the
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physicist
A PUBLICATION OF THE AUSTRALIAN INSTITUTE OF PHYSICS

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GRAPHIC RECORDERS
NOTICE TO CONTRIBUTORS

General—Manuscripts submitted for publication should take, in general, one of three forms:

An Article on matters of interest to physicists, including selected lectures given at Institute, Branch or Group meetings.

A Letter to the Editor on matters affecting physicists or on articles and letters previously published. In general, letters should not exceed 1000 words.

Notes and News may include Institute activities, announcements to members, comments and announcements by overseas Institutes of Physics and other local scientific bodies. In general, the text should not exceed 400 words. Abbreviated notices of meetings may be submitted for The Calendar.

In preparing manuscripts, contributors should follow the general style used in this journal. Manuscripts should be double spaced typed on one side of the paper only and with side margins one and a half inches wide. Every page, including those with tables and illustrations, should be numbered. For an Article, the author's name should appear underneath the title, followed by the address of the laboratory. For a Letter to the Editor, the author's name should appear at bottom right, and his address and the date at bottom left of the letter.

The original typescript and one copy should be forwarded. Original drawings should be submitted but, where possible, photographic copies, Xerox, or blueprints of the originals should also be submitted. Half-tone illustrations should only be included if essential; they should be on white glossy paper and show a full range of tones with good contrast.


References are to be cited in the text by year of publication, e.g., Brossel [1947], and are to be arranged alphabetically at the end of the article, giving author's name and initials, followed by year of publication. For journal articles, this is followed by the title of periodical, volume, and page, thus:


Abbreviations of titles of periodicals should conform to those used in A World List of Scientific Periodicals; please consult this.

References to books should give the author or editor, year of publication, title, number of edition, town of publication, and publisher's name.

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EARTHQUAKE-ENGINEERING SYMPOSIUM
Melbourne, 16—18 October, 1969
J. A. Brooks and H. A. Doyle
Bureau of Mineral Resources, Geology and Geophysics, and Department of Geophysics and Geochemistry, Australian National University

Introduction
This successful symposium, convened jointly by the Institution of Engineers, Australia (Victoria Division, Structural Branch) and the Australian Institute of Physics (Geophysics Group), attracted over 140 delegates. Its chief purposes were to formulate an objective appraisal of Australian seismicity in relation to structural design and to establish a National Committee which would hold membership in the International Association for Earthquake Engineering (IAEE).
The twenty papers presented, listed below, covered earthquake statistics and risk in Australia and New Guinea, the philosophy of seismic design and aspects of the design of particular structural types, damage to structures and research into the behaviour of structural components under earthquake loading.

A Summary of Important Points
A map of intensities of Australian earthquakes and a first attempt at mapping Australian seismic zones were presented. It appears that clustering and alignments of minor earthquakes often provide the only available criterion for the presence of an active fault system. The comparatively low seismicity in Australia and its short history result in poor earthquake statistics and make statistical prediction of larger shocks very uncertain.
The Adelaide and South-Western seismic zones appear to be of the most practical importance, having reported intensities of up to VIII and IX respectively. Other seismic zones in Victoria, NSW, and Queensland have experienced seismic intensities of VII. These intensities could be exceeded in the future, but they probably would be rare events.
The Adelaide network of thirty-five Australian stations still needs expanding, particularly in north-west Australia, Queensland and northern NSW. A few strong motion accelerographs which are of particular value in engineering studies have been recently installed in the Territory of Papua and New Guinea, but more are required for uniform coverage.
Effects of the Meckering earthquake (WA) of 1968 were described. Intensities of up to IX were experienced, the highest so far reported in Australia. Details were also given of effects and damage on buildings in Meckering, Perth, and other towns. Damage tapered off rapidly with distance from the epicentre. The most striking contrast was between masonry and timber-framed structures. Only one of fifty-two masonry structures survived with damage economically repairable, whereas only two of twenty-seven timber-framed buildings sustained lesser damage. Galvanized steel roofing was shown to be much safer than tile roofing against earthquake damage. Alternatives to brick chimneys such as metal or reinforced concrete were recommended.
The seismicity of South Australia and Tasmania was described. The considerable variability of occurrence of South Australian shocks was emphasized and also limitations in the use of the Richter local-magnitude scale.
Earthquake distribution and some recent damaging occurrences in New Guinea were described. A computerized storage and retrieval system for earthquake reports is now in use there. A half million dollars worth of damage has occurred in the Territory in the past two years, and earthquake risk is increasing with the large numbers of new buildings.
Cornell's statistical approach to the estimation of seismic risk was described with an example of an estimation for a site at Westerport, Victoria. Seismic risk in Australia appears similar to that of eastern USA and Canada. Improvements in risk analysis would result from geological and geomorphological research for evidence of past movements.
Several speakers from the engineering profession spoke on theory and practice in designing structures against earthquake accelerations. The problems involve dynamic rather than static design, as in early methods. A rigid structure is not necessarily the better design. As buildings spread and become taller and more expensive, the importance of dynamic design increases. The majority of structures have natural periods falling in the range of seismic periods and so attention must be given to the periods of building modes, to the building damping and ductility.
Some ductility in structures is desirable to absorb vibrational energy in larger earthquakes. For large buildings in active areas, computer calculations of the building vibration modes may be necessary, or measurements on models, and during construction of the building. Los Angeles and other cities now require accelerographs to be built into new buildings to measure their
vibrational characteristics. Already thirty buildings in Los Angeles have been so instrumented.

The computer output of a dynamic elastic analysis on a structure subject to a large earthquake was shown as a film, showing the building modes clearly and a plot of building-shear forces. The effects of geological foundations in aseismic design were discussed and also the design problems of bridges and very tall chimneys.

Research projects, sponsored in the USA by the American Iron and Steel Institute, and by the Portland Cement Association into the cyclic and dynamic straining of steel and reinforced concrete beams and columns, were described and one film shown. Teams of investigators from the AISI have been sent to such earthquake areas as Agadir and Skopje to study building damage in detail. These two earthquakes showed clearly that even a moderate size shock can cause great loss of life and property.

Building codes in many countries, for example the American Uniform Building Code, specify seismic coefficients as a function of the fundamental building period, and use seismic zoning of the country as a guide. The design codes used in New Zealand were outlined. That country has been divided into three zones, and powers have recently been given to local authorities to enforce either strengthening or demolition of some older buildings, as well as the regulations of the new buildings. Some speakers claimed that there is a need for some zoning in Australia.

The Commonwealth Department of Works and the New Guinea Administration are using a modified SEAOC (California) seismic code for parts of New Guinea, and it was suggested that such an approach may be suitable for areas in Australia.

Serious attention to the need for aseismic design of major undertakings such as large bridges, dams, and nuclear power stations, and the importance of regulating school buildings was emphasized.

It was considered that, particularly in Adelaide and Perth, attention should be given to the fastening of cornices, parapets, movable partitions and panels in older buildings. The reinforcing of masonry chimneys would be desirable and also the proper fastening of frames to foundations.

It was recommended that written records of actual damage to various types of structures be kept for future reference and not only derived intensity values. The possible future spread of population into valleys below dam sites should be borne in mind.

One speaker recommended that the Bureau of Mineral Resources set up accelerographs in various parts of Australia as well as New Guinea to provide local data for engineering purposes. Field studies of earthquakes in Australasia and the Near North were also suggested, plus routine first-order surveys (triangulation and levelling) at five-year intervals in high risk areas.

A film of earthquake damage and social effects of the 1964 Alaska earthquake was shown and also slides of the 1967 Caracas earthquake damage.

National Committee
Delegates elected the following office-bearers to an Australian National Committee:

Chairman: Prof. F. S. Shaw (School of Civil Engineering, University of New South Wales)
Vice-Chairman: Dr. D. J. Sutton (Physics Dept., University of Adelaide)
Secretary: Mr. H. A. Knox (Engineer- Secretary, Standards Association of Australia)

The initial functions of the Committee will be to seek affiliation with IAEE and to evaluate the subject matter and discussion presented, to meet one of the main objectives of the symposium. The Committee has no fixed terms of reference except those implied by its definition and the articles of the IAEE.

The organizing committee intends to publish a limited issue of proceedings including discussion, and inquiries should be directed to The Secretary, The Institution of Engineers, Australia, Victoria Division, 191 Royal Parade, Parkville, Victoria 3052.

Technical Papers
'The Earthquake Intensities in Australia', by H. A. Doyle (Australian National University, Canberra)
'The National Seismic Coverage', by J. A. Brooks (Bureau of Mineral Resources, Canberra)
'Recent Damaging Earthquakes in New Guinea', by D. Denham (Geophysical Observatory, Port Moresby, Papua)
'Numerical Seismic Risk' by R. Underwood (United Kingdom Atomic Energy Commission)
'Meckering Earthquake Intensities and Notes on Earthquake Risk for Western Australia', by I. B. Everingham (Mundaring Geophysical Observatory, Western Australia)
'The Effect on Buildings of the Meckering Earthquake of October 1968', by F. D. Beresford (Commonwealth Scientific and Industrial Research Organization)
'Seismicity of Tasmania', by W. D. Parkinson (University of Tasmania)
'Acceleration, Magnitude and Frequency Variations of South Australian Earthquakes', by D. J. Sutton (University of Adelaide)
'Earthquake Engineering Design Philosophy', by G. R. Walker (University College, Townsville)
'Comparison of Seismic Design Codes', by C. T. J. Bubb and J. Lloyd (Commonwealth Department of Works)
'Structural Engineering for Earthquake Conditions in New Zealand', by N. Rowley (Brickell, Moss, Rankine, and Hill, New Zealand)
'The Design of Bridges', by R. Shephard (University of Canterbury, New Zealand)
'Foundation Stability under Earthquake Loading', by P. McGregor (Electrical Commission of NSW)
'Earthquake Design of Reinforced Concrete Chimneys', by A. Fellows (Talman A/S) Pty Ltd
'Earthquake Engineering Related to Reinforced Concrete Structures', by M. Fintel (Director, Engs., Design and Standards Dept., Portland Cement Association, USA)
'Earthquake Engineering Research and Steel Structures', by E. O. Stephenson (American Iron and Steel Institute)
'Some Aspects of Earthquake Research in the United States', by B. A. Bolt (University of California)
'The Use of Microtremors in Evaluating Earthquake Activity', by R. Green (University of New England, Armidale)
'A Storage and Retrieval System of Seismic Data for the New Guinea-Solomon Islands Region', by D. Denham and W. M. J. Byrne (Geophysical Observatory, Port Moresby)
'Does Australia have an Earthquake Problem?', by F. S. Shaw (University of New South Wales)
AUSTRALIAN INSTITUTE OF PHYSICS (Incorporated in Victoria)
SEVENTH ANNUAL GENERAL MEETING

UNCONFIRMED MINUTES

Minutes of the Seventh Annual General Meeting of the Australian Institute of Physics, held at the School of Physics, University of New South Wales, Kensington, New South Wales, at 5.30 pm on Tuesday 20 January 1970.

1. Attendance

1.1 Present


1.2 Apologies and Proxies

Apologies were received from Professor R. Street, Dr. R. D. B. Fraser, Dr. J. K. Mackenzie, Mr. F. Lehany and Mr. W. Blevin. No proxy was appointed.

2. Sixth Annual General Meeting

2.1 Minutes

RESOLVED that the Minutes of the Sixth Annual General Meeting held on 25th November, La Trobe University, Bundoora, Victoria, on 27 February 1969, as circulated, be taken as read and confirmed.

3. Seventh Annual Report

In moving the adoption of the Annual Report, the President pointed out that the overall membership of the Institute had now reached 1500. This was rather an awkward size, being too big for the administration to be handled entirely by honorary office-bearers but not so large that the cost of paid staff could be easily met. The Institute had set up its permanent office in Clunies Ross House when that project commenced, and was like a man who had bought a house too large for his present requirements in the expectation that he would grow into it. The year under review was the first full year of operation of that office, and the President expressed particular thanks for the work done by the Assistant Secretary, Mrs. J. A. MacKenzie.

The year had been notable for the high level of activities carried out in Branches and Groups. The President mentioned particularly the activities carried out by Branches on behalf of the Institute as a whole, namely the Summer School organized by the Victorian Branch and the Pawsley Memorial Lecture organized by the ACT Branch.

"The Australian Physicist" was a particularly important aspect of the Institute's activities. For those members who do not take advantage of Branch and Group activities it is the only tangible benefit they receive in return for their subscriptions. During the year the Journal had run into severe production problems, as a result of which the printer had been changed as from the beginning of 1970. The President expressed particular thanks to the Editor, Dr. J. L. Symonds, the Assistant Editor Dr. W. H. Steel and their colleagues on the Editorial Committee for the work they had done over this particularly difficult period.

The results of the Survey of Physicists conducted during 1968 had been released, and these indicated some problems facing the profession which the Institute must consider very carefully. Ideally such surveys should be carried out about every three years instead of twice as at present, so that trends might become apparent more rapidly.

The adoption of the report was seconded by Dr. J. L. Symonds who presented a subsidiary report on the operations of 'The Australian Physicist'. In order to cover the increasing costs of production the advertising rates were to be increased for the coming year. With the change in the printer it was confidently anticipated that the monthly schedule of publication would be re-established and adhered to. The most pleasing feature was the abundant supply of material being submitted for publication which indicated that the journal filled an important role.

In the discussion that followed, contributions were made by Dr. Pryor, Professor Ellyett, Dr. Dryden, Dr. Collins, Dr. Davies, Mr. McAllan, and Professor Milner.

RESOLVED that the Seventh Annual Report be adopted.

4. Seventh Annual Financial Statement

In the absence of the Honorary Treasurer the adoption was moved by the President. He pointed out that the year under review was the first full year in which the Institute had operated without the benefit of many hidden subsidies from the employers of its honorary office-bearers. The overall deficit of $1410 was very close to the amount budgeted. He said that the contributions of the Company subscribers were particularly appreciated. Without them it would have been necessary to curtail activities considerably or make large increases in the subscriptions.

Despite the financial year ending on the 30th September, it had been difficult for the Honorary Treasurer to assemble all the information required for the Financial Statements in time for presentation at this Annual Meeting. The President urged that in future Branches and Groups send their financial statements to the Honorary Treasurer as soon as the financial year was over.

In the discussion that followed, contributions were made by Mr. Haneman, Dr. Collins, Mr. Burton, and Mr. Birch.

RESOLVED that the Seventh Annual Financial Statements be adopted.

5. Appointment of Auditor

RESOLVED that Gordon Quinn & Company of 325 Collins Street, Melbourne, be appointed Auditors for 1970.

6. Equal Pay for Women Physicists

Notice of Motion had been received from Mrs. K. R. Makinson that "this Meeting deplores the unwieldiness of relations between Council and the Membership which resulted in failure to take action on the question of 'equal pay for women physicists'. Such action was overwhelmingly supported by members as expressed at four Branch Annual Meetings in 1968-69, yet through the apparent hesitation on the part of Council and Executive to reach a decision, no action was taken before the arbitration case was concluded on 19 June 1969'.

In Mrs. Makinson's absence this Motion was moved pro forma by Dr. Macfarlane. He outlined the history of the equal pay discussions from April 1968 to June 1969.

The Motion was seconded by Dr. Pryor who referred to a previous discussion on the transferability of superannuation on which action had been taken much more promptly.

Other contributions to the discussion were made by Dr. Davies, Mr. McAllan, and the President who agreed that it is difficult for the Institute to arrive quickly at a considered opinion on a matter of this nature. The Motion was then put and carried.

In the absence of any other business the Meeting closed at 6.35 pm.
7th ANNUAL REPORT, 1969

1. General
1969 was a year of administrative consolidation following the developments of the previous year, while activity in the Branches and Groups increased.

Increases occurred in all grades except Subscribers, corporate membership increasing by 9 per cent. during the year to 1182, and overall membership by 7 per cent. to 1503.

Financially, following the surpluses of previous years, a small deficit was incurred as had been budgeted.

The Institute extends its congratulations to Dr. D. F. Martyn on his election as President of the Australian Academy of Science and to Dr. A. Walsh, Immediate Past President of the Institute, on his election as a Fellow of The Royal Society.

2. Finance
The Balance Sheet as at 30 September 1969, together with the various statements of receipts and expenditure and the financial statement for 'The Australian Physicist' are presented herewith, the form being the same as for 1968.

This year's expenditure has been in the following proportions:

- Branch and Group Activities 35%
- 'The AustralianPhysicist' 25%
- Administrative 35%
- Council Meetings 5%

and a small deficit has been incurred. Thus, with the first full year's operation of our office in Clunies Ross House, the steady increase in accumulated funds noted in previous years has been halted. Next year it is likely that administrative costs will be less, while 'The Australian Physicist' will cost more, so that the overall position will probably be much the same as for this year; a small deficit of $600 has been budgeted. Current reserves are substantial and more than adequate for the immediate future. However, there is a clear need in the long term both for raising more funds and for a careful husbanding of our resources. The recently instituted Company Subscriptions has increased our income by $2400 in the current year and we hope that this source will produce more next year. Exhibitions and certain conferences can also be sources of funds. Finally, prompt payment of members' subscriptions is a non-negligible item; at the end of the financial year 159 subscriptions were still unpaid (mainly Students and Graduates), representing $1045.

It will be noted that the investment in Alliance Holdings Limited has been increased to $3000 and now earns interest at the rate of $4 per cent. (previously $6 per cent.). Collectively the investments amount to $11,000, of which $8914 is held on behalf of the Branches and Groups. These investments are so arranged that about $2000 becomes available for use or re-investment every year.

The Income and Expenditure Statement shows a deficit slightly in excess of the budget estimate of $160. However this was only achieved by counterbalancing increased costs, both for administration ($1400 above budget) and for 'The Australian Physicist' ($500 above budget) by other savings and a withdrawal from reserves ($381); income was almost exactly at the budget figure. The cost of printing, stationery and insurance ($2946) was inflated by about $1000 in the current year by costs which will not arise again for several years. The major item in this connection was the printing of the Membership List, General Information Booklet, and application forms.

The item 'Distribution of AJP' ($204) needs some explanation. This is the cost to the Institute of distributing the 'Australian Journal of Physics' to those members who paid the old subscription of $2 per year. Somewhat less than half this sum is actual postage and the remainder non-recurrent setting-up costs for a reorganized system of distribution. Many years ago postage of AJP represented a very small item, but in recent years postal charges have increased considerably and, further, many more members now subscribe to AJP. During the current year Council reviewed the position and decided to charge future subscribes $2.50 per year so that this subsidy will be removed.

As a consequence of the change in the Institute's financial year introduced in 1968, and to facilitate administration, the Institute's budget year has been brought into line with the financial year and allocations to Branches and Groups in 1970 adjusted on a nine-months' basis.

3. Membership
The Institute records with regret the deaths of Sir John Madden FAIP, Professor A. L. McAuley FAIP, Dr. K. M. Burrows AAIP, Dr. K. A. Gross AAIP, Mr G. Russell Grad. AIP, Dr. D. L. McDonald Grad. AIP, Mr W. J. Jirand (Student), and Miss U. Hugelmann (Student).

The membership figures at the end of 1969, and the changes during the year, are set out in Tables I and II respectively. Membership continues to increase at the rate of about 6-7 per cent. per annum and total membership now exceeds 1500.

An increase in Student recruitment (62 for 1969 compared with 44 for 1968) may be attributed to the efforts made in this direction during the year.

A marked gain in Associate membership resulted from the reminder sent out with the 1970 subscription notices drawing members' attention to possible eligibility for a higher grade of membership. There were 34 transfers from Graduate to Associate during 1969 compared with 14 during 1968.

It is to be regretted that Council has had to remove the names of six Members, twelve Students, and seven Subscribers from the Register for non-payment of subscriptions.

The membership of the Groups during 1968 was Biophysics 77, Geophysics 150, Education 147, and Vacuum Physics 139.

4. Office
During the year the work of the office was consolidated with the streamlining of procedures and establishment of routines. Additional part-time assistance necessary in the earlier part of the year has been dispensed with and a continuing study of the disposition of time between AIP and AIRAH shows this to be almost equal. The cost of maintaining the office during the year ended 30 September 1969 was close to the budget figure.

5. 'The Australian Physicist'
The serious delays in publication since June are a matter for regret. Some delay was anticipated as the Land Printing House was to move its premises in May. However there has been little if any improvement up to the December issue preparations. The Editorial Committee discussed the matter in October and steps were taken to secure another printer for 1970. Quotations were sought and enquiries made, leading to the selection of Simmons Limited. These printers offer a more comprehensive range of type which can be set in Monotype form. This will facilitate the publication of articles which present mathematical information or use unusual symbols. It is expected that the journal will return to scheduled publication dates early in 1970.
It is vital that the publication schedule be stabilized quickly as the delays have caused a reduction in the volume of advertising, principally in the advertisement of vacant positions. In spite of these setbacks, the cost of individual copies rose only by 5 per cent. over the 1968 cost. The advertising charges have been reviewed in the light of increases in printing costs since the last review, and with consideration given to the 25 per cent. increase in circulation. New rates will be introduced in January 1970. The Editor and the Advertising Manager are attempting to broaden the scope of advertising in 1970 in keeping with suggestions made by members and Council.

6. Institute, Branch, and Group Activities

6.1 General Meetings

The Sixth Annual General Meeting of the Institute was held at La Trobe University, Bundoora, Victoria, on 27 February 1969. The President was in the Chair and 20 other members were present. The unconfirmed Minutes of this Meeting were read in "The Australian Physicists" in April 1969.

6.2 Council and Executive Meetings

Two Council Meetings, each lasting two days, were held in May and October. Four Executive Meetings were held during the year.

At the 15th Council Meeting in November it was decided to reduce to one per year the number of Council Meetings at which the attendance of Branch Chairmen would be supported financially. Branch Chairmen unable to attend the second meeting will be represented by proxies.

6.3 Pawsey Memorial Lecture

The Fifth Pawsey Memorial Lecture in honour of the late Dr. J. L. Pawsey was delivered by the Astronomer Royal, Sir Richard Woolley, at the Academy of Science, Building, Canberra, on 2 May 1969. The Lecture was entitled "Do We Know all about Our Own Galaxy?" and was attended by Mrs. Pawsey, the President of the Institute, and other invited guests and members. The ACT Branch is congratulated on its excellent organization of the Lecture.

6.4 Summer Schools and Conferences

The Fourth Summer School and Conference, organized by the Victorian Branch, was held at Glenn College, La Trobe University, Bundoora, from 24 to 28 February 1969 in conjunction with the Sixth Annual General Meeting. The attendance of 177 included 77 postgraduate students, a number of whom were subsidized by the Institute. The topics were "The Physics of the Stratosphere", "Diffraction Methods in Solid State Physics" and "Surface Physics".

The Victorian Branch held a National Seminar on the Training and Employment of Physicists in Melbourne on 27 and 28 May 1969. Seventeen papers were presented by invited speakers from industry, training institutions, and government instrumentality, covering the aims, requirements, and economics of the training of physicists for work in industry, teaching, public service, health services, government instrumentality, and research, and the need for a national policy on the training and employment of physicists in the future. The attendance included Dr. J. Goldman from the USA, Mr. M. F. Wood from the UK, 140 members, and a small number of industrialists.

Over 50 members of the Institute attended a seminar in Adelaide on 3 June on "The Training and Employment of Physicists", organized by the South Australian Branch and the South Australian Section of the Education Group. Dr. P. G. Law presented an address which was followed by a short discussion and prepared commentaries by invited speakers under the chairmanship of Mr. A. Moxon Simpson.

Other Branches held discussions on this important topic during the year at regular meetings.

The NSW Branch organized an Exhibition and Symposium on Instrumentation at the University of New South Wales from 27 to 29 May which was well attended.

In August, Professor C. P. Slichter of the University of Illinois visited Australia to attend the International Symposium on Nuclear Magnetic Resonance at Monash University from 11 to 14 August. The Institute contributed to his fare and he visited most of the Branches as AIP Special Lecturer. His visits were very much appreciated by all who heard him speak.

A Magnetosphere-Ionosphere Interactions Conference was held by the SA Branch from 26-27 August 1969, more than half of the 50 persons attending being postgraduate students from other states. Twenty papers were presented, the standard being high and the discussions lively.

The SA Branch also organized the Einstein Memorial Lecture, which was delivered in Adelaide on 10 October by Dr. R. G. Giovanelli on "Solar Magnetism".

6.5 Biophysics Group

The Ninth Annual Meeting of Physics in Medicine and Biology was held in Perth from 25 to 29 August 1969, and of the 38 delegates attending, 20 were from interstate. The Group financed the attendance of two young members who presented papers. The publication of the Australasian Bulletin of Medical Physics and Biophysics continues.

6.6 Geophysics Group

A highlight of the year was the publication of the Report on the Bass Strait Upper Mantle Project. The Stable Auralor Arc Project is also nearing completion with analysis of data and the preparation of reports. A successful Symposium on Crustal Studies was held at the University of Adelaide on 15 August with an attendance of approximately 25. An Earthquake Engineering Symposium organized by the Group in conjunction with the Structural Engineering Branch of the Institution of Engineers, Australia, was held in Melbourne on 16 to 18 October.

6.7 Education Group

The Annual Summer Schools for Teachers and Students were held in Adelaide again this year, and both the NSW and SA Sections of the Group have furthered projects to produce printed study material for students.

6.8 Vacuum Physics Group

The Group discontinued publication of its Newsletter in 1969 and published, instead, regular items in "The Australian Physicist". Sectional meetings continued and members also participated in the Instrumentation Symposium organized by the NSW Branch in May.

6.9 Survey of Employment of Physicists, 1968

The first announcement of the results of the Survey was made at the ANZAAS Congress in August in a paper by Mr. F. Argy of the Department of Labour and National Service. The results presented led Council to consider the implications of a possible oversupply of physicists within the next decade and to undertake action in watching the position carefully.

The Victorian Branch collated and analyzed the information obtained from the AIP questionnaires and a report by Professor J. M. Cowley was published in the July issue of "The Australian Physicist".

6.10 Reciprocity with other Institutes of Physics

This year saw the adoption of reciprocal arrangements with the American Institute of Physics and the European Physical Society, similar to arrangements which the Institute has with the IPPS, the Canadian Association of Physicists, and the South African Institute of Physics. The Honorary Secretary visited a number of these Institutes whilst overseas during the year.

6.11 Benevolent Fund

One payment was made from the Fund during the year. The balance of $258 at 30 September 1969 reflected an increase of only $178 on the previous financial year and it is hoped that members will continue to contribute as generously as they have done in the past.
7. Membership of Council for 1969

The following members of the Executive took office in February 1969 and complete their term at the conclusion of the Eighth Annual General Meeting in 1971:

President: Mr A. P. A. Harper
Vice-President: Professor R. Street
Hon. Registrar: Dr R. D. B. Fraser
Hon. Treasurer: Dr J. K. Mackenzie
Hon. Secretary: Dr J. G. Campbell

Dr A. Walsh holds office on Council, ex officio, as Immediate Past President.

Each Branch was represented on Council by its Chairman, who held office until 31 December 1969, as follows:

Dr G. E. Aitchison: ACT Branch
Dr A. W. Pryor: NSW Branch
Dr J. Crouchley: Queensland Branch
Dr P. J. Jacka: SA Branch
Dr A. G. Fenton: Tasmanian Branch
Dr J. L. Farrands: Victorian Branch
Dr E. N. Maslen: WA Branch

8. Officers of the Institute

Secretary: Dr J. G. Campbell

Assistant Secretary: Mrs J. A. Mackenzie

Editorial Committee, 'The Australian Physicist':

Dr J. L. Symonds: Editor
Dr W. H. Steel: Assistant Editor
Mr J. T. O'Mara: Advertising Manager
Mr G. A. Bell: Book Review Editor
Mr A. P. A. Harper
Dr J. S. Dryden

Auditor: Gordon Quinn & Company

Trustees for the Institute:

Dr R. D. B. Fraser
Dr A. G. Huctey
Mr J. J. McNeill
Mr T. P. MacRae
Professor R. Street

Trustees for the Benevolent Fund:

Dr J. K. Mackenzie (Chairman ex officio)
Dr A. Walsh
Professor H. C. Webster
Mr A. P. A. Harper
Dr J. G. Campbell

Returning Officer: Professor B. M. Spicer

Membership Committee:

Dr R. D. B. Fraser (Chairman ex officio)
Mr K. H. Clarke
Dr J. L. Rouse
Mr A. P. A. Harper (ex officio)
Dr J. K. Mackenzie (ex officio)
Dr J. G. Campbell (ex officio)

Finance Advisory Committee: The Executive

Joint Office Management Committee:

Dr J. G. Campbell (Chairman)
Dr J. K. Mackenzie
Mr H. J. Frost

9. Branch and Group Committees

ACT Branch

Chairman: Dr G. J. Aitchison
Vice-Chairman: Mr J. Dooley
Hon. Secretary-Treasurer: Mr B. Dennis

NSW Branch

Chairman: Dr A. W. Pryor
Vice-Chairman: Professor E. P. George
Hon. Secretary: Dr J. C. Macfarlane
Hon. Treasurer: Mr J. V. McAllan

Mrs K. R. Makinson, Professor C. D. Ellyett, Professor N. H. Fletcher, Mr G. C. Fletcher, Dr H. H. J. McKellar, Dr J. N. Stephens

Queensland Branch

Chairman: Dr J. Crouchley
Vice-Chairman: Professor D. Mugglestone
Hon. Secretary-Treasurer: Dr P. E. Munro

SA Branch

Chairman: Dr F. J. Jacka
Vice-Chairman: Mr R. Johnson
Hon. Secretary: Dr E. R. Sandercock (to 31 July); Dr B. H. Horton (from 31 July)
Hon. Treasurer: Dr R. D. Campbell
Mr E. Hirsch, Dr B. H. Horton (to 31 July), Dr E. L. Murray, Dr A. F. Nicholson, Mr C. G. Wilson

Tasmanian Branch

Chairman: Dr A. G. Fenton
Hon. Secretary-Treasurer: Mr P. A. Hamilton

Victorian Branch

Chairman: Dr J. L. Farrands
Vice-Chairman: Dr R. D. B. Fraser (until August); Dr A. J. Dyer (from August)
Hon. Secretary: Mr J. V. Sullivan
Hon. Treasurer: Dr J. L. Rouse
Professor J. M. Cowley, Dr D. Morton, Mr A. K. Connor, Mr G. V. H. Wilson; Mr R. de Groot, Dr J. F. Darby and Mr D. L. Swingler were co-opted in August, representing the Biophysics, Geophysics and Vacuum Physics Groups respectively.

WA Branch

Chairman: Dr E. N. Maslen
Vice-Chairman: Dr J. Graham
Hon. Secretary-Treasurer: Mr B. W. Thomas
Dr S. E. Williams, Dr R. S. Criag, Dr J. L. Robins, Mr R. W. Stanford, Mr B. King

Biophysics Group

Chairman: Mr B. W. Worthley
Vice-Chairman: Dr B. I. H. Scott
Hon. Secretary-Treasurer: Mr K. H. Clarke
Professor E. P. George, Dr K. Fowler, Professor D. G. Lampard, Dr M. Holman; Mr R. J. de Groot (co-opted)

Geophysics Group

Chairman: Professor D. Boyd
Vice-Chairman: Mr J. W. Holmes
Hon. Secretary-Treasurer: Dr D. J. Sutton
Dr W. F. Stackley, Mr P. L. George; state representatives—Professor R. Green (NSW), Mr B. E. Milton (SA), Mr R. J. S. Cooke (ACT), Dr J. F. Darby (Vic), Dr J. P. Webb (Qld)

Education Group

Chairman: Mr B. W. Thomas
Vice-Chairman: Dr P. D. Jarm
Hon. Secretary-Treasurer: Mr J. A. Dervos (to September), Mr R. Price (from September)
Mr R. Price (to September), Mr L. Davies, Mr D. Hutchison

Vacuum Physics Group

Chairman: Mr J. D. Mellor
Vice-Chairman: Mr W. R. G. Kemp
Hon. Secretary: Dr J. W. Kelly
Hon. Treasurer: Mr W. G. C. Cole (to August), Mr F. Ross Selinger (from August)
Dr W. I. Smith, Dr J. A. Ramsay


Council for 1970 will comprise the Executive, elected to take office at the Sixth Annual General Meeting, the Immediate Past President (Dr A. Walsh) and the Branch Chairmen (see Section 11 below).

The Executive, which hold office until the conclusion of the Eighth Annual General Meeting in 1971, is as follows:
President: Mr A. F. A. Harper
Vice-President: Professor R. Street
Hon. Registrar: Dr R. D. B. Fraser
Hon. Treasurer: Dr J. K. MacKinnie
Hon. Secretary: Dr J. G. Campbell


ACT Branch
Chairman: Dr G. J. Aitchison, Canberra College of Advanced Education, PO Box 381, Canberra City, ACT 2601.
Hon. Secretary— Treasurer: Mr D. C. Creagh, Department of Physics, Royal Military College, Duntroon, ACT 2600.

NSW Branch
Chairman: Professor E. P. George, School of Physics, University of NSW, PO Box 1, Kensington, NSW 2033.
Hon. Secretary: Mr J. C. Macfarlane, National Standards Laboratory, University Grounds, Chippendale, NSW 2008.
Hon. Treasurer: Mr J. V. McAllan, National Standards Laboratory, University Grounds, Chippendale, NSW 2008.

Queensland Branch
Chairman: Professor D. Muggleston, Department of Physics, University of Queensland, St Lucia, Qld 4067.
Hon. Secretary— Treasurer: Dr P. E. Monro, Department of Physics, University of Queensland, St Lucia, Qld 4067.

SA Branch
Chairman: Dr F. J. Jacka, Mawson Institute for Antarctic Research, University of Adelaide, Adelaide, SA 5001.
Hon. Secretary: Dr B. H. Horton, Physics Department, University of Adelaide, Adelaide, SA 5001.
Hon. Treasurer: Dr R. D. Campbell, School of Physics, SA Institute of Technology, North Terrace, Adelaide, SA 5000.

Tasmanian Branch
Chairman: Mr P. A. Hamilton, Department of Physics, University of Tasmania, GPO Box 252C, Hobart, Tas. 7001.
Hon. Secretary: Mr J. C. Sullivan, CSIRO Division of Chemical Physics, PO Box 160, Clayton, Vic. 3168.

TABLE I—REGISTER AS AT 31 DECEMBER 1969

<table>
<thead>
<tr>
<th>Grade</th>
<th>ACT</th>
<th>NSW</th>
<th>Qld</th>
<th>SA</th>
<th>Tas.</th>
<th>Vic.</th>
<th>WA</th>
<th>OS*</th>
<th>Un†</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hon. Fellow</td>
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<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>11</td>
<td>54</td>
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<td>3</td>
<td>59</td>
<td>8</td>
<td>12</td>
<td>2</td>
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<tr>
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<td>128</td>
<td>37</td>
<td>47</td>
<td>3</td>
<td>125</td>
<td>34</td>
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<td>8</td>
<td>115</td>
<td>31</td>
<td>64</td>
<td>11</td>
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<td>81</td>
<td>164</td>
<td>14</td>
<td>300</td>
<td>73</td>
<td>111</td>
<td>13</td>
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<td>71</td>
<td>6</td>
<td>32</td>
<td>1</td>
<td>43</td>
<td>19</td>
<td>3</td>
<td>12</td>
<td>196</td>
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<tr>
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<td>19</td>
<td>38</td>
<td>3</td>
<td>14</td>
<td>2</td>
<td>30</td>
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<td>90</td>
<td>219</td>
<td>17</td>
<td>373</td>
<td>106</td>
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<td>1503</td>
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* Overseas
† Whereabouts unknown

TABLE II—CHANGES IN REGISTER DURING 1969

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<td>From</td>
<td>Deceased</td>
<td>Resigned</td>
<td>Removed from Roll</td>
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<tr>
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<td>2</td>
<td>7</td>
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<td>4</td>
<td>1</td>
<td>7</td>
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<td>53</td>
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<td>Graduate</td>
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<td>2</td>
<td>14</td>
<td>5</td>
<td>34</td>
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<td>Total Members</td>
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<td>38</td>
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<td>21</td>
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<tr>
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<td>27</td>
<td>2</td>
<td>12</td>
<td>12</td>
<td>9</td>
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<tr>
<td>Subscriber</td>
<td>16</td>
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<td>3</td>
<td>5</td>
<td>18</td>
<td>7</td>
<td>-11</td>
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<td>GRAND TOTAL</td>
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<td>68</td>
<td>7</td>
<td>51</td>
<td>25</td>
<td>95</td>
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</table>
Hon. Treasurer: Dr J. L. Rouse, School of Physics, University of Melbourne, Parkville, Vic. 3052.

WA Branch
Chairman: Dr E. N. Maslen, Department of Physics, University of Western Australia, Nedlands, WA 6009.
Hon. Secretary-Treasurer: Mr B. W. Thomas, Department of Physics, WA Institute of Technology, Hayman Road, Bentley South, WA 6102.

Biophysics Group
Chairman: Mr B. W. Worthing, 15 Mattner Avenue, Glenelg North, SA 5045.
Hon. Secretary-Treasurer: Mr K. H. Clarke, Cancer Institute, 278 William Street, Melbourne, Vic. 3000.

Geophysics Group
Chairman: Dr A. J. Dyer, CSIRO Division of Meteorological Physics, Station Street, Aspendale, Vic. 3195.
Hon. Secretary-Treasurer: Mr B. B. Hicks, CSIRO Division of Meteorological Physics, Station Street, Aspendale, Vic. 3195.

Education Group
Chairman: Mr A. W. Pybus, 41 Harrow Road, Somerton Park, SA 5044.
Hon. Secretary-Treasurer: Mr C. V. Latz, 53 Arthur Street, Plympton Park, SA 5038.

Vacuum Physics Group
Chairman: Mr J. D. Mellor, CSIRO Division of Food Preservation, PO Box 63, Ryde, NSW 2112.
Hon. Secretary: Dr J. W. Kelly, AAECRE, Private Mail Bag, Sutherland, NSW 2232.

Hon. Treasurer: Mr F. Ross Sellenger, Precision Air Equipment Company, 275a Woniara Road, Blakehurst, NSW 2221.

12. Representation on Other Bodies
The Institute gratefully acknowledges the services of those of its members who represented it on the councils or committees of other bodies. The representatives for 1969 are listed below:

ANZAAS: Mr F. J. Lehany, Dr F. J. Jacka
Australian Journal of Physics Advisory Committee: Dr J. P. Wild
Australian UNESCO Committee for Natural Sciences: Mr W. C. Swinbank
National Association of Testing Authorities: Dr N. B. Lewis
Australian National Committee on Illumination: Mr J. E. Shaw
Australian Institute of Radiophysics: Mr J. F. Richardson
Australian Institute of Electrical Engineering: Mr H. J. Frost
Acoustics Standards Committee of Standards Association of Australia: Dr R. W. R. Muncey

Australian Academy of Science National Committee for Physics: Mr A. F. A. Harper
Institute of Engineers, Australia—Engineering Conference (June 1969) Committee: Mr E. Hirnsch
Australian National Committee on Computing and Automatic Control: Dr F. Hirst

At a General Meeting of ANCCAC on 18 March 1969 the Committee was dissolved and its assets paid to the Australian Computer Society.

A. F. A. Harper
President

**BALANCE SHEET AS AT 30 SEPTEMBER 1969**

<table>
<thead>
<tr>
<th>Assets</th>
<th>$</th>
<th>Liabilities</th>
<th>$</th>
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</thead>
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<tr>
<td>30.9.68 Current Assets</td>
<td>30.9.68 Current Liabilities</td>
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<td></td>
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<tr>
<td>132 Cash on hand or in transit</td>
<td>132</td>
<td>849 Institute of Physics—London</td>
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<tr>
<td>396 Branch and Group Bank Accounts</td>
<td>150 Sundry Creditors</td>
<td></td>
<td></td>
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<tr>
<td>127 New South Wales</td>
<td>225</td>
<td>165 Subscriptions in Advance</td>
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<td>162 Queensland</td>
<td>109</td>
<td>1785 ‘The Australian Physicist’</td>
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<tr>
<td>406 Victoria</td>
<td>223</td>
<td>412 Unexpended Grants—</td>
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<td>141 Western Australia</td>
<td>163</td>
<td>Project ‘BUMP’</td>
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<tr>
<td>369 South Australia</td>
<td>339</td>
<td>— SAR Arc Project</td>
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<tr>
<td>82 Tasmania</td>
<td>85</td>
<td>— $1918</td>
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<td>202 ACT</td>
<td>406</td>
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<td>28 Biophysics Group</td>
<td>107</td>
<td>149 Vacuum Physics Group</td>
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<tr>
<td>202 Geophysics Group</td>
<td>53</td>
<td>412 Project ‘BUMP’</td>
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<td>7483 Head Office Bank Account</td>
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<td>SAR Arc Project</td>
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<td>2375 Benevolent Fund Bank Account</td>
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<td>28 Prepayments</td>
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<tr>
<td><strong>Total Assets</strong></td>
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<td><strong>Total Liabilities</strong></td>
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<tr>
<td>Investments, at cost</td>
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<td>Alliance Holdings Ltd 8½% due 2000</td>
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<td>9292 Less Deficit year to 20 September 1969</td>
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<td>5 September 1974</td>
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<td>2000 Associated Securities Ltd 7½% due 2000</td>
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<td>8639 Reserve Funds</td>
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<td>2000 Mutual Acceptance Ltd 7½% due 2000</td>
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<tr>
<td>2000 CAGA Ltd 7½% due 2000</td>
<td>2000</td>
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<tr>
<td>2000 due 30 June 1971</td>
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<td>2000 AGC Ltd 7½% due 31 December 2000</td>
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<tr>
<td><strong>Total Assets</strong></td>
<td><strong>23692</strong></td>
<td><strong>17931</strong></td>
<td><strong>16796</strong></td>
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42 The Australian Physicist, March 1970
<table>
<thead>
<tr>
<th>Income</th>
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<td>428 Entrance Fees and Sundry</td>
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<td>389 Interest from Bank on investments</td>
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<td>140 (London) Share of Clerical Salaries</td>
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<td>991 Summer School</td>
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<td>991 Exhibition Income</td>
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<td>803 Salaries, Wages, Honoraria (325)</td>
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<td>822 Council Meetings</td>
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<td>159 Travelling &amp; Carriage</td>
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<td>150 Audit &amp; Accountancy</td>
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<td>- Special Visiting Lecturers</td>
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<td>61 Depreciation</td>
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<td>48 Sundries, Bank Charges</td>
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<td>- Distribution—Australian Journal of Physics</td>
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<td>3298 Branch, Group Grants, Expenses</td>
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<table>
<thead>
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<th>Deficit or Surplus for Period</th>
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<td>16999</td>
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**AUDITOR’S REPORT**

To the Members, Australian Institute of Physics

We report that in our opinion the accompanying Balance Sheet and Income and Expenditure Statement are properly drawn up in accordance with the provisions of the Companies Act 1961 so as to give a true and fair view of the state of the Institute’s affairs as at 30 September 1969 and of the results for the year ended on that date. The accounting and other records (including registers) of the Institute examined by us are properly kept in accordance with the provisions of the Companies Act 1961.

Melbourne
16 January 1970

(Signed)  
GORDON QUINN & CO.  
Chartered Accountants

**STATEMENT OF DIRECTORS**

We, James Kenneth Mackenzie and James Gordon Campbell, being two of the directors of the AUSTRALIAN INSTITUTE OF PHYSICS, do hereby state that, in the opinion of the directors, the accompanying statement of income and expenditure is drawn up so as to give a true and fair view of the affairs of the Institute for the period ended 30 September 1969, and the accompanying balance sheet is drawn up so as to exhibit a true and fair view of the state of affairs of the Institute as at the end of that period.

For and on behalf of the board  
Signed: J. K. MACKENZIE  
J. G. CAMPBELL

Dated: 3 February 1970

**DECLARATION BY THE SECRETARY**

I, James Gordon Campbell, Secretary of the Australian Institute of Physics, do solemnly and sincerely declare that the accompanying balance sheet and statement of income and expenditure are, to the best of my knowledge and belief, correct, and I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of an Act of Parliament of Victoria rendering persons making a false declaration punishable for wilful and corrupt perjury.

Declared at Dandenong in the State of Victoria this 5th day of February 1970.

(Signed) J. G. Campbell  
Before me: W. R. WERRETT, JP.

The Australian Physicist, March 1970
### AUSTRALIAN INSTITUTE OF PHYSICS

**RESERVE FUNDS—1 October 1968 to 30 September 1969**

<table>
<thead>
<tr>
<th>Balance 11/68</th>
<th>Deduct 1969</th>
<th>Add</th>
<th>Special</th>
<th>Annual</th>
<th>Balance 30/9/69</th>
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<td>$</td>
<td>$</td>
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**THE AUSTRALIAN PHYSICIST**

**BALANCE SHEET AS AT 30 SEPTEMBER 1969**

**Advances** made by the AUSTRALIAN INSTITUTE OF PHYSICS were:
- during the 9 months ended 31.12.64: $2020.00
- during the year ended 31.12.65: 400.00
- during the year ended 31.12.66: 1700.00
- during the year ended 31.12.67: 2879.50
- during the 9 months ended 30.9.68: 3750.00
- during the year ended 30.9.69: 3775.00

**Total Advances**

$13994.50

**Reduced by an Excess of Expenditure over Income:**
- for the 9 months ended 31.12.64: $754.64
- for the year ended 31.12.65: 1331.84
- for the year ended 31.12.66: 1353.64
- for the year ended 31.12.67: 3024.50
- for the 9 months ended 30.9.68: 2813.20
- for the year ended 30.9.69 as per attached Statement of Income & Expenditure: 3976.98

**Total**

$13254.80

**Leasing**

$739.70

**Total Available Funds of**

$739.70

**This is Represented by:**

**Assets**
- Cash in Hand—Payees' Cash: 15.13
- Bank of New South Wales (Cronulla Branch):
  - Balance at 30.9.68: $623.44
  - Deposits since 10363.40
  - Withdrawals since 9455.79
- Balance at 30.9.69: 1531.05
- Accounts Receivable, as per attached Schedule: 531.66
- Addressograph Plates:
  - Cost: 149.24
  - Less Amortised (at $5/month): 149.24
- **Total Assets**

$2077.84

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**Deduct Liabilities**

**Accounts Payable:**
- Land Newspaper Ltd (July & August): 1227.79
- J. T. O'Mara (August Issue): 25.20
- R. Richardson, AASA (July-September): 63.95

Subscriptions Received in Advance 11.20

**Total Liabilities**

$1338.14

**Net Assets**

$739.70

(Signed) R. Richardson, AASA
3 November 1969

**STATEMENT OF INCOME AND EXPENDITURE**

**for the Year Ended 30 September 1969**

(11 Issues—October 1968 to August 1969)*

**Income**

- **Gross Income from Advertising**
  - Less Costs applicable thereto—
    Advertising Agencies’ Commissions: $166.00
    Advertising Representative’s Commissions: 450.70
    Promotion Expenses: 31.51

  **Cost of Blocks recovered in charges to Advertisers**

  **Net Income from Advertising**

  **Sales and Reprints**

  **Printing for Australian Institute of Physics**

  **Less Cost of Printing**

  **Subscriptions Received**

  **Less Agencies’ Commission & Exchange**

  **Bank Interest Received**

  **Total Income**

$3276.95

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*The Australian Physicist, March 1970*
THE REGISTER

CHANGES IN MEMBERSHIP FROM 8 DECEMBER 1969 TO 9 FEBRUARY 1970

FELLOWSHIP

New Elections
Matzner, K. B., University of Alaska, College, USA.
Woolsey, G. A., University of New England, Armidale, NSW.

ASSOCIATESHIP

(a) New Elections
Crohn, E. V., Darwin, Northern Territory.
McCarthy, I. E., Flinders University of South Australia.
Nelson, G. J., Arecibo Observatory, Puerto Rico.
Teubner, P. J. O., Flinders University of South Australia.
Wilson, D. J., Australian Atomic Energy Commission, Sutherland, NSW.

(b) Transfers
Balasubramanian, E., Papua & New Guinea Institute of Technology, Lae, PNG.
Campbell, R. D., South Australian Institute of Technology, Adelaide.
Goad, P. R. C., CSIRO Division of Mineral Chemistry, Chatswood, NSW.
Grant, J. T., Aerospace Research Laboratories (ARC), Ohio, USA.
Guttman, A. J., University of London, UK.
Hooper, M. J., Defence Standards Laboratory, Adelaide, SA.
Kuhl, D. H., Education Department of South Australia.
Mears, L. A., Queensland Institute of Technology, Brisbane, Qld.
O'Leary, B. M., Queensland Institute of Technology, Brisbane, Qld.
Patt, G. D., University of British Columbia, Vancouver, Canada.
Rungis, J., CSIRO Division of Applied Physics, Chippendale, NSW.
Thompson, P. W., Royal Australian Naval College, Jervis Bay, NSW.

(c) Deceased
Burrows, K. M. (NSW).

(d) Resignation
Rietveld, H. M. (o/p).

EXPENDITURE

Publication Costs—Printing Blocks 5426.97
Cost of Reprints 5664.23
Book Review Expenses 116.52
Distribution Costs:
Insulating in Wrappers 677.11
Mailing & Freight 319.93
Addressograph Plates
Amortisation 35.00
Maintenance 52.12

Total Expenditure 1084.16

EXPENSES

Accounting & Clerical 290.00
Postages & Duty Stamps 38.75
Printing & Stationery (including approximately 5 years' supply of printed invoices & statements) 83.46
Telephones 5.35

Total Expenses 377.56

Excess of Expenditure over Income 7253.93

$3976.98

* September issue was printed in the latter part of October. Supplementary accounts will be prepared to 29 October to include the September 1969 issue.

GRADUATESHIP

(a) New Elections
Hall, G. H., Potterton Pty Ltd, Arndell, NSW.
Hanrahan, F. M., Sacred Heart Senior School, Ballarat, Vic.
Smith, G., Applied Physical Sciences 1, Reading, UK.

(b) Transfers
Byrne, J. C., Flinders University of South Australia.
Cahill, R. T., University of New South Wales.
Ellis, G. J., Education Department of South Australia.
Heele, K. D., CSIRO Division of Applied Physics, Chippendale, NSW.
Kruzeliski, K., Papua and New Guinea Institute of Technology, Lae, PNG.
O'Brien, R. S., University of Adelaide, SA.
Silawatthananai, C., Prince of Songkla University, Bangkok, Thailand.
Stoosman, P. H., Mount Pritchard, NSW.
Stroud, D. B., University of Melbourne, Vic.
Varga, I. K., Department of Supply, Salisbury, SA.

(c) Resignations

STUDENTS

(a) New Election
Penhall, J. G. (SA).

(b) Transfer
Weissell, J. K. (NSW).

(c) Resignations
Crouch, S. J. (SA).
Geake, J. G. (NSW).
Gaffney, J. M. (SA).

SUBSCRIBERS

(a) New Elections
Limbo, H. R. (SA).
Plimer, K. D. (SA).

(b) Resignation
Incoll, R. J. (Vic.).

COMPANY SUBSCRIBER

EAI-Electronic Associates Pty Ltd, St Leonards, NSW.

The Australian Physicist, March 1970   45
NOTES AND NEWS

Physics of Stellar Atmospheres

A joint conference of the AIP and the Astronomical Society of Australia will be held at the University of Queensland, Brisbane, on Wednesday to Friday 27-29 May. The title will be as above and the Meeting will cover topics in theoretical astrophysics, optical and radio observations of stellar atmospheres, and experimental and theoretical physics in fields related to the physical interpretation of stellar atmospheres.

Application forms are available from all State Branch Secretaries of the AIP, or may be obtained by writing direct to J. N. Holt, Conference Secretary, Department of Physics, University of Queensland, St Lucia, Qld 4067.

Conferences on History and Education

The International Commission on Physics Education of IUPAP is sponsoring two international meetings.

The first, an International Working Seminar on the Role of History of Physics in Physics Education, will be held at MIT on 13-17 July. The participants will be limited to about 30, who will be expected to have prepared themselves beforehand by reviewing literature and preparing reports, etc. The address for inquiries or applications is Professor Allen L. King, Chairman of the Organizing Committee, Wilder Laboratory, Dartmouth College, Hanover, New Hampshire 03755, USA.

An International Congress on the Education of Teachers of Physics in Secondary Schools will be held at Eger, Hungary, on 11-17 September. Again attendance will be limited, here to about 100. Applications were requested, if possible by November last year, to Professor Elemer Nagy, Institute for Experimental Physics, Eötvös University, Muszom Körút 6-8, Budapest VIII, Hungary.

LETTERS

The Revival of Mr Tompkins

Sir:—When I read a notice in Physics Bulletin (February 1969) announcing the availability of ‘Mr Tompkins in Paperback’*, I sent for a copy to the UK immediately. My efforts were well rewarded, for it is surely a most readable primer in modern physics.

Professor Gamow offers us a delightful explanation of the concepts of modern physics by introducing Mr Tompkins, a bank clerk whose fantastic dreams and adventures lead him into the world inside the atom. He is actually Mr C. G. H. Tompkins, representing the velocity of light (c), the gravitational constant (G) and the quantum constant (h). The world Mr Tompkins explores is one in which these fundamental constants have been changed by immensely large factors in order to make their effects easily noticeable by the man in the street.

By this means Professor Gamow treats in a particularly comprehensible and readable, although qualitative, way such subjects as general relativity, curved space, cosmology, quantization, uncertainty, atomic and nuclear structure, and elementary particles. His apt stories include the game of Quantum Billiards using balls cut from the tusks of quantum elephants, the Gay Tribe of Electrons, and Maxwell’s Demon actually playing practical jokes on the professor.

The current paperback volume combines and brings up to date Professor Gamow’s previous books, ‘Mr Tompkins in Wonderland’ and ‘Mr Tompkins Explores the Atom’, published respectively in 1940 and 1945. These were recommended as supplementary reading to my physics course in 1962 but were then unobtainable. The new volume is recommended to both scientific and general readers. It may be particularly appropriate for physicists working in other fields who feel somewhat out of touch with modern physics.

A. R. BROWN
Geophysical Branch
Bureau of Mineral Resources
Canberra
6 January 1970

Australian Institute of Physics Medals

Sir:—I was reading the published version of the excellent address given by the Oersted Medallist for 1969 the other night (a medal awarded by the American Association of Physics Teachers) when the thought struck me that the Australian Institute of Physics could with advantage make similar awards in recognition of services to physics by physicists living and working in Australia. These awards could also be in the form of medals struck, perhaps, by the Royal Australian Mint in Canberra.

Initially one might envisage two medals being awarded alternatively on an annual basis (if candidates of sufficient merit were available) and that these would be respectively for:

(i) a record of physics research of a high order over a period of years;
(ii) a record of dedicated service to physics over a period of years by teaching or other activity.

These two medals could be named after internationally known figures in physics from the past such as Max Planck and Lord Rutherford. It would seem to be dull...

*MR TOMPKINS IN PAPERBACK, George Gamow, Cambridge University Press, 1967. xii + 186 pp. 13/6 (UK) $1.95 (US).
nationalism to attempt to perpetuate lesser known Australian names by this method.

Consideration of possible candidates for the awards could be made by a representative committee of the Institute and presentation made at a special dinner held in rotation in the capital cities. The recipient could be asked to give an address at this dinner which would eventually be published in the Australian Physicist.

Perhaps other members would like to comment on this suggestion so that the Executive of the Institute can gauge whether or not any action should be taken. Those members I have spoken to in Canberra have strongly supported the idea.

A. J. MORTLOCK

Physics Department
Australian National University
30 January 1970

BOOK REVIEWS


Reviewed by H. S. Green, Mathematical Physics Department, University of Adelaide.

There is a considerable gap between the point where most books on elementary quantum mechanics end, and that where introductions to quantized field theory begin. Dr. Eisele’s book makes a conscientious attempt to bridge the gap, and is the first one the reviewer has seen which is in any sense comprehensive.

After a short introduction to elementary particle physics, the book starts with a review of basic electromagnetic theory, the special theory of relativity, and ordinary wave mechanics. These occupy the first 150 pages and ensure that the reader is well prepared for the material which follows. The next 150 pages (Part II) is concerned with a detailed discussion of the Klein–Gordon equation and Dirac’s equation. The remainder of the book is filled with elementary topics in quantum electrodynamics and the theory of weak interactions. There is a final short chapter on the isospin formalism, in its application to nucleons and pions.

A feature of the book is the amount of detail in which the mathematical calculations are carried out. This should ensure that it can be followed without difficulty by students who are not very gifted mathematically, and are perhaps destined for experimental rather than theoretical physics, but would like to know something of what the theorist is after. It is unlikely that a better book will be written for this purpose. Unfortunately, even when the contents of this book have been mastered, there is still a great deal to be learned before one is able to grapple with contemporary research. It may be asked whether, advancing at this pace, the student would ever catch up with the mainstream of modern theoretical physics. Thus, the subtitle, ‘An Introduction to Contemporary Physical Thinking’ may be illusory.

There is a serious pedagogic question here. Should a student wishing to learn theoretical physics content himself with only the pedestrian methods required to understand this book, or would he be better employed in improving his mathematical equipment? The answer probably depends on how far he wishes to go. This book will do well for the reader who has no ambition to leap into theoretical research. But if he wishes to compete with the professionals, he had better learn more about group theory, linear algebra, and complex analysis. With these tools, he would be enabled to cover the ground of this book in less than one half the space and time, and to advance rapidly into the broader fields beyond.

The book is well printed and bound.


Reviewed by J. G. Collins, National Standards Laboratory, Sydney.

Physics has never been quite the same since the field theorists took over. The physicist trained a decade or more ago to solve the partial differential equations of quantum mechanics, to manipulate matrix representations of operators and state vectors, and to regard with distaste problems involving perturbation theory at higher than second order is apt now to be bewildered by a typical issue of, say, Physical Review. He is confronted by topological equations looking like esoteric games of snakes-and-ladders; he gropes for perturbation theory in a sea of bubbles; he becomes lost in a maze of Green functions. Theoretical physics has, to use Professor Ziman’s metaphor, moved up a higher and steeper cliff to a new plane of abstraction. This book will assist the dogged climber and make his way easier.

The first four chapters deal with techniques of second quantization and field theory: bosons, fermions, annihilation and creation operators, S-matrix theory, Feynman diagrams, density matrices, Green functions, Kubo formalism, and the like. In the next two chapters these methods are applied to various aspects of the many-body problem, Fermi liquids, the Bose gas, relativistic electromagnetic theory, and the Dirac field. The final chapter deals with symmetry and group theory and is somewhat independent of the rest of the book.

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This book is quite unlike the usual treatise because it is deliberately superficial. The emphasis throughout is on physical understanding and no attempt is made to present a rigorous or complete mathematical development of advanced quantum theory. Professor Ziman has, in his own words, produced a scaling ladder for these intellectual heights rather than a grand staircase. He describes in clear and simple language the concepts and inter-relationships of field operators, diagrammatic equations, and Green functions, and lays bare the physical interpretation of the complex algebraic and topological manipulation involved. Because of the broad, sweeping treatment this is not, I suspect, a manual for professional field theorists. But for those who want a general introduction to quantum field-theoretic methods this is an excellent primer to the more detailed and difficult standard texts such as that by Abrikosov, Gorkov, and Dzyaloshinski.

Professor Ziman has an enviable facility for writing clear and elegant English, and his book is a pleasure to read. I strongly recommend it to any research student or physicist interested in advanced quantum theory as an admirable introduction to the subject at a bargain price.


Reviewed by Geoffrey I. Opat, School of Physics, University of Melbourne.

The aim of this book is ‘to provide a framework within which all physicists interested in particle and high-energy phenomena could try to “understand” what was going on’. A knowledge is tacitly assumed of special relativity, quantum mechanics, the Dirac wave equation, but not of field theory, group theory, nor analytic function theory.

The book is divided into three parts entitled: The Phenomenological Approach, The Use of Models, and Unitary Symmetry and Quark Models.

The first is principally devoted to the relativistic kinematics of reaction and decay mechanisms, the associated S-matrix elements, reaction rates, cross-sections, Dalitz plots, etc. It also contains material on channel opening phenomena, the K'-decay story, and the Fermi-Watson theorem concerning the phases of the S-matrix elements.

The second section is devoted to the analysis of the predictions of the early models of particles, their relevance to static particle properties, and form factors. Those models antecedent to SU-3 and the quark model are discussed in some detail, enabling the reader to place recent developments in historical perspective.

The third section contains an excellent extensive survey of the predictions of SU-3 and quark models for the static and dynamic properties of the hadrons. A final chapter is devoted to quark and current algebra in weak interaction physics. Appendices containing data for angular momentum analysis and SU-3 end the book.

A number of short model calculations and consequent comparisons with the experimental data together with the inclusion of many interesting problems enhance the usefulness of this book as a text. The typography of the book is excellent, however the use of P ‘barred’ to denote a 4-vector is to be deplored. In spite of these last comments I believe that the book succeeds in its aims of giving the reader a ‘feel’ for particle physics, and I welcome it on these grounds.


Reviewed by B. H. J. McKellar, University of Sydney.

The identification of resonances and their properties has played a major role in the development of high energy physics, from the (3,3) resonance of Fermi to the long list of the latest ‘Rosenfeld Tables’. This slim book gives an excellent account of how such resonances are identified in the pion-nucleon scattering data, with just enough about how the data are obtained and how the resonances are ‘explained’ and classified to make contact with the worlds of the experimental and theoretical high-energy physics. I recommend the reading of it to the student aspiring to enter either of them.


Reviewed by G. A. Woolsey, Department of Physics, University of New England.

The first of the three main sections of this book deals with the theories of cylindrical and non-cylindrical positive columns in low- and high-pressure arcs; the second considers wall and electrode phenomena as well as arc decay; while the third section reviews the methods of plasma diagnostics applicable to arc studies. The latter section is basically a synopsis of Huddleston and Leonard’s book on plasma-technique techniques.

In the foreword the author states his belief that extended bibliographies have become a sport for some writers. However, in attempting to reverse the trend, his own effort contains many obvious gaps.

The material covered is in general well chosen and the development of detailed theory is kept to a minimum. The book might be expected therefore to constitute useful reading for both physicists and engineers involved in the problems of arc physics. Unfortunately, however, it has been rushed into print with inadequate preparation. Considering the combination of German publisher, French author, and English language presentation, a pre-publication review by someone with a reasonable knowledge of English would have been useful and perhaps profitable exercise. Such an exercise was obviously not carried out, and the resultant poor presentation, together with the numerous typographical errors, makes digestion of the book’s scientific content a laborious process.

The prospective buyer would probably do best to await the publication of a second edition.
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