW SOUTH WALES

The first meeting of the NSW co-ordinators was held at NSC on 15 March 1996. The meeting discussed the outcomes of the AGM of 14 February.

The plan of action is to get things moving. The co-ordinators are looking for your input to make activities varied and interesting. If you could assist in arranging some activities please contact the co-ordinators. Similarly, please advise us of activities you would like. One which is being considered is a weekend in the Hunter Valley. If you are interested, please let the co-ordinators know.

If you have any articles for the Newsletter, please forward them to any of the co-ordinators.

Functions planned for the coming months are as follows.

Tuesday July 16th

This is a major function on "*Industrial Measurement, Calibration and Uncertainty*"

Venue: National Measurement Laboratory
Bradfield Road, West Lindfield

The NSW Branch would like to extend an **invitation to all members of the MSA** to attend all or any part of the following program.

- 1300hrs Discussion chaired by John Miles on the adoption of the ISO TAG 4 guide on uncertainties.
- 1530 hrs Dr Doug Shaw of the CSIRO, Division of Mathematics and Statistics
"Measurement System Variations"
- 1600 hrs Dr Raghu Kacker from the National Institute of Standards & Technology USA
"Industrial Calibration Systems"
- 1630 hrs Questions and Discussion
- 1700 hrs Drinks and Refreshments
- 1730 hrs The Uncertainty Debate. *Have we gone too far?* finishing at 1930 hrs

followed by:-

2000 hrs Dinner at the Lane Cove Steak House.

September

McWilliams Wines meeting.

October

Annual Dinner at the end of October.

If you wish to attend any of these functions or wish further details please contact **Marion Haire** at the National Standards Commission on **02 888 3822**.

Measurement thought of the moment : For members of the measurement community who think that the little things are not important, one might ponder the following:

One solidary vote caused King Charles I to be executed in 1649, elected Thomas Jefferson as US President in 1800, changed France from a Monarchy to a republic in 1875, and made Adolf Hitler head of the Nazi Party in 1923. (DT 21/02/96).

Barry Sutcliffe (Sutty)

VICTORIA

The next meeting of Victorian members will be held on Wednesday 17 July at CSIRO in Clayton. This is going to be a significant event on the calendar so make sure you don't miss out.

Our special guest speaker will be Dr Raghu Kacker from NIST who will be speaking on "Industrial Calibration Systems".

There will also be a number of business items to address. These will include the following:

- the formation of a Victorian Committee in line with the other States;
- the formation of a sub-committee to organise the 1997 MSA Conference which is to be held in Victoria;
- an update from the national committee on plans for the society in the future.

In addition, members are invited to raise any other matters they wish to discuss on the night.

Following the meeting, refreshments will be served.

Next Meeting

Date: Wednesday 17 July
Time: 7pm
Venue: South Seminar Room,
David Rivett Laboratory,
CSIRO Division of Materials Science
and Technology,
Normanby Road, Clayton
Melway map reference 70 F9

NML NEWS

Avogadro Project

The kilogram is the only fundamental unit still defined in terms of an artefact - a Pt/Ir cylinder kept in Paris. It is proposed in the medium term to redefine the kilogram in terms of an absolute constant. The preferred option is in terms of the Avogadro constant. One mole of ^{12}C contains an Avogadro constant of ^{12}C atoms and weighs precisely 12 grams.

In order to determine the Avogadro constant, it is necessary to determine the ratio of the molar mass to the atomic mass. The most suitable method to do this is to use a 1 kg highly polished single crystal silicon sphere (93.6 mm diameter). Silicon is chosen because of its purity, its well known crystal structure and its long term stability.

NML is the world leader in fabricating silicon crystal spheres with an out of roundness uncertainty of < 30 nm and measuring the sphericity. It is also well placed to measure diameter using optical interferometry as well as surface impurities and mass. The long term goal is to determine the Avogadro constant with an uncertainty of less than 1 in 10^8 .

As an intermediate goal, NML has begun a project to produce three or four high precision 1 kg spheres and to determine the density with an error of less than 2 in 10^8 by the year 2000. A number of other laboratories in Germany, Italy, USA, Belgium and Japan are also participating in the Avogadro project and it is being supervised by the BIPM in Paris.

Recent collaboration in dimensional metrology

Mr Carl Sona of NML's Coordinate Measurement Machine (CMM) group was invited to the first meeting of the Canadian CMM group in November 1995. Further collaboration between Canada and NML is anticipated through an intercomparison of ball plate measurement.

In December 1995, Mr Sona provided training in laser measurement systems and advanced CMM techniques to a staff member from the Filipino Metals Industry and Research and Development Corporation (MIRDC). Dr Nick Brown of NML is visiting Vietnam shortly to help the Vietnam Metrology Institute (VMI) to convert their 3 m measuring bed to a laser scale using a laser interferometer system.

Dr Esa Jaatinen is currently visiting BIPM in Paris for three months to help in the development of a new travelling green He-Ne laser for use in international intercomparisons.

Asia Pacific Metrology Program (APMP)

The APMP intercomparison programs of line standards (coordinated by NRLM, Japan), accelerometers (CSM/ITRI, Taiwan), spectral responsivity (KRISS, Korea), dc voltage (SISIR, Singapore) and rf power (HKGSL, Hong Kong) have commenced. The hardness intercomparison coordinated by VMI (Vietnam) is well under way.

As part of APMP's close collaboration with the other Asia-Pacific Specialist Regional Bodies (APLAC, APLMF, PAC and PASC), Dr Barry Inglis, Regional Coordinator of APMP, attended the February meeting of the Asia-Pacific Laboratory Accreditation Cooperation (APLAC) in Singapore.

To further increase collaboration between the Regional Bodies, an APEC Conference on Standards and Conformance has been proposed, to be jointly undertaken by the APMP secretariat and the Industry Technology Development Institute (ITDI) of the Philippines.

The conference aims to raise the awareness of the importance of technical infrastructure to representatives from government, funding agencies, industry, commerce and memberships of the Specialist Regional Bodies in Standards and Conformance, especially in developing Asia-Pacific economies. The APEC Standards and Conformance Sub-Committee formally endorsed the Conference which is to be held in Manila from 30 September to 2 October 1996.

Dr Angela Samuel, APMP Secretariat Officer, represented Dr Inglis at the international conference *Advances in Metrology and its role in quality improvement and global trade* held in New Delhi, India from 20 to 22 February. She delivered the APMP Secretariat lecture "Measurement Traceability and its importance to Global Trade". The conference was organised by the Metrology Society of India and India's National Physical Laboratory.

For further information about the Program or any of its activities, please contact the APMP Secretariat, National Measurement Laboratory, CSIRO Division of Applied Physics, PO Box 218, Lindfield, NSW, 2070. Phone 02 413 7788, fax 02 413 7383 or email: angelas@dap.csiro.au

Indonesia

The collaboration between NML and the Indonesian national measurement laboratory, KIM-LIPI, to obtain international recognition of the Indonesian National standards is proceeding. Technical visits were made in January by Mr Don Groeneveld (principal activity: force; subsidiary reviews of progress in pressure and mass) and Mr Peter Coogan (principal activity:

electrical resistance, subsidiary reviews of progress in voltage and ac-dc transfer).

Dr John Miles of NML and Mr Ian Bentley of NATA visited Indonesia in March to conduct a proficiency test of gauge block calibration by laboratories in, or joining, the Indonesian National Calibration Network, on behalf of the Indonesian accreditation agency for laboratory accreditation, Komisi Metrologi. As well, Mr Ron Cook and Mr Walter Giardini ran courses in the calculation of measurement uncertainty in March, one for the national laboratory KIM-LIPI, and two for Komisi Metrologi.

Philippines

Three members of the Philippines national measurement laboratory, Industrial Technology Development Institute (ITDI), including the Director Dr Rogelio Panlasigul, visited NML in February to discuss the proposed collaboration between NML and ITDI to develop international recognition of the primary standards of measurement of the Philippines.

Details of the project timetable were drawn up and a commitment made by Dr Panlasigul and Dr Barry Inglis, NML's Chief Standards Scientist, to the work program for 1995/96. The visitors were introduced to the activities at NML and other organisations in the Australian Measurement System. Two technical staff from ITDI visited NML in March for training in temperature and electrical measurements. Another staff member from ITDI underwent training in length measurement in April.

Angela Samuel

COURSE AND CONFERENCES

TAFE Metrology Units

For the general information of members regarding accredited modules in metrology subjects, the following lists those from the National Metals and Engineering Curriculum produced by the National Manufacturing, Engineering and Related Services Industry Training Board.

EA 781	Acoustics: Instrumentation and Measurement
EA 784	Automated Calibration and Controllable Instrumentation
EA 775	Introduction to Metrology
EA 797	Optical Instrument Calibration.
EA 793	Force Measurement
EA 774	Hardness Measurement
EA 771	Temperature Measurement

EA 794	Gas Flow Measurement
EA 792	Introduction to Flow Measurement
EA 796	Liquid Flow Measurement
EA 779	Pressure Measurement
EA 786	Calibration of Time and Frequency Standards
EA 787	Co-axial and Waveguide Equipment
EA 789	Digital Fault Finding
EA 795	Electrical Calibration Techniques
EA 791	Electronic Counter Calibration
EA 782	Oscilloscope Calibration
EA 798	Precision Electrical Measurements
EB 780	RF and Microwave Calibration
EB 781	RF and Microwave Measurement
EB 782	RF and Microwave Signal Sources
EB 784	RF and Microwave Transmission Lines
EB 783	Spectrum and Network Analysis
EA 788	Co-ordinate Measuring Machine (CMM) Technology
EB 785	Dimensional Metrology - Advanced Techniques
EA 710	Dimensional Metrology - Basic
EB 786	Dimensional Metrology - Complex Forms
EA 773	Dimensional Metrology - Measuring and Testing
EA 789	Laser Technology in Dimensional Metrology

Ian Richards

Course on the ISO Guide - Uncertainty of Measurement Expressions of interest

This three day course provides a detailed look at the ISO Guide on Uncertainty of Measurement. It gives a mix of background theory and practical application, participants being invited to bring real life measurement situations for discussion.

There have been several people in Sydney express their interest in this course and a session may be scheduled for later in the year. If you are interested, contact the Melbourne Branch of NML.

As well as public sessions, the course can also be run in-house with some degree of customisation to suit your organisation's needs.

Contact: Mrs R Crawford
CSIRO Division of Applied Physics
Normanby Road
Clayton Vic.
Phone: (03) 9542 2965
Fax: (03) 9544 1128

THE AUSTRALIAN METROLOGIST

THEORY VS MEASUREMENT

Theory and practice are often out of step and can cause much irritation and embarrassment. Unfortunately for NASA it has had to endure the anguish of a \$400 million experiment on the space shuttle Columbia's February voyage failing unrecoverably.

The 4 May issue of *New Scientist* carried a story of a joint Italian and American experiment in generating electricity in space ending catastrophically when a 22 km long tether attached to a satellite parted company with Columbia resulting in the satellite burning up some days later upon entering the atmosphere.

While there was much speculation over the cause of the 2.5 mm tether breaking, the matter of interest to the metrologist is the measurements which were recorded immediately prior to the mishap.

What was supposed to happen was that the satellite would be trailed behind and below the shuttle so that it passed through the ionosphere feeding data back to Columbia. At the same time, the tether moving through the earth's magnetic field would generate up to 5 kV. What happened before the tether broke stumped everyone.

The current in the tether was being monitored as the satellite was deployed. At one stage, the current flowing at a potential of 400 V was the same as was expected at 7 kV! It appeared that Ohm's law had also developed problems.

Another puzzle was that when the satellite's nitrogen gas boosters, used for fine manoeuvres, were activated in two second bursts, the voltage on the tether fell from almost 1000 V to 100 V. Not only this but the current did strange things. Instead of dropping in line with the voltage, it surged.

The explanation for the tether breaking may turn out to be quite straightforward but explaining why Ohm's law seems to have given out might take some more thought.

It will be interesting to learn (if we can) whether there really was some strange phenomenon causing strange relationships between the voltage and current or if it was simply a case of needing a good metrologist on board.

BRAIN TEASERS

1. A certain electrical calibration laboratory has the capability to measure resistance in the range 10 m Ω to 1 Ω with an uncertainty of ± 20 ppm. Because conductance is the reciprocal of resistance, it follows that the laboratory also has the capability to measure conductance in the range 1 S (Siemen) to 100 S by measuring resistance and calculating the reciprocal of the result. What uncertainty will apply to this result?
2. So far so good; but life wasn't meant to be easy! The same laboratory also has the capability to measure resistance in the range 10 $\mu\Omega$ to 10 m Ω with an uncertainty of $\pm (0.05\% + 1 \mu\Omega)$. What uncertainty will apply to the corresponding measurement of conductance in the range 100 S to 100 kS?

Doug Quinn

CONFERENCE LEFTOVERS

Following our tremendously successful conference last year, we have copies of the proceedings and other merchandise.

Item	Quantity
Proceedings	22
Satchels	32
Mouse Mats	24
Polo Shirts	M 5
	L 10
	XL 16
	XXL 8
	XXXL 8

Fax you order to Horst Sieker on 03 9555 6589.

FIRST JUNIOR MEMBER FOR THE MSA

The MSA would belatedly like to congratulate National Committee member, Dr Jane Warne and her husband Neil, on the birth of their first child, a boy Jaimon. Jane is now studying the Sleep Deprivation Index instead of the Southern Oscillation Index. Congratulations Jane and Neil!

THE AUSTRALIAN METROLOGIST

A RESIGNATION

I must start with an apology to the MSA membership for the lateness of this issue of *The Australian Metrologist*.

While I can honestly say that I and many of the contributors have been extremely busy over the past few months and TAM has had to take second place, this is not a satisfactory situation and it cannot continue.

TAM is the primary source of information about the Society and what is happening in the metrology profession and it is essential that issue appear in a timely manner.

While I have enjoyed the task of being editor enormously over the past two and a half years, *The Australian Metrologist* does not need a happy editor. It needs an editor with the time available to do the job properly.

It is, therefore, time to admit that my commitments to NATA and to a young family put the task beyond me. As such, I have advised the President and the National Committee of my resignation as editor.

WANTED - EDITOR

Following the resignation of the current editor, the National Committee is seeking expressions of interest from members interested in becoming the new editor of *The Australian Metrologist*.

The primary qualifications we seek are enthusiasm and commitment to the task. The current workload is in the range 35 to 45 hours per issue should you wish to do everything, that is obtaining and reviewing material, writing some editorial, layout and arranging printing. It is possible though that the layout could be sent out to be done professionally.

The Society has purchased PageMaker Classic which is available for use by the editor.

If you are interested, please contact the President or the Secretary as soon as possible.

MSA CALENDAR

Date	Activity	Venue
July	16 State Members Meeting Speaker - Dr Raghu Kacker	NML - Lindfield
	17 State Members Meeting Speaker - Dr Raghu Kacker	CSIRO - Clayton
	23 Management Committee Meeting (proposed)	NATA - Melb
August	TBA Queensland laboratory visit	SIMTARS (?)
September	18 Management Committee Meeting (proposed)	TBA
November	20 Management Committee Meeting (proposed)	TBA