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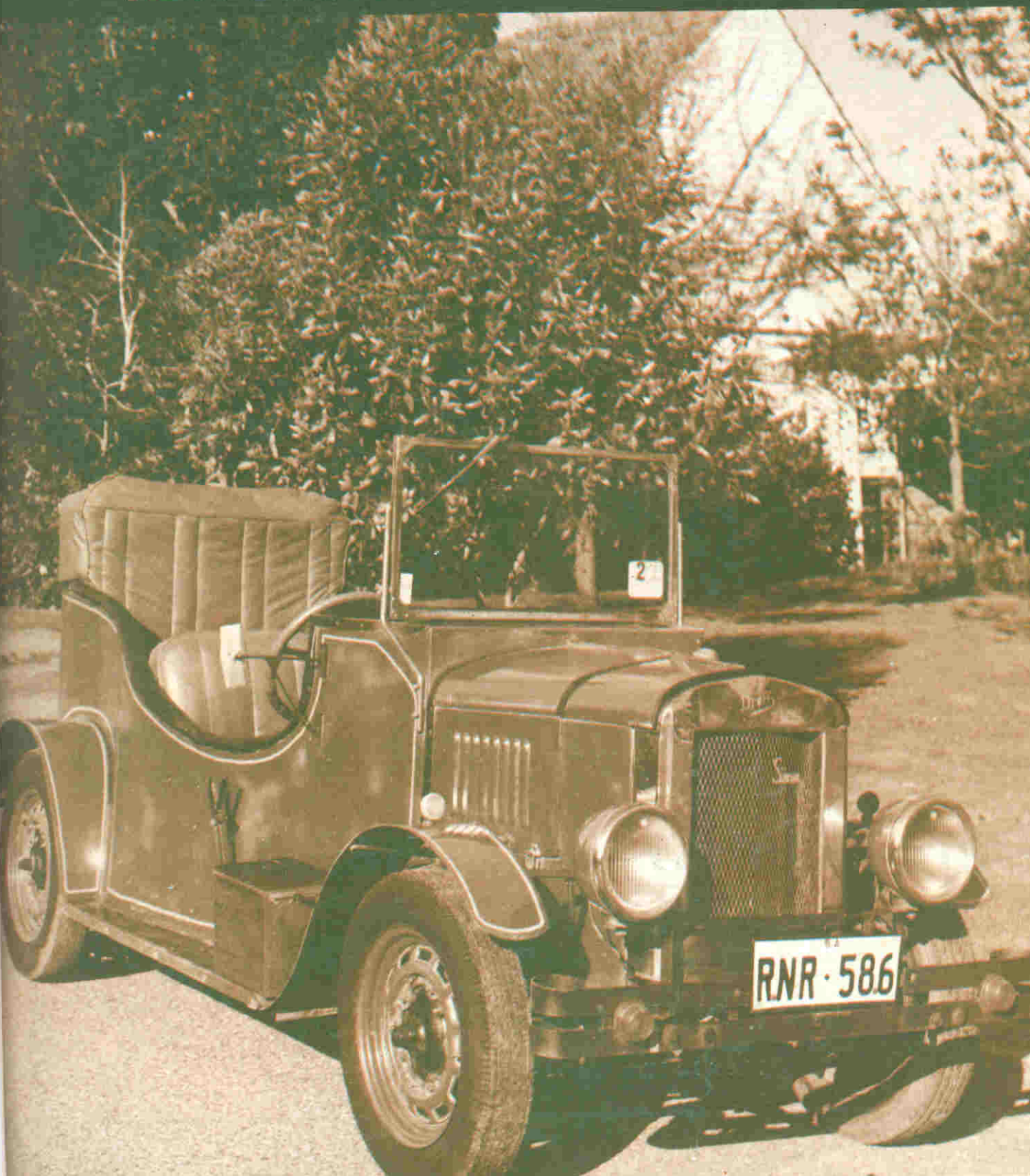

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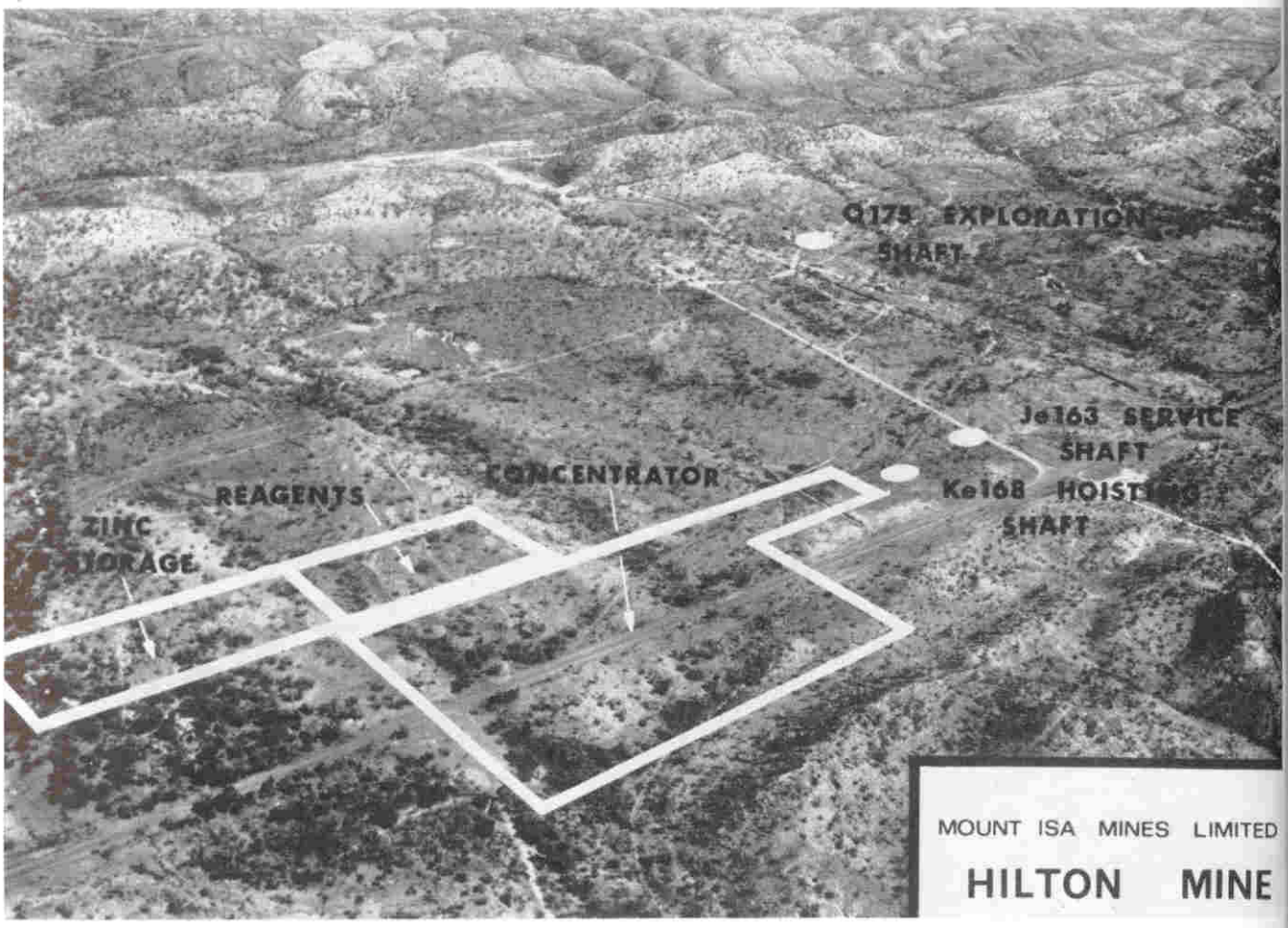

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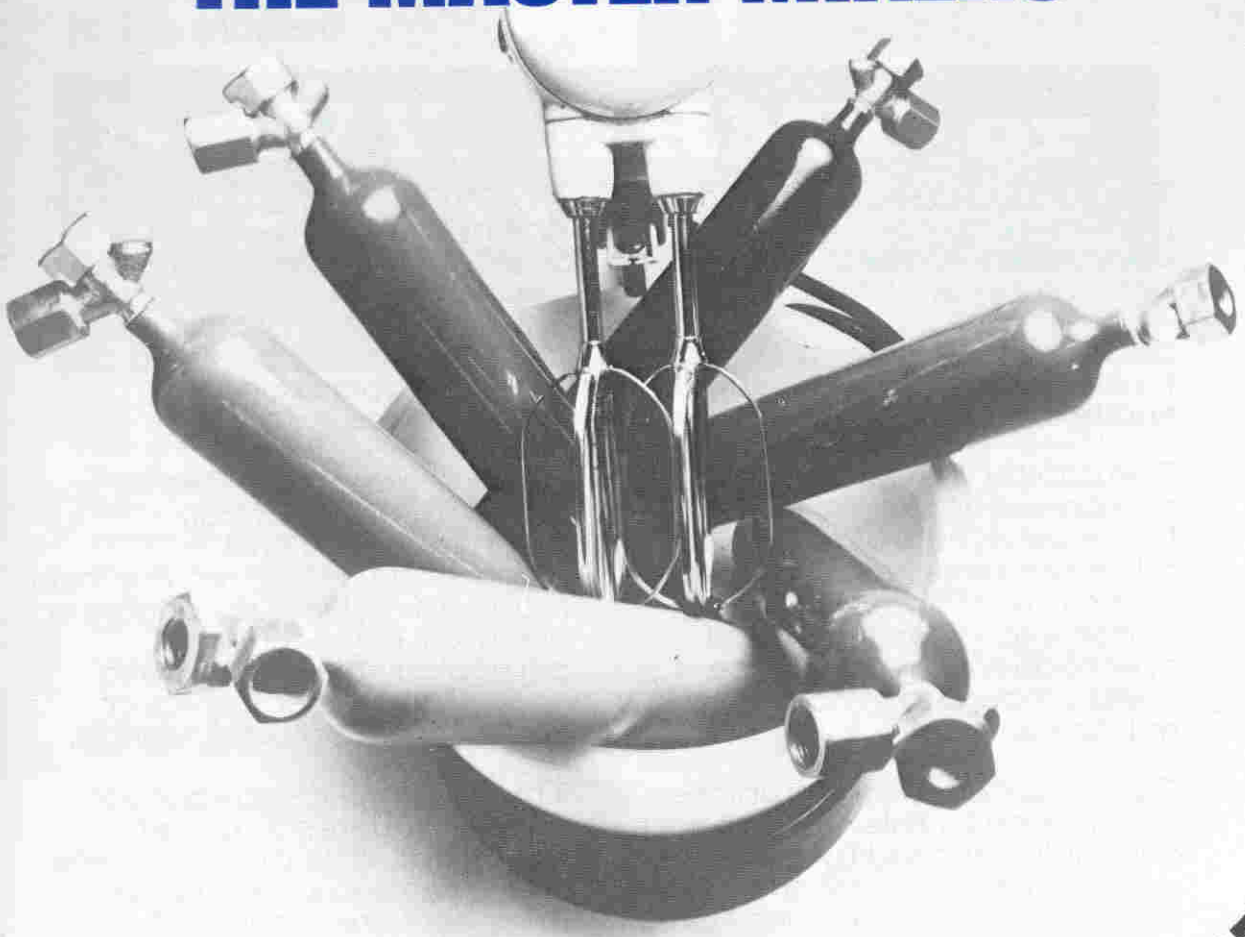

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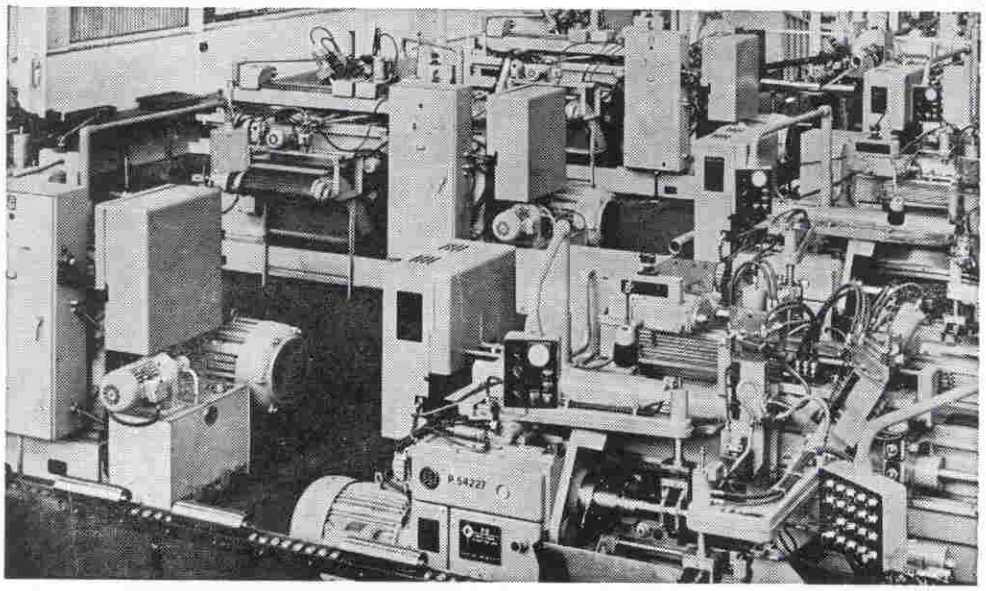

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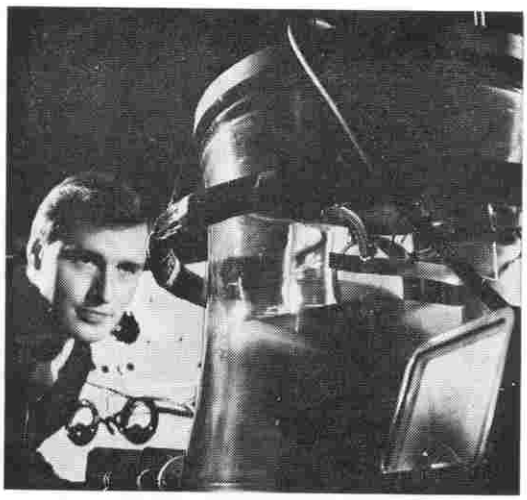

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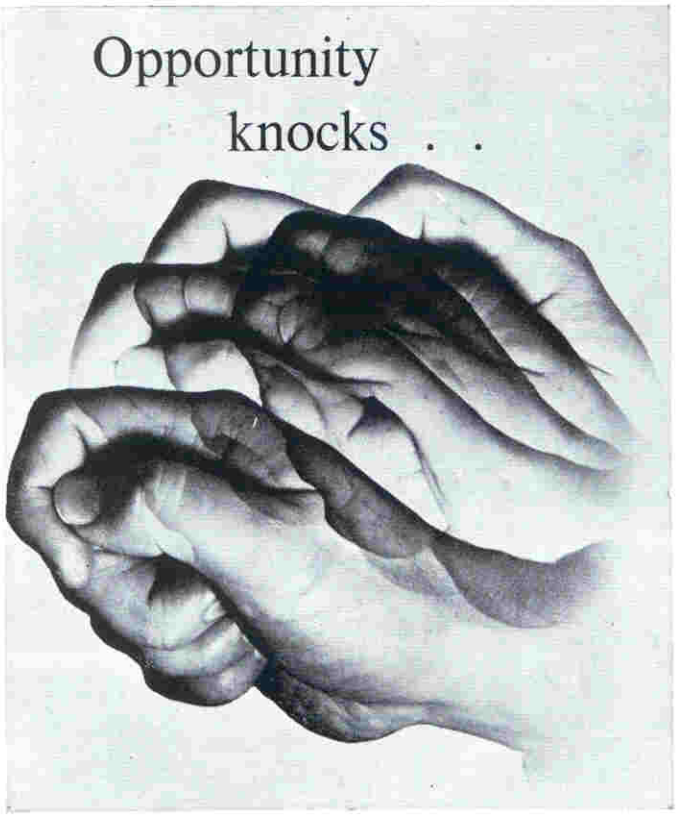

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Hysteresis

The official publication of the
Adelaide University Engineering Society

CONTENTS

We thank "The Association of Professional Engineers, Australia" and the "Cement and Concrete Association of Australia" for granting permission to reprint certain articles from their organisation's journals.
Our thanks to Maxine for typing the manuscripts.

Editorial

S. Mark Gilbert
Andrew F. Close

Last year a survey was conducted by the Psychology Department of this University. It was hoped that it would reveal a correlation between the course a student takes at University and the way in which he thinks. By this is meant, are they **divergent** or **convergent** thinkers. A typical question would be to ask what some ordinary object, say a paper clip, could be used for. The divergent thinker supplies a large number of uses, many of which are unusual and highly impractical, but all logically possible. These answers range from "holding sheets of paper together" to "nose-picks for wombats". The convergent thinker would, however, suggest only a short list of answers which all had a sound, practical base.
When analysed, this survey revealed a general correlation of Science-Engineering students with convergent thinking, and Arts students with divergent thinking. Now, it would be foolish to then conclude that convergence of thought is something which is acquired while under the influence of the Engineering Faculty, but rather something which is acquired as one's mind and character develop, and is subject to further reinforcement when in the Faculty.
Why then should convergent thinkers choose to study Science or Engineering. The answer, as I see it, is reasonably obvious and is inherent in the meaning of convergence. If a convergent thinker is asked a question which requires a list of uses to which a good intellect can be applied, he would give a short list of answers, all of which would probably include the notion of realising the full potential of this mind and to induce it to produce with maximum efficiency. From this follows the necessity of a University degree in a technical discipline where one can produce tangible results. Hence, a convergent thinker would choose to study Science or Engineering when given the opportunity, rather than Arts.
So far, I have placed no relative values on either of the two ways of thinking. To do this one must form an idea of how concepts which diverge from the given set of circumstances, fit into the social system. In many ways, the convergent thinker is the more useful, and safer, unit in a system based on maximum efficiency, production and order.
In a very extreme case of convergence of thought, the subject would consider the existing universe of conditions as being true at all times. This evokes Orwellian concepts of "Newspeak" where people are told one day that X has been at war with Y for ever, and then the next day they are told the reverse case has always existed. It's as simple as reprogramming a computer. The average case of convergence would be able to introduce new concepts of change which were derived from within, rather than without, the existing system; and hence are really an imitation or a permutation of some already existing concept.

Some very competent social theorists have emphasised this idea of transcending from the existing universe of facts in order to initiate social change which will right existing wrongs. Herbert Marcuse believes that society has become dominated by the very forces which it once controlled. These forces are, very generally, the economic forces which are a result of technological advancement. Marcuse says that all of society has become an active affirmation of this system and the system has become self-sustaining. The members of society live in a false but happy consciousness which, although it seems perfectly logical, is strengthening an evil system and speeding it towards inevitable climatic destruction.
Marcuse suggests that the only way that we can break this journey of destiny, is to transcend from the system — to refuse to accept the given facts and values and to look for new ones.
These thoughts are ones which should be considered seriously by us all, as potential Engineers. Engineers are the executive of the system. It is the technologists who have created many of the problems of our society. It now remains for us to solve them. This may involve a rethinking of one's values. Means must be evaluated in conjunction with ends, and at all costs, the quality of human life must be our prime consideration.

Education, Change & the Built Environment

Harry Parsons

> "The successive eons of the past are the historical graveyards of biological and cultural species that turned out to be incapable of coping with the catastrophes that confronted them. World order is not inevitable. It is only necessary." (1)

The quotation points to the requirement, for survival, of a species being able to adapt to change, and suggests the scale of the adaptation now required: towards a world order which is absolutely vital, but not inevitable. We shall survive on the basis of the integrity, quantity, and quality of the available environmental education. Within these terms education should be defined as the organized development of the potential inherent in the natural abilities of everyone, irrespective of age or academic performance to date. The immediate area of urgent challenge is to overcome the narrow traditions of examination performance (where curriculum failures, syllabus discrepancies, and teaching problems may conspire against many talents); and to recognize that, for many important human tasks, an environmental sympathy is the prerequisite to understanding and not an awkward disbenefit. The environment is the result of the aggregate of the external and internal stimuli to which individuals and groups in any one region are actually or potentially responsive. These complicated issues are made increasingly difficult to solve through the naive expectation of the potential of narrow proposals. This happened recently in urban planning, and the end results were described with brutal dismay in "Exploding Metropolis":

> "Once upon a time," says a close student of New York's slums, "we thought that if we could only get our problem families out of those dreadful slums, then Papa would stop taking dope, Mama would stop chasing around, and Junior would stop carrying a knife. Well, we've got them in a nice new apartment with modern kitchen, and a recreation center. And they're the same bunch of bastards they always were!"(2)

It appears likely that no problem will test the character of society, and none will provide so fierce a test for our education, as change, and especially the increasing rapidity of the rate of change. In his recent paper on "'Controlling our changing environment: the feedback between population density and environment", Professor Andrewartha used a chart of the "doubling time" of human populations.(3) Dealing with the years required to double the human population, he showed that the first major doubling, to about 1,000,000,000 simultaneously alive, took 1500 years;
the second doubling took 200 years; the third 80;
the fourth doubling from 1930 to 1975 — 45 years;
and the next doubling (two persons at the end of the period for every one at the start) will take about one generation. In our terms it means that we must double all our present schools, roads, universities, water supplies, houses, and so on, merely to maintain present standards over the next three decades. These increases illustrate the speed and intensity of future change; it will remain the one inexorable constant in our lives and work.
In this world of polluted air, water, soil, and food any change would be a blessing; but in the poverty stricken areas of the world these discomforts will be reinforced by the urban explosions of our time:

> "For poverty and frustration concentrated in the urban setting have a potential for generating social unrest, political instability, and threats to world peace of a much greater magnitude than poverty and frustration dispersed widely over the countryside."(4)

The first requirement for education, related to these problems of world, regional, and urban deprivation and pollution, is to create the groundwork for the understanding that they are not the results of too much technology. They are created and maintained by too little morality and reinforced by general irresponsibility.
The new technologies, which are inspired by materialistic profit, ingenuity and the moral determination to remove material want from the world, also add to the problems of change. When most repetitive material work can be performed cheaply and reliably by sensitive, self guiding machines, what form then should education take?
The effects of present change, caused by television, automobiles, increasing affluence, and leisure, already provide the impetus for change in the definition of education, at least for those who would remain interested in the applied values of the field.
It will not be enough for the educators alone to understand these changes, or the necessary responses for survival. They must encourage this understanding in others in new ways of joint searching, between teachers and students as colleagues, for the means of co-ordination, communication and accommodation between abilities and interests.
The traditional goals of simple productivity and narrow profit are incompatible with contemporary experience and responsibility. They can no longer satisfy the growing audience for quality, selectivity, and sensitivity in the performance standards of the built environment. A law of minimum responsibility is necessary in the appreciation of new works, to include the assessment of the unpleasant by-products of otherwise successful projects, such as:

a) the high rise office tower covering all of its small site, with a limited surrounding footway and zero parking, which adds the misery of discomfort and gross congestion to its users and neighbours;
b) the structural corporate symbol, clothed in glossy tiles which create a glare against anyone within reflective distance, and internally cooled with air conditioning at the expense of hot exhaust blasts to the surrounding areas and people;
c) the "beautified" expressway, which lifts the motorist easily to view the remains of the hillside from which

its community cleaving structure was gouged;
d) the redevelopment "complex" which clearly demonstrates within its own narrow confines that landscape, civic design, architecture, building, decoration, engineering, management, and the public interest are separate, unco-ordinated, and uncommunicative entities.

The long the arduous tasks of urban and rural rehabilitation will require new organizations and methods for joint investigation and mutual demonstration. These prerequisites to effective action must surmount the old barriers between the disciplines, trades, professions, businesses and industries, which have reinforced a functional myopia in environmental issues. The search for private and personal quality goals, away from a greedy quantity-ridden world of our own making, will no doubt continue to hide these problems by the exercising of our traditional ideas:

a) the escape of mobility to locations which are far from the madding crowd, or at least as far as the Jones' new exurban development;
b) the political escape from environmental issues found in the concentration on old shibboleth (although we are possibly seeing here a new search for contemporary significance on both sides of the political fence);
c) the personal escape to culture, drugs, good works and sport, plus or minus interpersonal relationships, to enjoy the means of leisure as the ends of temporary forgetfulness; and
d) the reservoirs of apathy, maintained against almost any crisis or sense, which must be broached with new forms of integrity in communications, and the study of the environmental consumer as a participant in the means to survival: "Ordering people to adopt a new custom may focus them on resisting the command, rather than on the advantages of the required change."(5)

All who make a living in the arts and sciences of land and buildings must complement their personal interests by the clear acceptance of their community of responsibilities. These insist on the establishment and maintenance of consumer oriented quality controls for the built environment. Professionals especially must continually reach out, beyond personal and corporate satisfaction, to the acceptance of mature idealism and technical integrity as the requirements of participation in this major area of human concern. The proposals must be related to the theories of organization and control: that a system of requisite variety is necessary to control a system of given variety; and that the aggregate of responses to the environmental issues of our times must be at least sufficient to match the scale, intensity and complexity of these problems; and include the establishment of:

a) institutes of urban and regional studies, to provide the locus for research, extension, experiment and demonstration into the real problems and potential of the built environment;
b) permanent commissions of all our common interests in the environment, to work for the integrated education of professional, industrial, and lay students, of any age and capacity, across the spectrum of primary, secondary and tertiary schools and institutions;
c) greatly increased student support and research funds, so that as many people as possible may be educated in environmental arts, sciences and technologies, and that their teachers may also be able to contribute new areas of knowledge and skill; and
d) environmental clinics, where any person whose peaceful enjoyment of land and buildings is threatened may go for advice and support against any agency or organization.

The barriers to the acceptance of these proposals will as usual be found in the old alliances between the artificial boundaries between sectors of the environment; the fear of ordinary people as decision participants; and the habits of secrecy which are endemic to certain levels of the public or private bureaucratic mind. These traditional fixations must be surmounted, for the problems of survival in this century are closely tied into the environment and: "For the first time since the beginnings of human society the history of mankind has converged into a single story."(6) The quantity of survival will depend largely on the environmental professions' deliberate assumption of responsibility for the product. The possible alternative is to turn to the genetic "engineers", to see if they can produce a breed of men for an intolerably polluted world: homo plastiwrapped. The quality of our survival will depend on developing new sensitivities for the environmental consumers and clients. When facing a similar complexity of considerations Robert Weaver wrote: "We must avoid doctrinaire approaches. There are no simple answers. Indeed, there are few single answers or pat solutions which will be effective."(7) There are, however, some principles which appear worthy of consideration in any search for education for the changing environment:

a) education is vital to the process of survival, on a joint basis as quantity as well as for the notions of the quality of the survival. As such education might be considered as that which is necessarily to be made available to any individual in our society, irrespective of any prequalification other than interest (intrinsic or aroused);
b) education means progression to the full capacity of the system and individuals in it, and thus all the participants are colleagues. The institutes of the environmental professions should become educational consultants, generally to be related vertically in terms of subject matter and horizontallyy in terms of experience and communications across

the system. As consultants they should encourage the concept of permanent enquiry as a structured, continuing process, both professional and user oriented. Their main purpose would be generally to encourage the consideration of educational policy, strategy, tactics, and the feedback between means and ends, with as broad a participating public as the imagination can inspire;

c) in planning the environmental education of tomorrow there must be sympathy and understanding for the failures of knowledge, but as little room as we can spare for failures of courage. Within these notions no person may be considered ready to leave secondary school without being exposed to, if not necessarily in complete understanding or comprehension of, the arts and sciences of the built environment. Here we must join in conservation and preservation if only to recognize how far we are away from the old notions derived from our folk heritage;

d) the goal for education is the integrity of man, and the standard of all performance is the reinforcement of the significance of those who participate as human beings in search (directly or indirectly, freely or with modest persuasion) of the understanding of the changing environment. The task of finding new values, to replace the old tyrannies of ignorance and greed will, moreover, depend heavily on inserting environmental education into the desirable areas of leisure satisfactions.

"The task of human self-preservation has now become a problem whose dimensions are are large as humanity itself. One of history's clearest lessons is that problems cannot be solved on a scale smaller than that on which they arise."(8)

Harry Parsons
Adelaide, September, 1970

(1) (6), (8) *HARVEY WHEELER "Democracy in a Revolutionary Era" Center for the Study of Democratic Institutions — Occasional Paper Vol. III, No. 3 April 1970, p.11, 10, 11.*
(2) *THE EDITORS OF FORTUNE "The Exploding Metropolis" Doubleday Anchor Books A 146 New York, 1957-8, p.106.*
(3) *PROFESSOR H. G. ANDREW-ARTHA "Controlling our changing environment: the feedback between population density and environment" to the Royal Institute of Public Administration (South Australia) Biennial Conference Adelaide — 1970 August.*
(4) *PHILIP M. HAUSER "Population, Poverty and World Politics" University of Illinois Bulletin Vol. 62 No. 97 June 1965, p.13.*
(5) *EDWARD H. SPICER (Ed) "Human Problems in Technological Change" John Wiley and Sons, New York 1965. p.292.*
(7) *ROBERT C. WEAVER "Dilemmas of Urban America" Harvard University (The Godkin Lectures 1966) Press, Cambridge, 1965. p.116.*

The Dean's Page

1970 and the Seventies

G. Sved

It must be a brave man who dares to forecast what is going to happen in the next ten years. Try to shake off the dust from the ten year old newspapers and technical journals and read what they prophesied for the Sixties. You will find that many of the developments that were "just around the corner" — like the gas turbine driven motorcars — are essentially still just around the corner, while others — like the NSU-Wankel engine and the nano-second working of some computers — have definitely come around the corner.

We may wonder what would have our colleagues of just twenty years ago said to the person who asked for several mega-dollars for a computer, to be used by scientists, engineers, medicos, students of politics, the Academic Registrar and the Bursar, to mention a few customers only.

Difficult as it is to foresee the future, we must plan several years ahead. The Australian Universities Commission, the body that provides a large portion of the money required for running the Universities, works in three year long cycles, called trienniums or triennia. 1970 is the first year of the present triennium; yet submissions for the years 1973-75 have to be completed before this issue of Hysteresis reaches its readers. We have to be brave enough to forecast our requirements five years ahead.

The "quota" of new admissions to the engineering courses is set at 180 per annum and we intend to keep this number for the next five years; as far as we can tell now, our own school will not grow much beyond this number. A steady annual intake of 180 freshers means that the Faculty needs additional space, equipment and additional staff. While we can see clearly where and how we are going to obtain the space we require, we have to await future decisions before we are certain that our equipment and staff keep up with the growing demand.

The Faculty expects to gain about 25,000 sq. ft. of area in the not too distant future. First of all, we are going to take over the area at present occupied by the Faculty of Architecture on the western end of the second floor of the Main Engineering Building. Second, the Computing Centre and the Computing Science Department will move into the new Library complex and we are going to inherit their area in the annexe. Last, but not least, the Mechanical Enginering Building is to grow another storey, providing us with approximately one-third of our new area.

Planning is now proceeding to allocate these new areas. We hope to provide "permanent homes," proper work and study areas, for all third year students in the Faculty, similar to those already enjoyed (?) by our final year students. Although we cannot reserve separate personal desks for our first and second year students, we intend to provide at least facilities for storing drawing boards and other equipment. We are also hopeful that we will gradually modernise the furniture and other equipment in our existing drawing offices and lecture rooms, to bring them at least into line with the best in other Faculties and in other Australian Universities.

I have so far spoken about the "input"; a few words about the "output."

We hope that with an intake of 180 freshers per annum we are going to graduate at least 120 to 140 young engineers annually. We have made enquiries, trying to gauge the demand for graduates in public service and in private employment; estimates showed that local demand in the foreseeable future will exceed supply in nearly all branches of engineering. We trust you will select your first employer with the same care and consideration that he uses in selecting you, making just as certain that the experience that you get in your employment is helpful for your professional career as your employer ensures that the education you received at the Univeristy is satisfactory for his purposes. And, as every private in Napoleon's army carried a field-marshal's baton in his haversack, so every one of you has hidden in the case of his slide rule the key to the executive lavatory (a symbol which some of you may remember from an old film) or the key to the executive bar (a symbol which you might have seen mentioned in some recent advertisements). However, when you get that key, do keep in mind two points

(i) the code of ethics of the Institution of Engineers, Australia, telling you that the first duty of an engineer is to the community;

(ii) all the glorious ideals for which you, the youth of today, are fighting and for which we, the unreliable generation, were fighting yesterday.

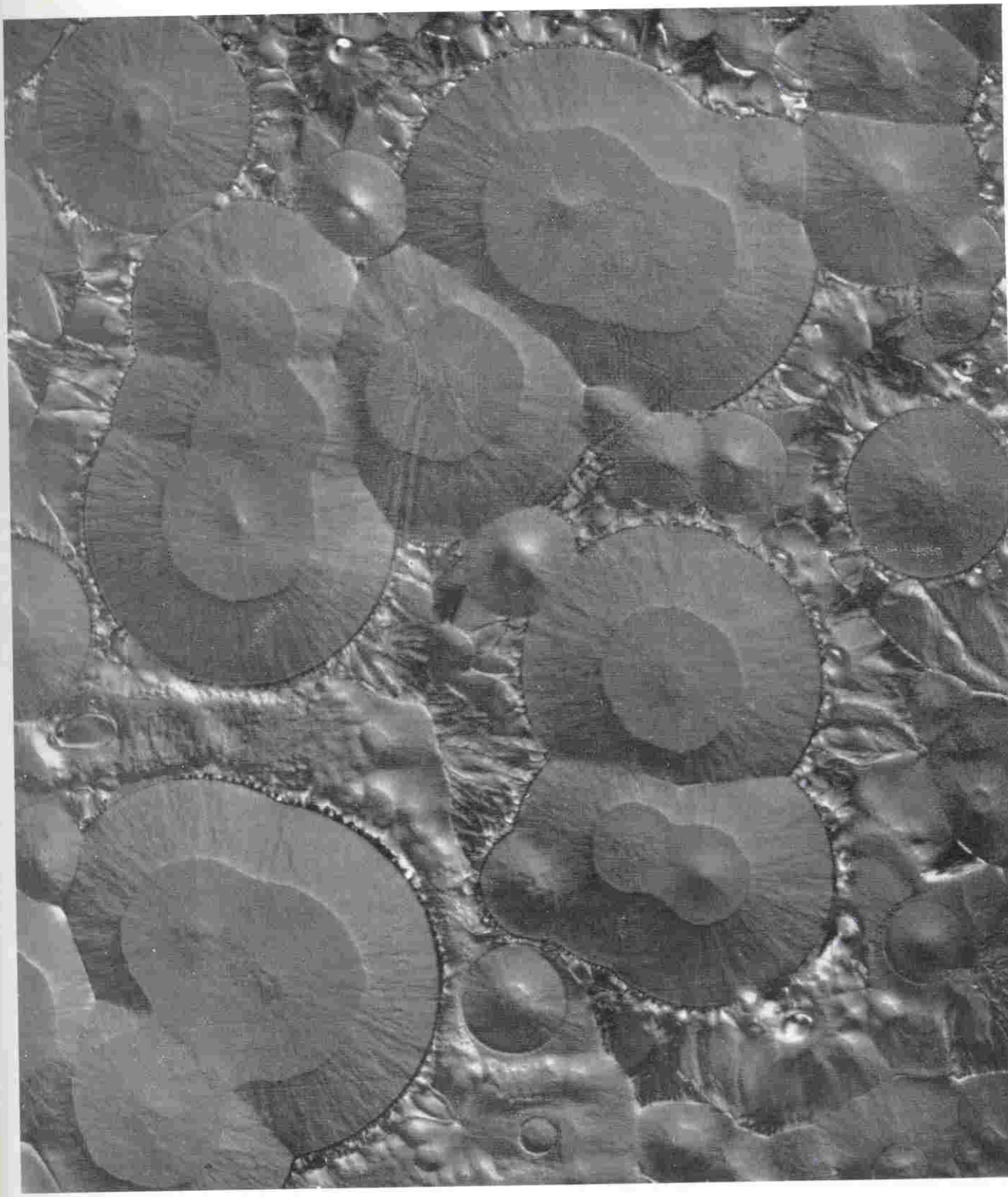
Department of Chemical Engineering

Head of Department and
Professor of Chemical Engineering: Professor R. W. F. Tait
Professor of Materials Science: Professor D. R. Miller

During the 1970 session, we were unfortunate to lose one staff member (Dr. M. J. Storey) to B.H.P. Further, we are unable to fill the other vacancy on our staff until early in 1971. Despite these difficulties, steady progress was made on all fronts during the year.
Our first "convert" from Chemistry (Eric Lindner) played a prominent part in the activities of the Final Year class, as did our second (John Keily) in Third Year.
On the social side, the year was marked by the staff winning the staff-student cricket shield for the first time since its inception and by a successful graduates and staff v. undergraduates Bridge evening.
On the more serious side, recognition of the importance of an understanding of the properties of materials to Engineers, particularly Chemical Engineers, has led to the introduction of a Final Year option in Materials Engineering. It is hoped that eventually this will blossom into a full four-year course in Materials Engineering.
Although progress on research topics has been slow, largely due to the causes enumerated above, the enthusiasm of staff members has kept things moving and Professor Miller has been able to attract promising research students from Physics and Applied Science.
During August, many distinguished overseas Chemical Engineers visited us on their way to the "Chemeca" conference in Melbourne and Sydney. Four members of the staff were able to attend the conference at which papers on their research interests were presented by Dr. Smith and Mr. Jeffreson.
Research on the dynamic thermal response of packed beds is nearing completion and as previously indicated has led to useful methods for predicting break-through curves. A sensitive hygrometer has been placed on order and as soon as it is received the studies will be extended to mass transfer problems such as are found in the drying of solids, adsorption of vapours, and purification of solids by sublimation.
Mixing phenomena, particularly with reference to the effect of instantaneous perfect mixing on control systems, has been investigated by honours students and by one staff member over the past two years. An extension of research to jet mixing was the subject of a paper at the recent "Chemeca" conference. With further refinement of photographic techniques, significant additions to our knowledge of control involving the use of additives are anticipated.
A problem which has always been of interest to Chemical Engineers is the movement of solids in fluids under the influence of a gravitational or centrifugal field.
A thorough understanding of this problem is essential in such widely different fields as the emission of smoke and fly ash from boiler house chimneys and the beneficiation of mineral ores by differential settling.
To this stage, an extensive study of sedimentation using particles of different sizes and of varying densities has been carried out.
One of the major difficulties in such work in the past has been the time consuming nature of the calculations involved, requiring as they do an estimating of the motion of a particle in the field of influence of several other particles, each of which is in turn affected by yet more particles, and possibly also by the walls of the container. Although electronic computers remove much of the labour from such calculations, they are nonetheless still expensive to carry out. Sensitive experimental techniques based on the use of radioactive tagged particles have been developed. Other aspects of the Department's work in two-phase phenomena are temporarily in abeyance due to shortages of staff and research students.
For the past three years, staff members in co-operation with Mr. R. J. Kelly of the S.A.I.T. have been studying the design and operation of a summer vacation practice school with the co-operation of P.R.A. at Port Stanvac. Many of the problems commonly associated with such schools have been successfully overcome, to the benefit of all concerned, not least of all P.R.A. who, possibly because of these schools, have been able to attract a high proportion of our graduates to their staff.
In Materials Science, two main areas are being studied, namely the properties of zirconium and its alloys and the brittle fracture of polymeric materials.
Zirconium and zirconium alloys are useful as canning materials in power generating nuclear reactors. However, the mechanical properties of such materials are drastically altered by the presence of minute amounts of absorbed oxygen. The movement of oxygen atoms has been followed using an ingenious form of torsion pendulum which measures the damping capacity of oxygen-doped zirconium alloys at various temperatures and frequencies. Under the action of oscillating stresses, the oxygen atoms migrate in resonance, thereby absorbing energy which in turn results in small losses in amplitude of the pendulum.
Within a reactor, the canning material is subjected to considerable thermal cycling causing large alternating stresses. It is necessary to know the strain behaviour of the canning material when subjected to cycling stresses just below the yield point. Using experience gained from the above-mentioned torsion pendulum, one of high amplitude is now under construction to enable the strain behaviour of zirconium materials to be studied in depth.
An important factor determining the behaviour of zirconium under stress is the movement of dislocations. More experimental information is needed before a proper understanding of the dislocation dynamics and interaction will be possible. To this end, zirconium strip specimens have been deformed in the temperature range 20-600°C. and then thinned by electropolishing to the point where they become partially transparent in the electron microscope. This work has been particularly fruitful in revealing the arrays of dislocations and has led to a much better understanding of the crystallography of a hexagonal metal such as zirconium. The dynamics

of dislocation movement has also been much clarified. Closely related to the above problem is the need to understand the factors which control the large fluctuations in creep behaviour at temperatures near the operating limit of 300°C.
A very hard tensile testing machine is being constructed to examine very accurately the occurrence of the yield point and the ageing behaviour of zirconium and its alloys.
Despite the tremendous growth in the use of plastics in industry the practising engineer is still hesitant in using a plastic in a load-bearing application. This hesitancy usually stems not from a lack of creep data but from a lack of faith in knowing whether the plastic will or will not suffer an unexpected brittle fracture. It is basically this problem which is being investigated in the polymer group in this department. The deformation of polymers subjected to different strain rates and temperatures is being investigated by a number of interesting techniques (polarized light, electron microscopy or replicas) and the preliminary observations of micro-crack and micro-neck formation suggest the interesting conclusion that all plastics undergo very similar molecular rearrangements prior to failure.

SURFACE TOPOLOGY OF POLYPROPYLENE
The surface of the polypropylene film was vacuum-coated with a thin layer of aluminium and photographed in incident light with an optical microscope using the technique of Nomarskii interference to provide the contrast and the appearance of depth.
(Magnification 2000X).



Department of Electrical Engineering

Professor J. L. Woodward (Head of Department)

Taking Stock

With the first year of the current triennium (1970-72) almost gone, and the pattern set till the end of 1972, this is a good time to take stock.

Wtih the first year student intake to Enginering stabilised at 180 beyond 1972 we have entered an era of stable undergraduate numbers, with 40-50 students in the final year of our course, and corresponding class-sizes in the earlier years. We know what these numbers mean in practice, this being our second year with a final year class of about 40 students. The academic staff have been increased by one to a total of ten, but the current financial stringency renders unlikely any further expansion in numbers before 1973. We look forward to a modest but very important increase in our accommodation in 1972. Unfortunately finance to equip this additional space is not guaranteed.

The important tasks ahead of us are to improve the content and relevance of our undergraduate courses, and to review our methods of teaching and assessment within the clear constraints of student numbers, teaching manpower, space, and equipment; to develop and expand our research activity while maintaining a proper balance between research and teaching commitments; and to work with industry and the engineering profession.

Teaching

The work of the final year has been reorganised on an experimental basis during 1970. Wherever possible course-work has been sub-divided into units, taught over one or two terms, and the final November examinations replaced by terminal examinations at the end of each term. In itself this is not a terribly revolutionary change, but it is hoped that less formality and a more flexible form of assessment will result.

Staff are currently engaged on a reassessment of the objectives of practical work in the laboratory. There is strong support for the introduction of a form of project activity at third-year level, the major obstacle being lack of space and finance for intermediate-level laboratory facilities.

The increasing importance of digital techniques and microelectronics to most electrical engineers has made its impact on our syllabus. For example courses on "Design for Integrated Circuits" and "Digital Filters" are now offered in the final year.

The need to stimulate in our students an awareness of the human, sociological, and economic problems facing the graduate engineer has not been overlooked however. An innovation in 1970 is a series of lectures extending over the whole year, while students are addressed by leading engineers, administrators, and others on the problems of management and administration over a very broad spectrum.

Academic Staff

We were sorry to lose Mr. B. H. Smith at the end of first term, upon his departing to take up the post as the foundation Professor of Electrical Engineering at Wollongong University College. His interests in electrical power and machines are ideally suited to the heavy industrial environment of Wollongong, and it is encouraging to see yet another Chair occupied by a graduate of this Department.

Dr. Michael J. Gibbard has since joined us to replace Mr. Smith. Dr. Gibbard is a South African and took his first degree in Johannesburg. He subsequently worked for some time with A.E.I. in England, before joining the Snowy Mountains Authority. Several years were spent in planning and design work with Snowy, before he was awarded a Commonwealth Overseas Postgraduate Scholarship, which enabled him to complete a Ph.D. degree at Queens University, Ontario, Canada. Before taking up his present post he worked for 18 months on operations research with I.C.I. in Australia. He has special interests in the fields of control and the dynamic behaviour of Power Systems.

Mr. C. J. Kikkert was recently appointed as a Temporary-Lecturer. A first-class honours graduate of this Department, he has been a full-time research student for the past two years working on the application of digital techniques to delta-modulation systems.

Dr. B. R. Davis is on study leave during 1970, working with the Electronic Systems Research division of Bell Telephone Laboratories, New Jersey. The work he is doing there on the development of new forms of mobile radio communication system closely parallels his recent doctoral research.

Among visitors to the Department during the year have been Professor Gordon S. Kino, Stanford University, and Professor S. Venkateswaran, Indian Institute of Technology, Kanpur. Professor Kino came for discussions on transferred electron device and surface acoustic wave research, while Professor Venkateswaran's interests were principally in the area of active and passive network synthesis.

Honours and Awards

Neil Bryans graduated with first-class honours in 1969 and has since been employed by W.R.E. A paper based on his honours project report was entered in the Institute of Electrical and Electronics Engineers Student Papers competition for 1969-70 and won first prize for Region 10, which includes India, Japan and S.E. Asia. In addition to a $100 prize, Neil won a free trip to New York to attend the I.E.E.E. Annual Convention.

Vic Sobolewski, nearing the end of his Ph.D. candidature, recently published a major paper on the measurement of distortion in graphic display systems in the Proceedings of the I.E.E.E. Recognition of the value of his work was immediate, and resulted in an invitation to join an expert panel on graphic display systems at the I.E.E.E. Convention in New York.

An invited paper by Dr. D. W. Griffin won the "Best Foreign Paper" award at the International

Convention of the I.E.E.E. Group on Electromagnetic Compatibility, at Anaheim, California, in July.

Research

Possibly the most satisfactory single aspect of the Department's research activity during the year has been the consolidation and expansion of the work in the Materials area. "Clean room" facilities have been established and equipment developed for laying down thin films by photolithographic techniques. Surface acoustic wave studies are well advanced and have already resulted in a considerable volume of published work. Existing A.R.G.C. and P.M.G. support has been renewed and supplemented by a grant from the Radio Research Board. Work on the application of transferred electron devices has got away to a good start with A.R.G.C. and Radio Research Board support, and the loan of research equipment worth $20,000 from American sources.

The new NOVA computer system is really proving its worth, and directly serves the research requirements of a group including 5 postgraduate students and 2 staff members.

Our industrial work has involved intense patent activity in the fields of antennas and surface acoustic wave applications, consulting work on design of digital filters and special-purpose digital systems, and co-operation with Electricity Trust engineers in the instrumentation of generating plant for research purposes.

Research Students and Projects

Aerials and Propagation

M. L. Lees: "Atmospheric Refraction Phenomena at Microwave Frequencies." (Ph.D.)

T. V. Nguyen: "Endfire Slot Aerial with Reflector." (Ph.D.)

Communications

A. Bolton: "Application of Electronics to Sound Synthesis." (Masc.)

G. Haack: "Active Network Synthesis." (Ph.D.)

T. S. Khoo: "System Characteristics Determination with Pseudo-Random Signals." (M.E.)

M. N. Neelakantan: "Network Synthesis from Specifications in the Time Domain." (Ph.D.)

D. P. Patterson: "Optimal Digital Data Transmission." (Ph.D.)

Materials

A. S. Burgess: "Information Storage Using Electroacoustic Devices." (Ph.D.)

A. R. Downing: "Studies of arrays of Micro-wave Transferred electron devices." (Ph.D.)

N. C. V. Charyulu: "Studies of Magnetic Ordering in Antiferromagnetic Resonance." (Ph.D.)

P. V. H. Sabine: "Studies of Surface Acoustic Waves." (Ph.D.)

Digital Electronics and Control

J. P. Bartlett: "Digital Control Studies." (Ph.D.)

W. Ford: "Pattern Recognition." (M.E.)

G. Jenkins: "Auomatic Character Recognition." (M.E.)

R. Olesnicky: "Computer-assisted Design of P.C. Layouts." (M.E.)

P. Polson: "Implications of Adaptive Control in Brain Mechanisms." (Ph.D.)

A. Y. C. Quan: "Identification of a Multivariable System." (M.E.)

V. C. Sobelewski: "Computer-aided Circuit Design." (Ph.D.)

Machines

A. H. Baghurst: "Characteristics and Design of Doubly-wound Induction Motors." (M.E.)

Endfire Slot Aerial with Reflector

As building complexes increase around airports and as airports get more and more congested with aircraft waiting to take off, aircraft navigational systems which have been designed without due consideration to the problem of stray reflection become of very little use and thus safe landing of an aircraft under adverse conditions can no longer be achieved.

A new aircraft navigational system using a long slot aerial has been investigated both theoretically and experimentally.

Apart from its simplicity which will make the construction very easy, the slot can be tailor-made in such a way that most of the signal coming out of it is focussed into a strong narrow beam in a forward direction with very little signal spreading to the sides. Ground reflection also plays a very important part in this system. The horizontally polarised signal coming out of the slot after reflection from the ground adds favourably to the main beam. The vertically polarised signal (less dominant) which spills over to the sides after reflection cancels with the direct signal at the sides. When combining the two effects the shape of the slot and the ground reflection, the results obtained so far are most encouraging. A good narrow beam with very little signal spreading out to the sides is achieved at an angle of elevation as low as 2½% (side signal level is as low as 25dB down, or more).

The above properties together with low silhouette are the main attractive features of this system as an aircraft navigational system.

Other use of this long slot aerial system is in broadcasting, where ground reflection presents some problem.

T. V. Nguyen.

"Identification of a Multi-Variable System."

Evaluation of the characteristics of a system is often encountered in engineering. This may help further improvements to the system. The goal of the identification problem is to find a mathematical model which behaves as closely as possible to the physical system as far as inputs and outputs are concerned.

Previous methods of identification involved "off-line" testing. These methods, of course, suffer from the inherent disadvantage of having to stop the operation of the process under test. Hence, these methods are not

particularly suited for industrial processes (e.g. a chemical plant or an electrical power station). The on-line method of system identification involves the use of a special class of signals known as pseudo-random binary sequences (p.r.b.s.). These are superimposed on the normal inputs of the system under test. By suitable cross-correlation between the output response and the p.r.b.s., the impulse responses are found. This problem has been investigated on an EEAI 580 analogue computer. The results obtained have been very encouraging. Through the use of a digital computer programme written in FORTRAN, the mathematical model (or black-box representation) of any linear, continuous and time invariant system can be identified.

Alex Y. C. Quan

"Computer-aided Circuit Design"

Computer-Graphics is one or more of the following:

— accepting
— processing
— outputting

of data by a computer in graphical form.

Man-Computer Graphics is Computer Graphics with the intervention and interaction between man and computer during one or all of the above stages.

A typical example may be the solution of the response of a circuit. The designer has "drawn" the circuit on a graphic display such as a large CRT with a "light pen." When some arbitrary driving waveform is drawn in, and the circuit node at which the response is required is nominated, applications programs solve the response and show it graphically on the display.

Widespread implementation of Man-Computer Graphics has been hampered by high cost of hardware.

In addition to a computer, and applications programs, the following are required:

a) a graphics display, commonly a large CRT
b) a user graphics input device
c) a large store containing the graphics data for display purposes
d) graphics generating devices such as alphanumeric and vector generators.

A system has been proposed and is being built which achieves requirements a)-c) simultaneously. It consists of a large CRT being imaged on a TV camera, the output of which is fed back into the CRT. Under certain conditions of light intensity (from the CRT) and geometrical linearity of CRT and TV camera, a display will be self-maintaining via the dynamic optical and electronic loop. This satisfies requirement c). Through an optical beam-splitter (a semi-silvered mirror) the CRT can be observed by the user, satisfying requirement a). With a beam adder (again a semi-silvered mirror) a narrow high intensity light-beam projecting "pen", tracing out any freehand graphics on the observed CRT display, is projected onto the TV camera image area and inserted into the display-storage loop. This satisfies requirement b).

The electrical link between camera and CRT can be entered into or excited from to provide graphics data processing by the computer when required. Commercial TV-monitor displays (high-grade TV receivers) and TV camera are used, satisfying the requirements of economics.

V. C. Sobelewski

Recent Research Publications

GRIFFIN, D. W.: "Interference aspects of transferred electron device (TED) operation involving harmonic tuning", Proceedings, IEEE International Symposium on Electromagnetic Compatibility, July 14-16, 1970, Anaheim, California, U.S.A.

GRIFFIN, D. W.: "Transferred electron device equivalent circuit determination", Proceedings International Conference on Microelectronics, Circuits and System Theory, Aug. 18-21, 1970, Sydney, Aust.

KIKKERT, C. J.: "Digital Techniques in Delta Modulation", Proceedings IEE Data Transmission Conference, Brisbane, 3-5 June, 1970.

PUCKNELL, D. A.: "Interface conversions and function generation using digitally controlled voltage sources", Proceedings of the Institution of Electrical Engineers, London, Vol. 117, No. 5, May 1970, pp. 912-916.

SABINE, P. V. H.: "Rayleigh-wave Propagation on a Periodically Roughened Surface", Electronic Letters, Vol 6, No. 6, March 1970, pp. 149-151.

SABINE, H., & COLE, P. H.: "Surface Acoustic Waves in Communications Engineering", Ultrasonics (In press).

SOBOLEWSKI, V. C.: "Using Moire patterns to determine the distortion of graphic displays and graphic input devices", Proc. IEEE, Vol. 58, No. 4, April 1970, pp. 567-583.

SOBOLEWSKI, V. C.: "Computer driven display distortion — causes, measurement and remedies", Proc. Computer Communication and Display Conference, Sydney, 29th June-2nd July, 1970.

SOBOLEWSKI, V. C.: "Wide range linear low voltage rail voltage control monostable", Electronic Design, N.Y. (In press).

SOBOLEWSKI: V. C.: "Work on Computer Graphics at the University of Adelaide", Computer Graphics (Quarterly Report), Vol. 3, No. 4, Winter 69/70, p. 21.

Department of Mechanical Engineering

Dr. J. Mannam (Acting Head of Department)

This year Professor Davis is on study leave and it becomes my privilege to write this report.

Professor Davis left for overseas in February and on his way to England he stopped off at various places in India, visiting a number of Universities. In England and the Continent he visited universities and centres of research working on similar projects to ours. A more detailed report will be presented by Professor Davis on his activities overseas in these columns next year.

Throughout the year research in the various fields proceeded satisfactorily and progress will be reported in papers next year.

Mr. A. L. Carpenter completed his work on "Tapered Land Bearings", and submitted a thesis which was examined and accepted for the degree of Ph.D.

He rejoined the staff at W.R.E. Mr. Paech completed his work on "Hydrojet Impeller Design" and his thesis is now being examined.

Two of last year's final year students obtained Commonwealth Scholarships to remain at the University and undertake research for a higher degree. Mr. R. R. Patterson is working on the problem of "Electrohydraulic Servo-Suspension" under Dr. A. G. Thompson.

Mr. Menadue is working in the field of acoustics under the direction of Dr. J. M. Pickles. This research project is entitled "Acoustic Detection of Boiling in Nuclear Reactors."

We received a few enquiries from overseas students to work for higher degrees in our Department, but their field of interest did not fit the available facilities.

This year we have 23 final year students, which is the largest number since I joined the Department in 1960. Quite a few are attempting honours. I hope that when this appears in print all of them will have achieved their present aim and obtained their first degree.

Mr. J. R. Dyer attended the International Heat Transfer Conference which was held in Paris in August. He presented a paper which was reported in last year's Hysteresis. On his way to Paris, he visited Singapore and London. Mr. J. H. Fowler, who was seconded to the Department of External Affairs for the two years 1969-70, will be rejoining us next February. He has been in charge of the setting up and organising the operation of the new computing centre at the University of Singapore.

We held two symposia on "Noise Generation and Control." The first one was held in May and the second in August. When applications were received for the first symposium, they exceeded the number we could comfortably accommodate, and for this reason it was decided to hold the second one in August. The symposia each lasted for a week and consisted of lectures in the morning, followed by practical work and demonstrations in the afternoon. The organiser was Dr. M. K. Bull, who also presented a series of lectures. Other lecturers who took part were Mr. W. D. Doble, and Dr. J. M. Pickles, from this Department, and outside lecturers, Messrs. R. B. King, M. Pryce and G. Stafford. The gargantuan amount of work put in by these gentlemen prior to the symposia, in addition to their daily routine work, made these two symposia a great success, and warrants commendation.

We had two visitors to the Department — Professor Rao from Bangalore University, India, and Professor Poure, Chairman of the Mechanical Engineering Department, Cornell University, N.Y. Professor Poure presented a seminar to the final year students on the subject of "Prestressed Design."

A.U.E.S. 1970
The Social Pages

Hamish Robson

Wayne Groom

Ross Patterson

John Sandland

Andrew Fletcher

Ron Sainsbury

A.V.E.S. Committee

The President's Report

Andrew Fletcher

1970 has been a challenging but reasonably successful year for the A.U.E.S.

For the first time in many years, the Civil "monopoly" on the A.U.E.S. committee was broken by the presence of several enthusiastic Mechanical final year students. This, I feel, has been most beneficial to the A.U.E.S. and hope that in future years students from other departments will take a more active interest in the Society.

The big event on the A.U.E.S. calendar this year was the A.N.E.S.A. Symposium held in Adelaide during the May vacation. Thanks to a tremendous effort by a most active sub-committee headed by Bryan Jenkins and Ron Sainsbury, the symposium was a great success. Two hundred interstate delegates descended on one of Adelaide's most exclusive motels for a week of interesting lectures and tortuous social functions. The topic of the symposium, "The Status of the Engineer," was covered very well by an impressive list of speakers with a wide variety of backgrounds.

If the attendance at the 9 a.m. lecture each morning was a gauge of the success of the previous night's social function, then the functions could only be described as "the most successful Adelaide has ever seen." In fact, at the end of the week, the average interstate delegate who had stumbled his way through a cabaret, winery tour, ball and dinner, could not wait to return home for a well-deserved rest. Thanks again to Bryan and Ron!

Aside from the symposium, the A.U.E.S. committee embarked upon a programme which was designed to benefit all the students in the faculty.

Working with the Dean's Committee, the A.U.E.S. devised a system whereby interested final year students talked with first years about the engineering course and problems associated with it. The first years were also informed that the final year students were available to help them with problems in their work. This liaison system functioned with only limited success this year, however, I feel it has great merit and should be at least continued, if not expanded, next year.

In conjunction with the Graduate and Students section of the Institution of Engineers, the A.U.E.S. arranged three lunchtime lectures in second term to give undergraduates the opportunity of learning from experienced engineers about what they will face in the business world. I would like to thank Messrs. Young, Fargher and Parkin for three excellent and most entertaining talks. It was unfortunate that the attendance at these lectures was so poor.

Thanks to the Institution of Engineers, the Freshers Welcome this year was again held at the Chapman Hall in Bagot Street, North Adelaide. Both staff and freshers were well represented at a most successful function. The highlight of the evening was undoubtedly the staff-student chat over a hot chicken supper kindly donated by Civil and Mechanical final year students.

Enthusiastic efforts by Flett Steele and Trevor Lands enabled the reintroduction of the A.U.E.S. weekly film show held in the Chapman lecture theatre at 1 p.m. on Tuesdays. Rugby fans can thank Mr. Steele for the strong orientation of the film topics in that direction.

An extremely successful cabaret arranged by Nick Sydorovich was held in the Arkaba Top Room to raise money for the May symposium. Over 500 swingers from all round Adelaide grooved to the sound of top bands at Nick's "Upperworld Explosion."

A most enjoyable inter-departmental baseball day organised by Wayne Groom at the Tea Tree Gully Memorial Oval was a new inclusion to the list of A.U.E.S. social functions. Although not very well attended, with more publicity this could become a very worthwhile annual event.

Hamish Robson's "Ninety-Miler" could only be described as the most sensational A.U.E.S. car trial ever to be let loose on S.A. roads. The barbecue and keg turned on at the final check point managed to subdue many weary, bewildered and irate entrants who had become completely and utterly lost during the trial and had returned looking for Mr. Robson's blood.

Hahndorf Oval was again the venue for the inter-departmental football carnival, arranged by Carl Christ. Despite the incessant rain, members enjoyed either watching or playing some of the most rugged football ever seen at Hahndorf Oval. The mighty Civil team once again proved too much for the other departments and ran out victors. Our thanks to Tim Hanson for providing canned music throughout the day.

It was good to see the Engineering students indulging in Prosh activities this year, something which has not happened for several years. Ross Patterson headed a very active stunts committee which planned two of the best stunts ever to be attempted in Adelaide. It was unfortunate that only one succeeded; however, the "practical experience" obtained by the participants was no doubt invaluable.

Colin Best is to be congratulated for the excellent Engineering dinner he arranged at the Feathers Hotel. A record number of 120 students and staff attended. An extremely courageous young lady set a precedent this year by becoming the first female Engineering student to attend this previously all-male function. The guest speaker, Mr. P. Fargher, related an amusing series of parables in a most entertaining speech well suited to the occasion. Our thanks to Mr. Fargher for his attendance and contribution to the success of the dinner.

The Mt. Barker golf course was the scene for the annual A.U.E.S. golf day organised by David Mudge. Although attendance was rather poor, despite widespread publicity, the keen golfers present alternatively stroked and swigged their way around a most enjoyable 18 holes. Mr. Male took out the wooden spoon award with a fine 183. On behalf of the A.U.E.S. I would like to

wish Mr. Male well in his new job and hope that the size of the Apple Isle does not restrict his "driving" ability.
The Dean's Committee has been meeting fortnightly for the major part of this year discussing topics such as Unit Courses, Terminal Examinations, Examination Sites, etc.
On behalf of the all Engineering students I would like to thank the Dean, Mr. Sved, and the other members of staff on this committee for their enthusiastic approach towards its operation.
On behalf fo the A.U.E.S. Committee, I would like to sincerely thank Mrs. Walls for her never-ending assistance to the Society, Kay and Maxine for all the typing and duplicating loaded upon them, especially during the symposium organisation, and also Mr. Robinson for auditing the A.U.E.S. books.
Finally, to the committee of the A.U.E.S., and to all fellow final year Civil students who have been co-opted to the committee throughout the year, thank you for making my year as President a rewarding and enjoyable one.

Car Trial

Hamish Robson

A record thirty-six entries was received for the 1970 Society Car Trial, held on Sunday, 12th July. Early fovourites for the event included Bruce Muggleton (Hunter GT), Peter McSkimming (Falcon XP), the F.Y.M.E.S.T.A.C.C. Works Team car of Inverarity and Griggs in an 1100, and the Eckert Holden utility. A late entry which raised the level of competition was the professional madman Al Palmer, straight from an all-night thrash in his modified Datsun 1600.

Mysterious "Captain Miracle"

The difficult route covering ninety miles of bitumen and unsealed roads in the Adelaide hills had been mapped out by "Captain Miracle in his Dreadnought" the previous week and after seven days of heavy rain there were many slippery sections to trouble entrants.
First checkpoint was Tweedvale (Lobethal) and all but four of the field managed to struggle in. Several cars checked in twice (due to poor navigation) and Bill Phillips drove into Lobethal just as the destructive checkpoint vehicle drove out. R. Bartram in a AP6 Valiant was the first to roar away on the speed section between Lobethal and Williamstown, but wasn't sighted again.

Secret Checkpoint

All but eleven entries lost many points on the next section when navigators failed to recognise a deliberate reversal of instructions and as a result twenty-one cars missed the secret checkpoint. Mike Smith in a Datsun 1600 was an early first into the secret checkpoint, despite a desperate attempt to reverse down the road before being noticed. Then followed Peter McSkimming, Roger Inverarity and then Jenny McSkimming. Alan Palmer was penalised five points for entering the checkpoint from the wrong direction at 90 m.p.h.

Granny Struggles in Bog

Meanwhile Andrew Wauchope's "granny waggon" Morris 1000 had somehow managed to become hopelessly bogged, Mark Cicozzi was still trying to get out of the Stonyfell Quarries and Bruce Muggleton continued to write abusive remarks about the organisers on his instruction sheet.
The final gruelling section took competitors past the Humbug Scrub reserve through to Tea Tree Gully and on to the Morialta picnic ground. Steve West (Peugeot) later lodged an official complaint when, as last car, he was nearly locked in the reserve. The complaint was not upheld.

Smiths First to Flag

Final results gave first place to the husband and wife team of Mike and Pat Smith (10 points lost). Second was Peter McSkimming with 12 points lost, and Alan Palmer performed very creditably by travelling about twice the required distance to come in third with 16 points lost. Jenny McSkimming also performed well to finish fourth with 18 points lost.
Surprise effort of the day came from Bruce Muggleton who lost 107 points and finished last.

Annual Football Match

Despite cold and wintry weather about 60 Engineering students braved the Arctic conditions to participate in the annual football carnival held at the Hahndorf Oval on Sunday, July 27th. As it usually the case with society fixtures the majority of those present were Civil students and the curtain raisers match saw a rugged clash between the Civil "B" team and a collection of Mechanical, Electrical and Chemical representatives. Rodent Robson caused a furore by playing for the Civil team after a last-minute court injunction to suspend his revoked provisional clearance failed at the preliminary tribunal hearing.

The game started at a furious pace with Mercurial Mays dominating the centre bounce ruck duels, even when resting in the forward pocket. Peter McSkimming tried hard at half forward despite a severe stomach complaint which obviously hampered his efforts and ultimately led to a number of small portions of the oval being cordoned off. Despite these gallant efforts the assorted Engineers team adapted better to the sloppy conditions to lead by five points at half time. For the second half the Civils put Sainsbury at full forward, the incredible Christ went on the ball, Marty Newland to a back flank and Dirty Dave Mudge was sold to the opposition for twenty cents.

These moves were not successful and it was only a number of courageous clearing dashes by the amazing full back Jim Tabilotny that prevented an avalanche of goals. The assorted team ran out winners by eleven points, mainly due to good play from John Kielly and Mike Roach.

For the match of the day a capacity crowd saw the scintillating John Sandland lead an experienced Civil "A" team onto the field to do battle with a Rest-of-the-World team. Despite the tragic withdrawal of Flett Steele (ankle injury) the Civil line-up included players of the calibre of Lightning Hopkins, Stack Stanley, the brilliant Basher Beauchamp and the elusive follower Leaping Lands. The outcome of this match was a foregone conclusion even before umpire Tim Hanson threw up to start the first quarter.

Flash Fletcher was quickly into the play and showed early patches of rare brilliance, while Animal O'Callaghan amused onlookers with an unusual performance from the forward pocket. Too many opposition players were left stranded out of position as the Civil team unleashed a devastating display of teamwork and whipped the ball around the ground like a greasy banana. Sandland was proving far too strong for his immediate opponent and some of his overhead marks in the wet conditions had to be seen on "action replay" to be believed.

Just before half time a small blizzard swept the ground, demolishing the broadcasting box and forcing players to shelter in the clubrooms.

The game was abandoned when players refused to return to the field.

Thanks must go to Messrs. Mayo and Christ for organising the event and to Mr. Hanson for thoughtfully bringing a football. It was agreed by all that the spectacular standard of football certainly warranted the drive to Hahndorf.

The precocious six-year-old daughter came tugging at her mother's skirt, asking, "Mummy, can I have a baby?"
"Of course not, dear," the mother replied, without missing a stroke in her ironing.
"Are you sure?" the little girl persisted.
"Certainly," said the mother.
As she ran to rejoin her playmates in the yard, the child called out, "All right, you Engee's, same game!"

★

After several unsuccessful advances, the Engee asked his alluring but standoffish date: "Do you shrink from making love?"
"If I did," she sighed, "I'd be a midget!"

★

Suspecting her Engineer-husband of infidelity, the wife attempted to put an end to it by arousing his jealousy.
"What would you say if I told you I've been sleeping with your best friend?" she asked provocatively.
"Well," mused the Engee, "I'd say that you're a Lesbian."

★

Having leased an apartment to an attractive receptionist the landlord appeared promptly on the first of the month and rapped sharply os the door. 'Who is it?" a feminine voice called out.
"It's the landlord," he shouted. "I've come to collect the rent."
"Could you come back in an hour?" she asked.
"I'm still paying my grocery bill!"

★

"How about making the evening a Dutch treat," cooed the gorgeous blonde to her handsome Engee boy friend. "You pay for the dinner and the drinks — and the rest of the evening will be on me!"

★

"I never slept with a man until I married your father," declared the stern mother to her wild young daughter. "Will you be able to say the same thing to your daughter?"
"Yes," replied the girl, "but not with such a straight face."

Inter-Faculty Debating

Andrew Close

This year the Engineering Debating Team, despite strong competition, reached the semi-finals after a run of incredible successes. This amazing team was the talk of the Faculty for weeks and the members' names are now household words. Ace reporter Andy Close reports.

In this year's bid to wrest the coveted Nehru Shield from the grasp of the Law, Arts and Medical faculties, the Engineering debating team was strongly supported by the efforts of Arch-Engineering Jim Bartholomaeus. In his role as Interfaculty Debates Organiser, he succeeded, by a planned campaign of seeming maladroitness, lack of timing, poor organisation, and by the clever trick of pretending to sleep in to 1 o'clock every afternoon, to limit the field to five before the competition was even under way. Then, by careful selection of the topics and by selecting the side of the argument better suited to our talents he was the guiding force in our early victory over Science. This debate was contested on the grounds that **"Love is more important than sewers."** Fighting it out before a largely hostile crowd, the monotony of which was broken by a strong nucleus of 1½ Engineering students, the Engineering team of Jim Bartholomaeus, Terry O'Shaunnessy and Andy Close put forward the convincing points that needleworkers were of no consequence, that while the history of sewers is alright, love has its roots at the beginning of man and that, although a picture of a falling sewer might be construed as a phallic symbol, a phallic symbol was unlikely to be construed as a falling sewer.

In awarding us the debate the adjudicator said that he had given no points for either matter or manner and that we had won on our good looks alone.

The semi-final against Arts was a more unfortunate affair. The Engineers, speaking affirmative on the topic that **"The untold millions should be told,"** argued strongly about what they should be told and even made a start at telling them, but unfortunately were robbed of a fine victory by the adjudicator who awarded the debate to last year's winners by one point.

Fresher's welcome

In one of the most successful Fresher's Welcomes in years, approximately 90 first year students went to the Institution of Engineers hall in Bagot Street for an introduction to the Enginering Faculty. A most entertaining speech by the President, Andy Fletcher, followed by remarks from representatives from each of the four departments provided some interesting thoughts for students just beginning their Engineering course. Professor Miller provided the quotation of the night when he told students (in a brilliant argument by analogy):—

"If she likes you, she'll let you,
If she loves you, she'll help!"

This certainly showed the younger students that the lecturers are human — in fact, it almost convinced some of the older students.

These speeches were followed by a film of Prosh stunts of previous years. Then a sumptuous feast of Colonel Saunders' chicken, cole slaw and potato salad was brought on by the very capable organiser Wayne Groom. This provided a good chance for informal discussion with staff and members of A.U.E.S. committee. An important thank you to all students who unselfishly donated money to pay for this supper.

All in all, it was a highly successful evening and a pleasant introduction to the rigours of University life.

The confident defense attorney approached the witness stand. "My client is only five feet tall and you are five feet eleven inches – and yet you claim that he raped you, standing up," rasped the lawyer. "Could you explain to the court how this was possible?" Squirming in her chair, the blushing victim admitted: "I guess I might have stooped a little!"

★

Did you hear of the sweet young nymph who hated to be laughed at. but didn't mind being satyrized.

★

Definition of "the St. Valestine's Day massacre" is a "gang bang."

★

On impulse, the chivalrous and ever-considerate Engee stopped at the flower shop after lectures, and purchased a dozen roses for his girl-friend. When he presented them to her, she immediately tore off all her clothes and leapt onto the couch. "This will be for the flowers," she announced, stretching langorously. "Oh, come now," he replied. "Surely you have a vase somewhere in this apartment!"

"Guess Who's Coming to Dinner"

Produced and directed by Colin Best.
Starring: Phil Fargher
George Sved
Andrew Fletcher
and 100 extras!
Filmed at the Feathers Hotel in yawning Chuck-a-colour.
SCENE I:

"Gentlemen, I would like to propose a toast to the Queen."
A number of students blush.
Having toasted the Queen, the final year (Civil) students break into a hearty rendition of "God save the Queen" — the whole of the attending Faculty are visibly moved and join in.
Drunks in adjoining bars are seen, standing proudly to attention — crying!
Manager begins to worry. Waitresses begin to giggle.
Overheard remarks from regular barmen:
"Bloody University students!"

Phil Fargher introduced (double Ian Sells).
Speaks to the audience in parables — Receives tumultuous applause at finish — Audience drunk.
George Sved speaks — silence reigns — George sits down — still silence, audience asleep.
Sculling challenge thrown out by Melbourne (New Zealand) students — suddenly dinner comes to life.
Chris Stanley, Adelaide champion, staggers to the head table — rousing cheers — jugs are brought forward — the race begins.
Beer begins to disappear — Stanley comes up for air — N.Z. appears to take lead — crowd hushed — guzzle, guzzle, and Stanley wins!
Cheers gush forth — chunder follows.
Students go home, barmen relax, manager takes Bex powder and replaces fire extinguishers — the dinner is over!

A.N.E.S.A. Symposium

The biggest happening of the Engineering student's year was held in Adelaide, May 17-23. Six years ago saw the last symposium held here and this year's chairmen, Jenkins and Sainsbury, intend leaving these hallowed halls sometime in the next six. Planning for this week had started almost 12 months before with most of the work being done by Fred LeMessurier (now holidaying in Mt. Newman disguised as a worker).

All interstate guests were to be accommodated in the "Arkaba Complex"; the Sunny South Sands and Arkaba Motels, plus the Arkaba Fullarton. Only 160 delegates turned up, leaving us with an embarrassing number of beds. The problem was solved by leaving the Sunny South empty, much to the management's delight. However it is noteworthy that this was the only unscathed motel at the end of festivities.

An informal welcome had been arranged for the Sunday night and from the start the Sydney boys were prepared to challenge and out-drink anyone. Flett Steele and John Sandland assembled a quick team but due to excessive spillage the results were invalidated. George Kellen, the captain of the Sydney team, drank five jugs that night but he got himself engaged (to a bird) two days later and was ruined as a drinker from then on. (I believe there is a moral somewhere in that story.) Linda the stripper of Bay Ganew fame dropped in to do her thing. The cops also came but were uninvited, so kindly left. Songs of Engineering excellence (rough as guts) were propagated throughout the Arkaba with each singing team attempting to drown the other. The grog ran out soon after and of course the show ended. Many guys were seen groping their way back to a bed after having consumed an average of two jugs per head. That night the Melbourne crew staged what looked like a demonstration so were given the honour of an hourly police check.

The Union Hall was the venue for the official opening by Mr. Tom Stott, former Speaker in the House of Assembly.

Attendance was very good, with most guys appearing to have had some sort of clean up since the night before. This could not be said of the rest of the week especially the attendance, which was found to obey the following relationship

$$A = \frac{K\ HQ}{nG^2}$$

A — total attendance at any lecture.
K — empirical constant, usually taken as

$$1/\text{no. of delegates} = \frac{1}{160}$$

H — total hour of sleep.
G — no. of gallons consumed for the week.
n — no. of days in Adelaide.
Q — expected lecture quality factor.
in absence of other info. take as 1.

Mr. Stott's address was brilliant and covered every aspect of the "Engineer in Politics." The meeting concluded with a fiery debate Chowilla v. Dartmouth.

Monday afternoon saw Mr. J. A. Michael, executive director of A.P.E.A., deliver what turned out to be a most interesting topic. "The Status of Engineers in Industrial Affairs."

With the serious part of the day over the festivities continued at a cabaret held at "Swinger", Hotel Aust. The advertising for the cabaret had promised 1,000 women and free grog — this would explain the 100 or so guys who rolled up before the scheduled 8 o'clock start. Andy Fletcher, director of women, had done a great job by personally conning the 600 or so birds who did eventuate. The Benjamin Courtenay, or John Wotherspoon (Spoons) and his crew gave a very polished performance controlling the mob and keeping animal acts to a minimum. Again the grog ran out but most were so boozed to care or even comprehend what had happened. In that short time — 8-11 p.m. — the drink bill was almost $1,000, or 208 dozen bottles of beer. Guys with newly conned birds continued the festivities on into the night and I assume eventually got to bed.

Next morning the lecture attendance was even lower than the formula would predict. Despite this, Prof. Moorhouse maintained the high standard of address seen so far by elaborating on "The Status of the Engineer in International Affairs."

The rest of Tuesday and Wednesday morning had been allocated for a Winery Tour, a masterpiece of Engineering Design by Wayne Groom and his associates Daniels and Dilliway. At 1.00 p.m. the train left the Adelaide Railway Station with some of the guys bringing their birds from the night before while others were content with rugs and sleeping bags. One group missed the train but gave chase and flagged us down some 30 miles from Adelaide. With all the precision of the "Great Train Robbery", Porter Groom managed to distribute the mob to seven wineries with everyone reuniting at the Angaston Show Hall for a smorgasbord meal. From all reports most of the time at the wineries was spent in the tasting rooms getting quickly inebriated on a combination of champagne, clarets and ports. One Adelaide Engee (no names mentioned) was seen chucking into a flower bowl. At Angaston the caterers had found it necessary to erect a barricade to keep away the starving masses until all had arrived. Finally the word was given and the mob charged, devouring all the food in sight. Due to the slight shortage of birds Mark Gilbert (otherwise known as Sam) indulged in a bird-raising effort by inviting all the local nurses and even the policeman's daughter. By the time the band started the show was well under way, complete with firecrackers, whistles, streamers and horns. I am happy to say that the grog did not run out, consequently many a chunderous looking figure was soon to emerge from the hall and make his way to the buses.

In order to maintain a semblance of authenticity, all photographs in this article have been deliberately put out of focus and incorrectly exposed. The reader can then view the scenes in just the same way as the participants did.

Once on the train many souls slept soundly with snoring audible from most carriages. The more energetic ones began a systematic souveniring operation by removing light bulbs, unscrewing the fitting, disconnecting the leads and hopefully getting off the platform with them.
Next morning very few were up early enough for the first lecture but they somehow managed to join one of the tours in the afternoon. Despite the rising blood alcohol levels maintained since the Sunday night the Brewery Tour was well attended — in fact, over-attended.
Ron Rigby and Garry Jones, the ANESA secretary and treasurer respectively, had flown to Adelaide to chair the A.G.M., which was held in opposition to the tours. The attendance was disappointing; the main points of discussion being the location of next year's symposium and ways of paying the loss incurred at this year's. It was decided that all cheques would be gratefully received and should be made payable to A.U.E.S. special purpose account.
The Wednesday night was left free to allow some degree of recuperation. However several guys rejected this idea and attended Disco's in a search for an accommodating bird.
The Arkaba Top Room was the venue for the Ball held on the Thursday night. By tradition the Engineers machine was erected and set in motion to perform an old Engineering action. Again the the guys were out-numbered but this situation was felt to be quite desirable and no action was taken. All agreed the supper was superb and a compliment must go to the Arkaba Hotel who were obviously out to impress the 160 interstate undergraduates. Overall the ball was an incredible success, easily surpassing last year's effort in Sydney.
The Melbourne boys achieved quite a name for themselves at '69 symposium by wrecking the Diplomat Hotel and this year proved no exception. This time Jack Gringlas and his boys were content with TV's and chairs but the management at the motel (all women) weren't impressed and hourly police checks were resumed. Incidentally, Jack is running next year's symposium in Melbourne.
Apart from this, and other minor disturbances, Glen Osmond Road reverted to its original character some time after 4.00 a.m.
Friday, the fifth and final day of this hectic week, was telling on the face of many a poor soul. One guy attended the morning lecture in dinner suit, and accompanied by his bird. A few appeared to have crawled out of bed, thrown some gear on and not bothered to wash or shave. I believe this to be true dedication to duty and no doubt a highly respected attribute to any future Engineer. Mr. A. K. Johinke, of the Highways Department, gave the final address to this weary contingent, but most brains were too dulled by the events of the week to appreciate the statistics quoted. Had it not been for the excellent Proceedings produced by Chairman Jenkins, much of the lecture material given during the week would have been forgotten forever.

The dinner to be held that night was to climax the activities for the week. Barry Griggs organised the best drinking team A.U.E.S. has ever seen. (The potential was there, but not the practice!) Eating began with a beautiful background rendition of "Eskimo Nell." This was followed by other Engineering type songs. The Adelaide contingent, mainly Civils and Mechs., dominated the airspace by chanting the roughest eight lines imaginable. (This tender collection of words had been carefully selected by Messrs. Rinder and Co., the official songwriters.) Each Uni. responded with an appropriate jingle from the Engineer's Songbook. At this stage "the machine," from the night before, was used as a battering ram in an attempt to storm the microphone. but the loading was too great and failure occurred.
First prize, however, must go to the final year Civil team, who, being disgusted with the obsenities uttered, presented their own version of "Some Enchanted Evening."
Finally the dinner itself was over and the mighty Adelaide team donned their drinking shirts (Arkaba table cloths) and prepared to face the water. After much debate it was decided to run only "eights" and B.I. Chris Stanley excelled himself with incredibly fast times and largely contributed to Adelaide's overall second place.
Sydney "U" won even without George Kellen, their best drinker. It was rumoured he was in the motel sitting starry eyed with his fiancee of two days. Three B.I.'s were awarded for consuming five pints in 5 minutes and holding it down for a further five. One guy missed out first time so had 2 cusec chuck and entered again.
During this an attempt was made to kidnap "the machine." It was quite successful and wagon wheels were seen rolling down Glen Osy Rd. in the early hours of the morning. Three arrests were made when police found students filling a boot with road signs and dumping trees in the Arkaba pool.
In retrospect, the symposium was financially disastrous, but no doubt the greatest social even of the Engineering student's year. For the record, were had two engagements, four arrests and an average consumption of seven gallons/head.

Ron Sainsbury

Why we held the Anti-demo Demo.

Our on-the-spot political newsman Chris Stanley reveals the startling events which led to the Engineers staging one of the most militant demonstrations ever seen in Adelaide. Cruel reactions are expected from the military arm of the State. But remember that Che lives in our hearts and the revolution is closer than we think. Now read on . . .

For too long now, the City of Adelaide has suffered from an acute shortage of S.R.P.'s (Sanitary Relief Points, or Dykes to the layman). There is now hope for great improvement, following the very favourable public reaction to a pilot study in open air S.R.P.'s, conducted by a group of Adelaide engineering students. The first such experimental open-air S.R.P. was erected in front of Parliament House on August 7th (which happens to be Prosh Day).

The smooth operation of this immense project involved extraordinarily difficult structural and managerial problems, and as a member of the team responsible I feel professionally obliged to set down our findings for those who may need to tackle something similar one day.

Preliminary Site Investigation

Two students went up to the site with a theodolite and other surveying gear, and then began to lift paving stones and examine the soil underneath. To the casual observer they were obviously looking for benchmarks! The policemen on duty proved most helpful on this job.

Results: "Paving stones easily lifted. Sub-grade quarry rubble poorly compacted and easy to dig."

We now had the necessary information to begin the complex structural design. Eventually a pier and raft footing was chosen for the structure and the necessary reinforcement was prepared.

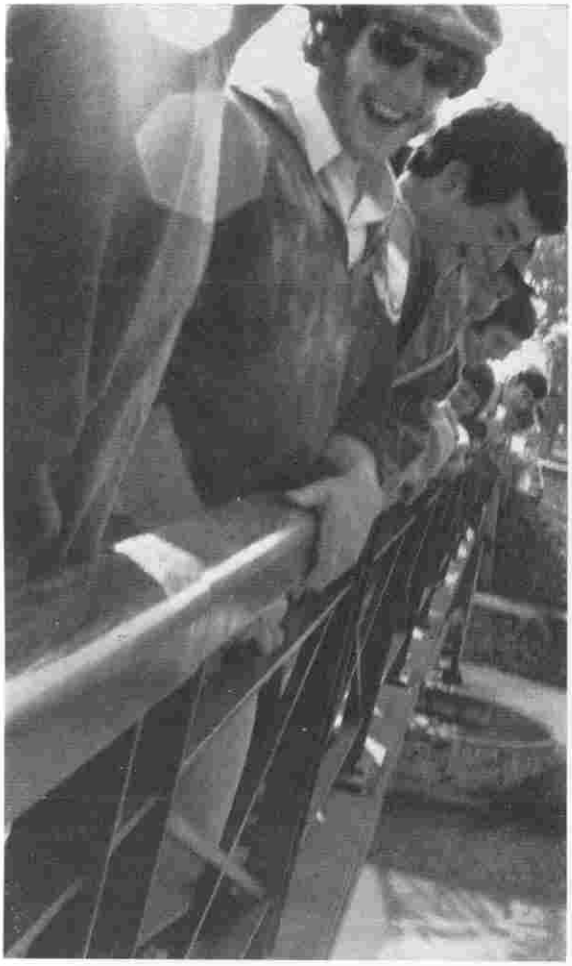
At this stage, our concrete technologist, Mr. T. S. Hanson, was faced with a difficult problem. We needed a fast-setting concrete with high early strength, so that the S.R.P. could be put into immediate service. After consultation with Adelaide's leading dyke-setter, Prof. F. B. Bull, a concrete mix was chosen (2,000 p.s.i. at 40 mins.). The mixes were then prepared.

It soon became apparent that public interest in our open-air S.R.P. program was high, so that the organisers decided to camouflage the erection operation to minimise danger from rioting S.R.P. fans. Hence the reason for the Anti-Demo Demo which has since become a legend. This was to be merely a cover to the erection operation. On the day, the operation went very smoothly. The dais, containing all the erection equipment plus the highly skilled team of A. V. Fletcher and myself secreted inside, was set on the footpath as the demonstrators arrived at the site. The demo was then squashed by the guest speakers, Messrs. Steele, Robson and Hendrickson, who managed to thoroughly bore the crowd. Mr. Steele Hall, who of course knew most of the details, stepped onto the platform when he saw this, and he too bored everyone for a while. Once again, quick, decisive action by this noted statesman saved the day, and the riotous crowd was calmed.

Within the specified 40 mins. the job was finished, the demo wound up, and the dais left.

Unfortunately, the crowd could not be contained by the specially trained policemen at the scene, and several people were hurt in the rush on the now-exposed S.R.P. This spot will undoubtedly become a shrine of remembrance to the amazing pioneers of this project to provide Adelaide with a network of open-air S.R.P.'s.


?
LOVE




TNT

The Droff

Motoring writer Hamish Robson reports on the 1970 Droff Superior, red hot challenger to the Big Three's stranglehold.
Story next page.

The "Droff", a logical successor to the "Proshmobile" (see Hysteresis 1968). was constructed by Bruce Muggleton, Hamish Robson, Trevor Johnson, Barry Griggs and David Mayo as an engineering exercise between January 1969 and March 1970. An imitation vintage car body was grafted onto a 95E Prefect chassis and drive train.
Since manufacture the "Droff" has featured in the Engineering Car Trial, a speed run to Clare, the 1970 Prosh procession and several other publicity stunts. The "Droff" is otherwise known as the Red Terror or the Midnight Phantom of Brownhill Creek.

The vehicle available for testing was well run in, having 67,000 miles on the clock. Droff's explosive entrant into the small car market is mechanically quite conventional, having a front mounted four cylinder in-line motor to drive the rear wheels through a three-speed gearbox. The motor is the well-proven Ford side valve Ten which was first introduced in 1935 and although this power plant is reliable the "Hysteresis" motoring staff feel that a Lotus twin-cam could be a better choice. Regrettably synchromesh does not appear to be fitted to the gearbox — this could prove a costly omission in the light of fierce Japanese competition. In keeping with a company policy of conservation, the suspension is orthodox transverse leaf springing both front and rear, coupled with cantilever Armstrong shock absorbers. On the road the Droff handles in a manner which can be best described as remarkable. Even more agile drivers will find that it is impossible to corner sharply without executing about ten steering corrections. Cornering at high speed can induce some oversteer and there is also a tendency for the inside rear wheel to lift, but this practise is not recommended as it is very distressing to rear passengers. The ball and worm steering is exceedingly direct and all variations in road surface are transmitted back to the driver. However, it is possible to minimise road shock in the steering column by positioning the wheel midway between the half turn of steering slack available, providing the driver is not of a nervous disposition. Braking is by three well cable operated drums which fade with heavy use to the extent that during our comprehensive panic stopping tests new heights in panic level were reached. By braking hard while corning it is possible to travel considerable distances sideways, thus making the Droff ideal for tricky manoeuvres in heavy traffic.

In the "Superior" model no effort has been spared to improve commuter comfort. We found that the patent Griggs' Vent heater which is bottled onto the transmission tunnel would work effectively for speeds of up to five miles per hour, beyond which the noxious nature of the fumes (coupled with the weird cross flow ventilation of the cabin) made it advisable to close off the heater. Instrumentation is comprehensive and includes clock, ammeter, fuel gauge and speedometer. The oil pressure gauge was missing on the test vehicle and we were told by chief experimental engineer Bruce Muggleton that it had been pinched by one of the Company's engineers for use in his own car.

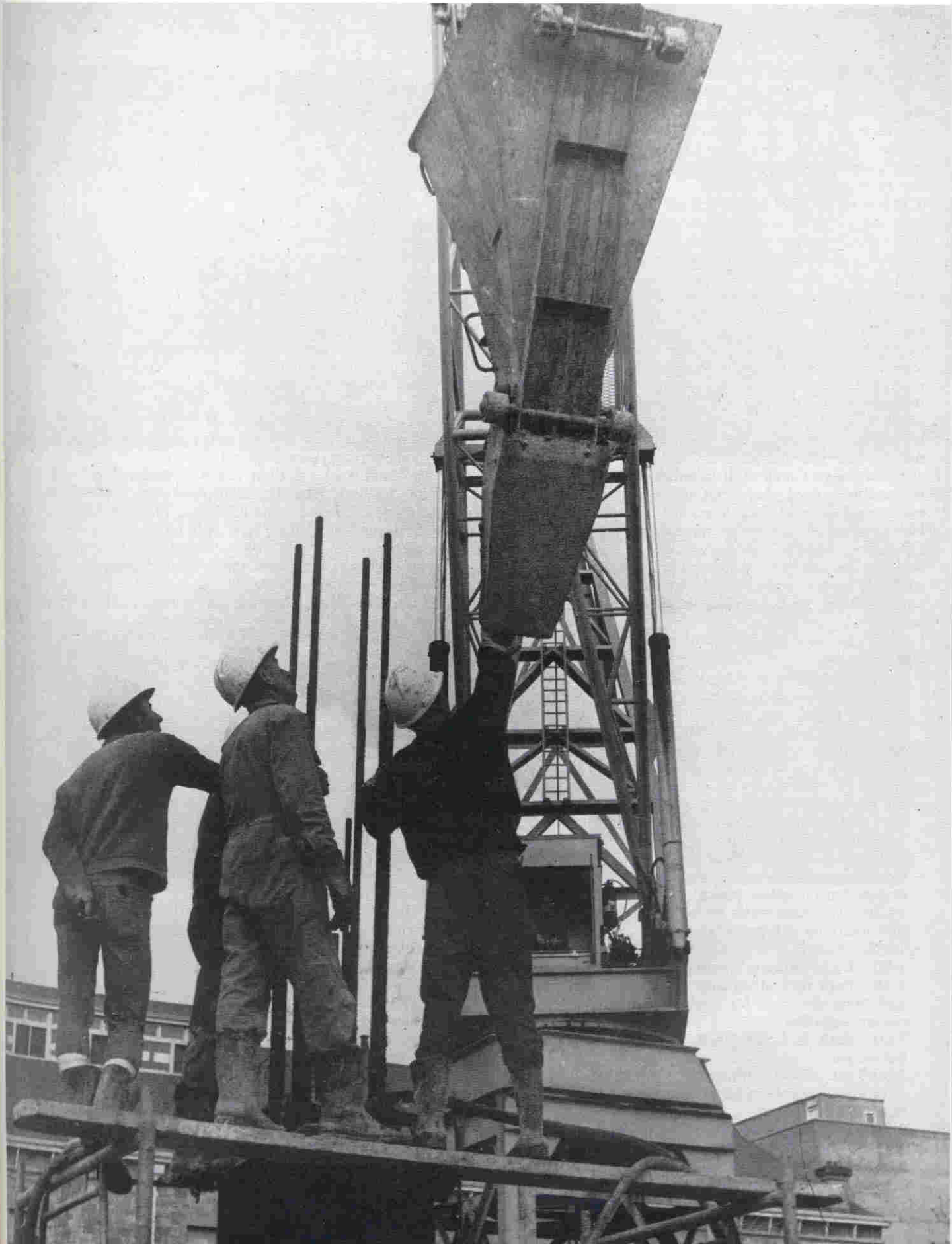
The vehicle design has obviously been influenced by the new Government legislations on road safety and the Droff features a fully automatic windscreen wiper, headlights, a rear vision mirror and an all-electric horn. The latter is wired to a very sensitive push button centrally mounted on the steering column and is apparently designed to sound intermittently during vehicle use, thus keeping the driver awake. In one instance, the horn self-activated in the middle of the night, thus lending weight to the theory that it also acts as a burglar alarm. Nevertheless most test drivers found the horn an unnecessary addition once the vehicle was in motion.

The non-sealed 36 watt headlamps are mounted at the front on either side of the vehicle and spread a soft, soothing glow over a very small part of the countryside during night-time motoring. The headlamps may be dipped by means of a switch located under the driver's seat. Since (a) there was no appreciable difference between high and low beam, and (b) the dipper switch broke anyway, we feel there is no cause for criticism concerning this unconventional positioning. For poorly lit roads the manufacturers recommend a torch be shone through the windscreen. Perhaps the most unique and important safety feature however is the vehicle's low side-profile which facilitates a rapid exit of occupants in the event of an impending mishap. Regrettably, overall finish is poor with not enough attention to small detail. There are numerous paint chips in the vicinity of the spare type and the left-hand parking light is missing. The heavy engine bonnets have razor sharp edges and tend to swing shut while the driver is performing minor engine adjustments. Obviously this is not conducive to happy motoring. Also young ladies in short skirts will have considerable difficulty maintaining a dignified demeanour while climbing into the high back seat. This problem has been brought to the attention of the design department and I believe it is to be rectified in the distant future. The layout of cabin controls and seating has been carefully studied and a compromise reached such that thin, one-legged, seven-foot drivers will have as little trouble driving the Droff as fat, bearded dwarfs.

At the time of writing the Droff company had not fixed a retail price for the "Superior" model but I believe it could be quite competitive. In this case those motorists who are anticipating a long stay in Antarctica, or who are masochists or hermits, could well be lured away from the far less exciting Datsuns, Corollas, Cortinas and Hunters.

DROFF DATA SHEET
Make: DROFF
Body: TOURER
Model: SUPERIOR
Colour: FIRE ENGINE RED
Performance:
Maximum Speeds
1st gear: 22.0
2nd gear: 37.0
3rd gear: 63.5
Acceleration:
0-20 mph. 4.5
0-30 mph. 9.3
0-40 mph. 16.0
0-60 mph. not available.
Specifications:
Engine: 4 cylinder sidevale, chain driven cam, Ford Ten
Carburettor: Single throat downdraft
Power at RPM: Not available.
Wheel base: 91in.
Track, front: 45½in.
Max. height: 60in.
Tyres: 5.00 x 16
(Make on test car): HARDIE, GOODYEAR, DUNLOP

World News 1970



2nd Final Year Survey Camp

Flett Steele

Because of the size of this year's Final Year Civil Class, our eternally-wise leaders saw fit to divide us into two camps. The first camp, by all reports, was a rather drab affair, and hence this report will deal solely with the second camp.

The train for Leigh Creek left on Sunday afternoon, with many of our number showing outward physical signs of a gruelling symposium week. I say a train with some reservations (pun) because our carriage from Pt. Augusta to Tilford was undoubtedly the most disgusting thing ever put on four wheels (or was it three?). Of course our intrepid bunch of surveyors did not attempt to improve the carriage's physical state during the trip. For one thing, the stink of Mrs. Fletcher's beetroot-and-onion sandwiches was almost unbearable, until Stanley kindly provided air conditioning by placing his posterior through the nearest closed window.

Some social drinking occurred on the train and it was with little surprise that a few of us did not make reveille the next morning at 7.30 after reaching Tilford at 4.00. Leigh Creek at 4, in an alcoholic daze, looked a reasonable sort of place, but sober, and in daylight, one's opinion rapidly changes.

However, we were there to survey, and survey we did. Of course our task was made easier by virtue of the fact that we were the second camp, and by carefully spotting the tape marks on the ground, and the smashed-up saltbushes, some remarkable railway routes were established.

Let me give you an example of a typical day at Survey Camp.

7.30 Our intrepid surveyor rises from his bed of boards, and staggers into the canteen for a plate of luke-warm porridge.

8.00 Reluctantly he collects his instruments and climbs aboard the E.T.S.A. horseless carriage.

8.02 We sing a little song.

8.05 We pass under a railway bridge, and scream for the now-famous gang-hang.

8.15 We reach the scene of the crime, and wish it were lunch time.

8.30-11.00 We survey a little and play a little (One member of each group always watches for an orange hat or yellow parka).

11.30 We head back for town each silently praying that today he will get a letter.

12.00 Lunch.

1.00 Back into the flaming field again.

4.30 Pack up instruments, and maybe play wars up and down the creek for a while or engage in other mature activities.

5.00 Back in Leigh Creek and a few quick ales before tea.

5.30-7.00 Shower time, and the University.

7.00-9.30 Maybe a bit of astronomy or a few quick "field adjustments."

9.30 Down tools and across to the boozer for half an hour of solid drinking.

9.30 to X Some go back to work and produce some amazing results, while Stanley goes out and books for a party.

X Stanley and friends arrive home in a very vocal state, and maybe in the company of a snake whice they put into May's room to scare hell out of him.

1 min. past X They succeed in scaring hell out of him.

So went a typical day — slowly.

Sunday was our day off, and after attending early morning church services (!) most went back to bed. Poor "Sandshoes" Riebolge however ended up in hospital with severe pains in the groin. The local witch-doctor diagnosed that they were gangrenous and wanted to whip them out, but Bob decided that he'd had enough of the whole affair and went home.

A few of us went out to Mt. Ararat Dam on the Sunday to climb the monster while the more common element of the class indulged the locals with a game of bush football. Only seven of us made it to the top of Australia's Everest, and among us was Dr. D. S. B. Honestly, I've never seen anyone so close to death as he was, but a "stirling"effort anyway, Doctor!

For the final week's activities, see "Typical Day" and multiply by five. Saturday night, however, saw 90 per cent. of the class under the influence. (The ones who were chasing the thirteen year olds must have been dumb.)

The following awards were made on the camp.

Individual awards:

1) Fool of Camp: Unanimous decision — Rod Hook for dropping a TIA from a great height.

2) Animal Act of Camp: Three-way tie.

Sandland, for standing naked in the washroom corridor and throwing a bucket of water over an innocent local.

Beauchamp, while in an inebriated state he threw a glass of whisky in Col Best's face and proceeded to attack Trev Moody with great enthusiasm.

Hopkins and Associates for keeping the entire population of Leigh Creek awake on the last night.

3) Piker of Camp: Moody, for failing to hang, failing to ring, failing to climb Mt. A, and failing to buy a round of beers after winning on the S.P.

4) Courage Award: T. F. Steele for climbing Mt. A and participating in both hangs whilst under the influence of a broken arm.

5) Human Calculator Award: Chris Stanley was switched on in the morning, and continued to calculate until switched off at night.

6) Most Illiterate Chairman: D.A.C.

7) Worst Driver: Obviously Dr. D. S. B.

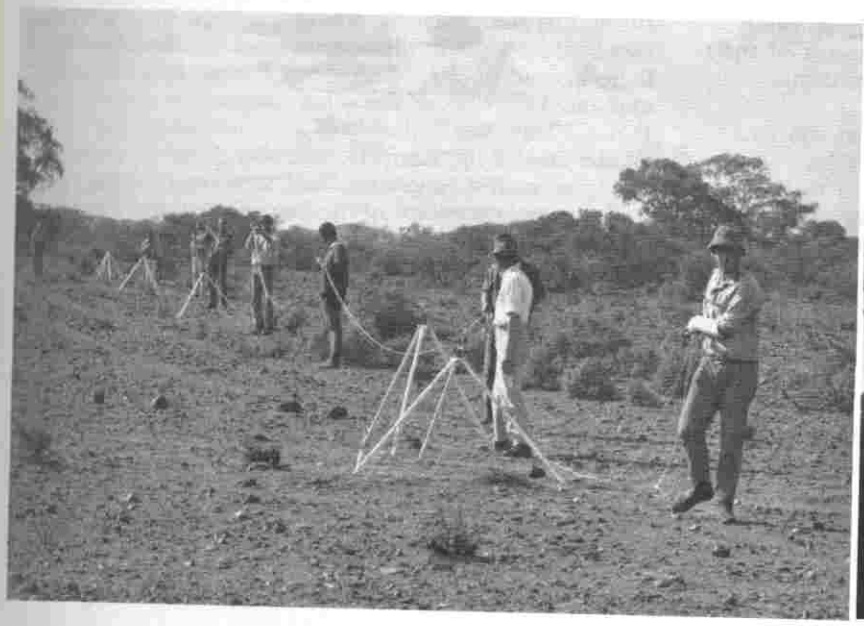
Group Awards:

1) Slowest: Moody, Copley, Riebolge and Wesselingh. Whilst all others were pegging their last curve, they were still trying to find first I.P.

2) Fastest and Most Efficient: Stanley, Steele, Sandland, West — obviously.

3) Most Unpopular: Beauchamp, Sydorowitch, Thomson and Best for being continually late for lunch.

4) Slackest: Fletcher, Lands, Summers and Mudge. Have you ever seen a railway curve pegged, only using two tapes and a good eye?



2nd Year Survey Camp

Dave Baldock

This year's camp was held in the first two weeks of the long vacation, and finished a few days before Christmas Day, but this did not dampen the spirits of the band of eager students who were about to indulge in this physical and scholastic exercise.

The camp was held at the Mylor National Fitness Camp, which is about six minutes drive from the "Pump Inn" at Aldgate. We all made our way up there on the first Sunday afternoon after our exams finished, and had to leave our cars over the hill from the camp. These natural phenomena were going to turn out to be a feature of the camp — we never seemed to stop climbing them, as flat ground did not exist at the N.F.C.

With much to do that night, Dave Baldock's CASINO opened up, and there was usually a game on every night.

Men Liken Camp to Auschwitz

Next morning everyone was aroused at some ugly hour, and forced to slave all day. Then the bombshell was dropped. Apparently we were expected to **work** each night, as well! Trev Daniell, Steve Christodoulou, Fritz Bonnin and Mike Boswell set an unprecedented, and I may say generally unfollowed, example by working till 3.00 a.m., but half this group saw the error of their ways, and so did nothing for the rest of the camp, to make up lost ground.

And so the pattern of Camp was set. Up at sunrise, or close to it, eat, work, eat again, dinner, then homework. Naturally the system was found to have a few flaws. A noticeable one was the pilgrimage at about 8.00 p.m. every night; after people thought they had been working far too long, they found that there was enough scrub to cover the climb to the car park in which the "Pump Inn"-orientated cars were rearing for their night's exercise. The barman got to know some of the students so well that he was giving away free beers to them, now and then. And then there was the friendly truck driver who failed to make the Murray Bridge turn-off and smashed into the W.C., and he was promptly offered a beer when seen to be all right, and he spent the night at the Inn waiting for his firm's tow-truck to arrive. Some people just can't wait!

Greek Goanna Scare

During one day's surveying, Brent Emmett and Andy Dracopoulos were seen hunting a goanna with a ranging pole, using a theodolite as a telescopic sight. Also, Con Koutsomanis had been convinced that droptail lizards were poisonous, or so said Steve Christodoulou, but he seemed to jump just as far when he found them in his sleeping bag.

Super Group of Stroppers

The stropper-group of the camp, which was Ron Taylor, Tattersall, Smithy, Ron Sainsbury and Ray Stocker, were seen out four nights straight, after dinner, doing extra work correction of a ten-foot error in their level-and-tape traverse, while the more dexterous students could do it in their rooms with rubbers in about ten minutes.

Andy put some life into the crowd by bringing up his family album, which Ian Dilliway was seen reading every night before he had a shower.

Sam's Spartan Swim

Sam Gilbert had his shower early one night. Some people had just come back from giving their cars the nightly run, and caught Sam working. They were particularly unimpressed, especially as he had been invited to come on the run, and unanimously decreeing that this was not up to standard, threw him into the near by dam.

Ralph Rotten's Bean Ball

Ralph performed for the crowd one day by telling them of his great prowess at baseball and when put under pressure by the audience for a demonstration, condescended to heave a stone at some poor and most unfortunate bird, which he hit and killed. The crowd was never the same after that miraculous performance.

The weather was on the whole quite kind (or unkind, depending on how you looked at things) and only really rained for one day.

All sorts of excuses were come up with to go home early, or come back late, but Pete Bayetto did the best, with his malaria, and missed nearly a week of camp.

In the first week Mr. Cummings and Mr. Male were the two bosses, while in the second week Dr. Brooks was there instead of Mr. Male. Pete Battye, Rick Guenthe and Ian Lange were the other helpers.

D.A.C. Tops the Polls

At the end of the camp D.A.C. was given a present for giving us such a good time, and so many calculations to do, namely one tap, of the keg variety; and that broad mind was heard to be responsible for saying that it was "the best drawing instrument I have ever seen."

We all left camp on the Friday night, and to Wayne's pub to have a few beers on him, and to praise be that those two weeks before Christmas were gone.

When she discovered her new lover had been in the Greek Navy, she hardly knew which way to turn.

The Dean's Committee 1970

Ray White

Towards the end of 1969 there was a considerable movement for a greater student participation in the running of this university, which culminated in a revision of the University Act (still being debated!) and the election of students to Faculties or Dean's Committees. It was in this atmosphere, under the instigation of Mr. Sved, that the Engineering Dean's Committee was formed. Under the chairmanship of the Dean, it consists of six student members (four department representatives and two general reps) and six staff members (the four heads of the departments and two other representatives). Meeting fortnightly, the committee operates on a fairly informal basis, e.g. it has no constitution or "powers", but on the other hand it generally obeys the accepted rules of debate. This has given rise to wide-ranging discussion on the various questions before it; and can be exemplified by the following:—

In late April a combined staff-student general meeting passed three resolutions concerning examinations:

1. exams be abolished from Centennial Hall and where possible to be held in departments.
2. discussions to take place in all departments and faculties between students and staff to work out alternatives to written examination and
3. recommend that regurgitive content of assessment be minimised, encouraging creative aspects in its place.

Their intents were neatly summed up by "formal assessment of any description is antagonistic to education."

The engineering profession as a profession requires some assessment and hence the committee proceeded on this basis.

As to the first proposal, a survey was conducted among most engineering students requesting their preference for Centennial Hall or the Engineering Buildings as a venue for examinations. Opinion was divided evenly, consequently the committee agreed to recommend to Faculty that individual decisions be taken for each class by the department head in consultation with appropriate staff. A detailed examination was also carried out by the staff as to the feasibility of holding examinations in the Engineering buildings. Apart from first year students where the numbers are too great, it concluded that in most cases it was a practical possibility.

With regard to the second proposal the committee examined the distortion of teaching and learning by examinations. Do lecturers lecture towards examinations and do students study to them? Or are they a goad? How can you examine all parts of a syllabus? etc. etc. Resolutions were put to the effect:

a. that open book examinations be held wherever possible and
b. the scope of assessment be widened wherever possible to include continuous assessment, oral exams, etc.

The third proposal struck a quantitative difficulty. How does one measure creativity for it is inherently very amenable to subjective interpretation.

From this example it can be seen that the committee has studied in depth those fundamental matters which have far-reaching implications. The staff have given the students their views and vice versa, and then both staff and students have co-operated in an attempt to solve the problem. Even if no solution came forward a stronger line of communication between staff and students has been cemented and we have been made aware of one another's difficulties. Basically it is an attempt to oppose slothful conservatism (or of submission to the "system" as we find it) by continually critically examining aspects of engineering education and either verifying matters or reforming them to a degree acceptable to a majority. In summary the committee has been, and is, one of review of student proposals and staff proposals; a half-way house between faculty and the engineering student body.

The Survey

At the end of second term, a survey was conducted among first year Engineering students by Mr. Little, the Student Counsellor, and Mark Gilbert. The questionnaire which was distributed consisted of YES/NO answers on a wide range of topics which could be considered relevant to a first year Engineering student. Unfortunately the amount of time required to analyse the data was underestimated, and it is hoped that they will be ready to publish in Hysteresis '71, if the computer doesn't break down from overloading.
However, at the end of the paper, provision was made for a free essay on any subject the student wished. Parts of the comments submitted are printed below. They are representative of all the ideas expressed. Authors enjoy anonymity and so it was deemed fair to grant anonymity to any people explicitly criticised in the text. A full, more comprehensive report exists and should be available to anyone who tries hard enough to get it. The comments are valuable, maybe not for their sophistication but rather because they show which issues are considered important by the students themselves.

★

Education is meant to be the cultivation and disciplining of one's mind. The University, with the potential supplied by many (supposed) cultivated and disciplined minds, does not achieve this. Perhaps the University concentrates too much on scientific progress or the economic stability of our society. The concern for supply and demand (of brainpower) should be superseded by the need to integrate young people into a society; young people who have been prepared on how to fulfil their lives. Perhaps a general electives subject (such as "Communications Between Social and Age Strata") is not a solution, but it is a start.

★

We get the impression, as first years, that after this, second year and onwards are INTERESTING, since we start to specialise in our chosen career. I only hope that this is the case, because first year, although only being a "weeding-out" year, must be responsible for many first-rate students dropping out, failing or switching courses, BECAUSE THEIR GOAL IS NOWHERE IN SIGHT!

★

I have found that generally the first year course appears to lack any practical motivation. After five years of science-orientated subjects we are confronted with a course which is little more than a series of differential equations. This abstract nature of most of the subjects notably Physics and Engineering inhibits personal interest and makes application to the large amount of work difficult. A far greater amount of satisfaction would be felt if we were given a little more of an inkling of where this is all supposedly leading us. General Engineering lectures are a step in the right direction, but they represent less than 5 per cent. of our allotted time.

★

Basic fault with Eng. course is that the work load imposed upon the student is such that it tends solely to develop him into a specialised scientific product with not enough awareness of the more important social and cultural aspects of life.

★

There does not seem to be enough opportunity to meet girls, especially as there are only two attempting Engineering I. Having not had much experience with girls it leaves a bloke floundering and frustrated. This is one aspect of University life that I was really looking forward to and I have been grievously disappointed. I suggest that the Engineering faculty has an all-out effort to attract girls to at least attempt Engineering.

★

I am generally unsatisfied with the course. I feel the general conception of the course is wrong. I feel that instead of the concept of doing say four separate units for first year a combined two subjects could be substituted. This could be of the following form: Subject A. Basically Engineering I as is but more time spent on the work and a tutorial system introduced. Subject B. A summary of the work applicable to engineers, e.g. Integration in maths. This unification of subjects would (1) reduce the unnecessary work load, (2) inspire interest by students.

★

I would like to be given a free choice for my fourth subject in first year. For example, as Chemistry is not essential for Mechanical Engineering, the student should be able to do any other humanities subject he prefers, e.g. Politics I. I feel this would help students contradict the feeling that all Science and Engineering students are only interested in physical things and not society around them.

★

I feel that the subjects Chemistry I and Physics I are unnecessary in first year of a Mechanical or Civil Engineers' course.

★

EXAMS. This year all faculties I am doing subjects in (Physics, Chem., Maths., Engin.) decided to hold at least two exams during the year to count towards the final grading. This does seem to be a fairer means of assessing a student, but I find, so far, that it seems to be merely increasing the load, and anxiety, etc., i.e. the tense period prior to exams has just been had three times a year instead of once, for each subject.

★

The work load is too great for first year students. Formal studies are only a portion of a person's "education."

★

To a certain extent, standards of teaching are satisfactory, but this only applies to say two out of three lecturers of a year. Overall the standard would be satisfactory but there are always one or two lecturers who are shocking and you find that all of a sudden topics appear in weekend papers that the lecturer has not covered but other lecturers have. On the whole most lecturers tend to teach only the skeleton of the course — the basic material — and many lecturers are to a certain extent boring. It would be better if relevance to everyday life and to

the associated profession was mentioned. When it has been done in Chemistry, Maths. (first term only) the lectures were very interesting.

★

Only a few lecturers appear to show much co-ordination and organisation of their lectures. Some of those who write very little and talk continuously give little consideration and don't pause or emphasise at any important points. In my opinion a reasonable good lecturer is one who gives us organised and lengthy (i.e. couple of pages/lecture) set of notes. This does not mean that they have to write every word necessarily on the board, i.e. good if they speak clearly at reasonable pace, e.g. present Geology lecturer.

★

Regularly set and marked exercises are an aid for the staff in assessing and help the student to find out how he's going.

★

Although the following comments on the 1st year Engineering course are my own, I feel they could, to a reasonable degree, typify the thoughts of the majority of 1st year Engineers. It is generally taught badly, the assessment is poor, and the subject matter boring.

★

Engineering I has given me no insight into the particular field which I have choesn. It is monotonous and boring, the only insight and inspiration coming from the general Engineering tutorials.
Something should be done to create an enthusiasm in students about their chosen field of engineering by showing them more about their field and the type of work, etc., which goes into it.

★

I think that the Enginering I subject is, in general, pretty irrelevant to my interest in electrical work. The practical sessions are interesting and of relevance because drafting is used in Electrical Engineering to some extent. However, the lectures deal mainly with Mechanical Engineering and this aspect could, I think, be improved (considerably). Apart from this the course is fairly interesting, particularly the tutorials, which are worthwhile going to.

★

Doing Electrical Engineering, it would be nice to do something with this aspect of engineering instead of all this other stuff so I could decide if electrical engineering is my thing.

★

I only find practical work (drawing) worthwhile to the extent that it will help me to pass exams. I see little relevance in a course of draughtsmanship for an Elec. Engineer (speaking for last year in Phys. & Chem. and mainly this year in Maths. and Eng.).

★

Dynamics exercises like Statics fortnightly papers would be a **good** idea.

★

Dynamics is of little relevance to the course I am doing yet it is shoved down our throats with no explanation why it is needed.

Dynamics lectures bear absolutely no relevance to the exams, in fact the course at present is not very relevant as far as the rest of Engineering is concerned.

★

Drawing, I think, should have a wider scope. Not just Mechanical as it is at the moment. Last year there were only a few drawings that were relevant for civil students (force diagrams and a freeway interchange). The lack of uniformity of supervision in the drawing office is bad.

★

Graphics should be judged on the weekly pracs. and terminal tests. A point in passing — why wasn't the Graphics exam. held at the end of 1st term when Graphics finished?

★

The Engineering tutorials have been extremely interesting and worthwhile.

★

If you intend holding an Engineering camp may I suggest that it be for all engineers (if you only meant it for freshers, that is) and that some other faculty with a majority of female members also be invited. In so doing, the camp would enable the first years, like myself, to get to know older students as persons. And have a good time!

★

There is not enough information readily available for Engineering students to help them choose their course. There is no information on the type of careers which are available or the job opportunities that are available in the State or throughout Australia.
I chose Mechanical Engineering because it gave me the greatest scope for change to another course at the end of my first year.
It would be a good idea for Professor Bull to devote some tutorial time to this matter and so correct the waywardness of many first year students. Question: Are the 180 first year Engineers needed by the community?

★

This questionnaire is about first year's ideas about Uni. life. But I feel more could be done about "Prior Orientation and Guidance" with regards to Matriculation. Matric. students no matter how much counselling is given them have no idea of Uni. studies or life. This is so because the system in secondary schools does not allow them the freedom which is a major aspect of Uni. life. Unless the school system can be changed a lot more will have to be done to inform the matric. students of Uni. life. If the conselling is increased it will result in the students being informed about the respective faculties as well as Uni. life.

★

I feel that our students ought to try to at least acquaint themselves with the events around the world and some culture. I find many fellow students lacking in the vestiges of culture.

★

On the subject of image of engineering students I feel my ideas are more personal than those on the course; the greatest mistake I feel any education process can have

is developing a student in only one area and leaving him a moron in others. Engineering seems ot be a chronic case of specialising and leaving students a vegetable in the humanities. A great many Engineering students I have spoken to, hated humanitarian subjects like English, History, Languages, etc., and gave them up at school as early as possible to concentrate on the learning subjects, viz. science. Things where they have to think and discuss leave them struggling and the political meetings on the lawns, general politics, reading, etc., are written off as a waste of time, of no possible use (where a view is gained from these students, it is usually a naive, thoughtless comment usually echoed from what their parents think, e.g. "Give the Commos an inch and your done; demonstrators are ratbags," etc.) and so they race off to the library to learn notes parrot-fashion for exams. I feel that there should be some attempt to get students involved in the humanities, perhaps have them do an arts subject, without having to pass the exam. but just go to the lectures and tutes and read the books prescribed.
Prof. Bull in his weekly talks, which are most entertaining, is the only evidence I have found of the Engineering Faculty trying to interest students in anything other than cramming facts into their heads.

★

I do not believe that such generalisations of personalities (that the survey assumes) can be made. Ideas, views, interest, personalities would be as diverse in a class of 170 Engineering students as in any other similar sized group of randomly chosen people. Comparing a large group of Engineering students with an equally large group of Humanities (or any other) students is ridiculous.

★

Image of the Engineer. "Engineers the tools of capitalism", what a lot of rubbish. I would like to see any socialist system exist without engineers. The engineer is a conservative type bloke and usually won't take part in demos. This ires the radicals of the Uni. Why is the Engineer conservative?. Because he is a builder and person who doesn't tear things down.

★

Is the engineer still seen by those not in contact with the profession as a muscle-bound thug wandering around sewers and mines or driving bulldozers or trains, carrying a monkey-wrench in the back pocket of his overalls?. If so, why? Lack of communication between engineers and the rest of society? I believe that it is due almost solely to the lack of information given to or seen by the public about the great part engineers do in fact play in our present society.

★

A withdrawn person is destined for a gloomy experience of University life. University is a beautiful place to get lost. More so for Engineers, I think, because there are so many of them (compared with say Architecture) that a person is frustrated that he can't gain any more benefit from university other than a degree. There are no new friends, nothing stimulating (except in the books in the library) and a general snobbish air about the whole place, which seems to say to the ordinary worker— "People in this place are better than you — they will become the leaders of Australia in a short time." Dread the day! Why? Because at university they develop the skills, expertise, knowledge (call it what you like) which with see them as leaders in the future. Also they are conditioned to treat people as numbers — anonymous bodies — (Just like this survey does — it is used only as an exercise in statistics which is irrelevant to the purpose of finding the student FEELING — **not** how many like this and that lecturer).

★

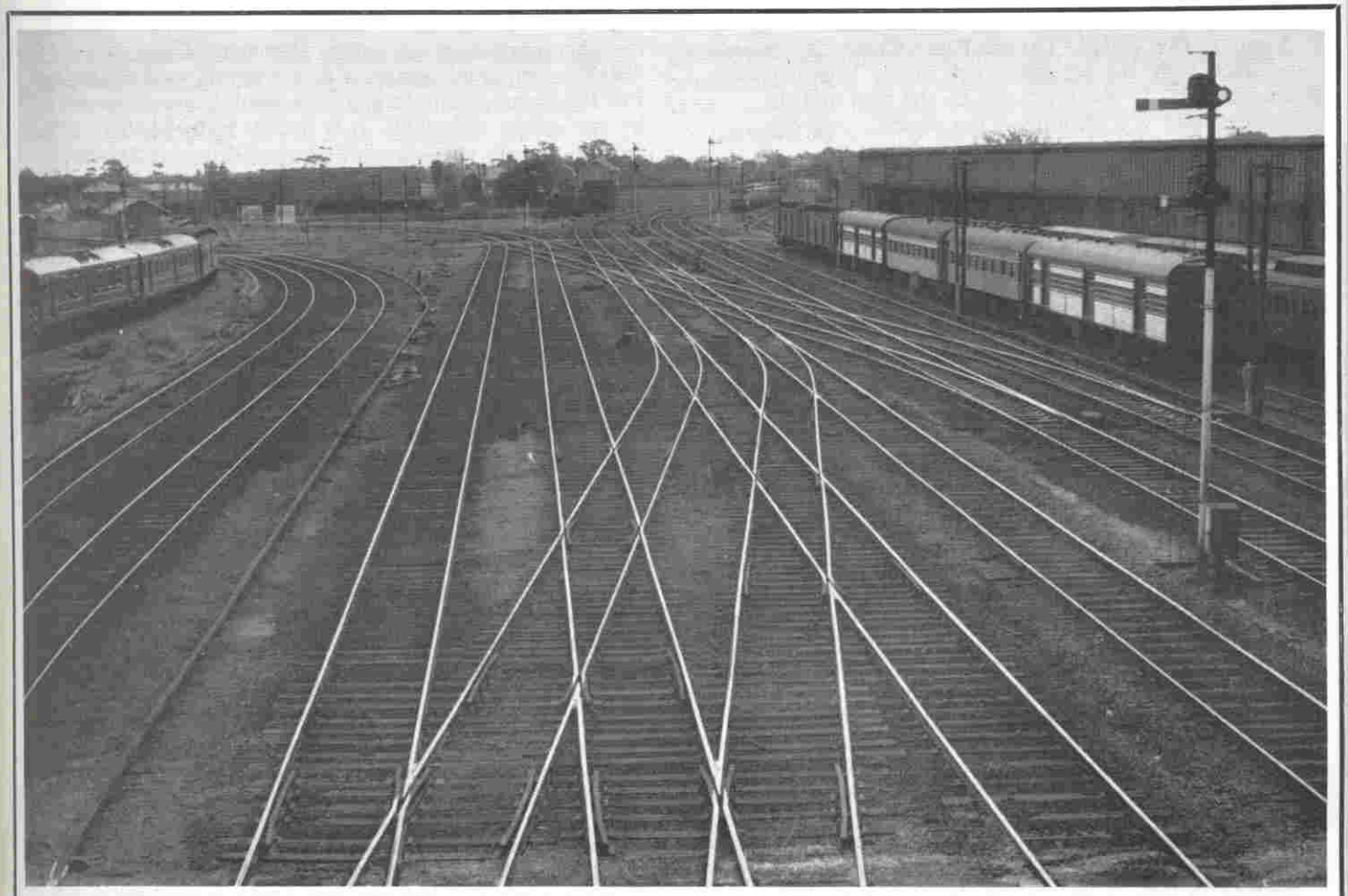
I feel there is no connection at all with the Society by first years. This year because of the large numbers room C101 is only being used once a week — Engineering Tutorials. (Which only one-half to two-thirds of the students attend anyway.) Last year we were in the actual Engineering building three days a week.

During camouflage training in Louisiana, a private disguised as a tree trunk had made a sudden move that was spotted by a visiting general.
"You fool!" the officer barked. "Don't you know that by jumping and yelling the way you did, you could have endangered the lives of the entire company?"
"Yes, sir," the soldier answered apologetically. "But if I may say so, I did stand still when a flock of pigeons used me for target practice. And I never moved a muscle when a large dog peed on my lower branches. But when two squirrels ran up my trunk and I heard the bigger one say, 'Let's eat one now, and save the other until later' — that did it."

"Mother always told me to be good . . . Was I?

Sleuthing

Lelde Vitols



influence lines slinking slithering while morning turns
the dawning dramatic black-red into deep grey,
culpable influence lines come creeping softly secretly
home, rest wearily, bloodshot eyes hung over
concrete bridges,
Hyperion rises warmly drying 'til every drop of
last night's orgy melts into air,
leaving limp lines crisp by midday,
now they stand to attention admired by the afternoon
Engee who notes with pleasure the stark contrast
'tween abstract and concrete.
but as the sinking setting sun carves away clear colours
the air fills with the slizz of light-headed lines
darting frollicking dodging gladly through girders,
stars reflecting the deep dampening dusk note
mischievous lines slipping from structures and away
to yet another night's revelry.

You can always pull the plug out...

Ross Patterson

A publication called "Up the Right Channels" recently emerged from the activist womb of the University of Queensland. It was produced by the staff and the students and is a critique of the structure and the function of the University. The published agglomeration of papers represents as many variations of opinion and background as there are contributors — the resulting discontinuity makes it ideal reading for those few relaxed minutes once or twice a day in the toilet. The Queensland engineering students seem to be a new breed. They have produced detailed reports for the faculty on the curriculum, and organised seminars. referenda, and opinion surveys. Two students were in fact financed by the Faculty over the 69-70 vacation to extend this work. We, in Adelaide, have a lot of ground to make up.

A further contribution to the text was "An Analysis," by a Mr. J. A. Job. It is a reasoned plea for social consciousness within the engineering profession. He asserts that the engineer should not first enquire "What kind of bridge do you want?" but rather "Why do you want to cross this river?" The popular desk-thumpers about the environment and pollution are used to prop up the analysis. He concludes with a paragraph entitled "Engineering Students Conformist." Though the earlier stuff is a little ill-considered, this is really safe ground. The ranks of the academic reform movement are characterised by a yawning chasm between "Education" and "English." The issue of student participation on the Engineering Faculty is illuminating. Apparently the Education committee enquired back in 1969 if some form of student representation was desired. The matter was favourably discussed but eventually dropped simply because of lack of interest on the part of students. Even the Dean's committee must be regarded as the product of the Faculty and not the students.

I have said some pretty disdainful thing about the A.U.E.S. for engendering football matches rather than seminars and surveys. However such endeavours would probably receive even less support than the current social cavorting and carousing.

A clinical examination of the engineer in a humanist context usually reveals the following symptoms: first the predilection for arbitrary authority, and secondly the denial of social responsibility followed by a mass exodus into some technocratic igloo. It has yet to be shown that these symptoms imply the existence of a disease.

The words above are a little tinted. You could, after all, claim that the Engineer is fulfilling a just and useful, if submissive, role within the existing environment. However I will try to show in a roundabout way that the patient does need treatment.

Implicit in the attitudes of many Engineers and educators is the belief that there is a more than immediate value in what they are doing. They are not merely fixing a leaky faucet. They are in some way contributing a small part of a higher good for humanity on behalf of technology. This could be tied to some Malthusian hang-up which you rarely hear explicitly stated. Malthus believed that the root cause of the woes of society was the phenomenon of an empty stomach. The "Malthusian Trap" amounts to a warning against charity. Fill the stomach and it will be replaced sooner or later by two empty stomachs. It is fondly believed that technology can provide a way out of this paradox, and the Affluent Society is proffered as justification. This belief is a little vulnerable. In the first place all technology can supply is the prerequisite, a full stomach. Given this, most people will ask for something extra to fill out the rest of their personality. Again the best technology can offer is optimum efficiency in the use of resources. Certain resources may appear to be created. One can imagine the population existing on synthetic fish and chips wrapped in polythene sheet. But this is an illusion, as any biologist will tell you. The world is not currently meeting its real food needs. The developed countries have flogged their own protein resources almost to death and are running down those of the rest of the world at a frightening rate.

Finally, the illusion of the affluent society has been shattered by better men than me. I give you Herbert Marcuse: "This world turns everything it touches into a potential source of progress and exploitation, of drudgery and satisfaction, of freedom and oppression." It seems that we must ultimately fill our stomachs at the expense of the rest of our existence. The gentleman is not talking about what might ideally arise. I don't think that an intrinsic contradiction in the marriage of technology and and society is implied. However the point remains that the affluent society offered as evidence will not stand up under cross examination. We must conclude that technology provides no escape and that we are fixing a leaky faucet; that and no more.

There is a parallel between this Malthusian thing and Marx's historical materialist thesis in which we find that technology provides the dynamics of a materialist (economic) basis for society. He allows no possibility of independent change originating from within the superstructure of art, ethics, politics and morals. The motive force is mindless technology and the actuating mechanism is the focus of social power. This gives a more realistic basis for the "technocratic igloo" mentioned previously. Of course with the present focus of power the retreat is enforced rigorously, but I think it is also true that the engineer has no historical prerogative to ask, "Why do you wish to cross this river anyhow?" The decisive act of an individual conscience from this strata would be repressed by any society.

In Fred Hoyle's "Andromeda" the baddies, played very effectively by the military-political beaurocrats, had provided for the construction of a super computer to a design that was decoded from a radio transmission from a distant galaxy. The hero, played by the technologist who had actually done all the hard work in building the device, suddenly saw the light and began to agitate vehemently. He tried to convince the baddies that, although the machine itself was neither good nor bad but quite passive, what was really wrong was that they were all losing control of it. "Nonsense, m'boy," quoth the military-politicos, "We can always pull the plug out!"

But the thing that had been planted in the culture had ingratiated itself by providing to excess all manner of goodies and by appealing to a whole range of human foibles. It had done this to such effect that all but the hero had come to consider it indispensible. The hero, as heroes are wont to do, ignored the democratic process and took it upon himself to put an axe through the monster and burn the design. He was immediately stomped all over by the forces of goodness and niceness and suffered the just wrath of a stricken society. As we flick over the last page we can imagine him rotting in a cell with the consolation of an untarnished soul and the 70-piece orchestra playing "The Impossible Dream."

There is the problem. It is possible to show that engineers, doctors, plumbers and other skilled tradesmen must accept an historically passive role, yet I would like to make a case for liberal studies and the possibility of such individual acts of conscience. How can such an active response be reconciled? I believe we can exit via the fire escape by allowing the possibility of an occasional independent perturbation within the superstructure.

The dialectic has been attacked here on logical grounds, and there is in fact evidence of such behaviour: for instance the socialist activism of the well-fed, middle class students. The alternative is emotionally abhorent to me. How could you regard people as entities reacting in a mechanically predictable manner to the exigencies of their material environment? Of course what I am advocating involves a sort of individual social schizophrenia. I believe the Faculty could produce not only passive technicians but also active human beings. The introduction of Psychology I into the course was justified because it would produce better engineers. This attitude is far too restrictive. By liberal studies I am referring to specifically non-directive or non-operational topics.

Such studies would indeed be a waste of precious time under the following conditions:

(i) If you sell out completely to the baddies of the piece,

(ii) If the engineer has the power to extricate himself and his fellows from the Malthusian mousetrap,

(iii) If the technologist can only make ripples via the mechanism of "mindless technology." I am convinced that many of the pressing problems of the day need an immediate humanist solution and not an inevitable materialist cataclysm.

We skilled tradesmen have been given the potential, on the assumption that we will not take advantage of it, to turn this world on its ear. The assumption has proved to be quite reliable. The "acquiescence to arbitrary authority" mentioned previously seems to be the result of environment rather than heredity. After a few years of vaguely liberal secondary education the engineering student is subjected to four years of intensive empirical training. At no time during these years is anyone interested in an original opinion on the part of the student. Empiricism is a blood brother of operationalism which denotes the merging of an idea with an associated set of operations. "We shall no longer permit ourselves to use as tools in our thinking, concepts of which we cannot give an adequate account in terms of operations." (P. W. Bridgeman). The four years of study has a mind-contracting effect. The world is reduced to operational terms where the engineer either has the solution or has the potential to solve all **allowable** questions. I have heard it said: "The value of a professional engineer is his unique ability to isolate the problem and get on with the job." If this is an asset then the achievement is indeed pyrrhic. The disease is not restricted to engineers but seems to be entrenched in most "highly developed" civilisations. It results in an unquestioning mobilisation for arbitrarily imposed ends. Questions and alternatives are not stood up against a wall and shot, but merely dissolved by a wave of uncomprehending stares.

The engineering student for four years is isolated from the cornucopia. He is given an unusual perspective and an unusual potential, which should not be usurped. Flanders and Swan have an excellent little ditty about a cannibal chief and his young son. The tribe's way of life is based on the consumption of their fellows and has been for centuries. Yet young Alfred wakes up one morning brimming over with transcendence and announces to the world, "I won't eat people! Eating people is wrong." What he has achieved is a break in a closed ecological chain. What I am talking about is the possibility of pulling the plug out. As students we have the chance to investigate without duress, to study with no thought of material gain, and to experiment without fear of calamitous redress. These things seem to occur infrequently in engineering faculties. Our graduates march out through the portals chanting, "Produce. Produce. Produce" to the sound of a distant drum. It's hard to say exactly who is beating the drum.

A.P.E.A. Survey

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This year the Melbourne University Appointments Board issued its third report on professional incomes in Victoria.

The latest report analyses the results of a survey based on 16,030 completed return from men and women who were members of the relevant professional institutions. The anonymous questionnaire asked for age, professional qualifications, nature of employment and salary or personal income as at June 30, 1969.

The report draws the general conclusion from the survey that "while all professions represented in the 1956 survey improved their incomes relative to average earnings in the community over the period 1956 to 1969, this improvement occurred over the first eight years of the period, and from 1964 to 1969, their relative incomes gradually declined. The incidence of taxation on higher income earners would have accentuated this relative decline in profession incomes during these five years."

The report notes that since the data for the survey was collected, salary increases have been granted to engineers and scientists. Other groups which have received increases of 10% or more since December 1969 include Commonwealth Public Service medical officers, psychologists and surveyors.

The median salary figure of engineers employed by the Commonwealth (18.4% of all engineers in the sample) was $6780, with a median age of 40. The APEA survey carried out in 1967 showed that 1907 engineers employed in the Commonwealth Public Service had a median salary of $5940 at that time. The median salary of 389 engineers in Commonwealth instrumentalities was $6810.

The median salary of all engineers included in the M.U.A.B. 1969 survey was $6950, with a median age of 39.

Our 1967 survey, which of course excluded employers and sole practitioners, produced an overall median salary of $6040, with a median age of 37.

An important difference between the two surveys is that while the APEA survey included recent graduates, the M.U.A.B. sent questionnaires only to corporate members of the Institution, who would normally be engineers with at least four years' experience after becoming qualified.

Of the groups included in the 1956 survey, engineering incomes have had the lowest percentage increase in the period 1956 to June 1969 — 75.5%. Incomes of dentists rose by 166.7% and medical practitioners by 90.3%.

The median incomes of medical practitioners as at June 1969 were:

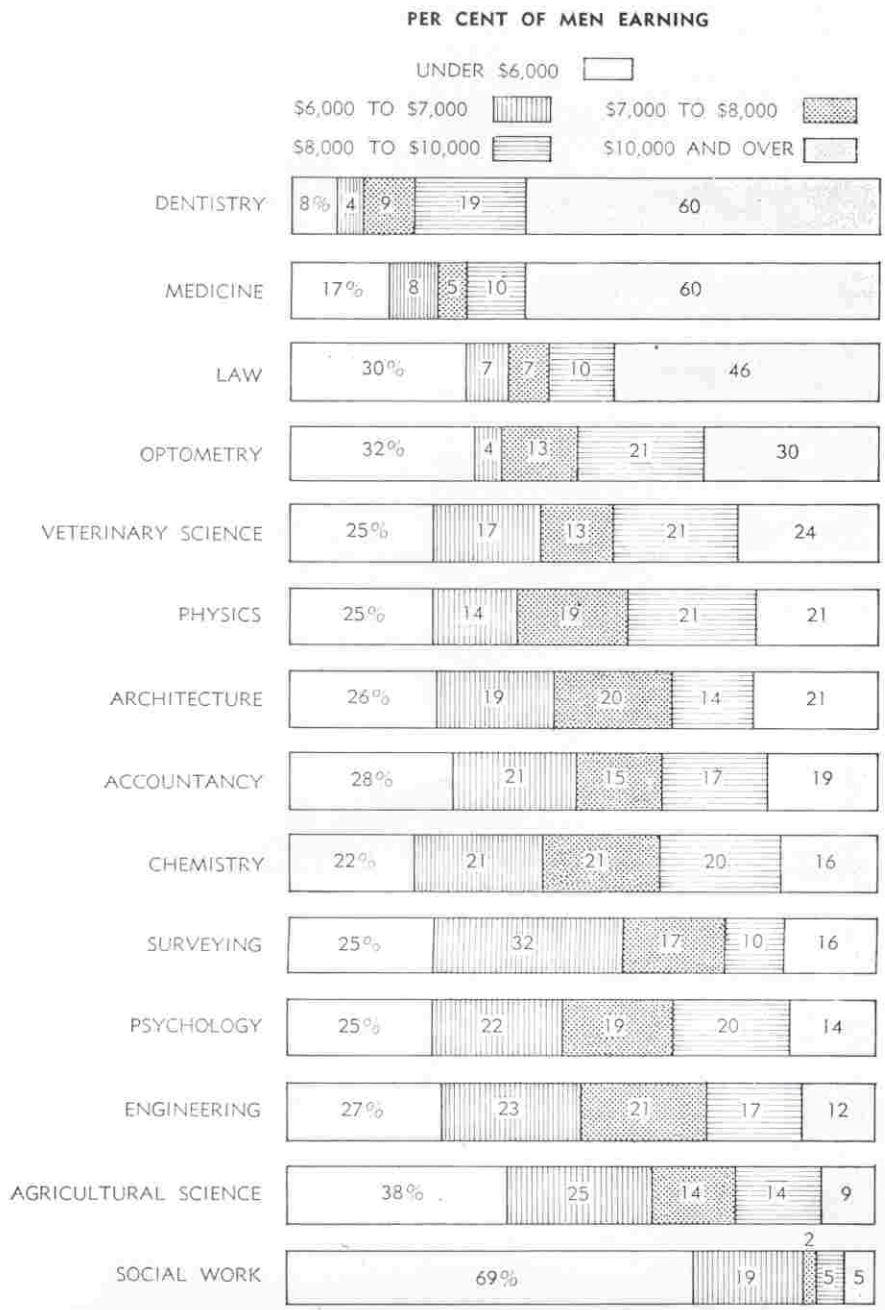
Partner in professional practice, $14,940
Sole practitioner, $14,000
Employee of professional practice, $9,000
Employee of Commonwealth Government, $7,800

Median Incomes According to Employer/Profession Groups

Profession	How Employed	Median Income $	Median Age (Years)
Medicine	Partner in Professional Practice	14,940	43
Dentistry	Partner in Professional Practice	14,000	40.5
Medicine	Sole Practitioner	14,000	43
Law	Partner in Professional Practice	13,000	38
Veterinary Science	Partner in Professional Practice	12,460	39.5
Engineering	Partner in Professional Practice	12,000	42
Dentistry	Sole Practitioner	12,000	44
Accountancy	Partner in Professional Practice	12,000	44
Surveying	Partner in Professional Practice	10,250	39
Veterinary Science	Sole Practitioner	10,000	40
Law	Sole Practitioner	10,000	43
Engineering	Sole Practitioner	9,750	43
Architecture	Partner in Professional Practice	9,570	45
Medicine	University	9,380	36.5
Medicine	Employee of Professional Practice	9,000	41
Law	Industry and Commerce	8,820	39
Engineering	University	8,380	38.5
Psychology	University	8,300	39
Agricultural Science	University	8,190	35.5
Optometry	Sole Practitioner	8,150	44
Accountancy	Sole Practitioner	8,080	47
Veterinary Science	University	8,060	34
Physics	Industry and Commerce	8,000	40
Architecture	Sole Practitioner	8,000	43
Dentistry	State Government	8,000	43
Dentistry	Employee of Professional Practice	7,940	26
Physics	University	7,900	37.5
Medicine	Commonwealth Government	7,800	41
Agricultural Science	Commonwealth Government	7,490	48
Engineering	Municipal Authority	7,470	39
Accountancy	Municipal Authority	7,420	45
Physics	Commonwealth Government	7,350	40
Chemistry	University	7,300	36
Engineering	Institute of Technology	7,300	42
Chemistry	Industry and Commerce	7,200	41
Veterinary Science	Commonwealth Government	7,200	43
Chemistry	Commonwealth Government	7,180	43
Physics	Institute of Technology	7,100	39
Agricultural Science	Industry and Commerce	7,100	40
Chemistry	Institute of Technology	7,100	40.5
Accountancy	University	7,060	40
Engineering	Industry and Commerce	7,050	36
Engineering	Employee of Professional Practice	7,000	34
Accountancy	Industry and Commerce	7,000	42
Architecture	Commonwealth Government	7,000	49
Accountancy	State Government	6,790	46
Engineering	Commonwealth Government	6,780	40
Engineering	State Government	6,660	40
Chemistry	State Government	6,580	42.5
Medicine	State Government (including Public Hospitals)	6,500	30
Psychology	Commonwealth Government	6,480	37.5
Psychology	State Government	6,450	42
Psychology	Industry and Commerce	6,400	32
Accountancy	Commonwealth Government	6,380	44
Accountancy	Institute of Technology	6,250	41.5
Architecture	State Government	6,200	46
Surveying	State Government	6,180	41
Architecture	Employee of Professional Practice	6,130	37
Agricultural Science	State Government	6,110	37.5
Veterinary Science	Employee of Professional Practice	6,000	26
Surveying	Employee of Professional Practice	6,000	30
Accountancy	Employee of Professional Practice	5,970	31.5
Veterinary Science	State Government	5,850	29
Social Work	State Government	5,650	39
Law	Employee of Professional Practice	4,320	26

Movements in Incomes in Certain Professions 1956—1964—1969

Profession	Median Incomes $			Increase in Incomes (per cent)		
	1956	1964	1969	1956 to 1964	1964 to 1969	1956 to 1969
Accountancy	3,140	5,000	7,000	59.2	40.0	122.5
Agricultural Science	3,120	4,880	6,380	56.4	30.7	104.9
Architecture	3,620	5,700	7,100	57.4	24.6	96.1
Chemistry	3,420	5,600	7,120	63.7	27.1	108.2
Dentistry	4,220	8,160	11,000	93.4	34.8	166.7
Engineering	3,960	6,180	6,950	56.1	12.5	75.5
Law	4,620	7,000	8,820	51.5	26.0	90.9
Medicine	5,780	8,800	11,000	52.2	25.0	90.3
Optometry	—	6,000	8,000	—	33.3	—
Physics	—	6,500	7,350	—	13.1	—
Psychology	—	5,240	7,000	—	33.6	—
Social Work	—	4,400	5,280	—	32.0	—
Surveying	3,600	4,000	6,510	22.2	44.0	80.8
Average Male Earnings — Victoria	2,054	2,780	3,830	35.3	37.8	86.2



Private Industry Awards

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Federal awards binding on companies and registered employers' organisations in private industry prescribe the minimum salary rates which an employer is legally bound to pay to a professional engineer. They provide the basis on which salaries appropriate to the duties and responsibilities of a particular position are negotiated between the professional engineer and his employer.

The minimum salary rates and definitions applying to Qualified Engineer and Experienced Engineer in the private industry area as from December 1969 are as follows:

Qualified Engineer, $3867 p.a.
Qualified Engineer (Graduate), $4213 p.a.
Experienced Engineer, $5851 p.a.

The awards prescribing these minimum rates also contain provisions as follows:

Definitions

"Association" shall mean The Association of Professional Engineers, Australia.

"Professional engineering duties" shall mean duties carried out by a person in any particular employment the adequate discharge of any portion of which duties requires qualifications of the employee as (or at least equal to those of) a Graduate member of The Institution of Engineers, Australia.

"Professional engineer" shall mean an adult male person qualified to carry out professional engineering duties as above defined. The term "professional engineer" shall embrace and include "qualified engineer" and "experienced engineer" as hereinafter defined.

"Qualified engineer" shall mean a professional engineer other than an "experienced engineer" as hereinafter defined, that is, it shall mean a person who is or is qualified to become a graduate member of The Institution of Engineers, Australia.

"Graduate" shall mean a qualified engineer who is the holder of a university degree (4 or 5 years' course) recognised by The Institution of Engineers, Australia.

"Experienced engineer" shall mean a professional engineer with the undermentioned qualifications in any particular employment the adequate discharge of any portion of the duties of which employment requires qualifications of the employee as (or at least equal to those of) a Member of The Institution of Engineers, Australia.

The aforesaid qualifications are as follows:—

(a) that he has attained the age of 25 years, and
(b) (i) that he is a Member of the said Institution, or
(ii) that he, having graduated in a four year or five course at a university recognised by the said Institution, has had four years experience on professional engineering duties since becoming a qualified engineer, or
(iii) that he, not having so graduated, has had five years of such experience.

Salary according to levels of responsibility

In some important industries, awards have been made which prescribe minimum salary rates for professional engineers exercising defined levels of responsibility. These are: civil engineering construction, the oil companies, the chemical industry, automobile manufacturing (the vehicle industry), firms of consulting engineers and companies which employ professional engineers on space-tracking.

All of these awards prescribe two minimum salary rates above the Qualified Engineer/Experienced Engineer ("Group A") level:

Group B, $6319 p.r.
Group C, $7385 p.a.

The levels of responsibility described in the **Professional Engineers (Construction Industry) Award,** which are intended to represent levels of responsibility broadly equivalent to those of Commonwealth Public Service Engineers Class 2 and Class 3 respectively, are:

GROUP "B"

Duties

Is responsible for the design and/or planning and/or estimating of engineering projects or the supervision of construction work involving buildings, roads, jetties, and other projects.

Requires application of mature engineering knowledge, with scope for individual accomplishment and co-ordination of difficult and responsible assignments.

Recommendations and Decisions

Recommendations reviewed for soundness of judgment, but usually accepted as technically accurate and feasible.

Supervision Received

Subject to periodic supervision, work is carried out within broad outline, but informed guidance is available from superior authority.

Authority and/or Supervision Exercised

Assigns and outlines work of subordinate staff in his section or project which may include other professional engineers.

GROUP "C"

Duties

Required to perform professional engineering design or estimating work involving independence in approach and demanding a high degree of originality or takes responsibility for important projects as to all assigned aspects of management, including costing, budgeting, and must be able to negotiate direct with representatives of the principal in submission of claims, pricing variations and finalising contract amounts.

Recommendations and Decisions

Makes responsible decisions not usually subject to technical review on all matters assigned, except those involving large sums of money or long-range objectives.

Supervision Received

Work is assigned in terms of broad objectives and is reviewed for policy, soundness of approach and general effectiveness, with guidance in terms of specific objectives and critical issues.

Authority and/or Supervision Exercised
Supervises a group or groups containing both qualified and non-qualified staff, or may exercise authority over a group of qualified professional personnel engaged in complex technical applications.
In the **Professional Engineers (Consulting Engineers)** Award the descriptions of the responsibility levels are the same as those used by the Commonwealth Public Service for Engineers Class 1, Class 2 and Class 3 respectively:

GROUP "A"

Definition
Under technical direction as to method of approach and requirement, performs professional engineering work.
Is normally required to carry out technical work of a high standard and responsible nature under the general guidance of more senior members of the profession.
Exercises limited independent selection and application of established principles, techniques and methods requiring some individual judgment, initiiative, adaptation, modification and co-ordination.

Characteristics of Group
This Group includes the qualified engineer without experience in the practice of the profession who is not merely a trainee but who is immediately capable of carrying out technical work of a high standard and responsible nature under the general guidance of more senior members of the profession. Performs useful and essential work as a member of a team.
May be required to supervise and/or co-ordinate staff, machines and equipment engaged in related engineering tasks.

General Features of Duties
In this Group are positions the duties of which may include:

- ★ drafting less complex orders, instructions, plans, specifications and reports;
- ★ detailed design and investigation work requiring professional treatment including the application of higher mathematics;
- ★ inspecting field and other facilities and activities to assess and report on standards;
- ★ general liaison to obtain basic data and information;
- ★ assembling and presenting basic data in a co-ordinated and useful form;
- ★ supervising and/or inspecting projects and preparing reports for higher authority;
- ★ issuing professional advice;
- ★ setting out and measuring work including checking thereof;
- ★ supervising engineering contracts;
- ★ planning and allocating tasks according to an approved programme of work and supervising the subordinate staff;
- ★ ensuring that work is performed according to prescribed standards and specifications.

GROUP "B"

Definition
Under general direction as to approach with guidance on novel, controversial and more important problems, performs professional engineering work primarily associated with a distinct group of activities. Requires initiative, judgment and some originality in the independent evaluation, adaptation, modification, co-ordination, selection and application of established principles, techniques, equipment and methods.

Characteristics of Group
A professional engineer with considerable experience who is required to contribute more independently to engineering work either as an individual or as a member of a team:

who may make unreviewed technical decisions on details of work covered by precedents;
who may be required to supervise and/or co-ordinate the work of a specific geographical or functional group;
who may require knowledge and capacity to interpret the application of regulatory requirements and standards in relation to engineering activities.

General Features of Duties
In this group are positions, the duties of which may include:

- ★ planning and allocating activities according to an approved programme and directing the subordinate staff;
- ★ making some original contribution and/or applying new approaches and techniques to design and development of equipment or specific aspects of facilities;
- ★ contributing to planning within defined limits such as planning the provision of a specific engineering facility;
- ★ investigating, examining and recommending for approval, methods and procedures, designs, drawings, specifications and any requests for concessions;
- ★ drafting technical instructions, specifications, standards, manuals, reports, submissions, directions and works estimates;
- ★ undertaking investigations, preliminary and revision surveys of facilities and equipment;
- ★ supervising more important engineering contracts.

GROUP "C"

Definition
Within approved policies and programmes and with guidance in terms of specific objectives and critical issues is responsible for and performs professional engineering work relating to significant geographical and/or specialised groups of activities, requiring originality, ingenuity and judgment.

Characteristics of Group
At this level a professional engineer, as an individual or team leader, is required ot perform professional engineering work involving considerable independence in approach and which demands a higher degree of originality. Makes decisions on engineering details and methods after consideration of alternative approaches.

General Features of Duties

In this Group are positions, the duties of which may include:

* planning and allocating work within an approved programme relating to groups of activities and managing and controlling the subordinate staff;
* reviewing reports, orders, instructions;
* accepting responsibility for modifications of standards and specifications in aspects of detail to suit local conditions;
* examining tenders for contract work and making recommendations thereon;
* investigating and recommending alterations to design, construction and manufacture to improve effectiveness and efficiency of equipment;
* assuming responsibility as project officer for major engineering projects;
* controlling specific geographical or functional groups;
* developing new and improved techniques, procedures and standards, accepting responsibility for details;
* assuming final technical responsibility for details of design;
* assisting in developing specialised engineering systems, facilities and functions.

Oil Companies, chemical industry

The descriptions of responsibility levels in the awards covering the oil companies and the chemical industry are identical and with the exception of one word, they appear also in the awards which apply to the vehicle and space-tracking industries:

GROUP "B"

Duties

He requires the application of mature engineering knowledge with scope for individual accomplishment and co-ordination of difficult and responsible engineering assignments. He deals with problems for which it is necessary to modify established guides and devise new approaches.

He may make some original contribution and/or apply new approaches and techniques to design or development of equipment or specific aspects of facilities.

Recommendations and Decisions

His recommendations may be reviewed for soundness of judgment, but are usually regarded as technically accurate and feasible. He makes responsible decisions on matters assigned, including the establishment of engineering standards and procedures.

Supervision Received

Work is carried out within broad guide lines requiring conformity with overall objectives, relative priorities and necessary co-operation with other units. Informed technical guidance may be available.

Supervision Exercised

He outlines and assigns work and reviews it for technical accuracy and adequacy. He may plan, direct and co-ordinate the work of other professional engineers and may also supervise other professional and technical staff.

GROUP "C"

Duties

He is required to perform professional engineering work involving considerable independence in approach and demanding a considerable degree of originality, ingenuity and judgment. He requires knowledge of more than one field of engineering or is an expert in a particular field of engineering. He initiates and/or participates in short and long range planning and makes independent decisions on engineering policies and procedures within an overall programme. He gives technical advice to management and operating departments. He may take detailed technical responsibility for the development and provision of specialised engineering systems, facilities and functions.

He co-ordinates work programmes and directs or advises on the use of equipment and material.

Recommendations and Decisions

He makes responsible decisions not usually subject to technical review. He decides courses of action necessary to expedite the successful accomplishment of assigned projects. He may make recommendations involving large sums of money or long-range objectives.

Supervision Received

Duties are assigned only in terms of broad objectives and are reviewed for policy, soundness of approach, accomplishment and general effectiveness.

Supervision Exercised

He supervises groups* containing professional engineers and other staff and/or may exercise authority and technical control over a group of qualified professional personnel engaged in complex engineering applications. (*The words "groups" is changed to "a group or groups" in the Awards applying to the vehicle and space-tracking industries.)

Airlines

The Professional Engineers (Airline Operators) Award prescribes 7 salary ranges, as follows:

$3867 — $5851
$6275 — $7028
$6805 — $7672
$7416 — $8346
$8062 — $9037
$8742 — $9402
$9816 —$10,496

Professional engineers are assigned salary ranges within these groupings on the basis of the duties and responsibilities of the positions occupied.

Conditions in Private Industry

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Association industrial staff receive many inquiries from members employed in private industry seeking guidance as to the general conditions of employment which prevail in that field of employment.
In addition to this general information, many ask for recommendations from the Association as to what standards we believe should apply to professional engineers in private industry.
The following guide attempts to provide a general answer to these problems. It covers the majority of conditions matters which are of concern to professional engineers. Specific inquiries should be directed to the industrial officer in your State.

Annual Leave: State legislation in general provides for three weeks annual leave. This should be regarded as a minimum only. APEA considers that a more appropriate period of annual leave for a professional engineer is four weeks. This standard is at present appalling in public authorities in N.S.W. and in some private industry companies. Additional leave is normal for persons stationed in remote or tropical localities.

Sick Leave: Generally the standards of sick leave in private industry have been set against the background of arbitration awards, which usually provide for at least one week per annum sick leave. Allowable periods of accumulation vary but a substantial number of awards now provide for unlimited accumulation. In most cases sick leave is forfeited if untaken on termination of employment. APEA considers that sick leave for a professional engineer should be 10-15 days per annum on full pay. Accumulation should be unlimited.

Long Service Leave: State legislation in general provides for 13 weeks long service leave after 15 years' service then 4-1/3 weeks for each 5 years completed service. Leave is to be taken at a mutually agreed upon time or at the employer's discretion. Pro-rata leave after 10 years' service is provided subject to reasons for termination. Generally, the quantum of long service leave provided by Federal arbitration awards is similar. APEA considers that professional engineers should be granted long service leave at the rate of 4½ months after 15 years' service then 3/10th of a month for each completed year of service thereafter. Leave to be taken at a mutually agreed time. Pro-rata leave should be based on the following minima:—

(i) a pro-rata payment on retirement, retrenchment or death before 15 years' service,

(ii) a pro-rata payment on resignation (or any reason) after 10 years' service.

Casual Leave: A number of arbitration awards provide for compassional leave on the death of a family member or near relative. Leave, with pay, is usually for a maximum period of two days.

APEA considers that professional engineers should be entitled to paid leave for pressing personal reasons up to 3 days per annum, cumulative to 6 days.

Superannuation: A considerable and complex variety of schemes operate in private industry. Some firms operate and administer their own schemes; some have retirement insurance schemes tailored to fit their needs by large life offices.

APEA expects to have operating this year a superannuation scheme for its own members. This will provide a member with a stable scheme to which he can contribute no matter who he is employed with. His contributions can remain with the scheme no matter how many times he changes his employment. Full details of the scheme will appear in "The Professional Engineer."

Hours of Duty: Standard hours of work, under Federal legislation, are at present 40 per week. In private industry varying conditions apply depending on the employer's particular requirements.

As a matter of policy, APEA has considered that the hours of duty for a professional engineer should be confined as far as practicable to 35 per week.

Overtime: The most general standard at present applying to employees under arbitration awards is for overtime to be paid on the basis of time and one half for the first three hours and double time thereafter.

APEA considers that professional engineers should not normally be involved in overtime work. However, if regular overtime is to be worked, at the employer's discretion, this should be paid for at the rate of time and one half.

Acceptable alternatives would be time off in lieu of overtime worked or additions to annual leave.

Meal Allowance: The most widely accepted standard for meal allowance payments is $1.

APEA considers that professional engineers required to work beyond a normal meal break should be paid a meal allowance of $1.50.

Accommodation: APEA suggests that you should ask a prospective employer for inspection of his office or factory, and if the standards observed seem low, call at the Association offices and discuss the matter.

Recording of Attendance: APEA recommends that if an employer requires an attendance record from a professional engineer, such a record should be kept by means of a personal diary, maintained by the individual professional engineer and available for regular inspection by the employer.

Travelling Allowance: APEA considers that professional engineers should be reimbursed all reasonable expenses incurred while travelling on an employer's business.

Mode of Travel: Professional engineers should be entitled to first class travel by air, sea or road.

Vehicle Allowance: When required to use his private vehicle on company business, a professional engineer should be paid a minimum alowance of ten cents per mile.

One Last Matter . . .

Remember when negotiating a new employment contract that all conditions, salary arrangements and any other arrangements should be set out in writing so that you have a picture of the entire position available to you before making a final decision.

GET IT IN WRITING!

David Fensom/*A first year student expresses some thoughts on our society and the engineers in it.*

Throughout the past twenty to thirty years it has become increasingly obvious that quite a large number of engineers have lacked foresight and have not been fully aware of the social and economic consequences of their actions. The engineers of the world have been given the task of advancing civilisation but often engineering feats have an adverse effect. The potential of engineers as advancers of humanity has yet to be fully realised. Most engineering students I know do not care what they build just so long as they make a comfortable living — football, study and beer are their pastimes and they are sure that they are safe in the society that they will later be building. But nuclear war has been made a possibility by engineers, in fact wars are perpetrated by engineers, and wars do not advance civilisation — any true Christian would tell you that. What is in fact needed is some humanities included on the engineering syllabus specifically designed to show a budding engineer that he has the capability to build but also the power to deliberately or inadvertently destroy. There would be no troubles as far as timetables go, chemistry equations could be printed out and learnt parrot fashion at home, whilst one term of incoherent Dynamics lecturing could be left out. The university may lose some revenue but it would be facing a very real situation in society where technology is removed from advancement of society and becomes technology for its own sake or for power.

The impact of technology has been to deaden the critical mind (some "respectable" citizens believe the ends justify the means) and to weaken the will to live. The pollution of the world is directly the engineer's fault as are many other problems we face, such as a car-crazed society. One can blame the owners of companies for the problems but the fact is engineers actually produced the problem — ask a lawyer about that one.

I think a general underlying discontent exists in our society but middle class people have not the money to stand up for themselves and the upper class likes it the way it is, and this discontent is due basically to the dirty dollar. The university in changing the syllabus would recognise the underlying discontent and hopefully do something to relieve it. But what university would look to the future?

Power Towers

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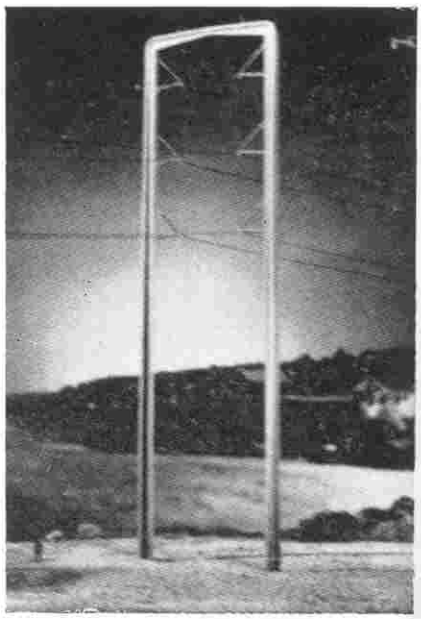
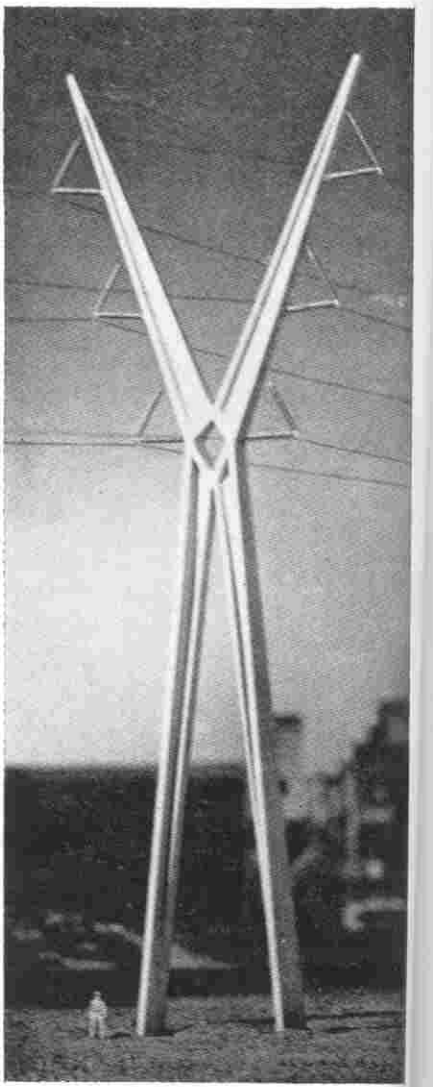




This 162 ft. high concrete radio mast shows what can be done. Built in England for the Durham County Police headquarters, the entire structure was precast in five elements. The mast was designed by Ove Arup and Partners and received a special mention in the British Concrete Society's 1969 awards.

Australia, they say, is the country where the living trees are cut down and the dead trunks erected to carry an ugly assortment of power lines, lighting fixtures, road signs et al. But while this least attractive facet of our suburban life has been widely publicised, little is heard of equally unattractive elements marching through our bushland.

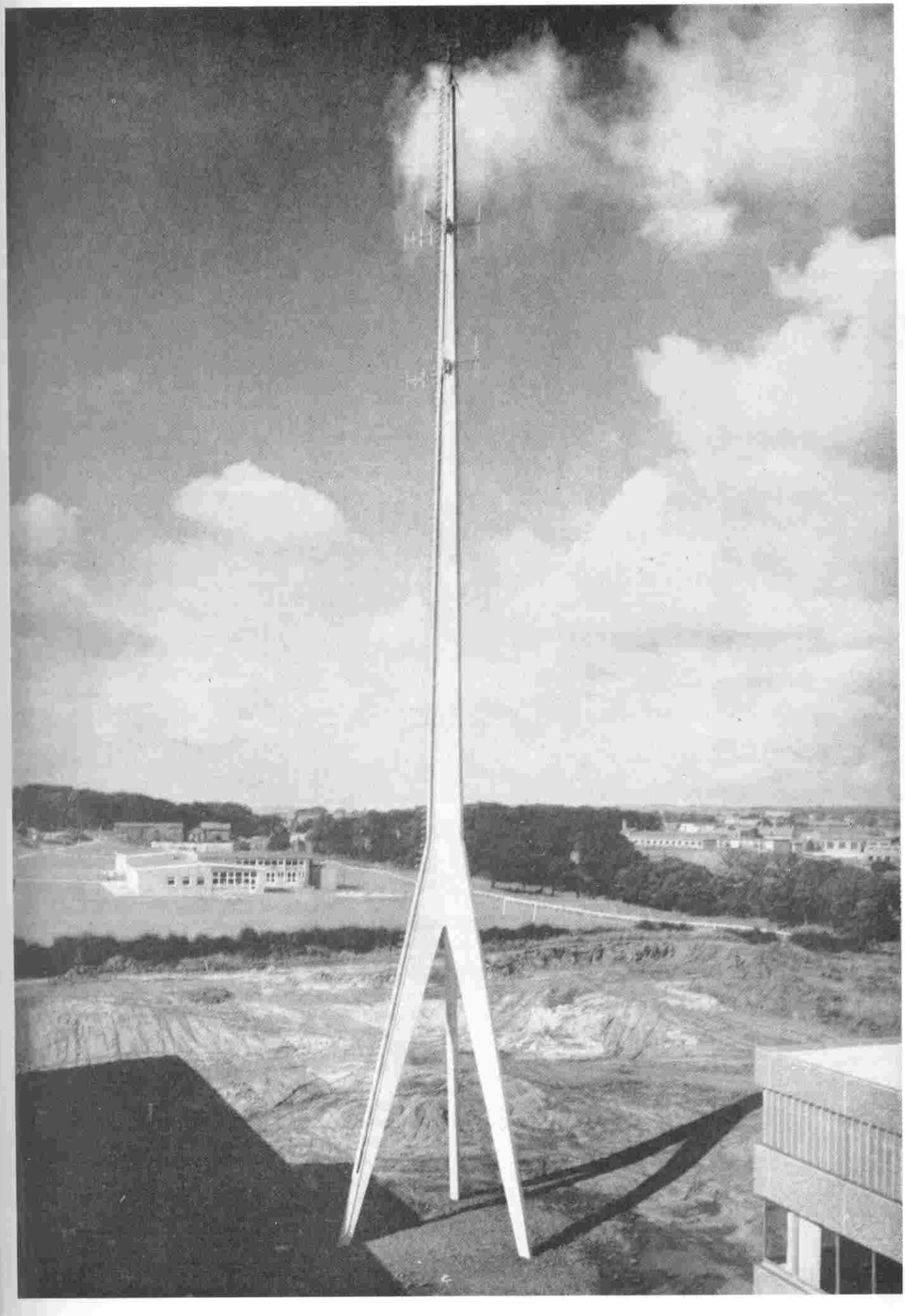
Once considered a proud symbol of progress, the high voltage transmission tower is becoming regarded as an unnecessary eyesore. In the years ahead, technological advances in this country will continue to make an impact on the countryside as power grids, micro-wave links and television relays are extended. The various authorities concerned with the supply and distribution of light and power are conscious of the problem but point out that there are severe technical difficulties involved in the installation of underground power lines and the attendant rise in costs. Again, micro-wave transmission and direct television broadcasting will probably always require above ground support elements. The obvious answer is that if we must have these structures, they should be acceptable aesthetically and constructed in a manner which leads to their integration into the landscape.

With this in view, the Electric Research Council of the United States has already engaged an industrial designer to create a group of towers which are both pleasing and structurally sound.

Mr. Henry Dreyfuss of the Dreyfuss organisation has designed some 100 towers up to 150 ft. in height and capable of supporting transmission lines carrying half a million volts. His design concepts are distinguished by the fact that the concrete towers in particular bear little resemblance to conventional lattice-work system. Whether required for urban, industrial or residential environments, each tower relates to its own particular location and it takes little imagination to visualise the benefits this type of creativity could bring to this country. Two of the designs are pictured here. One of these, called the "Portal", features a simplified web and flange cross-section. Its slim silhouette employs a unique insulator pattern combining post and suspension units which completely eliminates the need for support arms. The X-shaped design displays a sculptural quality allied to heavy strucural capacity and provides the necessary separation of the conductors. As precast concrete elements, these towers could be assembled in the field with a minimum number of connections and would require little maintenance.

As Dreyfuss says, "When transmission towers are given the same purity of expression accorded to a great bridge, then they, too, may be acclaimed as Twentieth Century art form."

Perhaps an Australian equivalent of Mr. Henry Drefuss is already at work in this country and we may yet see an end to so much needless ugliness in our cities and in the countryside.



Crafers Footbridge

Reprinted from "Construction Review"
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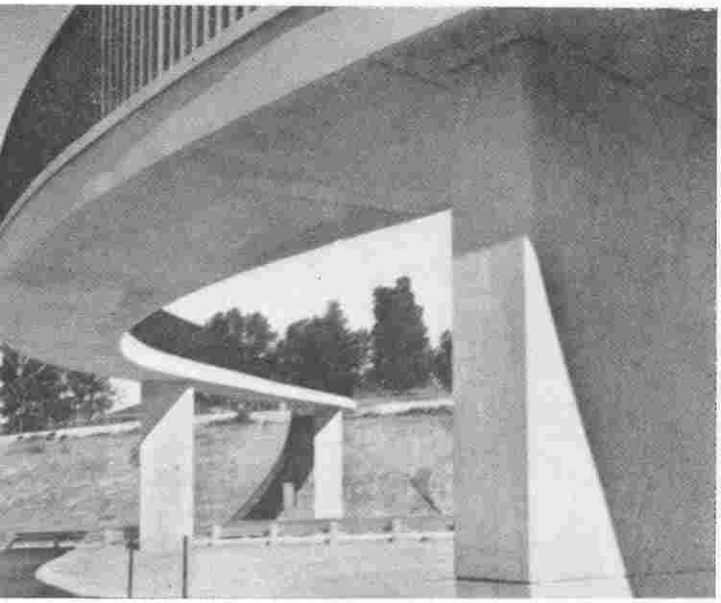


Location: South Eastern Freeway, Adelaide
Design: Highways Department of South Australia
Contractor: L. M. Robinson Construction Co.

The construction of a freeway through the hills township of Crafers in South Australia divorced the school and shopping facilities on the northern side from the main residential area on the southern side. On the road linking Crafers and Belair, a vehicular overpass bridge was provided for local cross traffic but a pedestrian bridge over the freeway was considered necessary for school children.

At the site of the footbridge the difference in levels between the southern abutment and the approach to the northern abutment, adjacent to Crafers main street, is approximately 25 steps. If steps were to be eliminated, a graded footbridge had to be provided. The design utilises a flat "S" shaped curve on plan giving a grade of 1 in 14 which is considered acceptable to pedestrians. A minimum clearance of 20 feet was provided for freeway traffic.

Using a variety of materials, several preliminary designs were investigated. The scheme finally adopted employed a thin ribbon-like continuous reinforced concrete slab of four spans with slender piers and an overall developed length of 355 feet. The deck slab is 20 inches thick and continuous over three spans of 87 feet 6 inches, and one of 90 feet. The deck is 7 feet wide overall, giving a clear width of 6 feet between handrails. The span/depth ratio of the deck slab is approximately 53 to 1. The three piers are 18 inches thick and 5 feet wide varying from 15 to 27 feet in height above ground level. The abutments are of normal reinforced concrete construction and spread footings have been used throughout.

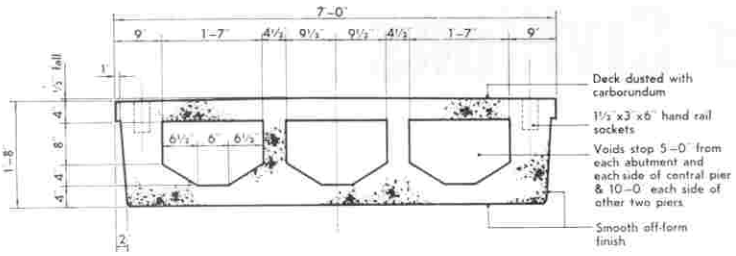
Three voids, each 1 foot 7 inches wide and 1 foot deep overall were introduced over the major portion of the length of each span to reduce the dead weight of the deck slab.

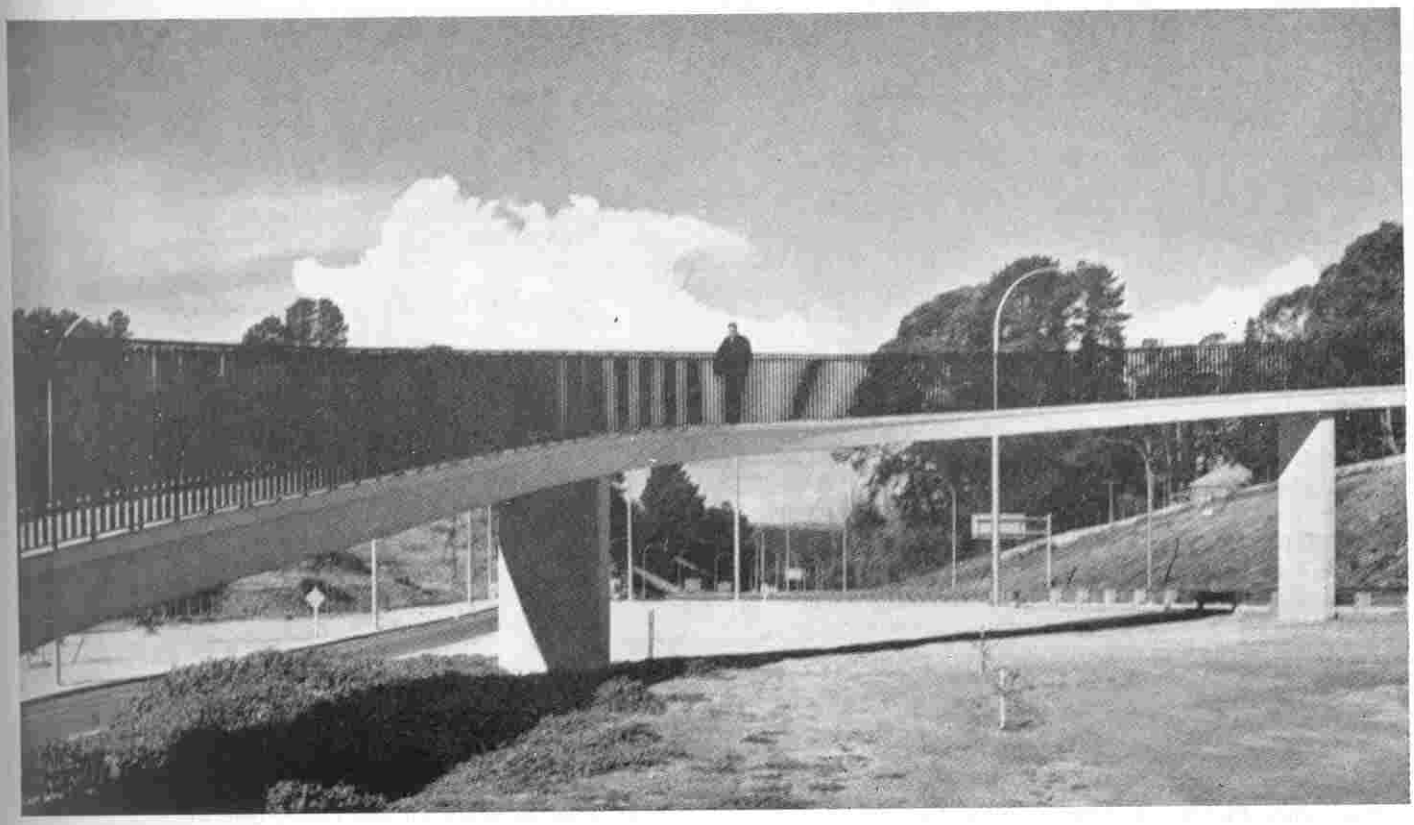
The only completely solid portions are at abutments and over piers to satisfy shear and torsion requirements. Stainless steel bearings employed at all piers and abutments have been concealed for maintenance and aesthetic considerations.

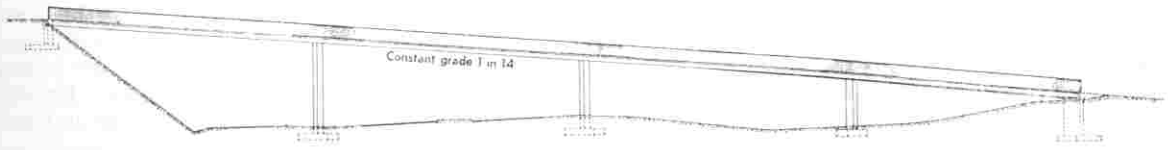
A light steel handrail has been provided for pedestrian protection.

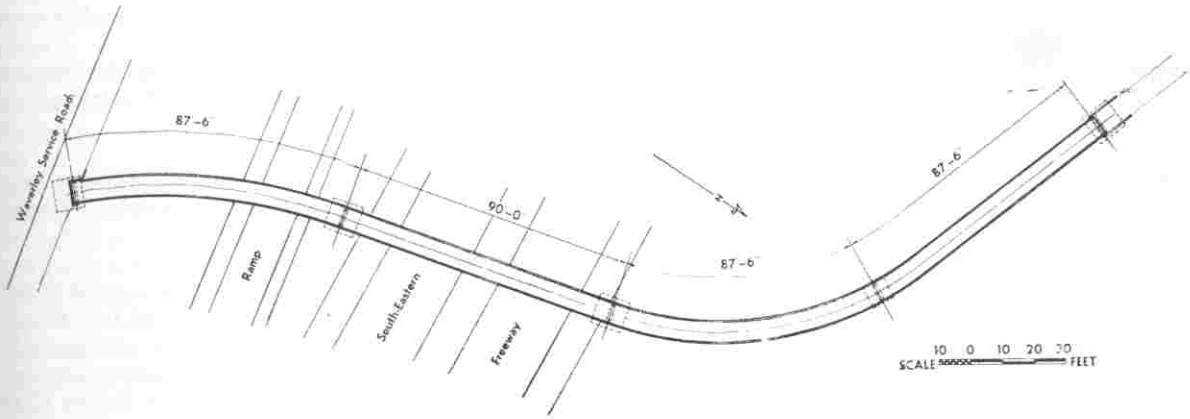
Light coloured concrete was used throughout. The specified 28 day strengths were 3,000 p.s.i. in piers and abutments and 4,500 p.s.i. in the deck. A rubbed finish was employed at edges and soffits of the deck slab, with a board-marked finish at the piers. The walking surface was finished with carborundum.

The bridge design was prepared by the Highways Department of South Australia who also supervised construction. It was completed in April 1968 at a contract price of $31,777 — or $12.78 per square foot of total deck area.


7'-0"
9"
1'-7"
4½"
9½"
9½"
4½"
1'-7"
9"
1'
½" fall
4"
8"
4"
1'-8"
6½"
6"
6½"
2'
Deck dusted with carborundum
1½" x 3" x 6" hand rail sockets
Voids stop 5'-0" from each abutment and each side of central pier & 10'-0" each side of other two piers
Smooth off-form finish




Constant grade 1 in 14


Waverley Service Road
87'-6"
Ramp
South-Eastern
Freeway
90'-0"
87'-6"
87'-6"
SCALE 10 0 10 20 30 FEET

Final Year Civilians

T. F. Steele, Esq.

Bob Riebolge
"Sandshoe Sam", tried desperately to be the best dressed in the class by occasionally wearing a suit, but only succeeded in looking like an Italian organ grinder. He'll always find something to whinge about!

Trevor Moody
"The Car Park Kid" would pay good money to go to a show, then sit and crash on with his woman in the car. His best effort was at the dinner when he left after the main course, but still had his desert in the car.

Bert Wessilingh
Bert was heard to say a word on the 3rd of July at 13 minutes past 10.

John Sandland
"Pinhead" has the distinction of having the smallest head in the class. He is well known for his love poems written on lecture room desks (obviously inspired by Jenny), and, when drunk, he should be approached with caution.

Peter Mitchell
Says "Er" a lot but that's about all. A good prospect for the Highways Dept. cricket team.

Rick Hopkins
Many think he should have stayed in Sydney. Many (including most of the staff) think he is still there.

Brian Loffler
Always a picture of sartorial elegance.

Guiseppe De Sciscio
Many say he is the reincarnaton of Benito Mussolini. Many think he should suffer the same fate.

Ong
Comes to life once a year when he tries to flog St. Marks Revue tickets.

Lance Gladigau
Ever since Fletcher was put in his design group, poor Lance has been fighting a losing battle. Looked particularly bad the night of Hopkins' show.

George Sobal
Who else but George would give a seminar on the synthetic Generation of Hydrological Time Series? Who else would be stupid enough?

Richard Botham
One of the more rowdy elements in the class. Whenever there was any disturbance, any tomfoolery — yes, you guessed it, Botham would be at the bottom of things!

David Mudge
Little David's sparkling eyes and cute dimples made him a favourite with the girls this year.

Tim Hanson
Tim, who is really Clark Kent in disguise, played 674 hands of bridge this year, but to his credit he still found time to do some work.

Roman Washyn
"Wog" Washyn might be alright at basketball but he's reasonably hopeless as far as football (and engineering) are concerned.

Marino Nassig
Favourite question at Leigh Creek: "How old's your sister?"
"4"
"Alright then, how old's your mother?"

Gaetano Cucchiarelli
Held faith in the Italian Army to the bitter end.

Colin Best
If you've ever read the News, then you must have seen his fiancee.

Steve West
"Well, kiddies." West was never the same after seeing Midnight Cowboy. He bought himself a suede jacket and wandered around saying, "I aint a fer real cowboy ma'm."

Graham Copley
Take a large, inflatable, airtight membrane. Put Copley underneath it and start him talking. Result, one hot-air balloon.

Trevor Lands
Defies description.

Carl Christ
Recently made life Patron of the W.E.A. bookshop, for services rendered.

Bruce Beauchamp
A particularly nasty little character when drunk. Come to think of it, he's not to good when he's sober.

Nick Sydorowich
After his extremely intellectual comments on Newsbeat, Nick had to go incognito, so he had a shave and a haircut. No-one has yet convinced him that there is no point in setting out a curve to the nearest ten thousandth of a foot.

Chris Stanley
The baby of the class. His method of sculling on the symposium reminded many of a Morning Glory Spillway in full swing.

Bruce Mutton
Bruce never really succeeded in whipping the class into a frenzy with his lively wit and chatty disposition.

Dave Mayo
Never look Dave in the eye, or you'll break your neck.

Bill Thomson
Possesses the only beard to survive Survey Camp. Held faith in North Adelaide longer than most.

Rodney Hook
Poor Rodney is so frustrated that he's got to ring up his wife at lunch-time for reassurance. He would have the greatest collection of disgusting ties in existence, and unfortunately he wears them to Uni.

Chris Summers
A word of advice, Taffy: Don't forget to Dot your eyes.

Andrew Fletcher
On the offchance that Jill should read this, we can find nothing of significance to write which would not be grounds for libel.

S. Yam
Six months passed before it was realized that he was one of the final year class. Some people still think he is a first-year that lost his way.

George Smolanko
According to George, when playing a hand of less than twenty points, one should always lead into the sixth highest card of his partner's weakest suit, providing that the bidding went to at least 3 no trumps or no greater than 4 diamonds. George cracked at Survey Camp

and got married the day after he got back.

W. B. Chua
What a man, always in the thick of things, downing his pints with the best of us, and with a cigarette clenched between his teeth. Yes, we found it hard to hold Dennis down this year.

David Suter
A very punny chap indeed.

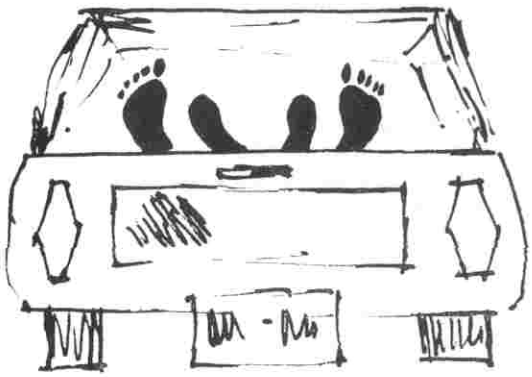
Rod Wright
What went on in the fog room with Mudge, on the afternoon of July 27th?

Noel O'Callaghan
If you want to know anything about thin membrance structures (for temporary storage, of course) just ask Noel.

Greg Miller
The school that produced such things as Sandland, also produced this. Should prove to be a smash hit with Highways.

Bill Stacy
Often seen, sometimes heard.

Flett Steele
Can be heard at any post ball or post dinner show reciting Winston Churchill's war speeches or giving a treatise on dimensional analysis. Although he was lucky in cards all year he was unlucky in love and refused to write love poems in lectures due to lack of inspiration. Often hummed the hit tune, "Julie, Julie, Julie, do you love me . . ."



"Just because I can open the windows with my toes, doesn't mean I do it for all the Engees."

F.Y.M.E.S.T.A.C.C. VALETE

(Final Year Mechanical Engineering Students Tea and Coffee Club)

Hamish Robson

Roger Inverarity
This year Roger entered a new era of second childhood and was responsible for more acts of trouble making than the rest of the class put together. (In particular, he became very adept at detecting and stealing Robson's sugared apricots).
Roger alone can be held responsible for the obscene posters that appeared in the final year room.
— Member, table tennis team.
— Member, ski tour.
— Group leader, Ceduna Expeditionary Forces.
— President, Fymestacc Investment Corporation.
— Member, Fymestacc Works Team, Engineering Car Trial.

Bruce Muggleton
Bruce could be relied upon to eagerly participate in all acts of rowdiness and was an active member in the unsuccessful mechanical Prosh stunt. He also figured prominently in the Procession, where he was seen having a marvellous time squirting people in the face with a water pump. Over the year Muggsy has gained the reputation as one of the leading class capitalists and a rumour that the new Pasadena residence has gold-plated door knobs came as no surprise. For a short time he was disowned by the class when he came last in the Engineering car trial in a Hunter GT.
Favourite comment, "No worries," "This is true."

Ray White
. . . provided the surprise engagement of the year when he announced his attachment to Jean, daughter of a well known professor. The resulting festivities brought about an unfortunate attack of dizziness and Ray was seen slumped in various corners of the Mech. building for the rest of the day. (He did manage to venture forth to a Commerce tutorial, only to be laid out on a table after a vehement attack on all those present.)
A hardy camper on the Whyalla trip, Ray was frequently heard to utter the comment "Bloody women!"

Barry Griggs (alias Seymour Gritts)
Reached new, exciting levels of untidiness and committed himself to an ambitious desk escalation offensive. Griggs' books, papers, folders and old lunch wrappers gradually overtook the entire north-west corner of the room. On several occasions he was seen shaving in the reflective mirror of the magic lantern. Barry also instigated classes in musical appreciation which were held before attentive audiences in the reverberation chamber.
— Member, ski tour.
— Navigator, Fymestacc works team.
— Ceduna Expeditionary Forces member.

Trevor Johnsson
Was an eager participant in the final year students' girl friend exchange service, otherwise known as "Musical Birds." Apart from regular social sorties on Monday, Wednesday, Friday and Saturday nights, Trevor had a quiet year and worked steadily. In fact he nearly started an hysterical riot when he submitted a project report a week before the date due.
Favourite comment, to be uttered complete with screwed up nose and pained expression: "Bloody hell!"

Andrew Wauchope
Andy became a principal shareholder in the girl friend exchange service, much to the surprise of many onlookers. He also provided a class talking point when he joined the long list of students who have blown up, seized up or in any other way completely destroyed their honours project equipment.
Favourite comment: "It's a cruel world!"

Gordon Pike
Gordon Henry Stewart Pike caused more trouble than usual in 1970, doubtless due to the influence of ace troublemaker Inverarity. Apart from attending many lecures in a crash helmet, Gordon was seen swimming in the River Torrens on Prosh morning for undisclosed reasons. He also figured prominently in the Motel Men versus Brave Pioneers battle at Whyalla.

John Lawrence
Created history when he wrote a letter to "On Dit" which was actually accepted. Despite a quiet year John nevertheless entered into the spirit of Fymestacc and became a member of the brilliant table tennis team which was beaten by the Technology staff team. John was class representative on the Dean's committee.

Paul Knispel . . . better known to his friends as "Knipples" Spent the year advising people on the merits of V8 Falcons. In the engagement stakes (for twenty-one year olds) odds on Knispel fluctuated between 7 to 1 and 111 to 1. Returning from a vacational job in Melbourne, Paul related to an overawed audience a number of delightful stories about healthy fun with an innkeeper's daughter. These stories were treated with disbelief until adequate evidence arrived later in the year to support all claims made. The evidence was carefully examined by the class and then invited to sit in on a Doble lecture, which she did.

Bill Phillips
. . . was also in Melbourne over the long vacation and in fact boarded with Paul Knispel and Mike Smith. Oddly enough, for most of the year Bill seemed very intent on getting to Tasmania and he had to be physically restrained on several occasions. A quiet lad until provoked, Bill spent most of the epic Whyalla-Ceduna trip playing his guitar and shooting at farmers.

"Boots" Shu
"Boots", who hails from up north somewhere, amazed all with his incredible ability to withstand extreme cold while clad only in a thin T-shirt and the other appropriate clothing needed to maintain decency. His large, elastic sided boots also drew favourable comment. "Shooey's" bungle of the year was the losing of a sizeable chunk of titanium which got swept up with the rubbish.

Mr. Mike Smith (married)
Mike's principal claim to fame was the winning of the society car trial, which he did from the back seat while his wife drove. He was also in the passenger seat when Craig Cock's Datsun received a hefty shunt at the traffic lights. Mike participated in most society events and brought honour to the final year mechanicals with a brilliant running performance at the baseball match.

Craig Cock
When not pranging his car Craig spent a lot of time not

telling people about his brilliant performances with a nondescript League football club. Nevertheless he convincingly demonstrated his elusive pace during the heroic campers verses motel slobs battle at Whyalla, probably because he was seen sneaking around a certain tent just before a certain accidental tent collapse.

Hank Van Herk
. . . this year became the world's leading authority on all forms and species of Coriolis Force. He also made the mistake of travelling on a long journey with Madman Palmer (the rally fanatic) and would collapse without warning into a screaming heap for months afterwards. Watch Hank on the engagement stakes — very good odds!

John Dreimanis
Is a qualified accountant and he seems justifiably proud of this achievement. The rest of the class were often reminded of this fact when struggling through the hardest part of a Commerce tutorial. When not revolutionizing bearing design theory, John spends his time roaring around the countryside in his ancient Jaguar.

Stan Mitula
. . . is the most active revolutionary in the class, always threatening to lead a Polish uprising and attack on the table tennis den. Stan is at present cultivating a set of incredibly long fingernails but he declines to offer a reason for this.

"Eerie" Maciuriak
It may come as a surprise for some to learn that quiet, well spoken "Eerie" is neither English born nor from England, despite a perfect English accent. I wonder where he picked it up? Certainly not from fellow students. Thought to be a confirmed bachelor, "Eerie" astonished all when, after many lengthy speeches on the benefits of the single life, he announced his engagement. Such is life!

Ean "Inky" Khan
Rumour has it that "Mr. President" is engaged to some delicious Asian dish though this has not been confirmed due to a general lack of knowledge on the engagement procedure for Asians. At least he certainly acts as though engaged. . .

Alan Crossing
Prefers Adelaide's clear skies to the heavy pollution pall that continually hangs over Canberra. He can be seen at various times during vacation periods clinging to a demon motorbike as he slipstreams behind a ninety-mile-an-hour semi-trailer. Alan considers himself stripped naked if deprived of his leather jack, goggles and crash hat.

Lyall Beaney
was one of the few winners in the Fymestacc table tennis team. Lyall had a quiet year but was galvanated into violent action during the opening speech at the A.N.E.S.A. Symposium when the cry, "It's all lies," was often heard from the rear of the auditorium.

J. L. Arnold and **A. L. Foong** spent far too much time being conscientious and the only insulting thing I can say about them is that they will probably get excellent exam results . . . and serve them right, too!

Tony Brookman, Hamish (Henry Ford) Robson and **Alan Palmer** also caused untold trouble in Commerce and Management lectures.

Final Year Electricians

R. Bleys

One of the great sporting spectacles of our time is the fight between the final Elec. students to get to the front seats of room E125, where they sit in silent anticipation of:

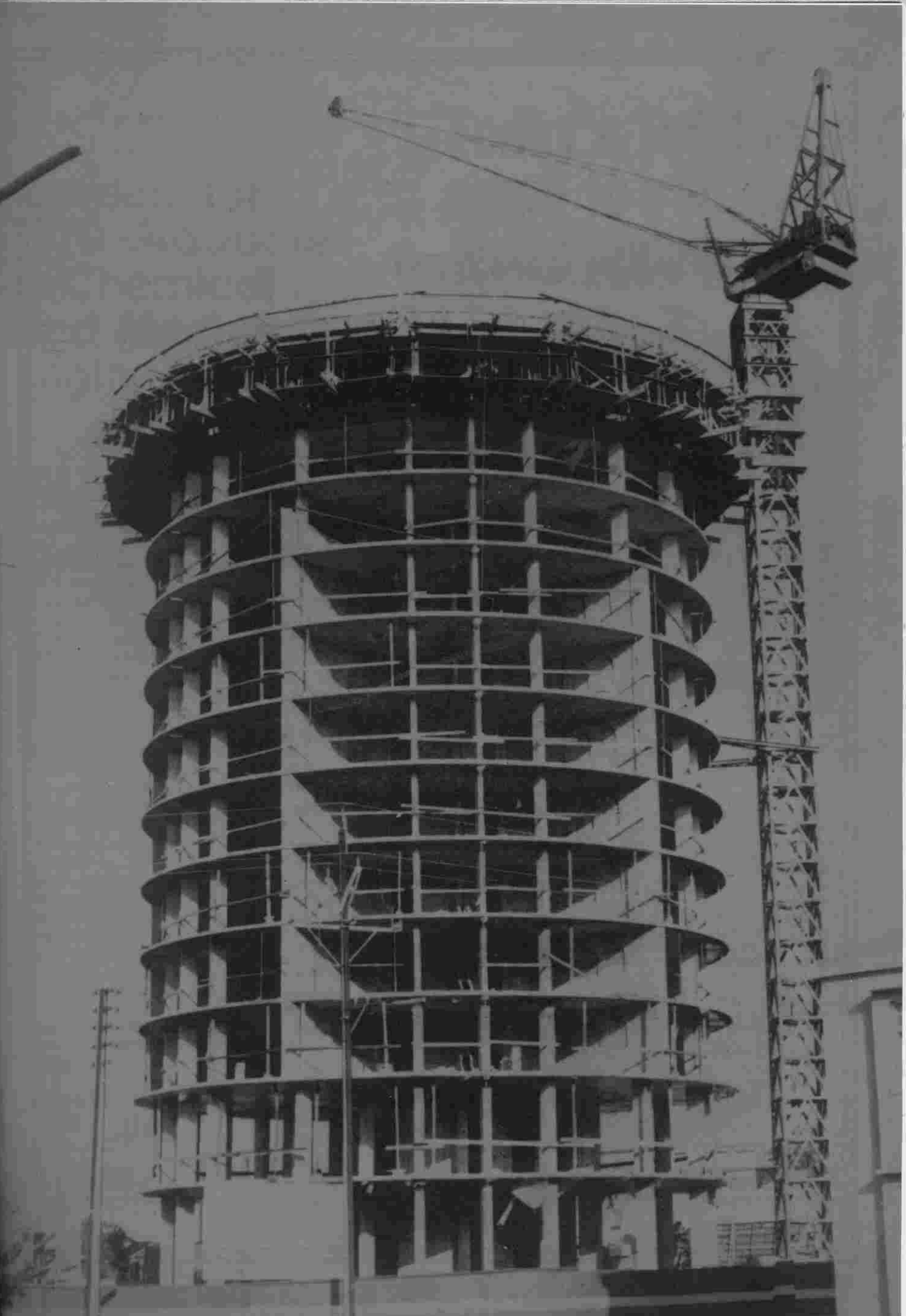
Dr. Coles striptease show. It is true that the performance is as yet unambitious but there is hope that one day great things will happen. But does this chalk-chucking quantum mechanic use a spanner?

Next on show is Prof. Willoughby, the one and only authentic Wirra-Wirra bird, who draws ever-decreasing magic circles in the cloud of confusion. Earlier for the general entertainment there was the "Magnificent Smith with his electric machines" but this fine man has retired to Wollongong to play tennis. The show, however, must go on! Another great performer, Mr. Karolyi, takes his place and is showing a tendency to develop a sense of humour. To compensate for Professor Smith's loss another entertainer has been imported. Dr. Gibbard is as yet a dark horse, but he is reported to be holding matinee sessions for the Elec. II's (children allowed in free).

The crowd waits impatiently for the moment when the star of the show arrives. To relieve tension Mr. Puchnell tells jokes and receives the title of humorist, whilst Mr. Kikkert, who is new at the game, but is learning faster than his students, expands on life as he sees it through a filter. At last the spell is broken, Professor Woodward's red tie walks in. This tie has been seen on the sole spectator at the Elec. football match and also on an active young man pedalling an ergometer. The tie yields great strength to the wearer who is reported to have produced a total of 1 horsepower. After a brief apology for the absence of Dr. Griffith, who has fiddled a holiday in the U.S.A., the show ends. Slowly the crowd wakes and with renewed vigour returns to the serious business of discussing the night before, or watching Lucio covering the board in heiroglyphics, or discussing the defeat of the Elec. II's.

The glories of that battle with a football against the rabbling herd of Elec. II's (plus 30 sundry outsiders) are still to be heard far and wide. Tusher, the manager, and Coach drew up plans for the pub crawl; Dougherty, our prize footballer, urged the team on from the sidelines; Joe, the centre of gravity of the team, carried the weight of the attack, whilst Kelly, the goalkeeper, cooked the books. Craick offered five of the hairs on his chin as a mascot.

It is anticipated that by the end of this year eight members of the Elec. fraternity will have sold themselves in holy matrimony, while the rest sell themselves to the devil.



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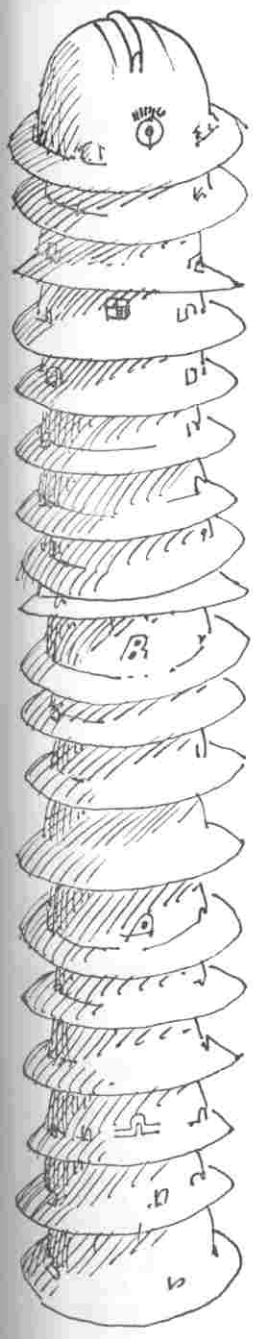

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