SCHOOL OF SURVEYING

REPORT

MAY, 1973

I N D E X

THE UNIVERSITY OF NEW SOUTH WALES

SCHOOL OF SURVEYING

REPORT TO VISITING COMMITTEE - MAY, 1973.

1. GENERAL

This report covers the period March 1972 to April 1973. The year 1972 saw the end of a very difficult triennium for the university During the new triennium 1973 to 1975 there will be a marked improvement in funding. In 1973 although there has been an improvemen in the funds for equipment and running expenses there has not yet been any improvement in the academic staff and this is the area of greatest difficulty.

The School has been facing the double difficulty of increasin student numbers and teaching commitments and a decrease in academic staff, due to resignations. There are now four vacant positions in the School, three of which are due to resignations. The fourth is a new position which was allocated to the School at the beginning of 1973. Because of the depressed academic salaries and buoyant conditio in the profession it is very difficult to attract suitable applicants. Pressed on all sides by these circumstances academic staff are forced to carry very heavy loads of teaching. The immediate priority is to attract suitable applicants for the vacant positions. Once the new academic salaries are announced, probably towards the end of May, this task should become considerably easier. The increased teaching commitments within the Surveying School justify the allocation of a further five or six teaching positions and the next objective must be to gain these new positions for the School.

All surveyors must be aware of the increasing cost of surveyi equipment with the powerful new desk top calculators and short range e.d.m. now available. These are being adopted by practising surveyors at a rapid rate and it is up to the educational institutions to train their students on the most modern forms of equipment. Photogrammetric plotters have always been expensive items and with the increasing student numbers in the senior surveying classes the small number of plotters available for laboratory work has become a serious problem. This underlines the second main difficulty of the School, the shortage of funds for major equipment.

The School is also well down in non-academic staff numbers but some relief was obtained at the beginning of 1973 with the allocation of one new position and the upgrading of another position.

2. UNDERGRADUATE COURSE

At the beginning of 1973 the revised course was implemented i Years 1 to 3 of the Full-time course and Stages 1-5 of the Part-time course. The transition entailed determining the standing of each student affected, subject by subject, in the new course. The transitio appears to have been achieved without any serious inconveniences or problems for students. This is largely due to the uniting efforts of the Timetables Officer, Mr. L. Berlin, and of the Enrolment Officer, Mr. W. Kearsley. It is unfortunate, but unavoidable, that some studen have an uneven distribution of hours in Sessions 1 and 2. One subject is being given in Session 1 and repeated in Session 2 to minimise the difficulty. This uneven distribution appears to be the limit of the difficulties experienced by students. The basic principle applied in the transition was that students should not be placed at a disadvantag by the introduction of the new course, and many gained minor concessions.

Year 4 and Stages 6 and 7 will be implemented in 1974. Sessi 1 of Year 4 is particularly important as it includes the five-month period of professional training, and the extended senior survey camp. The professional training period, if it is to provide the maximum benefit to students and the profession, requires close liason between the School and the profession.

It is recommended that a Committee comprising members of the Visiting Committee and the School of Surveying be set up to advise on

i) the types of training most appropriate in this period,

ii) the recommendations to be made to employers on the type of training,

iii) the best means of liason with employers in the private practice and official sectors of the profession and

iv) measures to ensure that cooperation of employers.

A committee will be established in the School to plan the operations of the survey camp. The 1973 survey camp at Bathurst will be an opportunity for preparations for the major camp.

The revised course was approved after the Visiting Committee meeting in April 1972. The approval was given only after two General Studies subjects had been added in the Third Year. This increases the contact time to well above the optimum, and it is hoped to obtain recognition for some of the Land Studies subjects as General Studies electives. This will mean that they are no longer compulsory subjects for surveyors, which is not considered as a serious disadvant

A Sub-Committee which was set up at the 1972 meeting of the Visiting Committee to assist in the course revision, held one meeting before the final submission of the revised course. Several aspects of the revision were discussed and the advice of the Sub-Committee was greatly appreciated. One outcome of the discussions was a small working group which was asked to review the place of Cartography in the course.

Two further aspects of the revised course need attention. A number of service subjects are not offered in session units, and approaches will soon be made to obtain them in the desired form. Secondly, it may be necessary to provide students with greater opportunities to study some of the branches of surveying such as hydrographic surveying and cartography.

The sandwich course, in which students attend the university for only one session per year, was also approved during 1972. Its smooth passage through all committees was somewhat unexpected as this revision of the course breaks new ground in the university. Much of the comment was highly favourable. It will now be implemented in the period 1975-80, and it will progressively replace the evening part-time course. The only aspect which was not approved was the use of the term "semester" for the academic stages of the course (Semesters 1 to 8 A long list of alternatives has been proposed and after discussing and rejecting many interesting alternatives such as "aliquot" and "section" the most suitable term appears to be the plain little word "part". Or perhaps a more exotic and colourful choice should be made: "bout" or "chukka" perhaps?

The first group of four students from the University of Newcastle has transferred into the course. Students can take the first two years or the part-time equivalent at Newcastle and transfer into the B.Surv. at the University of New South Wales. The Royal Australian Navy has two men in the second year of the course and in 1973 for the first time the first year of the B.Surv. is offered at the Naval College at Jervis Bay.

3. ENROLMENTS

The details of enrolments for the years 1970-1973 are shown in Table 1. The final figure, the EFCS or Effective Full Course Students, is a measure of the equivalent number of students which would be taught by the School if their studies were entirely within the School. It is a measure of the total teaching commitment.

TABLE I

SCHOOL OF SURVEYING - ENROLMENTS

B.Surv. - Full-time					
Year	1970	1971	1972	1973 ~~(provisional)~~	197 (Provi
1	59	46	~~60~~	~~107~~ 97	10
2	42	48	40	~~52~~ 50	
3	21	38	43	~~43~~ 42 ~~47~~	
4	14	26	38	~~29~~ 37	
Total F/T.	136	~~156~~ 158	~~180~~ 181	~~241~~ 226	
B.Surv. - Part-time					
1	36	24	24	~~28~~ 32	41
2	8	15	16	~~10~~ 13	
3	10	14	16	~~12~~ 12	
4	17	8	13	~~9~~ 14	
5	13	12	7	~~11~~ 10 10	
6	16	10	14	~~6~~ 7	
7	6	18	14	~~20~~ 18	
Total P/T.	106	101	104	~~96~~ 106	
Total F/T. & P/T.	242	257	284	~~337~~ 332	
Post-Graduate					
Ph.D.	6	2	6	5	
M.Surv.	5	5	4	4	
M.Surv.Sc.	11	8	7	8	
Total	22	15	17	17	
EFCS	122	171	184	210	

The most striking feature of the table is the increase in first year full-time students in 1973. There is an increase in interest in surveying as a profession, partly because of the increase of status given by the degree, partly because of the continued demand, and partly

because it has an outdoor flavour when the ideals of youth are turning away from the crowded offices and bustling city centre. The chief cause of the increase, though, is a gradual increase of momentum as the degree course in surveying becomes known. It is only 11 years since the first group graduated with the B.Surv. in 1962.

The question of the number of surveying graduates required is a pertinent one. Fortunately a detailed survey has recently been made by Dr. J.C. Trinder and a small committee, on behalf of the Reciprocati Survey Boards. The report has not been published yet but some preliminary results are available. Dr. Trinder states: "According to our figures, and based on a growth rate of the economy of 5% we project that Australia needs about 170 new surveyors in 1973. Of this number about half would be needed in New South Wales.

This excludes any numbers required to make-up for the existing shortage. From these figures, a graduation rate of 85-100 would not be excessive. Even a very conservative estimate would put the desirable annual number of graduates at 75".

Note that this is 50% higher than the number, 50, discussed at the 1972 meeting. Dr. Trinder's committee used several methods for its estimates, but one approach is illustrated below, for New South Wales.

The estimates are based on

5 %	growth
1½%	to replace losses due to death
1½%	to replace losses to other occupations
8 %	

There are approximately 1200 active surveyors in the State, so that this calculation yields 96 new surveyors, without accounting for the current shortage.

4. MASTER OF SURVEYING SCIENCE COURSE

The year 1972 saw a major change in the formal Master's courses in the Engineering Faculty, and the culmination of a process begun several years ago. It is now possible for a Master of Surveying Science or a Master of Engineering Science degree to comprise subjects from any schools within the Faculty or, with the approval of the Head of School, from outside the Faculty. The research component is also very flexible: it can be zero, 25%, 50% or 100% of the course. If the project, or the bulk of the course is taken in the School of Surveying, the degree awarded is the M.Surv.Sc.

With the serious shortage of staff it has notbeen possible, in 1972 or 1973, to offer more than a token number of subjects in the M.Surv.Sc. The School has not actively encouraged new students and in 1973 there is only one new enrolment.

When the M.Surv.Sc. was initiated the subjects were mainly in the areas of mathematics, geodesy and photogrammetry. It was envisaged that the scope of subjects would be broadened to include a number in the area of subdivision planning and land studies. This second step has never been taken because it was felt that the subjects should first be developed in the undergraduate course. Now that this is taking place there is the difficulty of no member of the full-time staff in the area. Consequently the development though desirable, will have to be held up again.

5. DEGREES AWARDED

During the period under review the following degrees were awarded:

Bachelor of Surveying:

Honours, Class 1	1
Class 11, Division 1	2
Class II, Division 11	7
Pass	34
	44

Master of Surveying Science:

E.A. Brady
O.A. Ojengbede

Master of Surveying:

Nil

Doctor of Philosophy:

A. Stolz

Thesis: "Three-dimensional cartesian co-ordinates of part of the Australian Geodetic Network by the use of local astronomic vector systems."

6. PRIZES, AWARDS AND ELECTIONS

Associate Professor R.S. Mather was awarded a U.S. National Academy of Science Resident Research Associateship. He has taken up the award from July 1972 - July 1973 and he is working at Goddard Space Flight Centre on geoid studies, satellite geodesy and four dimensional geodesy.

Associate Professor G.G. Bennett continued his tenure of the Ludwig Leichardt Scholarship in Munich until December 1972, undertaking studies of the survey systems in Bavaria.

Professor P.V. Angus-Leppan was awarded a Research Grant from the Australian Research Grants Committee (ARGC) for a project "The development of a time base theodolite".

Dr. J.S. Allman was awarded a research grant from the ARGC for the project "Least square adjustment and error theory".

The Gold Medal of the Board of Surveyors for 1973 will be awarded to Mr. T.R. Cooke.

Professor Angus-Leppan was elected Chairman of the committee for accreditation for the surveying degree at the Western Australian Institute of Technology. He has also been appointed as the External Course Consultant for the Diploma in Surveying at the PNG Institute of Technology, Lae.

Mr. A.P.H. Werner as been elected as representative of the Institution of Surveyors on the Standards Association's Committee for Linear Measurements in Construction.

Professor Angus-Leppan has been appointed as Australian delega to Technical Commission 2 (Professional education) of the International Federation of Surveyors (FIG).

Associate Professor G.G. Bennett has been appointed Australian delegate to Technical Commission 4 (Hydrographic Surveying) of FIG.

7. DONATIONS

The N.S.W. Division of the Institution of Surveyors has donated five books to the University Library. These rare books are of great historical interest.

Leybourn: The compleat surveyor. London, 1657.

Wing: Geodoetes practicus or the art of surveying. London, 1666.

Adams: Geometrical and graphical essays. London, 1741.

Fenwick: A theoretical and practical treatise on subterranean surveying. London, 1804.

Gibson: A treatise of practical surveying. Dublin, 1743.

8. EQUIPMENT

No grant for major plant was made from university funds in 1972. Through other grants the School purchased a Hewlett-Packard Model 10 desk top programmable calculator and a Geodimeter Mark 6. In 1973 funds will be used mainly for purchasing theodolites. A start will be made on developing a digital readout system for the Wild A8 plotter, interfaced with a Hewlett-Packard Model 30 calculator for on-line computations. Serious consideration has been given to the needs for desk top calculators. As a result it is planned to replace the 40 hand calculators by electronic calculators as soon as funds become available.

9. RESEARCH ACTIVITIES

Research has continued mainly in the fields of Geodesy, Photogrammetry, Adjustment of Observations, Distance Measurement and Integrated Surveys.

The specific projects include

i) Adjustment of large networks leading to an eventual readjustment of the Australian Primary Geodetic Network.

ii) Four dimensional geodesy - feasibility of the application of new ultra high precision techniques in global geodesy.

iii) Review of geodetic and micrometeorological observations over snow and ice surfaces leading to determinations of refraction.

iv) Lunar laser ranging. Feasibility of simultaneous ranging from MacDonald, Hawaii and Australian observatories.

v) Error theory. An analysis of observational variances for angular and distance measurements for the purpose of assigning "apriori" values in optimisation studies.

vi) Investigations into the error propogation in a number of different types of control networks.

vii) Development of computer programmes for geophysical studies.

viii) The design and construction of tables for predicting star positions for the determination of position and azimuth for a large range of latitude.

ix) Standards of accuracy in integrated survey systems.

x) Investigation of the relationship between image quality in photogrammetry on the visibility of target with particular reference to premarking of ground targets.

xi) A detailed investigation of the anomolous values of mean sea level and the factors causing the anomalies, in relation to the Australian third order levelling net.

xii) Investigations of the absolute accuracy of orthophotos and conventional line maps is being carried out using the Zeiss Topocart-Orthophot.

xiii) **Development of a Time Base Theodolite.**

Other projects reported earlier which are being continued are investigations in e.d.m. ground swing and zero error, studies of the geoid: the indirect effect and details of local undulations and the ratio method for trilateration.

xiv) The Effect of Topography on the Geoid.

xv) The Determination of Geodetic Information from Very Long Baseline Interferometry Observation of Extra Galactic Radio Sources.

xvi) Precision of Local Control Networks.

xvii) Investigation of Collocation Techniques for Prediction of Gravity Anomalies.

xviii) Determination of a Suitable Standard Forms for Levelling Staves, Surveyors Tapes and Bands.

xix) Zero Error and Ground Swing of the Tellurometer 101.

xx) Length Ratios in Trilateration Adjustment.

xxi) Preparation of a Text on Field Astronomy.

xxii) Investigation of Stereoscopic Vision.

xxii) Investigation of the Use of Programmable Calculators in Photogrammetry.

10. STAFF

(a) Mr. D.W. Lambden resigned during 1972 to take up a position in private practice.

Mr. A.H. Campbell was promoted to Senior Tutor but subsequent resigned to take up a position in private practice.

Mr. A.H.W. Kearsley was promoted to Lecturer from February 1973.

Dr. J.C. Trinder returned from study leave which he spent at Purdue University.

Associate Professor R.S. Mather left on study leave in June 1972.

The staff of the School is made up as follows:

Academic:	Professor	1
	Associate Professor	2
	Senior Lecturers	2
	Lecturers	7
	Senior Tutor	1
Vacancies:	Teaching Fellow	1
	Senior Tutor	1
	Lecturer	1
	Lecturer/Snr. Lecturer (Land Studies)	1
Non-Academic:	Professional Officer	1
	Administrative and office staff	3
	Laboratory staff	5

(b) Staff Visits

Professor P.V. Angus-Leppan and Associate Professor R.S. Mathe visited the Weapons Research Establishment, Salisbury,S.A., on 7th April 1972 and met members of the Space Research Group, Laser Group and Radar & Electronic Tracking Group. They discussed laser ranging system lasers and VLBI systems in connection with the Geodetic Observatory project.

The 15th Survey Congress was held at Newcastle during May 1972 and the following members of staff of the School of Surveying attended:

P.V. Angus-Leppan	J.S. Allman	A.P.H. Werner
A.J. Robinson	D.W. Lambden	A.H. Campbell

Mr. Campbell presented a paper on measurement of tape temperatures.

Professor P.V. Angus-Leppan was invited to make the Occasional Address at Open Day at R.M.I.T., Melbourne on 7 June, 1972.

Professor P.V. Angus-Leppan and Associate Professor R.S. Mather visited Division of National Mapping on several occasions for discussions on the geodetic observatory and laser ranging to the moon. They also visited the Australian National University and the Department of Education and Science for discussions on the same topics.

G.J.F. Holden, L. Berlin and A.H. Campbell visited D.M.R. Photogrammetry Section to discuss possible research areas.

A.J. Robinson during a 2-week trip to New Guinea visited Lae Institute of Technology and a private practice firm in Goroka, New Guinea, and also attended the 7th Survey Conference of the Association of Surveyors of Papua New Guinea.

A.P.H. Werner visited Australian Iron & Steel, Port Kembla to discuss aspects of metrication. He also visited Nymbodia, near Grafton to inspect pre-historic stone monuments connected with calendar computing; the Moree OTC Satellite Communications Centre to inspect engineering survey methods; and at Coonabarabran made a repeat visit to the Anglo Australian Telescope site which is under construction.

Professor P.V. Angus-Leppan was invited to meet members of the Queensland Board of Advanced Education during September for discussion on the future of surveying education in Queensland. He also visited the Surveying Departments at the Queensland Institute of Technology and the University of Queensland, and held discussions with members of the Vice-Chancellors' Committee on the future of the surveying course.

Professor P.V. Angus-Leppan also visited the University of Papua-New Guinea, Port Moresby and spent a week at the Institute of Technology, Lae.

(c) Papers, Lectures and Publications

J.S. ALLMAN & G.J. HOAR, "Optimisation of Geodetic Networks", *Survey Review*, XXII, No.167, (1973), 11-22.

P.V. ANGUS-LEPPAN, "Adjustment of Trilateration using Length Ratios", *Survey Review*, Vol. XXI, No.166, October (1972), 355-368.

P.V. ANGUS-LEPPAN, "Coordinate conversion between 6^{o} and 2^{o} Transverse Mercator Zones", *UNISURV Rep. G-18*, (1972), 21-31.

P.V. ANGUS-LEPPAN, "The new role of geodesy in geophysics". Paper read at Second International Conference on Exploration Geophysics, Sydney, January, 1973.

P.V. ANGUS-LEPPAN, "Practical application of accuracy standards in traversing". *Australian Surveyor*, March 1973, Vol.25, No.1, p.40-61.

P.V. ANGUS-LEPPAN, "Geodesy in four dimensions" in "Surveying and Mapping Australia" - technical papers, 16th Australian Survey Congress, Canberra 1973. p.B1-B8.

P.V. ANGUS-LEPPAN, J.G. FREISLICH, B. PURINS (Department of Lands), P. BERTHON JONES (University of Sydney) and J. HUTCHISON (Department of Lands). *Tables for the Integrated Survey Grid*, N.S.W. Department of Lands, (1972), 1-41.

L. BERLIN & G.J.F. HOLDEN, "Some aspects of perspective centre calibration", *UNISURV Rep. No. G-18*, (1972), 1-20.

A.H. CAMPBELL, "The dynamics of temperature in survey bands & tapes of steel & invar", *The Surveyor and Industry*, Technical Papers from 15th Survey Congress, Newcastle, (1972), 8.1-8.13.

A.H. CAMPBELL, "Notes on methods of temperature measurement of surveying bands and tapes", *Australian Surveyor*, Vol.24, No.3 (1972), 128-142.

A.H. CAMPBELL, "The dynamics of temperature in surveying steel and invar measuring bands", *UNISURV Rept. No.S7*, (1972), 1-210.

A.H. CAMPBELL, "A Review of Methods of Temperature Measurement of Surveying Bands and Tapes", *South African Survey Journal*, No.81 (1972).

A.H.W. KEARSLEY, "The integration survey system in N.S.W.", *Australia Surveyor*, Vol.24, No.4, December (1972), 196-202.

R.S. MATHER, "The theory and geodetic use of some common projections", *School of Surveying Monograph 1*, (2nd Ed.), (1972), 1-125.

R.S. MATHER, "Practical techniques for the establishment of a world Geodetic system from gravity data", (in) - "Extra collection of papers contributed to IAU Symposium 48", (ed. S. Yumi), Sasaki Publishing Co., Sandai, Japan, (1972), 105-121.

R.S. MATHER, "The Australian geodetic datum and the geocentre", *Search 3*, (1972), 80-85.

R.S. MATHER, "Earth space", *UNISURV Rep. No. G17*, (1972), 1-42.

R.S. MATHER, "Four dimensional studies in earth space", Goddard Space Flight Center, No. X-553-72-230.

H.L. MITCHELL, "An Australian geopotential network based on observed gravity", *UNISURV Rep. No. G-18*, (1972), 32-50.

H.L. MITCHELL, "Relations between mean sea level and the Australian levelling survey", *UNISURV Rep. G-17*, (1972), 43-59.

A.J. ROBINSON, "A table of short range electro-magnetic distance meter *Australian Surveyor*, (1972), Vol.24, No.2, 111-116.

A.J. ROBINSON, "Field test of H.P. 3800A distance meter", *Australian Surveyor*, (1972), Vol.24, No.3, 143-152.

A. STOLZ, "On the condition of the normal equation matrix in the local astronomic vector method of three-dimensional computation", *UNISURV Rep. No. G-17*, (1972), 59-71.

A. STOLZ, "Three-dimensional cartesian coordinates of part of the Australian geodetic network by the use of local astronomic vector systmes", *UNISURV Rep. No. S8*, (1973), 1-249.

J.C. TRINDER, "Relationship between pointing precision, spread functic and Modulation Transfer Functions", *Presented paper, 12th Congress of I.S.P.*, Ottawa, Canada, (1972), 1-25.

J.C. TRINDER, "Effects of image blur and lateral inhibition in the vis system on visual performance", *Optica Acta*, Vol.18, No.6, (1971), 461-476.

J.C. TRINDER, "Accuracy of x-parallax clearance", *Photogrammetric Engineering*, (1972), Vol.38, 61-70.

J.C. TRINDER, "Systematic errors in pointing observations", *Photogrammetria*, Vol.28, (1972), 61-70.

J.C. TRINDER, "Some remarks on numerical absolute orientation", *Australian Surveyor*, Vol.23, (1971), 368-371.

A.P.H. WERNER, "Problems and effects of the conversion of weights and measures to SI units in surveying", (Revised Edition), *Australian Surveyor*, Vol.24, No.1, (1972), 2-28.

(d) Professional Liaison

Staff members have served on numerous committees of the Institution of Surveyors and other professional bodies.

P.V. Angus-Leppan was re-elected to Board of Surveyors, New South Wales, was a member of the Educational Sub-Committee, Institution of Surveyors, the Standing Committee on Qualifications, and the Survey Integration sub-committee on Standards of Accuracy and the Technical Sub-Committee.

J.S. Allman was appointed as a member of the Standards of Accuracy Sub-Committee of the Integration of Surveys Committee.

G.J.F. Holden was appointed to Surveyor General's Committee of Investigation on the Application of Photogrammetric Techniques to Cadastral Surveying, and was appointed to Surveyor General's Committee on automated photogrammetry.

J.C. Trinder was appointed Australian representative on Working Committee on Education and Research of International Society of Photogrammetry. He was the convener of the committee appointed by the Recess Committee to study the "Needs of the Profession".

A.H.W. Kearsley was appointed to Sub-Committee on Survey Integration, New South Wales Division, Institution of Surveyors, Australia.

(e) International Symposium

An International Symposium on "The Earth's Gravitational Field and Secular Variations in Position" will be held at the University in November 1973. It will review recent developments in high-precision geodesy. The symposium is under the auspices of the International Association of Geodesy and is sponsored by the Australian Academy of Science. Professor Angus-Leppan is the Chairman of the Organising Committee and Associate Professor Mather is its Secretary. This will be a unique gathering in Australia of the most eminent scientists in these fields, including Professor Boulanger of the U.S.S.R., who is President of the International Associate of Geodesy.

11. VISITORS TO THE UNIVERSITY

Professor W.M. Kaula, Institute of Geophysics & Planetary Physics, U.C.L.A., Los Angeles.

Dr. K.G. McCracken, Head, Division of Mineral Physics, CSIRO.

Dr. Oshima, Professor of Photogrammetry, Institute of Industrial Science, University of Tokyo.

Professor Hans Klinkenberg, Professor of Geodesy, Laval University, Quebec.

Mr. Brian Murphy, Head, Department of Surveying, University of Melbou:

Mr. N. Brayshaw, Senior Lecturer, Department of Surveying, University of Otago.

Messrs. J.R. Gilliland & K. McCoy & Lyle Bishop, Lecturers, Departmen of Surveying, South Australian Institute of Technology.

Mr. A. Sprent, Lecturer in Surveying, Tasmanian College of Advanced Education.

Mr. Geoff Thomson, Principal Lecturer in Surveying of Royal Melbourne Institute of Technology.

Mr. A. Blaikie, Senior Lecturer in Surveying, University of Otago.

Mr. T. Birtles, Canberra College of Advanced Education.

Mr. E.S. Friel, Senior Lecturer in Cartography, University of Otago.

Mr. K. Toms, Head of Department of Surveying, Tasmanian College of Advanced Education.

Mr. David Morgan, Past-President, Institution of Surveyors, Australia

Members of Federal Council of Institution of Surveyors for their Annua Meeting.

Mr. G. Clarkson, Department of Shipping and Transport, Melbourne.

Mr. D. Russell, Lecturer in Geography, Mitchell Advanced College of Education, Bathurst.

Mr. Ian Cameron & Mr. John Bonham, Wild (Aust.) and Dr. Hugh Frey of Wild Heerbrugg, Switzerland.

Mr. W. Thomas, Hewlett-Packard, Sydney and Mr. W.R. McCulloch, Manager, Civil Engineering Division, Hewlett-Packard, U.S.A.

Messrs. B. Degotardi & W. Hunt, Surveyors.

Mr. G. Milliken, B.Surv. (Q) from Australian Iron & Steel.

Mr. Cosco, New South Wales Public Service Board.

Mr. A. Woodruff, Staff Surveyor, Department of Main Roads, Moree.

Mr. M. Gallagher, Surveyor, Papua-New Guinea.

Mr. John Connings, Surveyor, Melbourne.