

THE JOURNAL
of the
Association of Surveyors
of Papua New Guinea



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No. 1

MARCH 1980

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OF PAPUA NEW GUINEA
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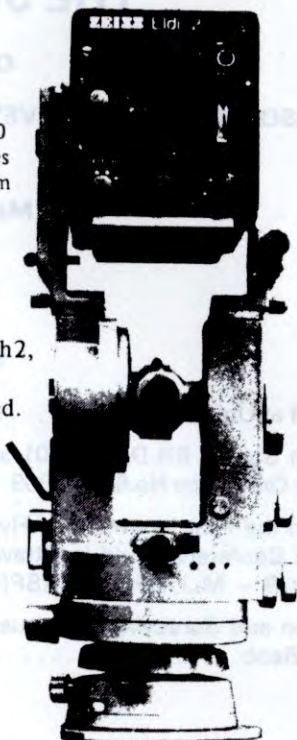
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NEW STAFF AT UNITECH

This year there has been a satellite state of Western Australia set up at the Unitech campus with the arrival of 4 more staff from Western Australia.

They are:

Ken Lyons — Professor and Head of Department

Geoff Bebb — Senior Lecturer in Surveying

Graeme Wright — Lecturer in Surveying

Derek Gibbs — Senior Technical Officer

They join Murray Day, Frank Young, and Darryl Parker all former Western Australians making up exactly 50% of the current Unitech staff. There is however no truth in the persistent rumour that a W.A. Embassy will be set up on Campus, although a black swan has appeared on the facade of the Surveying Department.

Here is a profile on each of the new arrivals.

NAME: Ken Lyons

PROFESSIONAL EXPERIENCE:

1964-1970 with Royal Australian Survey Corps doing 1st, 2nd, 3rd, 4th order control and topographic mapping from 1:25,000 to 1:250,000 all over Australia. One year in Vietnam doing engineering surveys, map revision, control, maps in support of the army.

1971 — private enterprise — photogrammetric mapping in support of mining, development.

TEACHING:

1972-79 W.A.I.T. (Western Australian Institute of Technology) teaching most subjects in survey degree and remote sensing, planning in Post Graduate Diploma and Masters.

PROFESSIONAL SOCIETIES:

Active in ISA (Australia) in mapping and charting committees.

SPECIAL INTERESTS:

Mapping, Remote Sensing, Planning and Economics, charting.

NAME: Geoff Bebb

PROFESSIONAL EXPERIENCE:

1963-1967 Australian Government — cadastral surveys, engineering surveys for large engineering works, control surveys, Alignment surveys, Network adjustments, Roads and Railways, Astro fixes and La Place obs.

1968-1970 IBM Australia Ltd as systems engineer establishing surveying and engineering computer systems.

1971-1974 Private Practice topographic/engineering mapping by aerial/terrestrial photogrammetry, subdivisions, engineering construction, computer simulations.

TEACHING:

1975 W.A.I.T. Final Year Surveying, Astro, Surveying for Engineers, Computer Programming, Survey Comps.

1976-1979 Perth Tech. Computer programming.

MEMBERSHIP:

MIS AUST

SPECIAL INTERESTS:

Control surveys, mapping adjustment, simulation, automated cartography.

NAME: Graeme Wright

PROFESSIONAL EXPERIENCE:

1974-1976 Cadet with private survey firm while undertaking studies in surveying at the Western Australian Institute of Technology.

Involvement in Cadastral, engineering and hydrographic surveys.

TEACHING:

1977-1979 Murdoch University (Western Australia) teaching surveying subjects in the Department of Environmental Science.

PROFESSIONAL SOCIETIES:

Associate Member of Institution of Surveyors (Australia).

SPECIAL INTERESTS:

Application of remote sensing to environmental problems.

NEW STAFF AT UNITECH Cont:-

NAME: Derek E. Gibbs

SURVEYING EXPERIENCE:

1964-1967: Surveying with Government Departments in South and Western Australia, carrying out 2nd and 3rd order control, geophysical surveys, and road surveys.

1967-1969: Surveying with American Companies in W.A. iron-ore developments (Mt Newman and Mt Tom Price) working on initial control and layout of townsite, industrial area, and minesite structures.

1970: Surveying motorway, bypass, and bridge construction (England).

1972-1974: Articled pupil and Instrument Hand at Highways Department (S.A.) carrying out cadastral surveys.

1975: Cadastral surveys with private surveyor Brisbane.

1976-1978: Completed Bachelor of Applied Science (Surveying) at W.A.I.T.

1979: Full time study, Graduate Diploma (W.A.I.T.)

TEACHING EXPERIENCE:

Part-time tutor, one year at W.A.I.T.

OFFICES HELD:

Committee member (3 years) and President (1 year) of Western Australian Surveying students Association.

SPECIAL INTERESTS:

Computer and calculator programming (i.e. Geodesy) and practical surveying.

PRIVATE INTERESTS:

Photography, baseball.

PERSONAL NOTES

Young Russell Smith, Don and Jeans rising star, is off to Rabaul at Easter time to show them how its done at the Swimming Carnival. Russell cleaned up all the other eight year olds at the Papua New Guinea National Titles last year in Port Moresby by winning six 'Gold Medals'. He was first past the post in the Freestyle, Butterfly, Breaststroke, Backstroke and the two relays.

Allan and Eileen Bale and their two boys are off to the Gazelle Peninsula in April to do some work. Things have been a bit slow in Popondetta and Allan is looking forward to getting back on his own turf for awhile.

Now that four of the Larmer children are at school in Australia Mick and Dianne decided that they don't really need 5 bedrooms. Rumour has it that they are leasing their house to one of the Foreign Embassies and intend to build another house more suited to their ongoing requirements.

Joe Wolfe had a little ticker trouble towards the end of 1979 and for a little while it looked like his mountain stomping days may be over. He had to see Fred Pratt about something the other day and could only catch up with him by walking right down the Kaugel Gorge and up again. Those two eminent 'bush doctors' Fred

Pratt and Terry Wickens were sufficiently impressed to pronounce him as fit as ten men.

Norm Leet doesn't do much flying around Madang these days following a crash 3 months ago with his single engine monoplane. He is an avid model aeroplane enthusiast, and in between his other joy flights as mentioned aforesaid, spends his spare time scaring the pigs and chickens on Yomba Hill.

John Mittelheuser's acting ability is not only confined to the tennis court, but is observed at amateur theatrical performances as well. Wife Marilyn is taking him back to the UK in July for a 3 month cultural refresher course, where she will also endeavour to teach him how to talk proper once again.

It's not too often that you hear of members returning to PNG for another term, but such is the case of John Robertson. John soon realised his mistake in leaving Hagen in 1975, where he worked with Ed Palaitus, and has returned to Madang as Area Surveyor, taking over from Dave Thompson who vacated the position during 1979 in order to make his fortune in Brisbane.

John has been joined by Geoff Acton as 2IC. Geoff originally hails from Rhodesia (don't let him hear you call it Zimbabwe), and

(for Personal Notes, turn to page 1)

after spending his early survey years in Malawi, did the right thing and obtained his ARICS in London before accepting his PNG posting.

Norm Leet, now as Regional Surveyor following Brian Mennis' pilgrimage to Moresby, somehow still finds time to get his paperwork done despite his frequent joy flights to Wewak, Hagen, Lae, Moresby, Wewak, Hagen, etc. At the time of writing, Norm is going through the throes of trying to understand the workings of a MRA101. Perhaps someone should tell him...

Bill McKibben, formerly of W&S in Madang, Kimbe and Hagen has finally decided to hang up his pen and do some work for a change. He reckons that even working down the bottom of a copper mine is preferable to that of the swamps of West New Britain. Bill starts with Smith & Hard, Kieta, in early April.

John Robertson reckons squash is a mug's game. It must be if one's game doesn't improve with playing 4 times a week for 6 months. He has given it away and taken up tennis. Now he reckons that tennis is a mug's game.

The planning department of Lands has been reorganised following Merlino Blanco's transfer from that department. Not only did his wife present him with twins in October, but he had to delay his leave as well.

Clement Sipara and Gregory Kasen are both down south, observing Queensland methods

of survey. We suppose that this sort of training is adequate, although far from the best available.

Vaki Vailala showed he has what it takes with the arrival of their firstborn in January, a daughter.

Bindum Salomo has transferred from Lands to W&S to see how the other half live, and to investigate the intricacies of the circular curve.

Colin Hard is getting the most out of his new boat and has won several fishing competitions in Bougainville.

Sometimes crew member Don Smith ponders the phenomena of an eleven year old partnership that otherwise successful, cannot organise itself to gaff a half dead fish in a flat sea. (The fish is presumably recovered by now — where ever it is.)

Ex New Guinea side Rugby rep., Skerry Palanga, now confines his football to coaching and has had recent successes in 'C' & 'D' grade.

Rocky Guirao of Lands, Arawa, just back from a trip to the big smoke in Rabaul. The comment of the year is the hotels in Rabaul are not as good as those in Manila.

Jeff Tierney & Tony Skeehan were sighted by Col Hard whilst on leave recently. Both are fit and well from either through lack of work, or as a result of plenty of it. They spend a large chunk of time on the golf course.

REPORT ON SURVEY BILL DRAFT 79/01 AS COMPARED TO SURVEY ORDINANCE NO.62 OF 1969

GENERALLY:-

The proposed bill is more detailed than the existing one; obviously the result of experience gained since the Surveyors Board was first created. At the same time there are no startling changes that are obvious, apart from a change in registration requirements, that gives the board some control over much more of the profession. This however is no cause for alarm by any bona fide members of the profession.

SPECIFICALLY:-

Part 1 (Preliminary)

In the definitions; the Association of Surveyors of PNG is recognised.

The term 'Authorised Survey' with its connotation of right to survey has been dropped and replaced by 'Cadastral Survey', which merely defines a boundary survey. However control is maintained in that the definition of 'Licensed Surveyor' specifies only a 'Licensed Surveyor' may carry out a 'Cadastral Survey'.

The term 'Registered Surveyor' is not defined but is mentioned, and it would appear the definition is not changed, although we will see later that the scope of the term has.

Part 2 (Administration)

As can be expected most of the Bill is concerned with the setting up of the Board and its powers — obviously the Board is then expected to achieve the aims of the legislation via its own regulations.

In this respect the concept of the bill has not changed, however more details have been added re the format of the board, its affairs, its functions and its powers. The format of the board has changed slightly in that an academic from Unitech replaces one of the government officers and any licensed surveyor elected by registered surveyors, replaces one of the three surveyors (approved by the minister) from nominations by the association.

The total board still numbers 7 and is still a body corporate as before.

I see no reason to comment further on this part, as the internal workings of the board are essentially the same; there are references to

'registered' and 'licensed' surveyors with different implications to the original document, but these will be covered under Part 3.

Part 3 (Registration & Licensing of Surveyors)

Generally in this section the board will accept for registration any surveyor not less than 20 years of age, who has the necessary formal qualifications, or the required (by the board) field service.

In addition the board will register persons (obviously mainly students) who are eligible to be admitted as Associated to the Association of Surveyors.

This registration however is termed 'provisional registration' and the person 'provisionally registered' will not be able to practise surveying (meaning *any* surveying) on his own account. A penalty of K500 is provided for offenders.

On the other hand the 'final registration' that will be allocated to suitably qualified persons allows them to practise surveying but *not* to carry out 'Cadastral Surveys'.

Only 'Licensed Surveyors' may perform 'Cadastral Surveys' and licenses are ordered by the board provided the person applying is registered and passes the required (by the board) projects.

So we see the new bill would allow the board to control all surveyors, not only authorised or what we currently call registered surveyors, and going onto Part 4:

Part 4 (Offences against the Act)

We see that *all* surveyors will be held personally liable for defect in *any* survey they are responsible for; whereas currently action can only be taken by the board against Registered Surveyors over defects on Authorised Surveys.

This part continues with the setting up of, and procedures at, inquiries resulting from offenses. Once again more detail is shown in the new bill. I was unable to find this clause which has always intrigued me in the existing bill, 'the board is not bound by rules of evidence or legal procedure, but may inform itself in such

REPORT ON SURVEY BILL DRAFT 79/01 AS COMPARED TO SURVEY ORDINANCE NO.62 OF 1969 Cont:-

manner as it thinks fit', nevertheless the power of the board to move against surveyors is still quite evident and, to me, disconcerting; although I must admit it is difficult to limit this power and still expect the board to operate in the best interest of the profession.

Part 5 (Appeals)

Once again this section is covered more fully but the procedure is the same. The only appeal is to the Supreme Court. More time is allowed to initiate the appeal in the new bill.

Part 6 (Regulations of the practice of surveying)

This section restates the difference between registered and licensed surveyors. Other than this there is no change.

Part 7 (Survey Marks)

Generally repeats the existing bill but in addition recognise the fact that marks can be legitimately lost to development and sets out the procedures in these cases.

Part 8 (Miscellaneous)

There is a bit more on access to carry out surveys but basically no change.

Under this section there is also a requirement to allow a student 'reasonable time' to attend lectures etc.

Part 9 (Transitional Provisions)

Current Registered Surveyors who wish to retain their status should be careful here as there is no automatic flow on apart from a one

month period after commencement. During this time he must apply for registration and a *licence*; the board will then decide on the application.

The stage could then be set for a witch hunt at this point, but personally I cannot see any cause for concern from bona fide members of the profession.

In conclusion, it appears to me that nothing much has changed as far as the practicing surveyor is concerned, in that there is no great difference in philosophy between the two bills.

The obvious differences are:

- i) there is a bit more meat in the new bill and
- ii) the board will control all surveyors and surveys; instead of what we now call registered surveyors and authorised surveys.

(D.T. Smith)
Registered Surveyor
30th November, 1979.

REPORT ON THE FIRST INTERNATIONAL HYDROGRAPHIC TECHNICAL CONFERENCE HELD IN OTTAWA, CANADA IN MAY 1979.

by: M.J. Larmer MASPNG.

The Association of Surveyors of Papua New Guinea was invited to send a delegate to this Conference by C.A.S.L.E.

C.A.S.L.E. in turn had been asked by the Canadian Government to nominate member Countries who would be interested in attending and the Canadians agreed to pay for air fares and accommodation of suitable delegates.

1979 had already been a vintage year for the ASPNG as the President Francis Posanau had represented it at the South East Asian Survey Congress in Singapore and Vice President Stephen Low attended the C.A.S.L.E. Regional Seminar in Hong Kong.

The Secretary was next cab off the rank and so Dianne and I left Port Moresby on Saturday 12th May and travelled almost non stop to Ottawa via Sydney-Honolulu-San Francisco-Vancouver and Toronto.

Ottawa is the Capital of Canada and is a very attractive city with a good deal of French influence in its architecture.

We stayed, as did the majority of delegates, in the Chateau Laurier, a very old dignified hotel connected by underground walkway to the Government Conference Centre which in turn is adjacent to the Canadian House of Parliament.

We arrived on the Monday morning and registered in the afternoon after a couple of hours welcome sleep.

The Icebreaker Party, the first of the official social functions was on that same evening. This of course is an apt title for an opening party particularly for delegates from as far away as we were. It is also a reference to the Icebreakers needed by the Canadian Hydrographic Service, which is one of the largest and best equipped Hydrographic Services in the World, and often has to contend with pack ice in the course of its operations particularly in areas like the Beaufort Sea which is in the Arctic Ocean.

The Canadian Hydrographic Service was a Co-sponsor of this Conference along with the Federation International des Geometres, the Canadian Institute of Surveying and the Canadian Hydrographers Association.

The only other delegate at the Conference we knew was Captain Mike Calder, Hydrographer, Royal Australian Navy, who has done a good deal of work in Papua New Guinea waters. We had a lot of ice to break and set about breaking it.

The Technical Sessions commenced on the Tuesday morning. Mike Bolton, of the Canadian Hydrographic Service, the Conference Chairman, introduced Mr Gerry Ewing, Assistant Deputy Minister, Ocean and Aquatic Sciences who welcomed all delegates, who numbered about 400 and were from some 47 countries.

The key-note address was presented by Mr Lenard. H. Legault, who is the High Commissioner for Canada in Lagos, Nigeria, and a member of the Canadian Law of the Sea delegation.

His topic, Law of the Sea and the Developing Countries, is quite relevant to Papua New Guinea. I have made a copy of his speech available to the Government here and can make it available to interested members.

In essence his message was that Developing Countries have arrived and will no longer be bound by Colonial Sea Rules. The problem is how these Developing Countries can manage and control their 'new' Resource if other countries, ie. the major sea powers, who are doing all the oceanographic research, know much more about these resources than the 'host' country does. The Developing Countries have legal rights over their 200 Mile Zone but have neither the Technology nor the funds to exploit those rights for the welfare of their citizens.

Mr Legault urged the Developed countries to assist the less developed countries in exploiting the oceans resources for the good of mankind. He concluded by noting that the 8th Session of the Law of the Sea Conference held recently in Geneva had made considerable progress.

The first technical paper was presented by Rear Admiral David Haslam, Hydrographer of the Navy, United Kingdom.

The title of Rear Admiral Haslam's paper was 'The Surveying requirements for deep draught routes.' Some points of interest in the paper were that some 80% of total world

trade is carried by sea in ships considerably larger than they were 20 years ago.

This is highlighted by the fact that until the turn of this century hydrographers did not concern themselves with depths of over 11 metres as far as danger to shipping was concerned. This increased to about 20 metres by the early 1960's whilst now the potential danger level for the huge vessels in service, (in 1973 Lloyds of London's statistics showed that there were 514 vessels larger than 100,000 dwt), is 31 metres (102 feet).

Haslam's paper also made the valid point that there is no exploitation of Sea bed resources without exploration and there is no exploration without hydrography.

Hydrographic charting has not been updated over the last few decades with anything like the intensity road and air maps have. This of course is somewhat understandable.

The British Government realizes the importance of continued upgrading of its Hydrographic chart inventory and to this end that Government has recently gone to tender for the construction of three new hydrographic vessels.

The second paper entitled 'The North Sea', an area where offshore positions and tidal datums make high demands on accuracy, was prepared and presented by Rear Admiral Krefler, Hydrographer of the Netherlands.

This paper deals with the upgrading of Survey standards in the North Sea necessitated by the proliferation of offshore oil rigs in the area. These rigs have huge drafts and must be towed to site over relatively shallow depths. Also, the position on the sea bed where the drilling is to take place is critical, requiring great accuracy in position fix.

As early as 1967, the Sub-Commission on Marine Geodesy, which is part of the Netherlands Geodetic Commission, recommended the installation of a Geodetic framework on the Netherlands Continental shelf.

The third paper entitled 'Joint Hydrographic Surveys of the Straits of Malacca and Singapore' was presented by Dr Takao Uchino of Japan.

Japan and the three coastal nations of the Straits of Malacca and Singapore, i.e. Indonesia, Malaya and Singapore, jointly carried out four series of hydrographic surveys in the Straits of Malacca and Singapore from 1969

to 1974, by using survey vessels of the three coastal nations.

The joint hydrographic surveys were conducted for the purpose of promoting navigational safety in the Straits in view of the fact that the nautical charts so far published had been based on the old-dated surveys up to 1930s and that, on the other hand, the size and the number of vessels navigating the Straits were rapidly increasing.

Various difficulties in conducting the joint survey had been anticipated as the technical standards and the level of surveyors were different among the four nations. These difficulties, however, were successfully overcome by full coordination of the standards and practices of training and study in advance.

What was obtained by the hydrographic personnel of the four nations from these joint surveys was not only the fruitful survey results but also the up-graded technical levels and strong friendship among surveyors.

The initial team consisted of twelve surveyors from Japan, five from Indonesia, two from Malaysia and three from Singapore.

The Survey was necessary primarily because Japan, the largest oil consuming nation in the Asian region, is importing about 70% of her total consumption from the oil producing nations in the Middle East. The oil transporting route at sea joining Japan in the Far East and the Middle East countries lies through the Straits of Malacca and Singapore.

The navigable channels through these straits with depths of over 23m is quite limited and so a very accurate survey was required.

Paper 4 was presented by Neil Mackin of the United Kingdom. Its title 'Use of ARGO Positioning System in Orinoco Delta, Venezuela'. It was prepared by Mr Mackin, Mr E. Schwartz and E. Gomez of the Instituto Tecnologico Venezolano Del Petroleo, Venezuela.

The paper describes an unusual problem confronted by the users of the 2MHz ARGO system in the Orinoco Delta. Very large seasonal outflows of freshwater from the Orinoco River are believed to degrade the attainable range accuracy. Readily available literature, as well as the manufacturers' operating manual, indicate the range error to be alarmingly serious.

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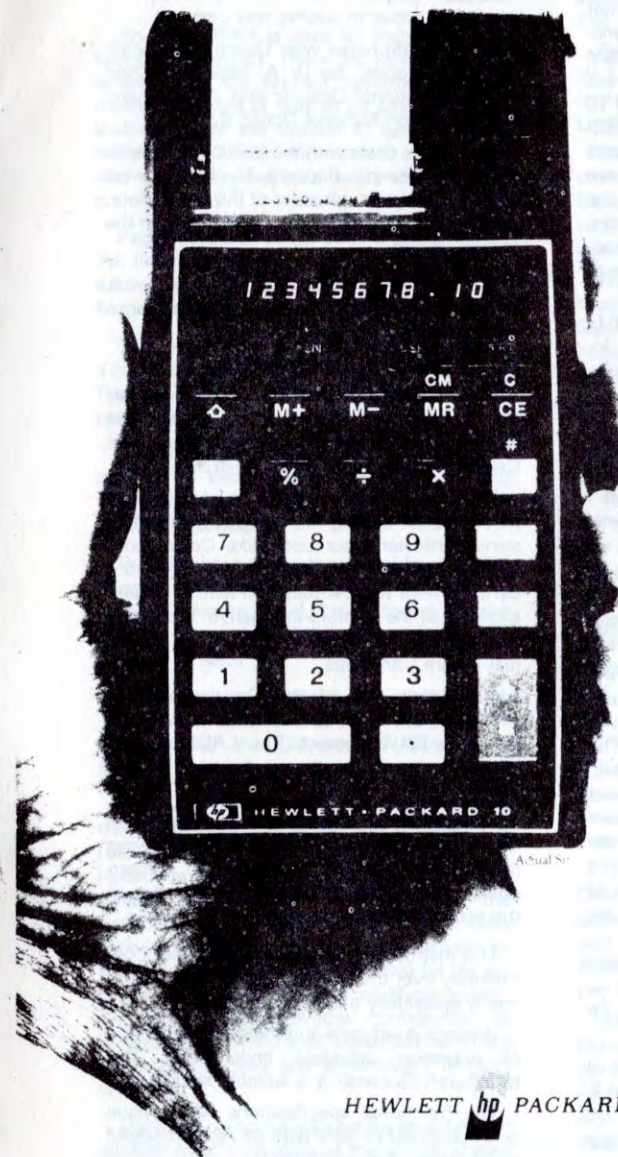
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The authors had been prompted to review relevant propagation theory and it is shown that techniques are available to define such a problem, though seldom presented in a form readily understood by the end user. The techniques are followed through and results obtained are at variance with earlier assessments: propagation speeds are a function of distance. But assumption of a constant speed close to that quoted for an 'all-sea water' path leads to errors of the order of 10 metres in this case. The theoretical predictions are compared with experimental results obtained in the Orinoco Delta, and it is here found necessary to thoroughly discuss the meaning of accuracy in using such a system. Within the limitations of experimental accuracy, the field results agree with those from theory.

Paper five was prepared by Dr E.L. Onischenko of the Shirshov Oceanology Institute USSR Academy of Science, Moscow, USSR.

The paper entitled 'Choice of Techniques for measuring concentration and composition of suspended Sediment on Shelf' was delivered by Captain I. Miroshnikov and I must say I found it very difficult to understand.

It mainly dealt with the use of light beams to determine sediment particle sizes.

Hereunder the abstract from the written paper:

Analysis is given the principal methods for the determination of suspended sediment concentration and composition from the point of view of their applicability to shelf surveys. The methods under discussion are: photoelectric, gamma-method, conductivity and three direct sampling methods. Advantages and disadvantages of these methods along with the main sources of errors in concentration measurements are discussed and the fields of rational application of each method are pointed out.

Paper six was the 'Definition of the seabed in Navigation Routes through Mud Areas'. It was presented by one of the Co-Authors, Dr Bob Kirby of the United Kingdom.

Dr Kirby's paper dealt with the problems of defining the actual seabed in areas where liquid mud is prevalent.

The liquid mud causes a 'Ghost Echo' which can cause the echo sounder to record a false bottom up to 3 metres above the true bed.

The problem is quite serious in Europort (Rotterdam) where 13 million tonnes of mud are dredged annually at a cost of US\$55 million.

The Institute of Oceanographic Sciences at Taunton, England has developed density gauges to assist in solving this problem.

The seventh paper was 'Ocean Floor Scanning Techniques', by Dr A. Malahoff, Chief Scientist National Oceanic and Atmospheric Administration National Ocean Survey.

This paper deals with the methods of identifying Oil bearing deposits by Bathymetric means is deep trough areas of the ocean floor, e.g. the Baltimore Canyon on the coast of the United States.

In the course of carrying out this work massive subterranean landslides were discovered in the Baltimore Canyon.

No written paper is available.

Paper 8 was 'Wrelads - The Australian Laser Depth Sounding System'. This paper was written and presented by Captain Mike Calder, Hydrographer Royal Australian Navy.

This paper appeared to me to generate the most interest among the delegates. The Russians particularly pursued Mike Calder constantly after his presentation seeking more details. There were virtually no written papers available at the Conference itself; in fact I only received my bound copy of the written papers just before Christmas.

The paper told of the Development of Wrelads 1 and 2 by Australian Weapons Research Establishment. The LADS part of Wrelads stands for Laser Airborne Depth Sounder.

Up until the 1920's, the only method of depth sounding was lead and line. Following the 'Titanic' disaster, research into iceberg detecting methods led to the development of the acoustic depth sounder.

This instrument has been refined very considerably over the last fifty years but it still remains essentially a profiling device.

Wrelads is airborne and therefore the speed of operation increases enormously. The Beechcraft Queenair is a suitable aircraft.

The functional specifications which have been obtained to date with an Aircraft speed of 70 metres per second are:

Depth measuring capability	2-30 metres
Accuracy of depth soundings	1 metre

Position of depth soundings	25 metres
Across track swath width	200 metres
Mean spacing of soundings	10x10 metre grid
Aircraft speed	70 metres/second

An Argo DM54 is used for fixing the position of the aircraft. There are limitations and problems in the present systems, e.g. the massive amount of data to be stored and the inefficiency of the system in turbid waters. Despite this, it is an enormous break through and apparently Australia leads the world at present.

Paper nine was prepared and presented by the Frenchman Bernard Schrupf and entitled 'The Search for Wrecks by Magnetometer'.

This paper pointed out that a vessel towing a magnetometer had a much better chance of finding wrecks than conventional sonar methods.

The magnetometer should be towed at least three times the length of the towing vessel behind that vessel to avoid interference to the instrument.

Profiles about 400 metres apart have a 99% chance of detecting wrecks 16 metres in height. Wrecks have been found in the English Channel by this method even when covered in sand.

Paper ten was prepared and presented by Tom McCulloch, 'CASLE', representative in Canada and the Director of Ocean and Aquatic Sciences, based in Ontario.

Tom was virtually our host and contact at the Conference. His paper was entitled 'The role of NGO's in the Promotion of Hydrography', N.G.O. stands for Non Government Organization. Examples are the Association of Surveyors of Papua New Guinea, C.A.S.L.E. and of course private industry which has done a great deal for the advancement of the Science of Hydrography. The paper discusses the contribution of various non government organizations in the hydrographic field and encourages its continuation.

Points of particular interest made are that at present more than 20% of the worlds known Oil and Gas Resources come from Offshore and this will rise steadily. It is estimated that even though efforts are being made to cut

down on the use of fossil fuels, more than 60 million barrels of additional oil need to be found each year.

Non Government Organizations and Hydrography will have to play a major role in achieving this goal as it must be remembered that existing supplies are depleting.

Paper eleven was presented by Lt Cdr W.J.M. Roberts F.R.I.C.S.(R.N.) (Retired) who is the operations manager of Decca Survey Limited.

This company recently won the tender for the large (PNG style) Hydrographic Surveys at Eleonora Bay in West New Britain. I understand that Lt Cdr Roberts is not personally involved with the job.

His paper was 'How the contractor contributes to the Development of Modern Survey Practice'. This paper told how the huge demands of the Oil Industry, particularly in the last decade, had prompted a positive response from private contractors in refining both equipment and methods to enable hydrographic surveys to be done faster with no loss of accuracy requirements.

Examples include analysis of a sample of the output of an integrated satellite/sonar doppler system as compared with other positioning systems; a test routine for checking the performance of a side scan sonar transducer; development of a practical method of echo sounder calibration in depths beyond the range of a bar check; and participation in the U.K. satellite doppler campaigns so as to collect data on JMR receiver output and its subsequent processing.

Paper 12 was 'Canada's Research and Development Imperatives - Ice Covered Waters' by J. Cameron O'Rourke, Dome Petroleum, Alberta.

This paper described Arctic Research and Development, if Canada is to construct and operate the Arctic marine systems necessary and if oil and gas are to be exploited in the Beaufort Sea and other Arctic regions within the next 10 years.

Whilst this paper had very little relevance to Papua New Guinea, I found it most interesting as it highlighted the enormous problems of carrying out hydrographic surveys, construction and drilling operations and the problems existing in the Arctic Ocean area including the Beaufort Sea.

Arctic conditions cannot be successfully simulated in a laboratory so the Canadians

learn how to operate in frozen conditions by actually going out and doing it.

The estimated cost of development of the procedures necessary to overcome the obstacles so that oil and gas can be exploited in the Arctic Ocean, and this includes specially designed icebreakers, systems to drill in pack ice, adequate transportation systems to enable the oil to be got out of the area, is C\$25 billion over the next decade.

I got the impression listening to this paper that the Arctic Ocean is almost the last frontier.

Paper thirteen was 'Quality Control of Off-shore Positioning Surveys' by Ir. J.G. Reimersma, Head of Topographical Services and Advice Shell International Petroleum, The Hague. This paper discussed the need for and the actual use of a quality control method for offshore positioning surveys with respect of radio locationing systems only.

The main thrust of the paper was the need to constantly calibrate the system you were using, calculations should be based on the spheroid and two lines of position were inadequate to fix a ship.

Paper fourteen was 'The United Nations View on Hydrographic Surveying and Nautical Charting.' Rear Admiral F.L. Fraser, Indian Navy, Chief Hydrographer to the Government of India.

This paper had quite some relevance to PNG and I quote from the abstract of the written paper.

The United Nations Regional Cartographic Conferences have for the past decade been focussing attention on hydrographic surveying and nautical charting. The concerns expressed by the United Nations Regional Cartographic Conference stems from the growing lack of up-to-date charting information from numerous developing Coastal States that either do not have Hydrographic Services of their own or possess inadequate hydrographic facilities. The result of these inadequacies are reflected in the concerned navigational charts and nautical documents which increasingly are becoming more and more out of date. In the past the waters of a number of developing Coastal States were charted by the industrialised countries until these developing Coastal States attained independence.

The United Nations therefore established two Groups of experts on hydrographic surveying and nautical charting, the first of

which met in early 1970 and the second in December 1977. Each group examined the ways and means of encouraging developing countries to establish or strengthen their hydrographic facilities. This paper deals with the 1977 meeting of the group of experts which was held in accordance with ECOSC Resolution 2049 (LXII). The report of the Group of Experts examines the present state of hydrography in developing countries, the necessity for developing countries to establish or strengthen their Hydrographic Services, the national advantages these countries could derive from such action and the guidelines for the establishment and the strengthening of hydrographic services.

The United Nations 1977 Report (E/CONF. 71.L.I.) expounds guidelines on the formation of Hydrographic Services and Nautical Charting. The Papua New Guinea Government should have a copy of this report. It is written in simple terms and contains elementary information explaining the need for and economic advantages of adequate coastal charting. The Report details the staffing organization of a typical embryo Hydrographic Service, the type of ships, equipment, etc., necessary and also talks of the United Nations willingness to assist a developing nation like Papua New Guinea in setting up a National Hydrographic Service. This assistance could include Professional advice, funding, training of Papua New Guineans in Hydrography by giving them practical experience in some service overseas etc.

The training is world standardized with the F.I.G. and the I.H.O. setting the standards.

As I said, Admiral Fraser's paper was of particular interest to me because of its relevance to Papua New Guinea.

Later in this report I will endeavour to elaborate on my discussions with certain delegates re-assistance to Papua New Guinea.

Paper fifteen, was again relevant to Papua New Guinea. It was entitled 'Standard of Competence for Hydrographic Surveyors' and was presented by Rear Admiral D.C. Kapoor, Director of the International Hydrographic Bureau which is based in Monaco.

Lt Cdr A.E. Ingham also spoke on the subject.

The International Congress of Surveyors (FIG), at its session in Wiesbaden in 1971, decided to form a working group to develop professional standards of competence for sea surveyors. In 1972, the Xth I.H. Conference of

the International Hydrographic Organization set up a working group for compiling standard training syllabi for the guidance of International Hydrographic Organization Member States. Subsequently, it was decided by the two organizations to combine the working groups in developing international educational standards.

The report of this joint FIG-IHO Group was accepted in 1977 by the two parent bodies, who decided to constitute an International Advisory Board to implement the recommendations of the Working Group.

Admiral Kapoor spoke on the Report of the IHO-FIG International Advisory Board. The Report spoke on academic requirements for entry into courses and stressed three aspects which I found very sensible and gratifying.

- a) that candidates should previously ensure their adaptability and suitability for working afloat;
- b) that course should contain generous periods of supervised sea training surveying;
- c) that a minimum aggregate period of two years field experience is necessary for competence in either category the Hydrographic Surveying A (Professional) or Hydrographic Surveying B (Technical).

It became apparent listening to this paper that the F.I.G. and the I.H.O. are committed to ensure that people from developing countries such as Papua New Guinea are trained in Hydrography to an acceptable International standard of competence.

The 16th speaker was Mr R.S. Bryant the Co-ordinator of F.I.G. Working Group 414a, Canada, who tabled that groups report on 'Data Acquisition and Processing Systems'. I did not feel that anything coming out of that report was of interest to us here in Papua New Guinea.

The seventeenth speaker was Commodore A.H. Cooper RAN (Ret'd) of the I.H.B. in Monaco. Tony Cooper was formerly the Hydrographer, Royal Australian Navy before the days of Mike Calder. His report was 'A Standardised Test Programme for Radio Positioning Systems'.

It seems that the reason FIG Working Group 414B, of which Commodore Cooper is Chairman, was asked to report on the above,

was the unreliability of the manufacturers specification of some radio positioning systems.

The object of group 414B was, and probably still is, to devise a system of tests to prove the worth of positioning systems. The report contained a series of field tests including static tests where short base lines of between 500 and 2000 metres were used to eliminate the effect of errors or variations in the velocity of propagation. This will enable the error in the zero setting to be identified and corrected entirely and consequently one main source of error has been eliminated.

The next report was presented in French by Bernard Schruppf on behalf of Monsieur Bourgoin, entitled 'Instrumentation and Techniques for Detection of Underwater Anomalies'.

This was the Report of FIG Working Group 415.

At the 15th Congress of the FIG (Federation Internationale des geometres), Commission 4 decided to create a 'task force' or study group (SG415) for the purpose of reviewing the methods (mechanical, optical, acoustical, magnetic etc.) as well as the instruments used in the detection of natural or artificial depth anomalies.

The author, chairman of the SG415, gives an account of the progress made by the group. About ten countries have shared the task of drawing up the report, which contains the following chapters: General remarks — Acoustical methods: sonars and their use — Magnetic methods: magnetometers and their use — Mechanical methods: dredgers and their use — Optical methods: aerial and satellite photography: underwater photography and television — Conclusions and prospects — Bibliography and specifications of the materials.

The nineteenth speaker was Mr G.R. Douglas of the Canadian Hydrographic Service. His paper was 'Hydrographic Research in the Canadian Arctic'.

Again, despite its irrelevance to Papua New Guinea conditions, I found this paper very interesting because as in Cameron O'Rourke's paper earlier, it outlined the enormous physical difficulties faced by Hydrographers working in the Arctic Ocean. It was like listening to a narrative by Alistair MacLean (Ice Station Zebra, etc, etc). The paper talks of

operating in temperatures of minus 40°C, where both man and machine are tested to the limit.

It described certain of the expeditions, the answers they achieved, and the way they achieved them. Of course this activity was necessitated by the demand to exploit fossil fuels in the Arctic.

The twentieth paper entitled 'Detailed Sea Bed Mapping for a Pipeline across the Norwegian Trench' was presented by the Norwegians Martin Hovland and Arne Indreide.

The best way I can precis this paper is to quote direct from its Abstract.

In 1976, two years after the discovery of the Statfjord oil field in the North Sea, the Statoil/Mobil Group decided to go ahead with an evaluation of the feasibility of laying a submarine pipeline from Statfjord to the western coast of Norway.

Due to the rough nature of the Norwegian west coast and unexpected features (pockmarks) in the Norwegian Trench, the Statfjord-to-Norway pipeline route called for a detailed sea floor mapping.

For the general mapping, boomer, sparker, side scan sonar and pitch, roll and heave compensated echo sounders were used.

For the detailed surveying of the rocky shore approach areas, a dense profile grid with the above mentioned systems was used in addition to manned submersibles carrying video equipment and precision profiling equipment. In all, 9 shore approach routes were studied, of which 3 were subject to manned submersible surveying before one shore approach route was selected.

Valuable experience was gained in the course of the survey programme, including experience on the complexity of submarine navigation in rugged terrain, automatic mapping systems and the difficulty of producing side scan sonar mosaics over large areas.

This too was an interesting paper by virtue of the task at hand. The total submarine length of the route was 183 kilometres with 99 of these in water greater than 300m deep.

The end result was a route suitable for the laying of a 36" diameter crude oil pipeline.

The twenty-first speaker was Lt Cdr John E. Chubb who is attached to the U.S. Defence Mapping Agency in Washington.

The Title 'The Mission Area Concept in an Analysis of Worldwide Coastal Survey Requirements'.

Commander Chubb's definition of Mission Area includes 'those navigable coastal waters deeper than 6 fathoms (11 metres) which are readily accessible from the sea and upon which naval of merchant vessels can reasonably expect to operate. Where charts are required, ports, and their approaches are within the mission area regardless of water depth.'

The aim of the Defence Mapping Agency seems to be to have data (including charts) on all areas where United States military or merchant shipping is likely to operate. The concept is to only chart what is needed for the safety of the bulk of maritime shipping.

The twenty-second paper, entitled 'Oil Exploration Program at Gulf of Suez and Role of Hydrographic Survey' was prepared and presented by Commodore Mansour M. Moustafa, Director of Hydrographic Department Ministry of Defence, Naval Forces, Egypt.

Commodore Moustafa made the point that Egypt must be unique among the maritime nations, in so far as she is having to embrace a prodigious expansion of sea-borne trade, her extensive off shore exploitations in the Gulf of Suez, and the vast flow of international shipping through the re-opened Suez Canal all at the same time. As the oil activities were proliferating to the South of Suez, the world highway of ships to and from the re-opened canal were being subjected to increasing collision risk as a result. Safety of navigation has therefore become, through force majeure, one of the inescapable conditions of the wellbeing of Egypt itself.

The paper goes on to discuss the safety problems caused by the enormous concentration of shipping in the Gulf of Suez. It describes the methods currently being employed in assisting navigation including visual, acoustical and electronic aids and also the Traffic Separation System.

He made the point quite strongly that ship-borne radar was the best existing aid. Even all this is not enough and if I may quote Commodore Moustafa's conclusion, 'The particular case of the Gulf of Suez is such, in our opinion, as to need special or exceptional measures in the form of some local rules, to

induce the uniformity of conduct needed to provide an acceptable level of safety in the area'.

These rules cover specifically the peculiarities of special rules for ships and special rules for oil rigs, mobile plant and service aircraft.

The last paper was presented by Mr R.E. Eschelbach of the Magnavox corporation, California.

It was entitled 'State of the Art Development of Integrated Navigation Systems'.

This paper reviews the status of integrated navigational system designs at Magnavox Marine Systems for differing user requirements. System configurations that are both independent of and require various levels of radio navigation aids were discussed.

The paper went into considerable detail about various configuration of Integrated Navigation Systems, virtually all finishing up with a digital computer and some form of display.

The new systems are inevitably geared to position fixing from satellites. The equipment was very complicated and very expensive and the whole thing was almost too much for a jigger and chain man like myself.

This paper did highlight the incredible amount of research and development companies such as Magnavox carry out and there is no doubt the maritime industry owes much to their initiative.

While these papers were being presented from Tuesday through to Friday the Social functions of course continued on.

I have already mentioned the Icebreaker party on the Monday night.

On Tuesday night there was a boat tour up the Ottawa River; the Canadian Hydrographic Association hosted a luncheon on the Wednesday; there was a Beer Seminar on the Wednesday evening where all guests were presented with a pair of beer mugs which you kept after the beer ran out.

On Thursday night was the Dinner Dance and on Friday the official windup luncheon.

There was a very good speaker at this luncheon, one Marcel Cadieux who is Special Negotiator for Maritime Boundaries (Canada/USA) from the Canadian Department of External Affairs.

His talk was entitled Boundary Delimitations and their implications on Natural Resources.

His job was to negotiate a settlement agreeable to both Canada and the United States of the problems caused by overlapping of the 200 miles zones. The two nations have common water boundaries in the Atlantic and Pacific Oceans and also the Beaufort Sea.

Monsieur Cadieux' message was that to solve any problem such as International boundaries, good will, friendship and understanding are the key elements to success.

He believes that men are fundamentally friendly with each other and in the words of the U.N. Charter they wish 'to practice tolerance and live together in peace with one another as good neighbours'. There is a message for Papua New Guinea, Australia-Indonesia in all this.

Well that takes care of the Conference itself, the only other thing I wish to report on is the discussions I had with appropriate people with respect to Papua New Guinea obtaining some sort of assistance in setting up a Hydrographic Service.

Papua New Guinea, particularly in view of the relatively new 200 mile limit, has an enormous volume of Territorial waters, the exploitation of which will have a very significant effect on this country's economic development.

You may remember that Admiral David Haslam in the very first paper presented at this Conference said that there was 'no exploitation without hydrography'. Papua New Guinea coastal waters are woefully under-charted.

There exist at present four coastal sheets at scale 1:100,000. A further 90 are needed.

Money and expertise are required if a programme to carry out Hydrographic Charting in this country is to be implemented.

The setting up of Papua New Guinea National Hydrographic Service seems essential if this work is to be done in the next 20 years. I spoke with Admiral Haslam, Hydrographer, United Kingdom and Captain Calder, Hydrographer Australia and whilst both seemed quite enthusiastic about assisting Papua New Guinea without technical advice and with the training of Papua New Guinea Hydrographers, etc, neither could make a Survey ship available because of the considerable work commitment they already had.

They will give training and they will advise and the Papua New Guinea Government should follow this matter up with them.

I was also able to secure an appointment to speak with Admiral Kapoor, Director of the International Hydrographic Bureau in Monaco.

He was aware of Papua New Guinea and that it required assistance in the Hydrographic sphere and he indicated that if its case was properly presented, Papua New Guinea could expect assistance from him and the U.N.D.P. would very likely approve some appropriate funding.

He did say that this subject had been approached on more than one occasion in the past and inferred that lack of continuity and cohesion on the part of the Papua New Guinea Officials concerned had caused the matter to drop.

The message is clear. If Papua New Guinea is serious about establishing a Hydrographic Service, they will get considerable assistance provided they seek this assistance in a positive and mature manner.

One positive result to come out of my discussions with Admiral Kapoor was that Commodore Tony Cooper also of the I.H.B. in Monaco will be visiting Port Moresby from 27th to 29th of February, 1980. Admiral Kapoor and I discussed the desirability of such a trip and this information was passed on to Mr Doug Lloyd, Marine Officer, Hydrographic Survey Division of the Department of Transport who followed it up enthusiastically.

The First International Hydrographic Technical Conference was definitely a success and it will have had lasting beneficial affects for Papua New Guinea if Commodore Coopers visit eventually leads to the formation of the Nations own Hydrographic Service.

MICHAEL J. LARMER
M.A.S.PNG

SIMULATION AND SURVEYING IN PAPUA NEW GUINEA

Geoff Bebb, B.Surv., (NSW), LS, MIS, (AUST)

This paper discusses the relevance of simulation techniques to train surveyors in Papua New Guinea. The concepts of simulation are introduced and details of a classroom experiment in simulation of control networks are discussed. Suggestions are put forward to extrapolate the experimental results to the general field of training Papua New Guinea's surveyors.

Introduction

On face value, the suggestion that simulation has a place in surveying in Papua New Guinea, would seem unrealistic and extremely academic in a country where there is so much work to be done and such a scarcity of well trained manpower. But it is the scarcity of manpower and the pressing need to upgrade the skills of existing manpower that creates an environment for the use of simulation techniques.

Concepts of Simulation

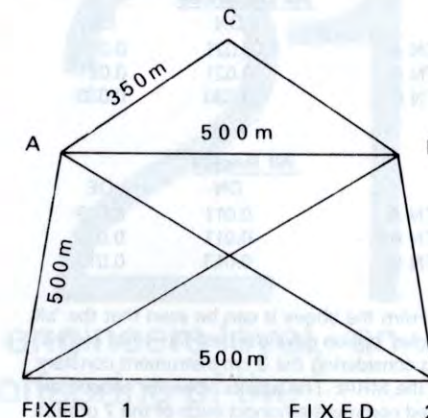
What is simulation? The dictionary says it means 'to feign, to pretend to feel or have....' but nowadays the technical definition would be 'to duplicate with a digital computer, selected physical processes'. In Surveying, this means letting the computer duplicate the measuring process — any kind of measurement — so that in our terms a trainee surveyor, technician or graduate might examine the consequences of professional decisions he might make in the field — and gain experience in a few minutes or hours, that would otherwise take months or years to accumulate. This concept, though new to surveying is not new at all having been used for over 20 years in the airline industry where pilots are subjected to emergency experiences in the simulator and the consequences of their actions studied. If the simulated aircraft "crashes" then the pilot learns without the consequent loss of life.

The same can hold true of a simulation exercise for surveyors. The simulated gross misclose in a traverse because of a blunder, is no less embarrassing as a real misclose but the money cost and the time involved are much, much less.

Class Room Experiments

A class of 22 fourth-year students at UNITECH were recently subjected to an exer-

cise where the consequences of a choice of EDM equipment caused a stunned silence of shocked disbelief.



The students were asked to investigate how the new stations A, B and C in the above diagram, would best be fixed.

1. fully observing, all angles and all distances
2. observing all angles
3. observing all distances

In the choice of instruments for angular measurement, a T2 was chosen and it was decided that a combination of instrument and target mis-centring would amount to ± 5 mm and a standard deviation of the angles would be $\pm 5''$ or 2 arcs.

For the distances, an MRAI tellurometer was chosen with measuring precision of ± 3 cms + 3 PPM. To the experienced surveyor a poor choice — to the students a reasonable choice especially as the first of the above options was a fully observed figure. To a man, the students nominated that option as the one they expected to give the best results. The results of the simulation are summarised below. DN and DE are the standard deviation in Northing and Easting respectively.

Fully observed figure

	DN	DE
STN A	0.014	0.013
STN B	0.014	0.013
STN C	0.020	0.019

All Distances

	DN	DE
STN A	0.021	0.021
STN B	0.021	0.021
STN C	0.030	0.030

All Angles

	DN	DE
STN A	0.011	0.009
STN B	0.011	0.009
STN C	0.013	0.012

From the above it can be seen that the 'all angles' option gave the best fix — not surprising considering the 3 cm instrument constant of the MRAI. The results however caused excited comment amongst each of the 7 groups of students and a dramatic quickening of interest in the propagation of errors in networks — which was the object of the lesson.

Immediately the 'feel' for the choice of instruments began to become apparent as students tried more and more networks in an effort to make the correct choice. That 'feel' normally only comes to a surveyor after years of hard, cold and sometimes costly experience.

Extrapolation to the Training Situation

The application of simulation is not just confined to networks; it can be applied to almost any area of surveying. Here are just a few examples:

- The effects of a collimation error in levelling with unequal backsights and foresights.
- The effects of short backsights or careless centring on traverse misclosures.
- The effects of not applying consistent and correct tension in chaining.
- The effects of non-vertical staff in tache or levelling.

- The effects of the heighting capability of a stereo plotter on volume calculations.

The list is endless.

The usefulness is heightened by first asking the student or trainee to nominate the effects he is expecting — from his previous experience or from his education.

This causes mental involvement on the part of the student and increases the effect of the exercise.

Another benefit of simulation, is that in his own time and at his own pace the student can answer his own 'what if' questions.

The major government surveying agencies in Papua New Guinea now employ training officers as a recognition of the part that industry must play in the training of surveyors. The use of simulation techniques along the lines suggested above might well make that training more effective and help make a success of the PRACTICAL YEAR which 3rd year students at UNITECH must now undergo.

Software for simulation programs is relatively easy to write and even the most mini of mini computers these days has a BASIC language which has a random member generator built in. Staff at UNITECH would be glad to assist in the development of such software.

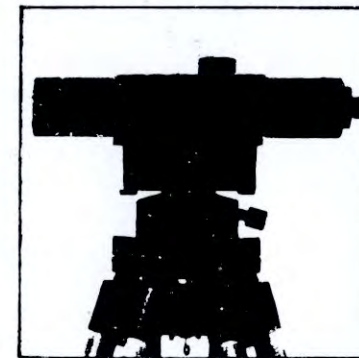
Conclusions

Simulation of survey networks has proved to be a very worthwhile and economic process and has been used all over the world for nearly 10 years. Agencies such as National Mapping, Royal Australian Army Survey Corps, Australian Survey Office, Melbourne Underground Rail Loop Authority, W.A. Metropolitan Water Supply, W.A. Lands and Surveys Department have all made use of the techniques together with at least 2 private survey firms in Western Australia.

The use of simulation with teaching and training of surveyors is still relatively new but offers a great deal in a country like Papua New Guinea where young surveyors must gain a lifetime's experience as quickly as possible.

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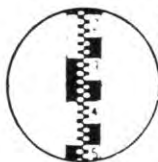
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