Colleges of Advanced Education — What Goes There? — an editorial commentary .......... 35
A Student Exercise in Industrial-Type Projects —
G. C. Kerrigan and K. W. Terry ............. 36
The Role of the Institute of Technology —
C. G. Wilson and W. S. Boundy ............. 39
The 11th International Conference on
Low-Temperature Physics — D. Creagh ..... 41
Institute Affairs .................................................. 42
The Register ........................................................ 43
Notices and News .............................................. 43
Letters to the Editor ............................................ 44
Book Reviews ..................................................... 45, 48
Partial Coherence ................................................ 47
National Seminar on Training and Employment
of Physicists .................................................... 48

Registered at the G.P.O., Sydney, for transmission by post as a periodical.
Look what $325 buys
in a 1µV Full Scale
DC Null Detector/Microvoltmeter

It buys you a portable performer with 0.15 microvolt resolution. It's handy and convenient to use. It's rugged, too—works more than 1000 continuous hours on four carbon-zinc batteries.

It's the Keithley Model 155—the lowest-priced electronic null detector on the market today. The 0.03 µV rms input noise is quieter than any other in its price class. Coupled with better than 2 µV per day stability and 1 megohm input resistance at 1 µV full scale, the 155 is ideal as a null detector for potentiometers, bridges, ratio devices and comparator circuits.

When the Model 155 isn't working as a null detector, it doubles as a 1 µV to 1000 volt microvoltmeter with 19 zero center ranges. Use it for measuring thermocouple and thermopile potentials, contact resistance, making Hall Effect studies, or whatever.

See this little giant perform. Call your Keithley Sales Engineer for your demonstration. Or contact Keithley Instruments, Inc. for complete details—28775 Aurora Road, Cleveland, Ohio 44139. In Europe: 14, Ave. Villardin, 1009 Pully, Suisse. Prices slightly higher outside the U.S.A. and Canada.

KEITHLEY

SOLE AUSTRALIAN REPRESENTATIVES:

SAMPLE ELECTRONICS

9-11 CREMORNE ST., RICHMOND, VIC. 3121
171 GILBERT STREET, ADELAIDE, S.A. 5004

8 ALEXANDER ST., CROW'S NEST, N.S.W. 2063
8 MATIPO ST., ONEHUNGA, N.Z. 565 361
Positions Vacant

UNIVERSITY OF NEW SOUTH WALES

invites application for appointment to the position of

LECTURER

School of Applied Physics and Optometry

Salary: $5400 range $7300 per annum. Commencing salary according to qualifications and experience.

Applicants must have high academic qualifications in physics and research experience in applied physics. Experience in industry or industrial scientific work would be advantageous.

Further information regarding the newly established Department of Applied Physics and research interests in applied physics may be obtained from Professor C. J. Milner.

An application form and details of conditions of appointment, including superannuation, study leave and housing scheme, may be obtained from the Appointment Office, P.O. Box 1, Kensington, N.S.W. 2033. The closing date for applications is 28th April, 1969.

E. H. Davis, Bursar.

The Australian Physicist

Editor: Dr. J. L. Symonds,
C/- A.A.E.C.R.E., Private Mail Bag,
Sutherland, N.S.W. 2232.
Telephone: 531-0111 : 523-2247 (after hours).

Assistant Editor: Dr. W. H. Steel,
C.S.I.R.O. National Standards Laboratory,
Chippendale, N.S.W. 2008,
Telephone: 660-0566 : 94-3818 (after hours).

Book Review Editor: Mr. G. A. Bell,
C.S.I.R.O. National Standards Laboratory,
Chippendale, N.S.W. 2008,
Telephone: 660-0566.

Advertising Manager: Mr. J. T. O'Mara,
P.O. Box 39, Bondi Junction, N.S.W. 2022.
Telephone: 38-2698.

London Representative: Mr. H. A. Mackenzie,
Telephone: HOL3779.

Branch Correspondents:
A.C.T.—Mr. J. A. Marsloek N.S.W.—Mr. J. A. Birch
Qld.—Dr. J. D. Whitehead S.A.—Mr. C. G. Wilson
Victoria—Dr. J. Farrands W.A.—Dr. R. S. Crisp

Manuscripts and Correspondence relating to the editorial content of The Australian Physicist should be sent to the Editor.

Copy deadline—21st of month prior to the month of issue.

Advertising space instructions and/or copy should be forwarded to the Advertising Manager.

Annual Subscription:
For non-members, the subscription to the Australian Physicist is $85.00 per annum; single issues are 45 cents per copy. Subscription requests should be sent to the Editor.

$3.00 is transferred to The Australian Physicist account from the annual membership subscription received for each financial Member, Student and Subscriber of the Institute, to whom The Australian Physicist is issued. Copies so issued are intended solely for the recipient's personal use.

THE AUSTRALIAN PHYSICIST, MARCH 1969 33
A NEW GENERATION OF GENERATORS...

...for X-ray fluorescence and diffraction studies

When looking for more energy, it's only natural to look to the younger generation.

This new generation of Philips X-ray generators is the most energetic of a long line of dependable power sources for X-ray diffraction and spectrometry.

Each of them is capable of handling three kilowatts of power.

The PW 1120 is ideally suited for camera work, but it can also be used for qualitative or semi-quantitative diffractometry. Tube current — continuously variable from 4 mA to 80 mA — is stabilised to within 0.3%. High voltage is continuously adjustable from 10 kV to 60 kV.

Electronics are all transistorised. Control panel design is simple and many safety features protect both the operator and the apparatus.

The PW 1130 is designed for use with X-ray diffraction, diffractometry, or spectrometry with a manual spectrometer. Both high voltage and tube current are stabilised to 0.03%. Tube current is variable in 5 mA steps, from 5 mA to 80 mA. High voltage is variable in 5 kV steps, from 20 kV to 60 kV. Space is provided for incorporation of a high-voltage switch, to provide for permanent connection of two tubes, to be used alternatively.

The PW 1140 is for X-ray diffraction, diffractometry, and spectrometry with a manual or semi-automatic spectrometer. Tube current and high voltage are stabilised to 0.01% for mains variations of +10% to —15% and temperature variations of 15°C. Its high degree of stabilisation, improved counting efficiency and optimum reproducibility make it ideally suited for advanced spectrometry and crystallography. High voltage range is 10 kV to 100 kV. Tube current range is 4 mA to 80 mA. It is specially designed for twin set-ups, and space is provided for a high-voltage switch.

There is so much more that needs to be said about this new generation of Philips X-ray generators that it has taken us 12 pages to do it — in a brand new brochure that's yours for the asking.

Order yours today, by writing to your local Philips sales organisation or to:
An Editorial Commentary

In accepting in broad principle the findings and recommendations of the Martin Committee on the Future of Tertiary Education in Australia (1964), the Commonwealth Government agreed that, during the following decade, Australia should develop advanced education in virtually new types of colleges, now known under the collective heading of 'Colleges of Advanced Education'. By accepting the general pattern, the Commonwealth Government also accepted a measure of financial responsibility for its implementation. The rapid emergence of these new colleges in the intervening four years or so can be traced in no small measure to the recommendations of the Martin Report and the subsequent Wark Report (1966).

The Wark Report stated that many of the existing buildings, equipment, and facilities were sub-standard, lowering the standard of the institutions in the eyes of the community. It is not surprising therefore that the injection of funds up until now has been largely directed to capital works which would raise the standard of buildings and services 'up to that in the best educational institutions in Australia and overseas'. The progress which has been made in achieving this aim will be obvious to those who observe the construction activities in their States.

But what of the students entering these colleges, the staff who will train them, and the courses which will be followed? After direct involvement in several interesting discussions, it is clear that the role of the colleges of advanced education is now much under discussion and rethinking of the patterns of tertiary education in them is being undertaken. The Wark Report discussed the more important distinctions to be drawn between universities and colleges of advanced education. In the colleges there will be students more interested in the application than in the development of knowledge: a more applied emphasis in courses and a more direct and intimate relationship with industry and other relevant organizations; and, as a corollary to less emphasis on research, more emphasis on high quality training and teaching. The colleges must develop a character of their own by providing a range of education which is of such excellence and richness of content in their own sector of tertiary education that students and staff will be attracted to them on their merits, for the special opportunities they offer.

In this issue we offer some evidence of the thinking which is going into the planning of these institutions' future, and the action which follows it. The Martin Committee held the view that the education which can be provided by these institutions has long been undervalued because of the overvaluation of the social status of a university degree. The community has an urgent need for the graduates of these colleges and the ranks of our professional personnel will not be completely filled, in all their diversity, by relying on universities as our only source of recruitment. Members not directly involved in colleges of advanced education would do well to follow the progress of the new training approaches adopted in these institutions and to assist in the contact between the colleges and the outside technological world.
A Student Exercise in Industrial-Type Projects

G. C. Kerrigan and K. W. Terry
Department of Physics, Western Australian Institute of Technology

In this article we discuss our experience in introducing project work involving advanced equipment into the third year laboratory programme in the Applied Physics course at the Western Australian Institute of Technology. To clarify the reasons for our methods, we outline the differences we feel exist between universities and institutes of technology, and make some remarks regarding conventional laboratory programmes. The project work that the students have undertaken is discussed together with their problems and those of the lecturing staff.

Following the Martin Report on 'The Future of Tertiary Education in Australia', a new generation of tertiary educational establishments called Institutes of Technology, or Advanced Colleges of Education, has developed in Australia. The function of these institutes is to provide vocational training for students in contrast to the universities' emphasis on scholarship and research. Many students are not suited to the traditional style of the university courses and yet could probably succeed in reaching a high level of competence in a less academic programme. The practical emphasis in the institutes' courses caters for such students. Consequently it is hoped that the graduates from the institutes will be more suited for employment at the Experimental or Technical Officer grade in industry than their university counterparts who hold pass degrees.

Among the apparatus that the Physics Department at Western Australian Institute of Technology possesses are four major items of equipment. These are an Hitachi HS7S electron microscope, a Siemens X-ray fluorescent spectrometer-diffractometer, an A.E.I. M.12 mass spectrometer, and a High Voltage Engineering 2–MeV linear accelerator. These major items have been used by the students in their projects, thus introducing them to advanced equipment much earlier than in a conventional course, which, we feel, is in the spirit of what should be in a course at an institute of technology.

To produce the necessary qualities in a physics graduate we believe that a laboratory course should perform a number of functions. It should:

(i) reinforce the theoretical course;
(ii) familiarize the student in the handling of a range of physical instruments, and
(iii) develop the skills necessary to design and perform individual experimental work.

The first two functions are normally fulfilled in the laboratory where the student is made to perform, usually in a set time, an established experiment with the aid of a detailed laboratory manual. The third skill, however, is not developed in such a programme. The absence of problem-solving exercises is a glaring omission in a physicist's training, since after graduating much of his work would come under this category. Throughout his training a student should be encouraged to think for himself and be gradually weaned from following laboratory manuals. Problem-solving exercises to achieve this can be included at all levels in an undergraduate course, as it does not require elaborate equipment, only a problem appropriate to the student's ability. This approach puts more demands upon the lecturer in terms of preparation, which possibly ex-

Apparatus being used by third year students in the Physics Department of the Western Australian Institute of Technology:
(1) The Hitachi HS7S electron microscope.
(2) The Siemens X-ray spectrometer-diffractometer.

plains why this type of training is often omitted. Closer student supervision is also required in the early stages, but this reduces to a bare minimum as the student gains confidence in himself and becomes more competent.

The existing laboratory programme at the Western Australian Institute of Technology in all three years consists largely of established experiments, together with a detailed laboratory manual. It was felt that this satisfies the first two functions mentioned above, but only partially satisfies the third. The introduction of project work represents an attempt to remedy this deficiency. The third term of the third year programme has, during 1968, been devoted to project work involving the major items of equipment with the students working either individually or in pairs. It is felt that this work in the last term has made an important contribution to the training of physicists at this level. The projects undertaken with two of the major items of equipment are discussed in the remainder of this article.

In the area of Electron Microscopy, five projects have been undertaken involving a variety of sample-preparation techniques. Where appropriate, the students have used selected-area electron-diffraction techniques and made an interpretation of the corresponding spot or ring pattern. The five projects were presented as typical investigations that an electron-microscope group could expect to handle in a working environment. Not only were problems of self interest undertaken, but also those of other disciplines, so as to demonstrate the benefit of close co-operation between the various departments of any organization.

An important task after taking delivery of any piece of apparatus is to check that it does in fact perform as stated by the manufacturer. With this in mind, one student has checked the magnification calibration curve supplied with the instrument by making a replica of a diffraction grating and taking a set of photographs at various magnifications.

The development of semiconductor devices and integrated circuits has resulted in a commercial interest in the study of the nucleation and growth of evaporated films into single crystals. The growth of gold evaporated on to a single crystal substrate and the use of selected-area diffraction techniques to test whether or not single crystal growth was occurring was undertaken by a student. This project also involved the use of the Siemens X-ray spectrometer to measure the mean thickness of the observed films, so demonstrating the importance of common usage of equipment by personnel within one department.

To help in the teaching of crystallography within the department, one student was given the task of
obtaining a set of electron-diffraction ring patterns from different crystal structures. From measurements of the diameters of the rings and the A.S.T.M. X-ray data files, the materials' identity could be checked, so reinforcing the similarities between X-ray and electron diffraction, since a Debye-Scherrer X-ray powder camera is included in the normal laboratory programme.

Sometimes it is required to have an evaluation of different brands of a certain commodity. The usefulness of an electron microscope in such a test on brands of chalk was investigated by another student. Distinguishing features in the shapes and surface features of the particles were revealed, thus showing that the instrument could have a function in this role.

Corrosion problems are the interest of a member of the Chemistry Department at the Western Australian Institute of Technology, and one project has revealed the shape, size, and crystal structure of various forms of rust. This inter-departmental use of facilities has demonstrated to the students the importance of liaison between disciplines.

Seven students participated in project work in the X-ray laboratory. One student used the Siemens S.R.S. spectrometer to measure the thickness of gold films associated with work being done on the electron microscope. Absorption by the gold film of the Calcium Kα line gave a sensitive method of measuring the film thickness.

Another pair of students made a series of isomorphous crystals composed of various percentages of nickel ammonium sulphate and zinc ammonium sulphate. Using the Siemens diffractometer, they attempted to correlate a change in ‘d’ spacing with constituent content. This particular combination of crystals presented some difficulties, but since a local industry was having trouble with these isomorphs, they were preferred as a project rather than some more artificial example.

A programme of age determinations of rocks using the rubidium–strontium method is currently being carried out by the Physics Department at the Western Australian Institute of Technology, in conjunction with the Western Australian Geological Surveys. The X-ray spectrometer is being used to determine the Rb/Sr ratio in the rocks. Two students were given the task of making artificial Rb and Sr standards and constructing a calibration curve. They were quite successful in sorting out some preliminary problems and moreover had a feeling of having done something useful.

A formula, used extensively in X-ray spectrometry, shows the intensity of a characteristic radiation from an element to be linearly related to the elemental concentration and inversely to the absorption coefficient of the sample. However, it was suspected that for samples whose absorption coefficient is low (e.g., solutions in water) a certain geometrical correction should be applied. Two students carried out tests and showed that the expected variation from the simple formula did occur.

To develop the real-life environment of a working physicist each student was asked to submit a research note on his work whether or not it was fully completed. These unfinished projects will be continued by subsequent students at this level.

So much for the details of the projects; a point of interest now is the response of the students to such a scheme. With no laboratory manual for the students to follow, some of them were slow off the mark before they commenced to think constructively about their problems. The various instruments and techniques had been covered previously in lectures, but their lack of understanding of the subjects was apparent when faced with the practical situation. However, with extra reading they came to grips with the relevant theory which has consequently reinforced their theoretical course.

Most students were despondent when their first attempts were unsuccessful, regarding it cold comfort to be told that it was indeed rare for any initial work to be a success. It was emphasized that so long as they learnt from their mistakes, then in fact some progress had been made. A major cause in regarding the initial work as a failure is the students’ conditioning to expect a result in a set time. They have now learnt to appreciate the uncertainty in predicting the time taken for an original investigation. The experience of being involved with an actual industrial problem and advanced equipment has reinforced the whole purpose of his years of study to the student. The stimulated interest that the projects aroused was reflected in students performing extra work outside normal laboratory times.

The inclusion of this work in the undergraduate programme has meant decreasing the student-to-staff ratio throughout its duration, in order to maintain the necessary supervision. In return the closer staff-student relationship has enabled a final evaluation to be made of the various attributes of a student at the end of his formal training, so giving a better measure of his value to future employers. This project work has largely been successful because of the reality of the problems presented. To preserve this advantage, it is vital for the lecturer to strengthen his contacts with local industry, since without their co-operation the appropriateness of the projects would be lost.

From our experience during 1968, we are convinced that presenting the student with industrial-type problems in his undergraduate course is to be encouraged. We expect that such a scheme will benefit not only the student in his future career, but also the employers of our graduates. Whether this occurs will take a few years to establish; in the meantime we plan to make this a permanent feature of our undergraduate laboratory programme.
The Role of the Institute of Technology

C. G. Wilson and W. S. Boundy
School of Physics, South Australian Institute of Technology, Adelaide

Introduction
The education of scientists is being examined in many parts of the world and the reasons for this interest lie in the generally accepted view that progress in technology and science is vital to any modern community. It follows that suitably trained scientists are needed to effect this industrial progress. Older, technologically advanced countries like the United Kingdom are alarmed because the most able scientists are not going into industry, and, furthermore, school leavers are not seeking tertiary education in science. The same pattern of behaviour is becoming apparent in Australia. In this country, institutes of technology (or colleges of advanced education) have been given large injections of sorely needed funds in an attempt to encourage developments in technological education and technology. It would appear that the Commonwealth Government is deliberately supporting a rapid growth of institutes of technology with a consequent slower growth of the universities. This unique development in Australia has led to a rather rapid emergence of institutes of technology as centres of tertiary academic education. What is the role of such institutions in the training of professional personnel, particularly physicists?

The Physicist and the Community
Before examining this question it is worth-while investigating the role of the physicist in technological development. Physics is essentially a pure discipline in that it has no industry associated with it. Prior to the onset of World War II, most graduates in physics found their careers in teaching in schools and technical colleges and in teaching and research in the universities. The number of physicists employed in outside industry was comparatively small. This tradition of academic training for the advancement of a discipline, rather than the development of the community, was given a severe jolt during the second world war, when physicists were directed into a boosted technological war effort and the immediate solution of ad hoc problems.

After the war the realization of the importance of scientists to the community led to the rapid creation of new universities and for these universities the advancement of fundamental disciplines was a natural function. The enormous expansion in university research effort in new and fashionable areas, especially in Australia, demanded a large cadre of highly trained specialized physicists with the result that the war-time association of the discipline with technological development dwindled alarmingly. It would seem that once again, university physics has asserted itself as a very pure science whose principal interest and emphasis in the training of physicists is the preparation of professionals for meeting the intellectual challenge of extending knowledge for its own sake.

The importance of this is not denied, and it is admitted that there are great dividends from pure research—pure science begets a lot of applied science—but the authors believe that the practical exploitation of this kind of research takes too long and that the direct association of physicists with the applied end of the research spectrum is as essential now as it was in war time. Unless there is an increasing amount of this direct research, the pace of technological advance will be inevitably slowed. Furthermore, the modern physicist working at the frontiers of his science is heavily dependent upon expensive facilities provided by society and, thus, community interests inevitably intrude upon the discipline of pure physics. In many cases, public interest may well be in conflict with the interests of the physicist, but it is the task of a physicist to convince society of the value of a particular piece of pure research. This divergence of professional and lay opinion is most significant for projects at the frontiers of any science and, for a large amount of physical research, can be minimized by recognizing the applied physicist as a professional derived from treating applied physics as a discipline in its own right. The situation is parallel to that of the various branches of engineering. The training of this professional man is a role of the institutes of technology.

The Applied Physicist
What manner of man is the applied physicist who is to be consciously trained by the institute for professional work in the community and who will employ him? He already exists in various research, defence, and industrial organizations and professional advertisements recognize both the theoretician and the experimentalist. Experience shows that the majority of such men are required at the experimental-officer level. He is a man with a good command of the English language and mathematics, who is able to translate the ideas of the pure scientist into experimental reality. He is essentially a practical man who has a thorough grounding in the principal areas of applied physics, in the principles of modern instrumentation, and in the interpretation of experimental phenomena. He sees physics as a universal tool for all areas of science and, given an idea, he will use the immense resources of modern techniques, modify available instruments and direct the technicians in producing results. He may well become an expert X-ray crystal-
lographer, an electron microscopist, a vacuum technologist, geophysicist, spectroscopist, agricultural or meteorological physicist, etc.—in all cases a man associated with some sector of technological research and development which needs the unique approach of the physicist for efficient progress. Industry itself may not know that it needs such men. As it becomes aware of the need for an Australian contribution to technological development, it begins to realize the value of the physicist to a team which contains the design engineer, the production engineer, and the chemist.

Such men have been trained by universities in the past and many will come from universities in the future, but it must be admitted that the teaching of physics for its own sake within the universities has prevented immediate and direct contact between the physicist and industry—between pure research and industrial development—and it is for this reason that the training of applied physicists as an essential profession must not be entrusted to the universities. The universities must be free to teach the discipline of pure physics—our effective scientific progress as a nation demands this—and we would argue that they must be protected from the streaming influence associated with applied physics teaching that the close association with industry would bring about. Within the university departments a natural directing force operates, leading to specialist teaching at honours level of those aspects of physics which form the basis of their major research work. On the other hand, post-graduate work in the institutes will involve intensive training and teaching in particular areas demanded by and supported by industry and applied research centres.

Applied Physics and the Teacher

Any profession must be concerned with the problems encountered by its members in the field of education and this applies particularly to the secondary schools, since it is here the image of a profession has to be attractive if the profession is to be a force in the community. To ensure this, the shortage of physics graduates in high schools must be overcome. The shortage probably derives from two major causes, viz community indifference, and disillusionment with physics. In prewar days the graduate high-school teacher was an exclusive member of the community, because of the small number of graduates existing at that time. His teaching was in an area he loved and he nurtured very few students for any office higher than his own. The war-time requirement for physics and physicists drained the highly trained teachers from the high schools and translated them to posts which offered more exciting futures and certainly better pay. After the war many never returned to teaching.

Unlike the universities, the high schools never recovered from the brain drain; new professions competed for graduates. They were not given massive injections of help, salary differentials increased unfavourably and only general-degree graduates found their way into schools. Here they were forced to cope with large classes, lack of modern equipment, competition from other sciences, and an explosion of physics into areas which had not yet entered the school text books. Many teachers who had been subjected to the traditional version of physics ultimately found themselves out of touch with the industrial community and its technological development and there was little opportunity for in-service training which is so necessary in a lively subject.

It is not surprising that high school students, who are groping for an association with a modern complex community, find that physics at school does not offer them much help with real life. If there is to be a resurgence of interest in physics at the high-school level, teachers of physics should be trained with a greater awareness of the role of their subject in industry and in community services. The training given to the applied physics student at an institute of technology is appropriate for teachers who are to be professionals. The association of trainee teachers with universities has been of value in the past and in this new era association with institutes of technology will be no less fruitful.

Conclusion

In an article of this nature it is not appropriate to detail the applied physics course offered by institutes of technology. Sufficiency has been said to indicate that such a course must be oriented towards a study of those parts of physics which are of immediate importance to the technological development of the community, so that extended discussions of advancing theories of the nucleus, cosmology, astrophysics, relativity, fundamental particles, etc. would not be justified. Experimental techniques would be an essential ingredient of the course and specialist lectures from practising physicists, with associated visits to industrial and government research and development laboratories, would be important. Does this prevent the formulation of an academic discipline? We believe not. The concept of 'Applied Physics' as a discipline will lead to a form of academic training which will be just as viable as that given to other technologists such as doctors and engineers.

References

The 11th International Conference on Low-Temperature Physics

D. CREAGH
Physics Department, Royal Military College, Dunrobin, A.C.T.

The 11th International Conference on Low-Temperature Physics was held at the University of St. Andrews from 21 to 28 August 1968 under the auspices of the International Union of Pure and Applied Physics, the University of St. Andrews, and The Royal Society. It was attended by 751 delegates to whom 257 papers were read, 12 of which were given in plenary session and 13 read by invited speakers. The business of the conference was divided into four sections, each section dealing with a different aspect of low-temperature physics. Closed circuit television was employed to relay the plenary section lectures to delegates in all sections and to keep delegates in touch with the progress of papers given in other sections. Section A dealt with investigations into the properties of liquid and solid helium. In Section B phenomena associated with superconductivity and magnetic effects in superconductors were described. The Fermi surface (investigated by the de Haas–van Alphen and R.F. Size Effect methods) and giant thermoelectric (Kondo) effects were discussed in Section C. Section D dealt mainly with instrumentation and the measurement of miscellaneous properties of materials at liquid helium temperatures.

At the opening session of the conference the H. London Award was made to Dr W. H. Fairbanks (Stanford University) for his contributions to the understanding of the properties of materials at low temperatures. In his address-in-reply Dr Fairbanks reviewed his past research and described in detail some recent experiments with which he has been associated:

- the experimental comparison of the gravitational force on freely falling electrons and metallic electrons;
- the design of super conducting cavities for the klystrons in the new LINAC accelerator;
- the design of telescope bearings for use in Orbiting Geophysical Observatories.

The other papers which were common to all sections of the conference were given in plenary session. A brief summary of these papers follows:

J. G. Dash (University of Washington) described experiments performed on monolayers of helium which had been absorbed onto solid surfaces at low temperatures. For some experimental conditions the films exhibited the characteristics of two-dimensional gases on solids and for other conditions interaction of individual atoms with the substrate were important. An interpretation of the results of these experiments was made in terms of a model in which the substrate interactions played a dominant role.

In a discussion of long-range order at the superconducting transition by R. C. Hohenberg (Bell Telephone Laboratories) some limitations of 'mean field' theories of superconductivity were mentioned, in particular their failure to account satisfactorily for thermodynamic fluctuations. The B.C.S. theory predicts a classical 'second order' transition in bulk specimens: a finite jump in the specific heat, and a sharp fall in the resistance. Many bulk specimens have been observed to exhibit such transitions. Hohenberg contends, however, that if sufficiently accurate measurements were made deviations from the classical 'second order' properties would be observed. For samples which have one or two dimensions small compared to the B.C.S. coherence-length fluctuations become significant, and deviations from the predictions of the B.C.S. theory should be observed.

A review of the radio frequency size effect which was to be given by V. F. Gantmakher (Solid-State Physics Institute, U.S.S.R. Academy of Sciences) was read by R. G. Chambers (Bristol). A description of the main features of the size effect lines (asymmetry of location, line width, correlation between the real and imaginary parts of the impedance) was given together with some of the recent comparisons of experimental and theoretically predicted line shapes. The application of the size effect to the investigation of Fermi surfaces and the relationship of the line position and line shape to the extremal diameter of the Fermi surface were discussed. A series of experiments using size-effect lines to determine the mean free path of definite groups of electrons on the Fermi surface was described and the temperature dependent part of the reciprocal mean free path was shown to be proportional to $T^3$; a result previously observed for tin and indium. The relationship between size-effect and de Haas–van Alphen measurements of the Fermi surface was also discussed.

In his review of magnetic ordering at low temperatures A. H. Cooke (Clarendon Laboratories) dwelt mainly on the use of magnetic transitions to investigate ordering processes. Studies using magnetic fields which were small enough not to affect the ordering and using fields which were strong enough to influence the ordering were described. O. G. Symko (Clarendon Laboratory) spoke on the topic of nuclear cooling from the experimental point of view describing experiments in which nuclear
Zeeman energy was used to cool specimens of copper and of indium. Weak coupling between the nuclear spins and the conduction electrons and poor contact between the various constituents of the nuclear cooling system remain the major barriers to efficient nuclear cooling.

The attainment of low temperatures by the use of helium dilution refrigerators was discussed by E. Mendoza (University College of North Wales, Bangor). Helium dilution is expected to replace demagnetization as a cooling technique for the temperature range down to 10 millidegrees. Because of the recent interest in helium dilution machines, Symko gave a review of the technical problems associated with the technique (flow across the $\text{He}^3$-$\text{He}^4$ boundary and the temperature distribution at the boundary, and the optimal design for the mixing chamber). Alternative methods of circulating the $\text{He}^3$ within the refrigerators was also suggested.

J. Clarke (Lawrence Radiation Laboratory) read a paper on the proximity effect between superconductors and normal metals in which he discussed: the depression of the transition temperature of a N.S. sandwich due to the diffusion of Cooper pairs from the superconductor to the normal metal; single-particle tunnelling experiments to show that the density of states in the normal metal of a N.S. sandwich resembles that of a superconductor; S.N.S. junctions which can sustain supercurrent indicating the presence of condensed pairs in the normal layer. In the latter experiment current steps induced on the $j-V$ characteristics of S.N.S. junctions by electromagnetic radiation have been used to demonstrate the fact that $2e/h$ is identical in different superconductors to an accuracy of 1 part in $10^4$.

The decoration of superconductor surfaces with small ferromagnetic particles is a technique employed by U. Eissman (Max Plank Institute für Metallforschung, Stuttgart). He demonstrated the existence of flux-line lattices at the surface of superconductors and showed that the triangular flux-line lattices of Type II superconductors contain lattice defects analogous to defects in crystal lattices. A method for the investigation of the pinning forces on single flux lines was demonstrated. The paper finished with a survey of macro-flux lines and lamellar structures in normal regions of thin foil Type I superconductors.

C. A. Price (Vassar) gave the final paper of the plenary sessions in which she discussed the question of the conservation of liquid helium and the net economic benefits which have accrued since the conservation scheme was commenced in the U.S.A. in 1960.

The proceedings of the conference are to be published in March 1969.

It has been said that conference can be judged by the extent to which discussion between delegates is stimulated. If this statement is true the 11th International Conference on Low Temperature Physics was an extremely successful and pleasant conference.

---

**Institute Affairs**

At the Annual General Meeting of the Australian Institute of Physics on 27 February, the retiring President, Dr A. Walsh, installed Mr A. F. A. Harper, M.Sc., F.A.I.P., F.Inst.P., as the new President.

Mr. Harper is a Senior Principal Research Scientist of the C.S.I.R.O. Division of Physics of the National Standards Laboratory at Sydney and has been associated with the administration of the Australian Institute of Physics since its inception in 1962, first as its Hon. Secretary, then as the Vice-President.

Mr Harper is an M.Sc. of the University of Sydney having graduated in 1934 with the University Medal in Physics. He is a Past President of the Royal Society of N.S.W. and last year was awarded that Society's medal for his contributions to science and the Society. He is a specialist in temperature measurement and in recent years, as Secretary of the National Standards Commission, has also been closely associated with many aspects of weights and measures. Last year he acted as Technical Consultant to the Senate Select Committee which reported in favour of Australia converting, over a period, to the sole use of the metric system.

Other office-bearers are:
Vice-President: Professor R. Street, Professor of Physics, Monash University.
Hon. Registrar: Dr D. B. Fraser, Chief Research Scientist, C.S.I.R.O. Division of Protein Chemistry.
Hon. Secretary: Dr J. G. Campbell, Managing Director, Perkin-Elmer Pty Ltd.

A full report on the Annual General Meeting will appear in the next issue.
The Geophysics Group (A.I.P.) is arranging a symposium on the earth’s crust to be held on the Friday before the week of the 41st ANZAAS Congress in Adelaide. Papers will be presented relating to Project BUMP. The program will be divided into three sections relating to work carried out in the following different types of structural areas.
1. Shield and other stable areas.
2. The ocean and the continental margin.
3. Unstable areas such as island arcs.

Papers dealing with or related to any aspect of crustal structure are invited and it is expected that publication will be arranged.

Any persons wishing to receive circulars concerning the symposium or to submit papers should contact:

Dr D. J. Sutton,
Hon. Secretary, Geophysics Group,
Physics Department, University of Adelaide,
Adelaide, S.A. 5001.

The Register

Changes in Membership from 3 January 1969 to 11 February 1969.

FELLOWSHIP
(a) New Election
Candler, C., Bendigo Institute of Technology, Vic.
Duncanson, W. E., New Guinea Institute of Higher Education, Lae, T.P.N.G.
(b) Transfer

ASSOCIATESHIP
(a) New Election
Harvey, P. J., University of Melbourne, Vic.
(b) Transfer
Morgan, J. L., Brisbane Grammar School, Qld.

GRADUATESHIP
(a) New Election
Blackburn, P. B., Dandenong, Vic.
Hsu, H. D. H., Anaconda Australia, Inc., Sydney, N.S.W.
Szirmay, S. G., C.S.I.R.O. Division of Mineral Chemistry, Chatswood, N.S.W.
Trebilco, G. R., Monash Teachers’ College, Clayton, Vic.
(b) Transfers
Collins, D. W. K., State X-Ray Laboratory, Shenton Park, W.A.

STUDENTS
(a) New Election
Contuzzi, V., W.A.
Frenkel, D. I., Vic.
(b) Resignation
Debnam, L. C., A.C.T.

SUBSCRIBERS
(a) New Election
Klinkenberg, H. A., Vic.
(b) Resignation
Meath, J. R., Qld.

COMPANY SUBSCRIBER
E.M.I. Electronics (Australia) Pty Ltd, Elizabeth, S.A.

Notes and News

Nuclear Facilities — Siting and Safety Assessment Course
The Australian School of Nuclear Technology will present a course on the siting and safety assessment of nuclear facilities from 3 July to 23 July 1969. The objective of the course is to develop a broad understanding in this field for those staff who will be charged with the task of selecting sites for and safety assessment of nuclear facilities or will have to perform regulatory functions in Australia, New Zealand, and South-East Asian countries. Nuclear facilities in this context include nuclear power stations, plants for supplying feed materials, manufacturing fuel elements, reprocessing irradiated fuel elements, treatment of nuclear wastes, and irradiation of materials or other facilities making use of nuclear reactions.

Information and application forms (closing date 6 June 1969) may be obtained from—

The Principal,
Australian School of Nuclear Technology,
Private Mail Bag,
Sutherland, N.S.W. 2232.

THE AUSTRALIAN PHYSICIST, MARCH 1969 43
Retirement of Dr Boas

Dr Walter Boas, D.Eng., F.A.I.P., F.A.A., retired on 9 February from C.S.I.R.O., where he was Chief of the Division of Tribophysics, a position he had held for nearly twenty years. He is well known to most members of the A.I.P., having been a Fellow for twenty-five years and a past Chairman of the Victorian Branch. His interests in solid-state physics are internationally recognized, and have led to the high repute of the research of the Tribophysics laboratory. As yet, he is non-commital about his plans for retirement, but his position as a Vice-President of the International Union of Pure and Applied Physics ensures that he will travel overseas each year for the next few years, and maintain his touch with developments in physics. It seems certain that he will retain his interest in solid-state physics, and maintain contact with physicists in Australia through the A.I.P. and the Australian Academy of Science.

IUPAP News

News-Bulletin no 9 from the International Union of Pure and Applied Physics includes the following items:

European Physical Society

The inaugural meeting of the European Physical Society will take place in Florence on 9-11 April next. The meeting is being sponsored by IUPAP as an expression of its gratification at this important event in the development of International Physics.

The interim President of the E.P.S. is Prof. G. Bernardini, who is also a vice-president of the Union.

Physics Education Commission Congress

In News-Bulletin no 5, a list of six proposed international conferences on various aspects of Physics Education proposed by the Commission was published. The first of these—on the education of Physicists for work in industry—was held in December 1968 at Eindhoven. The second is now being prepared. It will consider the problem of the Education of Secondary School Teachers of Physics. It has been suggested that congress be held in Hungary, near Budapest, in late September 1970.

Human Environment


This Committee will propose urgent problems concerning those characteristics of the environment which man himself is altering and towards the solution of which the scientific competence of I.C.S.U. could be applied. For the initial phase, members of the committee will be drawn from the Geophysics and Biological Sciences Unions. IUPAP will no doubt have a role to play in the ensuing program.

Summer School Proceedings

The proceedings of the Summer School in Plasma and Laser Physics which was held at the Flinders University of South Australia in February 1968 (Australian Physicist, April 1968) are now available. Members of the Summer School who ordered copies will receive them by post in due course. Others who are interested in purchasing a copy of the proceedings or reprints of individual papers are requested to contact Dr E. B. Sandercoc, Hon. Secretary, S.A. Branch, A.I.P., C/- Bedford Park Teachers' College, Bedford Park, S.A. 5042.

On Walkabout

Dr E. T. Linacre, F.A.I.P., is taking up a post as Associate Professor of Climatology in the School of Earth Sciences at Macquarie University. He is transferring from C.S.I.R.O. Irrigation Research Division, Griffith, N.S.W.

Letters to the Editor

Equal Pay

Sir,—In the January issue of The Australian Physicist, Dr J. G. Campbell expressed his concern 'at the tendency to involve the Institute in activities of a trade union type', citing in particular the proposal that the Institute should make a pronouncement on the question of equal pay for women physicists, so 'advocating sectional views of employees as against employers'.

As to whether the Institute should engage in activities of a genuinely trade union type, I do not wish to argue here. Surely the question of equal pay transcends this, in that it involves questions of national policy which are or should be the concern of the Federal Government; this seems particularly true when one considers the I.L.O. Convention on Equal Pay which still awaits ratification by Australia. The proposed resolutions in fact were:

(1) That this meeting approves the principle of equal pay for women physicists.

(2) That the A.I.P. should write to the Prime Minister expressing support for the principle of equal pay (the W.A. branch added 'for women physicists' to make the meaning quite explicit).

(3) That copies of the letter to the Prime Minister should be made available to advocates conducting the case for equal pay.

Clearly, it is the approach to the Federal Government which is most important as far as the Inst...
stitute is concerned, Resolution 3 simply recognizes the fact that in Australia even questions of national policy and government concern have to be dealt with through the mechanism of the Arbitration Commission.

All three resolutions were in fact carried at the Annual General Meetings of the following branches: N.S.W. (one dissentent), Queensland (unanimously) and Western Australia (numbers not known); the first two were carried by South Australia but the third was not put because it was considered that if advocates asked for information it would be available; only Victoria is known not to have put any of the resolutions to the vote. We have no news from Tasmania. I cannot regard this high level of support from the overwhelmingly male membership of the Institute as serving ‘purely selfish objects’.

Mrs K. R. Makinson
(Member of N.S.W. Branch Committee)
C.S.I.R.O. Division of Textile Physics,
338 Blaxland Road,
Ryde.

Sir,—I read with interest the letter from Dr J. G. Campbell entitled ‘Trade Union Activities’ which appeared in the January issue of the Australian Physicist. I was astonished to realize that a question such as the so-called ‘equal-pay issue’ could be seriously regarded by any physicist as controversial. It seems to me that this issue, presumably that of equal pay for women, cannot simply be dismissed as a matter of trade union concern only, but must be regarded as an issue concerning a fundamental and, to my mind, self-evident human right. The principle is surely simply that of non-discrimination, for employment purposes, against individuals on the basis of either colour, race, sex, or creed. This principle is stated in article 23(2) of the Universal Declaration of Human Rights promulgated in 1948 by the United Nations Organization.

If members of the Institute feel that its influence in the community would be jeopardized by standing openly by basic human rights then those members underestimate the mood of the general public today. If the Institute does indeed fear that it may thereby alienate its Company Subscribers, perhaps it should also weigh against this possibility the fear of alienating its women members and perhaps also some liberal-minded male members.

Barbara J. H. Possingham
10 River St,
Marden, S.A. 5070.

Sm.—A recent letter from Dr J. G. Campbell advises against any action by the Institute of the trade union type. Whilst finding myself in sympathy with many of Dr Campbell’s comments, I feel there is a danger that these may be construed to mean that the Institute should do nothing at all other than conduct its own internal affairs. I am reasonably certain that this is not what Dr Campbell intended.

The case could well be argued that the Institute is a most competent body to issue public statements on broad issues such as education, encouragement of scientific research, scientific salaries as they relate to the international scene, and so on. In short, I consider the Institute should adopt an active policy of functioning, in part, as a pressure group representing the profession as a whole.

Such a policy would, I believe, serve the public good.

A. J. Dyer
C.S.I.R.O. Division of Meteorological Physics,
Aspendale, Vic. 3195.

---

**Book Reviews**

ADVANCED MECHANICS, S. W. Groesberg,
$15.25.

Reviewed by K. E. Bullen, Department of Applied Mathematics, University of Sydney.

It is an interesting sign of the times that a book on mechanics for engineers should, as this one does, include sections on such topics as Hamiltonian perturbation theory, and chapters on special and general relativity, and quantum mechanics.

The book follows a common American pattern in going all the way from the evolution of the equivalent of Newton’s laws of motion, through Lagrange’s equations to Hamiltonian mechanics. The approach is sophisticated, however; items such as inertial frames, rotating frames, and curvilinear coordinates are discussed inside the first of the book’s nine chapters. There are also chapters on orbital mechanics, rigid-body dynamics, gyroscopic problems, and variational mechanics. Useful exercises are set at the ends of all chapters.

In writing specifically for students of engineering sciences, the author insists that ‘despite a common scientific and mathematical sustenance, engineers and physicists bring dissimilar points of view to their respective crafts’. The applications are principally of engineering interest, and include, for example, sections on rotation sensing instruments, the gyrocompass, ‘attitudinal stability of space craft’, particle accelerators, Doppler tracing of satellites, ion thrust engines, time keeping in the space age, laser theory, and semiconductors.

THE AUSTRALIAN PHYSICIST, MARCH 1969 45
The author's stated 'limited objective to provide a heuristic bridge between the remote abstraction of theory and the tangible immediacy of hardware' is perhaps responsible for some features which will not appeal to every reader. In particular, the author displays a slight taste for jargon and long words, though perhaps not more than the average American writer of today on scientific and engineering subjects. A moving system of particles is referred to as a 'conglomerate of particles enjoying translatory motion'. Forces between particles are 'interparticulate', where this reviewer would write that a Newtonian (or quantum mechanical) particle is part of a 'mathematical model' structure, the author writes 'clearly particles are idealizations which do not correspond to the reality of palpable substance'. 'General systemic statements' are referred to, and so on.

Nevertheless, the book is on the whole clear, and it is essentially sound—in fact it avoids some traps that lofty theoretical physicists have fallen into on occasion. It rightly stresses the mathematical model ('postulational') character of scientific (so-called) laws, and its philosophy is probably adequate for engineer and physicist readers whose tastes do not run to fine points in the philosophy of scientific inference. Even with statements which may slightly irritate some readers, e.g., 'in view of the limited degree of experimental validation this postulate should more properly be demoted to the status of an empiricism', the context usually makes the essential meaning clear. The book is specially valuable, and not only to engineers, through the well-set-out information it gives on significant practical applications of the theory covered. If the content of books like this can be blended into non-engineering accounts of advanced mechanics without too much corruption of vocabulary, that will incidentally be all to the good.

All parts of the book should be found of much interest to Australian physicists and applied mathematicians, and to those Australian engineers who have the necessary applied mathematical background (about third- or fourth-year Australian undergraduate level). It could be a useful addition to final-year undergraduate book lists in some Australian departments of mechanical and civil engineering. At the least, it is well worth placing in libraries.


Reviewed by H. S. Green, University of Adelaide.

This book is subtitled 'A NATO Advanced Study Institute' and is based on a sort of early Summer School held in Paris in the first half of 1963. The book itself appeared towards the end of 1967, and the delay in publishing is to be regretted, as some of the material, which was in great demand a few years ago, has appeared elsewhere and lost some of its topicality through the lapse of time. No doubt it was a difficult matter to coordinate the work of 13 different authors, and their separate contributions are still rather heterogeneous. Still this remains an important book.

The first chapter, by Harary himself, provides the key to many of the subsequent contributions, and, considering the variety of Harary's own work on graph theory, could have been considerably extended. The casual reader must be impressed by the number of apparently simple unsolved problems, which, as Harary points out in a footnote, seems to remain almost constant in time, in spite of the substantial progress which has been made in the last few years. The second chapter on the applications to crystal physics, by Kasteleyn, was of particular interest to the reviewer, and well written. This is followed by a chapter on the theory of electrical networks, by Bryant, and then some contributions to the more mathematical aspects of the subject. Chapter 7, by Groenewold, is of interest for its applications to the statistical mechanics of fluids, but rather too concise and restricted in scope for anyone who is not already an expert in the field. There are some more chapters on pure graph theory. The last chapter is concerned with a generalization of the four colour problem.

The book is well produced and reasonably priced, and is therefore a recommended addition to one's personal library.


Reviewed by C. N. Watson-Munro, School of Physics, University of Sydney.

This book is Volume I of yet another scientific review series and the arguments for the venture are rationally excused by the rapid advances in plasma physics in such diverse fields as controlled thermonuclear research, astrophysical plasmas, solid state plasmas, magnetohydrodynamic conversion, and possible space propulsion. In that approximately biannual conferences, adequately reported and reviewed, are held in each of the above fields, one might have hoped that 'Advances in Plasma Physics' might have formed a channel of communication between the fields.

The editors also express this view, but unfortunately the choice of material and the coverage make the Review only partially successful. 'Radiation from Plasmas' would be better presented as a series of post-graduate lectures; it reviews none of the experimental results and does not include the practically very important cyclotron and synchrotron radiation. 'Minimum Average-B Stabilization for Toruses' is just a summary of one aspect of C.T.R. work and of limited interest to workers in other fields. 'Plasma in the Magnetosphere' is an excellent review, informative and easily digestible by workers in other fields. 'Drift Waves' and 'Thermodynamics of Unstable Plasmas' are short reviews of two current problems in laboratory plasma physics presented by theoreticians for theoreticians and unsoiled by inclusion or reference to experimental re-
Partial Coherence
A new column for appropriate contributions

Some are more Physics than Others

The science of physics is no freer than other lesser occupations from its pecking order and similar forms of snobbery. Two bases for these are well known: the university at which the physicist was trained and the field of work he pursues. Thus we have the nuclear physicist who asserts that his is the true branch of physics and the classical physicist's retort that nuclear physics, like chemistry, is now a separate subject and should be split off from physics as a 'New Chemistry'. There are other disagreements of a similar kind.

I am concerned here, however, with a more subtle question of status. It is tied up with the phrase 'the physics of it'. This expression is often used as a weapon by the experimentalist against the theoretician, but to see this as its only use would be an over-simplification. In fact, the phrase can be used with contradictory meanings. Yet, whenever it is uttered, a look of respectful comprehension appears in a physicist's eyes, and you feel an outcast if you do not conform.

Let me illustrate the uses of the phrase by two examples. A conference is grinding on with a series of short, boring talks. Then a speaker gets up and, for about 10 minutes, presents brilliantly a neat piece of instrument design in which a known principle has been applied to make a completely new type of measurement. But he appears uneasy. Looking at his watch he finally announces apologetically 'we are now getting to the physics of the talk' and proceeds to show a series of results that confirm (very dubiously) some theoretician's predictions that the speaker himself does not quite understand. Perhaps the first part of the talk can be called engineering but I hate to think that the second is really physics.

Another example. A speaker presents both the theory of some phenomenon and its experimental verification. The results agree nicely with prediction, but the audience seems unhappy. Finally someone asks the vital question 'Yes, but what is the physics of it?'. The speaker then embarks into a new explanation in terms of a simplified model in which atoms or photons are billiard balls, waves are water waves, and forces are springs. Everyone seems happy, except the writer, who keeps remembering how he was taught the dangers and difficulties of representing physics by simple models.

I hope these examples illustrate my problem. Does the phrase 'the physics of it' have a useful meaning, recognized by most physicists, or is it merely a cliché used to score off those who are not 'with it'.

W. H. Steel

THE AUSTRALIAN PHYSICIST, MARCH 1969 47
treatment of controlled Q-switching and pulse shaping.

The final chapter, six, is devoted to the diode injection laser. This is a largely descriptive treatment of the operation of the laser and effects of temperature, magnetic field and pressure on its characteristics.

The material for the book has been gathered from research publications and covers progress up to 1966 including some developments which have taken place in that year.

The book contains, in places, unnecessary or trivial details which could have been omitted, but is well produced and only minor misprints have been noted. The book, although far from complete, can be recommended to a newcomer to the field, and has some value as a reference text.


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

Few of the conference and summer-school proceedings now flooding the bookshops are as welcome as this book. The organizers and editors are to be congratulated on their choice of lecturers, and on the speed of publication. The former is responsible for the excellence of the lectures, the latter for the fact that little of the content is obsolete.

The lectures and lecturers are:
Experimental Aspects of K. Decays—V. L. Fitch.
Experimental Aspects of Strong Interactions—G. Goldhaber.
Hadron Spectroscopy—R. H. Dalitz.

Of the topics of present interest in particle physics only Regge poles and high-energy interactions are omitted.

I recommend this book as an excellent introduction to the current literature.

AUSTRALIAN INSTITUTE OF PHYSICS — VICTORIAN BRANCH
NATIONAL SEMINAR
ON
THE TRAINING AND EMPLOYMENT OF PHYSICISTS
to be held at
Clunies Ross House, Parkville, Melbourne, 27–28 May

The main purpose of this Seminar is to foster understanding between the teachers and the employers of physicists and to define the aims of these teachers and employers with respect to physicists engaged in industry, education, and the public service.

The programme has been divided into four sessions which run from 2 p.m., 27 May till 3.30 p.m., 28 May. Fourteen speakers have been invited to address the Seminar. The Seminar is particularly fortunate in having as its principal speaker Dr J. E. GOLDMAN, Head of Research and Engineering at Xerox Corporation. Dr Goldman has had wide experience in the training and utilization of scientists in general and physicists in particular for research, development, and production at the Ford Motor Company Scientific Laboratory, Dearborn, U.S.A.

Victorian Branch members should note that the evening address on 27 May will take the place of the usual monthly meeting.

Further details of this Seminar will appear in Circular No 2.

CIRCULAR 1
Please return to J. V. Sullivan, C.S.I.R.O. Division of Chemical Physics, P.O. Box 160, Clayton, Victoria 3168.

I do not expect to attend the Seminar.

I expect to attend the Conference Dinner.

NAME

ADDRESS

P.S. Please enclose fee of $7.00 for dinner.

48 THE AUSTRALIAN PHYSICIST, MARCH 1969
MONASH UNIVERSITY
FACULTY OF SCIENCE
Lectureship in
Science Education

The faculty of Science invites applications for a lecturer who, in the first instance, will be responsible to the dean. The lecturer's prime duty will be the planning and co-ordination of appropriate postgraduate courses in Physics and Chemistry for graduate science teachers. These courses will form part of a subject for the postgraduate degree of Bachelor of Education. His duties will also include suitable contributions to the general teaching programmes of the departments of Chemistry and Physics, and may extend to wider aspects of science education within the faculty.

We envisage that this appointment could be of interest to persons having any of a wide variety of qualifications and experience. The dean of the faculty of Science will be happy to enter into discussions with intending applicants. Details of the current research interests of the departments of Chemistry and Physics may be obtained from Professors R. D. Brown and R. Street, respectively.

Salary Range: Lecturer $5,400 - $7,300 per annum, with superannuation on the F.S.S.U. basis and disability cover.

Benefits: Full travelling expenses for appointee and family; removal allowance; repatriation after three years' appointment if desired; initial subsidised housing; availability of loans for home purchase; STUDY LEAVE is granted at the rate of one term's leave for six terms' service with provision for financial assistance.

Further general information and details of application procedure are available from the Academic Registrar, Monash University, Wellington Road, Clayton, Victoria 3168.

Closing Date: 12 April, 1969.

The University reserves the right to make no appointment or to appoint by invitation.

J. D. Butchart,
Academic Registrar.
There are scalers, and there are timers.

But there is only one dual preset scaler-timer with 6-or 7-digit in line display.

A highly readable display, too. Because when Hewlett-Packard designed the 5590A Scaler-Timer, we had the user in mind. A single package combining a preset scaler and a preset timer, the 5590A provides you with a versatile multifunction capability for building nuclear measurement systems.

With the 5590A both count and time can be separately preset, and you get both automatic or manual operation. The 6-digit in-line display (7 digits, optionally) allows you to hold each measurement in read-out until the next one is complete. You can read elapsed time—or count—without interrupting the measurement process. With all this, pulse resolution is 100 nanoseconds (10 MHz scaling rate).

In a 4-width NIM package, the 5590A also offers you, besides the combination of scaling and timing in two separate registers, integral discrimination, and printer output, both count and time. Thumbwheel switches for presetting, lever switches for programming, and pushbuttons for commands give you the utmost ease of use.

The scaler-timer is shown below with the HP 5582A Linear Amplifier and the 5583A Single Channel Analyzer in the 5580A/B NIM power supply—indicating its compatibility with other nuclear instrumentation. Price: Model 5590A, $1675. For 7-digit display (Option 02), add $50.

For further information, call your local HP field engineer or write Hewlett-Packard Australia Pty. Ltd., 22-26 Weir Street, Glen Iris 3146. Telephone 20 1371.

HEWLETT PACKARD
NUCLEAR INSTRUMENTS