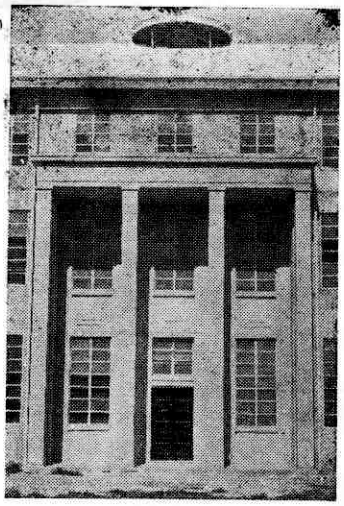
Varsity Engineer



Varsity Engineer 1949-50

Volume 4 **One Shilling**

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Editor
John Neuenkirchen

Formerly the "Adelaide University Engineering Society Magazine."

Published by the Students' Representative Council for the Adelaide University Engineering Society, Adelaide, South Australia.

A.U.E.S. Committee—1949.

President ...... Dick Moffit
Vice-President ...... Andy Kinnear
Secretary ...... John Neuenkirchen
Treasurer ...... Dick Severin

Committee:

Alan Scott, Bruce Anderson, Rod Linklater, Jim Bullock, Bill McCormack.

A.U.E.S. Committee—1950.

President ...... Bruce Anderson
Vice-President ...... Alan Scott
Secretary ...... Brian Smith
Treasurer ...... Dick Mattner

Committee:

W. B. Murrell, G. C. Reynolds, R. B. Moffitt (ex-officio), and two freshers yet to be elected.
Covered by your Sports Reporters:

The Case of the Disappearing Engineer

WHAT exactly do you think the title of this editorial means? Even I am not too sure what it means, for who is the disappearing engineer, where has he disappeared to, and why has he disappeared, and how?

The disappearing engineer is a big fellow, for he represents ninety per cent., or more, of the Engineering Faculty. He has disappeared from many phases of Varsity life—not the least of which is the Engineering Society—apparently with his head buried in the sand of engineering education.

In these days of "pressure groups," the engineering student body, which is one of the largest groups on the card, has about as much influence and interest in varsity life as a wet jelly-fish.

The primary step to be taken is to create an energetic Engineering Society, which will provide a common meeting ground for students, both for faculty life and socially, and will enable them to safeguard their rights.

I can do no better than refer you straightaway to the articles by Professor Spooner, Dean of the Faculty, and Bruce Anderson, 1950 President of the A.U.E.S., on this subject.

TWO engineers only were nominated and thus elected unopposed as engineering representatives on the 1950 S.R.C. recently. Unfortunately, due to the late start of our third term, the A.U.E.S. Annual General Meeting could not be held before the close of nominations for the above positions and thus the Society lost its chance of proposing men on whom it could rely to present the engineering view-point.

One of the men elected has been a keen worker for the Society, while the other is unknown. The danger in such cases is obvious. Men can be elected who are more interested in representing the interests of some small "pressure clique," such as the Communist group—which, to put it mildly, is not well supported by engineers—rather than the engineering view-point.

Time alone will show whether this has occurred this year, as has been alleged by some.

If the persons elected are not fully representative of faculty outlook, then steps must be taken to correct the situation and call for a re-election.

This point must be watched carefully by engineers next year.

LACK of interest by members of the faculty, such as is shown in the cases above, has become much more noticeable in the past few years. The reason would appear to be the strain of work. The engineering courses are certainly the most concentrated and strenuous at this University.

How do they compare with other Australian Universities?

The answer to this question lies in Adelaide's participation in the Faculty Bureau scheme, which was inaugurated to compare courses, and thus to solve problems of common interest. So far, the A.U.E.S. has not felt itself strong enough to join the scheme, but next year's committee should seriously consider taking its place in the Bureau in an effort to discover how over-burdened our courses are.

Recommendations could then be passed on to the staff-student committee for consideration.

Full advantage of this committee was not taken by the A.U.E.S. in 1949, its first year of operation, but the benefits of this round-table conference are so obvious that I can only hope the staff will continue the idea next year.

As secretary this year, my report need only be brief, for so were the Society's activities. Functions included a dinner, a freshers' welcome, the annual initiation and night procession, the Engineers' Ball and several lunch-time meetings, at some of which films were shown.

The Society was well represented in the many activities of Procesh, although our team was narrowly beaten in the Drinking Horn Final.

Last, but not least, the magazine, in which I trust you will notice the "new look," has appeared for two consecutive years, a feat unparalled in Society history. The price has also been lowered. Altogether, I think the magazine is headed for a bigger and brighter future.

THE editor, alone, is to blame for "Varsity Engineer's" late production this year. For that, I must apologise.

Contributors did an excellent job, as you will see by perusal, although some were called upon at short notice to prepare their articles. Special thanks are due to Professor Spooner and Mr. Schneider.

Lastly, I thank those who have read this ponderous editorial to the bitter end.

—THE EDITOR

(See Editorial Epilogue, p. 20.)

Have you joined Your Trade Union?

THERE are today, few students able to spend three or more years at a university without some form of financial assistance and, in general, the acceptance of such assistance obliges the student to produce satisfactory results in each year of his course.

Just as there are but a limited number of students wealthy enough to 'holiday' at a university, there are few who are not compelled to earn a living on leaving the university. The competition which exists for first-class positions in any profession makes students desirous of having a good university record behind them.

INCREASE COURSES OR TIME?

The fields of pure and applied science continue to grow rapidly and universities are ever faced with the necessity of accepting either an increased number of courses, i.e., specialisation, or an increase in the time required to complete any one course. Too much specialisation is undesirable, as is a lengthy course; hence there is a tendency to cram more work into each academic year.

There is little doubt that, for the above reasons, the engineering student of today is compelled to spend more time at his studies than was the case in past years. Gone is the half-day each week for sport and gone much of the time once given to student societies and clubs.

"OVERLOADED"?

Having loaded—I almost said overloaded—the student with technical studies he is accused of receiving a narrow education and it is proposed to add to his burden by giving him compulsory lectures in the so-called humanities.

No one will deny the desirability of providing the engineering student with a basic knowledge of, for example, the social sciences, or of giving him adequate time for sports, debates, amateur theatricals, etc., but who will take up these matters and see that each issue is dealt with in a manner satisfactory from the students' viewpoint? The only possible agency for this purpose is a strong University Engineering Society.

LACK OF INTEREST.

It is probable that the present lack of interest in the Engineering Society has arisen from a number of causes. The student—particularly the married C.R.T.S. man—after attending daily lectures in engineering subjects is not attracted by the idea of turning out in the evening for a further dose of the same medicine sponsored by the Engineering Society; in any case, ample such evening lectures are provided by the professional engineering institutions. This is not an unreasonable wiewpoint and could readily be met by doing away with all technical lectures at Engineering Society meetings; this time might well be devoted to discussions concerning student welfare and, in particular, to specialist talks in the much-needed 'broadening' fields of politics, philosophy, economics, etc.

LITTLE TIME UNLESS . . . .

As already admitted, the student can claim to have little time for Engineering Society meetings. He must, however, realise that he never will achieve time for any such activities unless he gives support to the Society and so strengthens the Society that it may look after his interests.

Engineering students should get rid of the idea that the function of the Engineering Society is to persuade students to present papers they haven't time to write, or to listen to technical papers they cannot understand!

The Engineering Society must have, as its primary objective, the general welfare of all engineering students; it is their trade union and as such demands the active support of every student.

THE DEAN

Engineering Education in Britain

By W. H. Schneider,

Lecturer in Mech. Eng.

THE pattern of engineering education in Australia is clear, simple and easily understood. In Britain, there is no set pattern; the paths leading to professional status are many and varied. The first step towards achieving professional status is compliance with the conditions prescribed for corporate membership of one of the chartered institutions of professional engineers—civil, chemical, electrical, mechanical, mining, and so on. This involves passing the examinations of the appropriate institution (or obtaining equivalent status) and the serving of an apprenticeship of at least two years at an approved engineering establishment. Provided the satisfaction of these two requirements is within his grasp, the young engineer feels free to plan his course according to personal taste, convenience or economic circumstances. Engineering courses at the universities are far from uniform in scope, content, duration and probably in standards.

Broadly, a distinction can be drawn between the engineering schools at the older universities of Oxford and Cambridge and those of more recent growth. Both Oxford and Cambridge have resisted the trend towards specialisation in the course leading to the bachelor's degree; tradition is stronger than change and the emphasis is on a broad culture rather than utilitarian objectives. Thus mathematics and physics are taught to a high standard and their applications comprise the bulk of the professional subjects. Such subjects as engineering drawing and design, surveying, engineering practice and organisation receive little attention. Lectures are intended to stimulate interest and enthusiasm for study rather than to instruct and present details of subjects which can be obtained from books and journals. It is possible for gifted students to complete a course in two years, but three years is the usual time.

INFLUENCE ON STUDY.

At the other universities, courses are much more utilitarian. The staff is in close touch with industry and students make frequent contact with practising engineers interested in the course they are doing. Courses of study have been profoundly influenced by the nature of surrounding industries or the leadership of members of staff, past and present, in specialised fields. Several of the universities, e.g., Bristol, Aberdeen and Glasgow, have combined with technical colleges in providing engineering courses.

At Manchester the liaison with the college of technology follows a rather different pattern; the engineering school is located at the university and has its own faculty and degree course in engineering; the college of technology is located about a mile from the university, but is just as much a part of the university as the engineering school; it has a faculty of technology and a degree course in technology. Whilst there is inevitably some overlapping in scope and content of courses, the technology staff is quite distinct from the engineering staff.

At the University of London, engineering is taught at affiliated colleges, such as City and Guilds, Imperial College and Royal School of Mines. It is the only university in Britain which grants degrees on the basis of work done outside the university. A student may study at any institution whatever, he may receive teaching by correspondence or he may study privately; the university will admit him to its examinations provided that prescribed laboratory work is done at an approved institution. Many of the technical colleges are approved institutions and almost every student, wherever he may be in Britain, has the opportunity to sit for the London degree.

VIEW OF INDUSTRY.

What does the engineering profession and engineering industry think of the engineering schools? It is difficult to give a straightforward answer to this question. During a twelve-month stay in Britain one can only record impressions of the viewpoints of practising engineers and industrialists. Impressions are not certainties and are apt to be influenced by the specialist surroundings in which most British engineers have to work. With these reservations, it is perhaps permissible to state that a university degree in Britain—even an honours degree or a doctorate—does not, of itself, confer much status on the holder. The young engineer is judged on what he can do, on his present accomplishments in the practice of his profession, rather than on past performance in an academic institution.

Within the hierarchy of large engineering establishments, amongst men themselves educated at the universities, it is commonly remarked that the great names in engineering are those of men who achieved greatness, not because of, but despite, the university they attended. On the other hand British industry maintains close contact with the engineering schools and assists them generously. In inspecting engineering laboratories, one is impressed by the amount and variety of equipment which has been donated by manufacturers. Further, many firms make a point of replacing equipment by their most recent designs. Students thus become familiar with modern practice and design trends.

"REFRESHER COURSES."

Some large firms, such as the British Thomson-Houston Co. and the Metropolitan Vickers Electrical Co., frequently run refresher courses at their works for technical teachers. The value of these courses lies, not only in what is presented and in the contacts made with those engaged in engineering practice, but also in the exchange of information and ideas between teachers in universities and technical colleges.

The technical colleges play an important part in the education of professional engineers in Britain. Most of them prepare candidates for the London University examinations, but the majority of the students sit for the National and the Higher National Certificate in Engineering. These certificates are awarded on the results of examinations sponsored by the chartered institutions of professional engineers and the technical education authorities. The standard of the Higher National Certificate is about the same as that of the examinations of the chartered institutions. The technical colleges also prepare candidates for the examinations held by the various institutions of engineers and other technical societies. Engineering laboratories of the colleges, like those of the universities, receive liberal grants of equipment from industry. The electrical laboratory of Rugby College of Arts and Sciences, for example, was completely equipped by the British Thomson-Houston and English Electric Companies; new instruments and equipment are continually being added as they are developed in industry. A notable feature of many technical college diploma courses is the inclusion of humanistic subjects, the aim being to give the student an understanding of the relationship of his chosen field of study to contemporary life and the more general interests of mankind.

APPRENTICES REACH TOP.

It is a matter of law in England that trade apprentices must be allowed to attend a technical college on at least one whole day per week in the employer's time. The colleges are therefore organised to take these apprentices as part-time students in addition to the regular full-time students. A surprising number of senior executives and engineers in British industry started as trade apprentices.

After completing his course at the university or technical college, the engineering student usually enters an engineering works for at least two years as a college apprentice. Here he spends from one to three months in each department appropriate to his training course. Thus a mechanical engineering apprentice usually passes through the pattern shop, foundry, tool room, assembly, erection, testing, drawing office and design departments and may spend some time on research, outside erection, physical metallurgy, and so on, finishing up as a personal assistant to one of the senior engineers. He is obliged to attend lectures, demonstrations and visits to other works which are arranged and is expected to take part in meetings of the apprentices' association and in social and sporting activities connected with the works. He is also encouraged to attend some of the post graduate courses of study provided at most technical colleges during the evenings. At the end of his apprenticeship he may be invited to join the permanent staff. If he shows outstanding promise he may be offered a scholarship giving him the opportunity to continue his studies abroad.

With his apprenticeship completed, the young engineer is eligible to apply for corporate membership of his appropriate engineering institution, he becomes a chartered engineer and is regarded as qualified to practise his profession.

THE WANDERING STUDENT.

During his student and apprenticeship days he has many opportunities to meet students from other countries who come by the thousand to the engineering schools and works of Britain. These contacts with people from other countries are not the least valuable of the experiences gained by British students. In the carefree days, before Hitler came to power, Continental students were permitted to wander over the earth in search of the best teachers and facilities for study. Thus a student might spend a year at Zurich, another at Cambridge, another at Glasgow, another at Massachusetts; provided that he reported back at his university in his final year, he qualified to sit for the final examination. There were thus always a large number of foreign students in Britain and although in more recent years this flow has diminished, it has not stopped. This 'wandering of scholars' is not a feature of the British system of education for engineers, but many students spend their vacations on the Continent. They can do this very cheaply; by push or motor bike or by hitch-hiking an amazing amount can be seen in a short time. Travelling on the Continent, one frequently meets parties of these students and there are generally one or two Australians amongst them.

Travel and experience in other countries is not so readily available for Australian students, but its benefits in manifold directions are so great that all should aim to spend at least a couple of years abroad.

Town Planning and the Engineer

By Bruce Anderson

TOWN and country planning is defined to be the design for living on humane, scientific and economic bases. It is a science which has developed tremendously since the close of the 19th century and especially since destruction began in the second world war.

From earliest times man has striven with the aid of current progress in the fields of science, medicine, engineering and the humanities to build on this earth a place of living in which he can live a life of freedom, health and cheerful service in advance of the state in which he existed formerly.

This has been exemplified in the Britain of 1939. The oncoming darkness of war found the city bright with such a fire as had not been seen since 1666. The bombs screamed down to destroy this church or that hospital, this block of flats or that group of cottages. But before morning came to reveal a London surprising all but intact despite the night of horror, men were already fashioning in their minds their hopes of a better London after the war.

While directing relief operations after the bombing of Coventry, the city architect, yet found time to point out to a friend, indicating this devastated area or that the site of the new town hall, a new school, hospital, shopping centre and parkland to draw a verbal picture of the nobler Coventry which will commemorate the courage of its citizens.

STATISTICS REQUIRED.

The formation of national, regional and town plans requires all the available information provided from the studies of economics, social science, engineering, architecture and preventative medicine.

It happens only too often that the town planner borrows from the related sciences not their truths but their errors.

The importance of statistics in planning cannot be over emphasised, but it is important that these should be correctly interpreted. The identification of bad housing conditions with high population densities, by which we mean the number of inhabitants in a given area, is a most widely spread misconception. Such vague simplifications that the death rate goes down as population densities decrease, tend to blur the complex ramifications of existing conditions and driving force of human life.

SLUMS IN MELBOURNE, illustrating the urban disease of lot-overcrowding. Common features of Australian slums are long rows of small houses or single-family units erected on tiny allotments, with little or no space at the rear or at the side. The undersized allotment is the cause of lot-overcrowding in single-dwelling areas. All of which goes to show that an engineer needs a far-sighted conscience in town planning.

The adjustment of statistical data very often represents a misuse of facts. It has been shown that the relation of house density to death rates bears no correlation.

Modern theorists in planning use such functions as room, lot and area crowding on which to base satisfactory living standards.

It is seen that cities as different as Stockholm, Greater Berlin, Birmingham and Greater London show the same overall density of 20 persons per acre. But how different are the urban living conditions of the slum free capital of Sweden from the congested and inhuman urban agglomerates of London and Berlin. It is indeed shameful to think that the people of London cast aside the excellent plan formulated by Sir Christopher Wren after the great fire of 1666.

ELIMINATE CROWDING.

Room Crowding is defined to be the relation of the number of persons to the floor area of rooms.

Minimum requirements are:— 70 square feet for one person and 110 sq. feet for two persons.

Lot Crowding is measured by the proportion of built-up area to the whole building allotment. Lot over-crowding is one of the principle features of slums in Australian cities.

Area Crowding is a complex term including the space time factor and cannot be defined by a simple relation of unbuilt to built-up area. It is measured by the relation of the gross floor area to the entire residential area and to the various types of organized social services in space and time.

Residential area is the developed area, minus industrial and main commercial area and the parts devoted to general civic purposes.

The part played by the engineer in city planning is quite significant but too often do we find the hideous, massive engineering structure disfiguring the landscape, when a small amount of time and money spent in design and construction could transform the structure from an ugly utility to a pleasing ornamental structure.

Power stations, water towers, gasometers, and factory buildings are just a few of the offending structures. As the science of planning progresses these are being improved, but very little importance is attached to this aspect in the professional training of Australian engineers.

THAT PARKING PROBLEM.

The problem of traffic and transport control essentially belongs to the engineering sphere. The fact that our own city is already suffering from growing pains and traffic indigestion, shows that expert planning in the next few years is essential for the well being of the future.

The construction of multi-story parking stations in the city proper is just one of the solutions which must be investigated. Overhead walkways for pedestrian street crossing would assist the drive at present launched to prevent the growing increase in fatal traffic accidents.

Engineers are responsible for the modern developments in powered transport. It is therefore our responsibility to make these things safe beyond the dependence on the very slow reaction of the average motorist.

The loss of every maimed and lifeless body is of national importance and the value of road safety design cannot be underestimated.

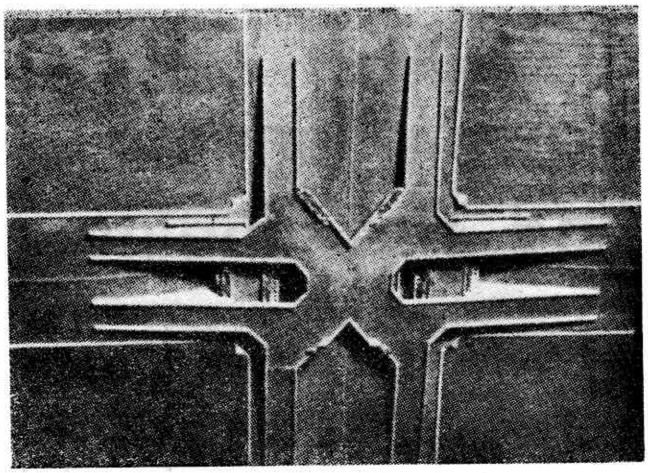
For instance, an uninterrupted four-way traffic crossing would help to eliminate accidents other than those caused by mechanical defects such as steering failure, etc.

The subject of property subdivision is extensive and room permits this, as many other subjects in this paper, to be mentioned briefly only.

Subdivisions of land should conform with the master plan for the town or neighbourhood area and embrace the principles of minimum crowding standards, sufficient parklands, educational and shopping facilities, economy preservation of desirable existing features, e.g., fine buildings, trees and natural surroundings.

CO-OPERATION NEEDED.

Town planning is not the work of one expert, but the co-operation of men from all walks of life, particularly architects, engineers, economists and medical practitioners. Working together with the co-operation of the citizens in a community, a new town may be built from the old, resulting in a transformation to a healthy progressive city giving a healthy environment to the men of tomorrow in which they will develop a true sense of beauty, work and recreation.



AN ARCHITECTURAL FEATURE of main-road crossings in the future. The model shows uninterrupted traffic four ways, as well as safe foot-passage four ways.

JOHN CLELAND.

We regretfully record the death of John L. Cleland during the second term vacation. To his relations and friends, we offer our deepest sympathy.

Pioneer Platoon

THE Faculty of Engineering and the Adelaide University Regiment have co-operated to give us a chance to apply our engineering knowledge to Army Life. The regiment has raised an Engineering Platoon, to be manned by members of this faculty. It has been arranged that the time students spend in camp, shall count towards the six months practical experience required by the faculty to obtain the B.E.

Already about twenty 'Varsity Engineers have joined up, who don't mind being paid while gaining a little practical experience in the field—earth moving and electrical side of engineering. Perhaps the civil, mech., and electrical engineers can teach each other a few things about their own special line. It has been pointed out to us that the greater our number the bigger the projects we will be able to tackle in the January camp. A few more of you may care to join us.

The syllabus of training isn't hard to wade through, but if you don't like reading or required a 'Sup' in leaving English, and are mildly interested in the idea, you can get all the answers at Regimental Headquarters without the bother of even having to use a slide rule.

—SAPPER.

Measurement of Ocean Sand Movement

By P. Brokensha

A problem of major importance in harbour engineering is the movement of marine sediments which may cause insuperable problems of erosion or accretion. More particularly in the investigation of a proposed port area it is most essential to have some idea of the directions and intensities of the littoral drift so the harbour works may be designed accordingly. This article gives a brief description of some equipment which has been used in South Australian waters for this purpose.

Material may be moved in the ocean by wave action, current forces or by a combination of both. Wave action alone is not a very effective means of transportation unless the waves strike the beach obliquely, in which case the familiar zig-zag movement along the shore line is produced. Wave action may also place fine material in suspension so that it may be moved by current action.

Near shore currents which are usually produced by tidal forces and run mostly parallel to the shoreline, may be strong enough to move particles along the sea bed either with a rolling action or with a small jumping motion which is known as saltation.

The instruments used to measure these movements were made in South Australia from information supplied by the Dutch who have long carried out similar work in the English Channel and around their coastline.

GEHALTEMETER.

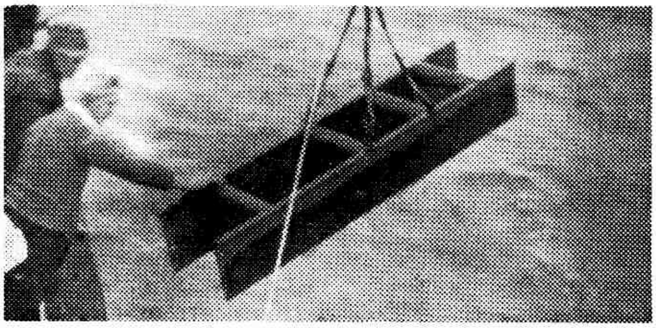
This instrument traps four 5-litre samples of sea-water and any moving sand on the bottom, and at distances of 20, 40, and 60 cm. above it. The four horizontal square tubes are set one above the other at these distances apart and are open at each end. After the framework of the gehaltemeter is lowered to the bottom, the tubes sink slowly on buffer pistons until the bottom tube is resting on the sea-bed. A trigger weight is then released from the surface. It falls down the supporting cable releasing a trigger which causes the rubber loaded doors at each end of the tubes to snap shut, trapping the sample. The machine is then raised and placed on an inclined platform where the doors are opened. Each sample gravitates to graduated cylinders in the laboratory below deck where the volume of sand in each cylinder is recorded.

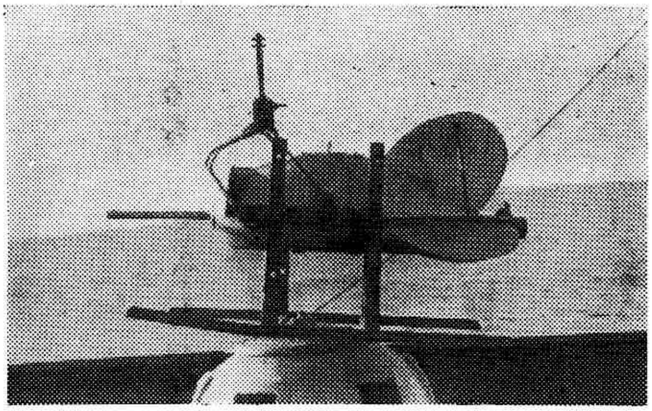
This is repeated at many test stations over the area under investigation at many different tidal and storm periods. Readings of current direction and velocity, using floats and a Watts current meter, were taken at each station. These are correlated with the sand concentrations at the four different depths as obtained from the gehaltemeter to give a fairly good approximation of the total amount of matter being moved at any period. If tests are taken over a sufficient length of·time the net transport of sediment in any direction can be obtained.

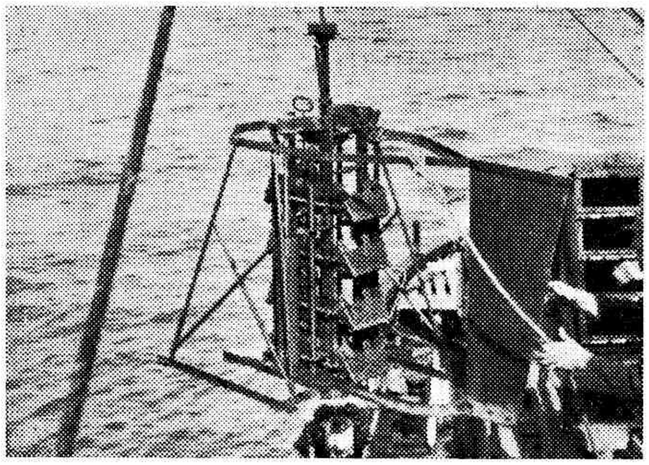
The only criticism we could level at this instrument was the uncertainty of the mechanism when the boat swings, so that the suspending wire is inclined at a considerable angle, causing the weight to either jam the trigger or miss it altogether. This could be remedied by using several anchors to rigidly moor the testing ship, which would limit the number of stations which could be visited to one or two a day. An easily noticeable inaccuracy occurs when the machine settles on a steeply sloping sand bank, causing the bottom tubes to dig into the sand and collect an altogether disproportionate amount of sand.

SAND CATCHER.

This instrument is lowered to the bottom where is sits for some hours facing into the current direction. The water and sand flow in through a narrow inlet tube, over a horizontal baffle plate in the body of the apparatus, and out through a suction collar, near the inlet tube, which keeps the water flowing through the sand catcher whilst any sand is trapped. The sand catcher is left in







Upper Left—The Grab being raised.
Lower Left—The Ripple-Meter, no ripples are apparent.

Upper Right—The Sand Catcher.
Lower Right—The Gehaltemeter being raised before emptying

position for a complete tidal period if possible, then raised to the surface where the bottom cock is opened and the trapped sand emptied into a graduated tube and measured. As the inlet tube can be set no nearer than 10 cm. to the bottom, only the sand in suspension is trapped.

The results are meant to corroborate those obtained with the gehaltemeter. However, as the sand in suspension is usually very small in depths well away from wave action, as was in our case, few measurable results were obtainable with this instrument. As the inlet tube as supplied, is only 12 mm. diameter, it is unsuitable for bottoms with any weed present, as this soon clogs the inlet tube. For comparative measurements the long period sample of the sand catcher would be more reliable than the instantaneous samples obtained with the gehaltemeter.

RIPPLE METER.

This consists of two heavy steel plates about 6 ft. by 1 ft., which are held a foot apart in a vertical position by several heavy horizontal bars. It is suspended slightly eccentricly with a swivel joint so it will swing into the direction of the current. The plates are freshly painted each time before it is lowered to the bottom, where it comes to rest with the plates sunk some inches into the sand. The sand grains then stick to the wet paint to form a pattern showing the profile of the sand ripples on the bottom. Only when the plates are sitting normal to the ripple fronts will the true ripple profile be obtained. This would, however, generally be the case unless the ripples were formed by a previously stronger current or wave action.

The sand ripple shape and dimensions as outlined on the plates of the ripple meter, are recorded or photographed to be compared with similar records at different times and stations. Then by plotting the direction and size of these ripples an approximation can be made of the amount and direction of the sand being rolled along the bottom.

The main drawback to the use of this instrument is the requirement of a sandy bottom over a large area to give comparative results. Assuming this condition filled, it is difficult to find suitable paints which retain sufficient stickiness under water to pick up enough sand grains to give a profile.

GRAB.

This is merely an instrument for taking a sample of the sea-bed at different locations. Where a sand sample was obtained it was collected and stored together with sand samples from all parts of the area. In many cases (as in the photograph) only weed or rock was obtained and it took several grabs to get enough sand for a sample.

These sand samples were analysed by sieving and by a water settling method. It is hoped that when analysed, these results will yield information on the sediment behaviour. The values most used to assess the general size and sorting of a sample are:

(1) The median diameter which represents the diameter with 50% of the sample having greater diameter particles and 50% less.

(2) The first (Q_1) and third (Q_3) quartile diameters which have 25% smaller, 75% larger and 75% smaller and 25% larger respectively.

(3) The sorting coefficient may be defined as the square root of Q_3/Q_1. This varies from about 2.0 for a well sorted sediment to 4.5 or more for a poorly sorted sediment.

Immediately we can say that greater median diameters and lower sorting coefficients indicate greater current velocities, but this merely touches the fringe of a subject which is outside the scope of this article.

ADVANCED TECHNIQUE.

These tests described are only a few of the many investigations being undertaken at the proposed South-East port site by the South Australian Harbours' Board. When the tests, which include the measurement of wave heights, currents and physical nature of the site, as well as tidal measurements, are completed and analysed, they will form a record of investigations as complete and advanced as any done overseas.

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True to life....

THE Engineers' Club of the University of Western Australia, has the right idea!

Instead of having a formal badge such as that of the A.U.E.S.—see front cover—where we have the hand of the engineer supporting the revolving world, they sport a design which is truly representative of any Engineers' Club's activities. It takes pride of place on their stationery.

The four quarters of their shield design are filled by a swan, a set of three spanners, two crossed pipes, and lastly, some dice and what suspiciously looks like a good poker hand of five aces.

But the crowning glory of the design is above the shield. There, we see an arm raised triumphant, with a bottle of amber fluid, obviously being emptant.

An Attempted Explanation of Servomechanisms

By S. G. F. Ross

IF you have not already decided to skip the next couple of pages, you may possibly be wondering what on earth it is all about, and why. On the bold assumption that this is indeed the case, an explanation will now be attempted, together with such elaboration as may be deemed necessary. If you have started. I beg of you not to give up after the first dozen pages, as this is really important—so I'm led to believe.

For the sake of the uneducated majority, it should be explained that the term, "servomechanism," was dreamed of by some strange processes of the subconscious to indicate the rather intricate process of keeping a regulated quantity matched to a reference quantity. If you think this sounds easy, you have a very low opinion of yourself, as you will learn in the next paragraph.

The truth is, that back in the dim, dark far-away past, the senses, reflexes, muscles or what have you, became totally inadequate to keep up with the changing times. This has nothing to do with the inabilities of the senses to regulate the rate of elbow-bending to the safety level of the receiver. It simply means that, as invention followed invention and the machine age took control, the control power of the insignificant human being just naturally fell by the wayside. Thus, each device needed a controlling device, and this another, and so on, ad infinitum, or, at least, until we eventually arrived at the simplest of controls and this was operated by our hero—man. Even then the poor creature couldn't do the job.

PRECISION MANIA.

By this process of evolution, we have today, arrived at a high-level machine age, in which the precision mania becomes more and more apparent. The obvious need, then, is for processes, consisting of some closed cycle of events which maintains the utmost stability of the system as a whole. That is to say, if some slight change should tend to occur in the end event, this tendency will at once be frustrated by some other portion of the system.

Such a closed system constitutes a "servomechanism," and is shown in block form in Fig. 1.

Reverting once again to genus homo, we might say that he can be regarded as the most primitive of all servomechanisms. Suppose he is left to guard some manufacturing process, involving a certain plant set-up. Suddenly, one of his senses detects something wrong, whereupon the reflexes go into action to amplify the distress signal into muscular action. He then rushes around pulling levers, turning wheels, pushing buttons or whatever else his semiconscious brain may command. If the body has been sufficiently favoured by Nature, this corrective action will have the desired effect (plus or minus 50 per cent.).

How much more pleasant it would be for our hero to set a few controls, and then lapse into

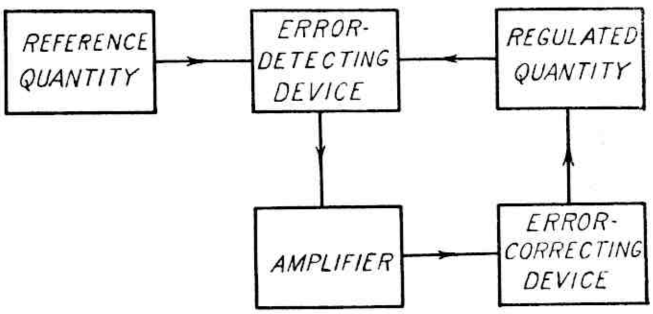

FIG. 1. Essential Components of Servomechanism.

deep sleep, while the whole process looks after itself with far greater efficiency. This is the aim of our servomechanism—who said, "Hear, hear!"?

Perhaps the simplest of all forms and the most familiar, are those employing that little mechanical wonder, the thermostat. This is the control element maintaining constant temperature in our household refrigerators and hot water services by switching the power (when available) on and off at fixed values of temperature, determined by the setting of the little knob. In these applications, the thermostat has a considerable time lag, requiring about a 10 per cent. temperature variation before it operates.

Another familiar form arises from the application of the engine governor, correcting speed fluctuations by varying the rate of fuel supply. Here again, there is a time lag due to the friction in the moving parts of the governor.

WHO'S FUSSY?

Such applications as the above have their uses so long as we are not very fussy. However, imagine the chaos that would be affected if we had a 10 per cent. lag in speed control in a paper mill. One envisages a room quickly filling with a tangled mass of torn paper, in the midst of which the rollers whir aimlessly on.

All this leads us to the properties we need to incorporate in our precision servomechanism. First and foremost we must have **reliability**—once the initial adjustments have been made, the system must always produce the same end conditions, without further attention. Another very important consideration is the **amount of power required** for

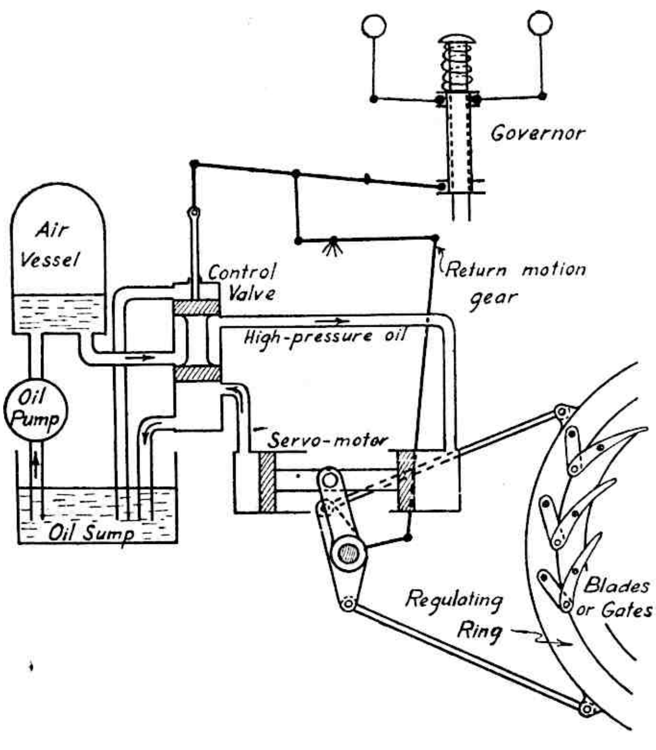

FIG. 2. Servo-motor control for Francis turbine. (not to scale)

the control process—this incorporates finger-touch control of heavy plant and the physical size of the control system. This necessity means that we need high amplification. The third important characteristic, as we have already seen, is **instant response** without jerky action. Finally, we must obviously have the utmost **accuracy.**

Now the mechanical engineers probably think they have something out of the bag, with such ingenious applications as their governor-controlled servo-motors on hydraulic turbines. In these, the governor controls the oil supply to the servo-motor actuating the guide blades which, in turn, control the quantity of fluid entering the turbine and, consequently the speed as illustrated in Fig. 2.

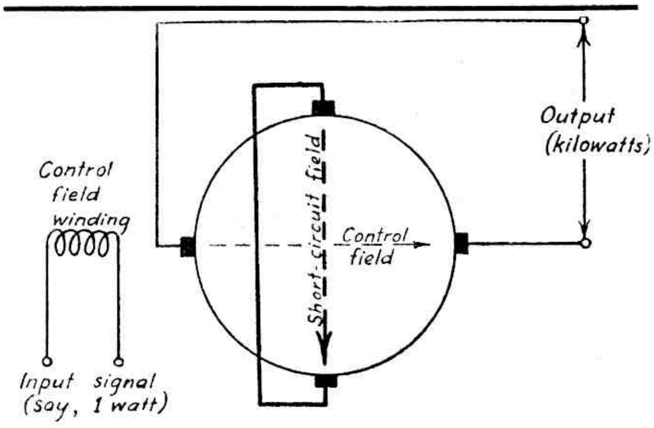

FIG. 3. The Amplidyne.

Various other simple, yet effective, systems can, no doubt, be called to mind by the reader. These may include devices for keeping constant level in reservoirs, constant gas supply pressure, and the like. It is not the purpose of this article to give details of the many and varied systems, but rather to stress the physical principles involved. Assuming that said physical principles have been firmly grasped, the time has now arrived to point out what a really ingenious bloke the electrical engineer is.

AMPLIDYNE DEVELOPMENT.

By the application of a few electronic vacuum tubes and, perhaps, a couple of small machines, the E.E. can arrange for the very tightest of controls on heavy plant, with rapid response to the most minute signals. Such controls have been made possible by the recent application of the Amplidyne. See Fig. 3.

Briefly, this is a relatively small direct-current generator, in which a pair of output brushes are short-circuited to create an intense magnetic field for only a small input to the ordinary control field winding. This second intense field is then used to furnish the generator output from a second pair of brushes.

The possibilities of this ingenious device should at once be apparent. The necessary control signal can be obtained from an electronic amplifier, which,

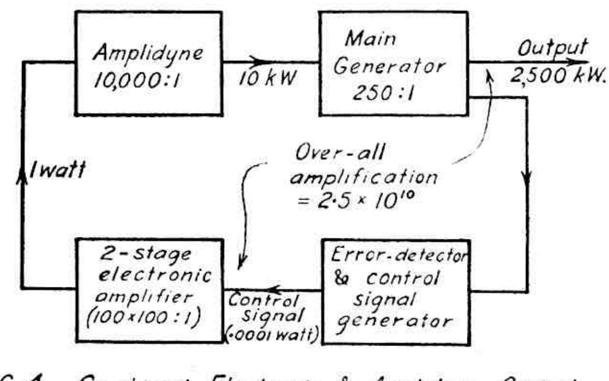

FIG. 4. Combined Electronic & Amplidyne Control.

in turn, requires only a very small driving power. The output power is sufficient to control very heavy machinery. The overall amplification of a control signal can easily be, as shown in Fig. 4.

It would seem that the mere act of breathing on the generator in Fig. 4., would be taken into account by the system. This should be sufficient to convince anyone that there is no limit to what can be achieved in the electrical field.

Furthermore, the amplidyne can be used to control voltage, current, power factor, speed, motion, position—in fact, anything. If you don't believe it, ask the manufacturers. It finds application in the control of machine tools, mine hoists, heavy-duty power shovels and steel mills, paper mills, etc.

In conclusion, it might be said that the physicists are far behind the times. Control of the atom bomb should require no more effort than the raising of a finger.

How to Corner at 45.... Blowout.... And Get Away with it!

IN 1939, exhibitions given in Northern California, attracted thousands who witnessed tyres being blown with shotguns while cars were travelling in excess of 70 miles per hour! To the dismay of thrill-seekers, the cars always remained upright and continued to travel in a straight line under the perfect control of their drivers.

Onlookers were witnessing a demonstration of Miracle Safety Wheels . . . . a new invention destined to save countless lives, while at the same time, adding to stability, balance and riding comfort of modern cars.

The principle responsible for this performance is as simple as the results are startling. Two grooves are rolled into the land, or flat portion of the rim on which the bead of the tyre rests. Each bead is firmly embedded between a groove and the outer flange of the rim. No matter what happens, the tyre is held fast in place on the rim and the cause of serious accidents from blowouts, is eliminated.

A highly efficient, simple machine is now available for converting any standard type of wheel into a safety wheel. This machine is known as the Miracle Rim Rolling Machine.

As explained, the tyres, front or rear, remain centred on the rim and the driver can continue to steer the car without difficulty. This is important enough on a straight run, but think what it means on a tight turn . . . . especially with the car running at high speed!

BLOW THAT TYRE!

While trying to cause previously weakened casings to blow on sharp turns—without using dynamite caps—it was sometimes necessary to try again and again before the tyre would blow. At first, caution dictated a moderate approach, but in time, speeds were increased until right angle turns were attempted at speeds in excess of 45 miles per hour. Cars not equipped with Miracle Wheels would often roll two and even three tyres clear off the wheels! As the cars rolled over they landed in several tons of loose hay provided for this purpose. At other times, a car would stay upright and spin completely around several times. But in no instance did a car make the full turn on standard rims at speeds over 30 m.p.h. At best, the car would mush over a front wheel, completely lose traction and broadside clear out of the 30-foot wideturn area.

Slow motion pictures showed that all tyres rolled over until the side walls were where the treads should have been. This rolling action forced the tyre to bulge over the rim in a direction opposite to that of momentum, causing the same effect as that of a powerful lever trying to pry the car over into a roll. At this critical stage of the turn the front tyre bead at the outside radius of the turn would snap into the drop centre of the wheel. The tube would usually blow or tyre side wall give way. From this point on, the car would be considered essentially out of human control.

This sort of thing can't happen with Miracle Wheels; they don't allow tyre beads to slip outside of their grooves. They don't allow tyres to fall into the drop centre part of the wheel with consequent blowout and loss of control.

OTHER ADVANTAGES.

The action of rolling the rims also balances the wheel due to the fact that previous eccentricities are eliminated.

Lower tyre pressures can also be used with Miracle wheels—up to one-third less than recommended tyre pressures—thus giving greater traction and greater riding comfort, without any undue wear.

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DO or DIE?

By Bruce Anderson

President, A.U.E.S., 1950.

THE fifth year since the end of the war has begun and the progress made by the Adelaide University Engineering Society has been negligible. During this post-war period, the numbers in the faculty have increased tremendously—at the same time the interest in the faculty society has decreased at the same rate. Why?

The answer to this question will give the solutions to the problems confronting the society at the present time. The problems being:—

- What does the society really lack?
- How can we build up a really worth-while society with full, enthusiastic membership?

According to the constitution, the objects of the society are "to further the interests of engineering and to promote social intercourse among its members."

In the last few years, the society has failed badly in the fulfilment of these aims. Firstly, nothing has been done to further the advancement of engineering.

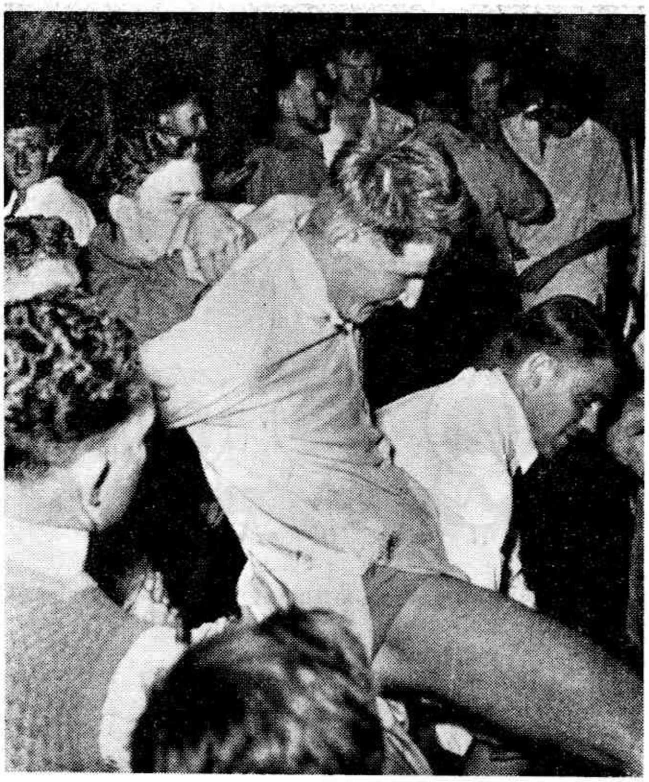
Secondly, the social intercourse, sponsored by the society, except in a few cases, has not been of a stimulating variety.

No society can expect to flourish whilst it depends upon organised excursions to breweries, "soak" socials and so-called "initiations" to attract membership.

WORTHY OBJECTS WANTED.

Could not worthy objects be found to supplement those specified in the constitution. Our faculty is sadly in need of prizes and scholarships to be awarded at the end of the academic year for outstanding work in various subjects in the course.

Editor's note.—This article, by Bruce Anderson, will be of especial interest to all engineers, who have any time at all for the Engineering Society. Bruce was elected at this year's A.G.M. as the 1950 A.U.E.S. President. His ideas on this subject will carry a lot of weight in the coming year. The article is of all the more interest because it was written before he was elected President. Good luck, Bruce!



THE WRONG APPROACH? A fresher, under persuasion, undergoes treatment at this year's initiation. This annual event did not attract many seniors this year. In fact, the numerous freshers could almost have turned the tables on their tormentors. Is the initiation a dead letter? Yours is the answer.

The "Chapman" prize for Strength of Materials is keenly contested each year and, apart from the Angas Engineering scholarship, there are no others awarded by the University. Several prizes are awarded annually at the School of Mines in the Department of Mining and Metallurgy, but most students are not eligible to enter for these.

The society could strive to maintain a fund to provide prizes for the student who most distinguishes himself in each year. In making the award, consideration should be taken of academic work, sporting and other extra curricula activities.

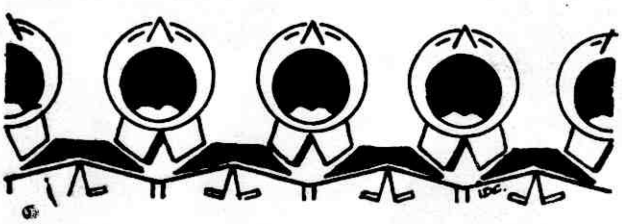
It is realised by most that the attainment of the present B.E. degree requires the most time and concentration that a student should devote to the study of his life's work. Many claim that this is the real reason for the appalling lack of interest in society activity. If this is so, then it would seem that the course is badly balanced; for members of the staff and graduates continually stress the importance of the part played by students in extra curricula activities.

THE "DISAPPEARING" ENGINEER

The annual dinners, balls, picnics, invitations, processions, debates, and sporting games are among the normal activities of any university society and if properly organised, are highly desirable. It would seem significant that since the course was remodelled, attendance by students at these functions has steadily declined.

The former term meetings, at which under-graduates were addressed on engineering subjects, have been abandoned, due to particularly poor attendances.

Lectures on subjects far from the field of engineering have been talked of, but have not yet eventuated.



During this year, an attempt was made to form an Engineers' Choir. This failed, but another attempt will be made next year.

The Gliding Club, which went into recession in 1947, awaits members to resurrect a perfectly good glider and make another attempt at the Australian primary glider record.

MAY OR MAY NOT . . . .

Working to provide prizes and scholarships to be contested by students may or may not provide an incentive for enthusiasm. If this and other aims do not help to make a foundation for the society, then engineers of the present and future in this university will be missing an essential part of their professional training. Not only does the successful engineer require academic ability, but also the qualities which enable him to be interested in the lives of others, to be able to lead men and to manage an engineering organisation so that each member can work cheerfully and efficiently.

These qualities will not be developed by continuous study, but by mixing with study, the activities of membership in a good faculty, society and a healthy enjoyment of sport.

It is essential therefore, that the society should be set upon a sound footing immediately. Engineers are urged to shake off this lethargic apathy, to come to the society's meetings "en masse," formulate sound principles on which to base activities, elect energetic, capable committees and start the new society year with a swing.

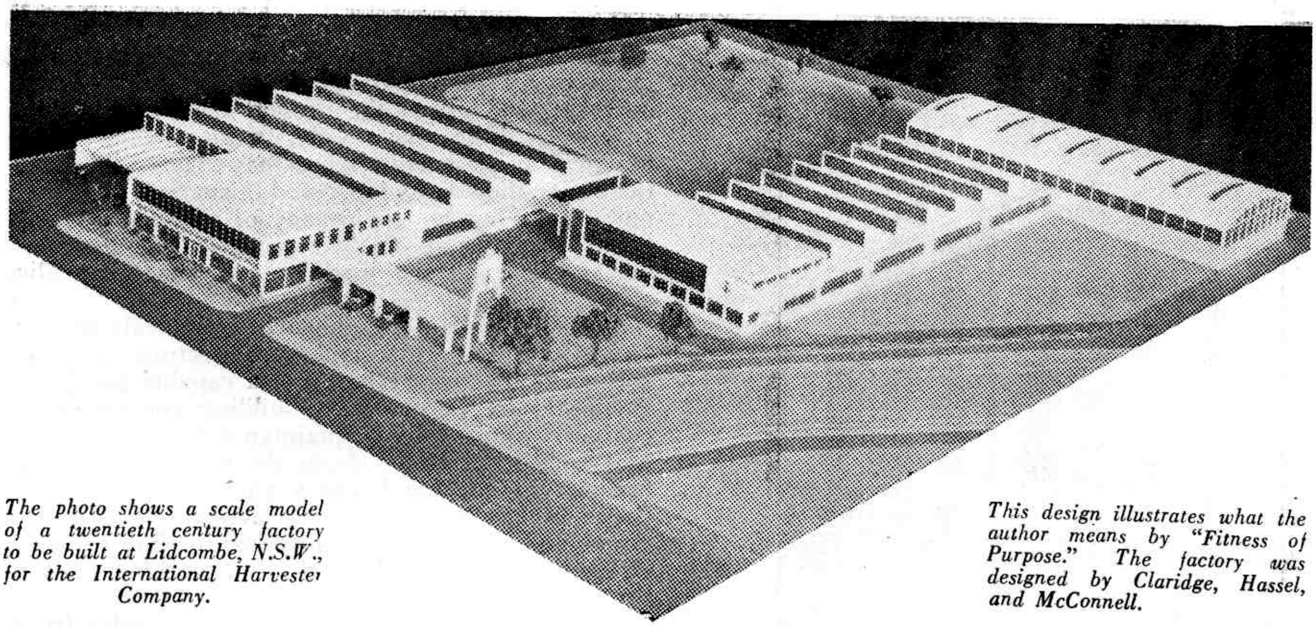
EDITORIAL EPILOGUE

The identity of the "Disappearing Engineer" is probably the Editor (I hope not).

If so, "Vale Editor."

If not, "Do some b — — work for a change."

Oh, for a relief from obligations.



The photo shows a scale model of a twentieth century factory to be built at Lidcombe, N.S.W., for the International Harvester Company.

This design illustrates what the author means by "Fitness of Purpose." The factory was designed by Claridge, Hassel, and McConnell.

The Failure of Architectural Engineering (B.E.)

By Don Thompson

CAN an architect be an engineer? Can an engineer be an architect? More precisely does an architect **need** to be an engineer, that is, in the narrow sense of the word. Should the question be not is B.E. (Arch.) a failure, but can it ever be a success?

The answer to these questions is contained in the mute evidence of Adelaide's architecture, or more accurately, Adelaide's **buildings.**

This answer might need a little interpretation for those of you who have experienced the benefits of a free, compulsory and secular education under our modern hit-or-miss public examination system —divorced as it is from any true appreciation of aesthetics, the humanities and the fine arts, in short, the appeal of the finer side of man's nature.

It is becoming increasingly obvious, even to our progressive twentieth century minds, that the scientific concept springs from the philosophic concept.

So, just as Leibnitz arrived at the scientific concept of calculus for a starting point in philosophy, we must also work from a primary philosophic concept to the significance and nature of architecture if we are to discover the answer to our questions.

Editor's note.—Don Thompson is well-known for the forthright opinions he holds on many subjects. This article is offered to the public without prejudice to "Varsity Engineer's" policy. The views expressed do not necessarily coincide with the Editor's, nor can any responsibility for them be taken by "Varsity Engineer."

WHAT DOES ART MEAN?

Now art means two things. In creative action it means quality of performance. In concrete form it means quality of achievement. Architecture can satisfy these general requirements as an art. We respond to it by a sense of appreciation that it also aroused by those activities having a certain finish and organisation or order which we call culture. It can be shown that all arts are a part of the Art of Living.

The Art of Living consists in well-being, which subsists in goodness. Therefore the Art of Living and hence the arts subsist in goodness which may be defined as that which provokes the greatest amount of well-being for the longest period. Ultimate goodness exists as a philosophic concept. It is the ultimate destination of all things. As all

THE SAVINGS BANK OF S.A.,
KING WILLIAM STREET.

things tend to improve they approach more closely ultimate goodness.

Goodness implies Universal Order. Goodness is God. In action it is **Righteousness**; in thought it is **Truth**; and in spirit it is the **Divine Will.**

In each work of art subsisting in goodness are three motive forces characterised by human needs, namely:—Function or physical needs in comfort and service, the ideal being **Fitness**; the mental or organising, being needs in co-ordination and harmony, the ideal being simplicity, efficiency and **Order**; and finally, the spiritual, for the needs of the soul aspiring towards universal perfection, the ideal being inspiration and the dedication of our action to God.

These three motives, Fitness, Order and Spirit combine to make a great work of art, and, if any are lacking, the result lacks in Goodness and therefore lacks as a great work of art.

This spiritual or philosophic concept is the only satisfactory approach by which we can attempt to explain a great work of art.

Since art and hence architecture appeals to the spiritual side of man, it is essential that it be Truthful, which is the expression of universal order or goodness in thought.

DULL . . . . DRAB . . . . DEPRESSING.

In light of the foregoing if you are of analytical bend you may now be able to appreciate why some buildings appear to be dull and drab, to be the pretentious and depressing work of a pompous architect.

You may be able to appreciate why buildings appear to be either good, bad, or indifferent; why factories up to the past twenty or thirty years **overseas,** and up to the present day **in Adelaide,** have been in the main ugly, because while being practical in the narrow sense that they had a practical use, they lacked ordered form and spiritual purpose taking no cognisance of an efficient and fitful arrangement of their parts or the psychological effect on the workers and general public alike.

A brief glance through such periodicals as the "Architectural Forum" and "Architectural Record" will show that in the hands of a capable architect, and not just the confident building contractor or engineer whose only acquaintance with architectural well-being comes from the ability to hold a hammer in one hand and a pattern book of the Greek Orders in the other, a factory can be functional and a thing of beauty expressing Fitness, Order, and Spirit and, mark you, working all the better for it.

Most of the ugliness then seems to arise from unsuitability. The motor car made to resemble the coach it replaced, was ugly. Its method of functioning was entirely different and so were its requirements. Any attempt to dress it in the styles of its predecessors was uneconomical and unjustifiable. This is true of modern building materials and methods and the various architectural styles and orders. These are at best what powder and paint are to women, sometimes decorative, but not always, and never anything more.

Architecture has nothing to do with styles. Mass and Surface are its elements and these are created and determined by its plan.

Yet, consider the millions of pounds spent on furnishing the cast iron pillars on the verandahs of hotels, shops, homes and railway stations with useless Greek, Roman or Gothic capitals.

The untrained enthusiast for building, the engineer transgressing his capabilities and the architect bankrupt in background and ideas are those usually responsible for the expensive details, styles or order which clutter the composition of a building. Very often this unnecessary decoration disguises poverty of design.

YAH, THE SAVINGS BANK!

Yet there are those who must have a style even if it is the so-called "moderne" style. Move up Adelaide's blot number one to the dissecting table —the Savings Bank Building, King William Street.

This pile rearing upwards without apparent cohesion embodies most of the apparent faults in Adelaide's architecture and a few it invented for itself. Its **Order** is destroyed by a stucco exterior simulating the covering of stonework denying its true construction. Its portico, with a span that would be impossible for its simulated stone construction to bridge, does not even give a true indication of its interior chamber. The **Fitness** of the building is destroyed by a plan that does not function efficiently and that relegates its second staircase and fire escape to darkness or artificial lighting. As a building dedicated to the worship of money subject to blatant commercialism at its worst, it automatically cancels itself out on the score of **Spirit** since its warren-like effect and vulgar ugliness could scarcely be called inspiring.

I single this building out particularly, because it is one of Adelaide's most recent big structures and hence could reasonably be expected to take advantage of the twentieth century developments in architecture and indicate the success of our B.E. (Arch.) course.

Furthermore it so reflects the sorry quagmire of the official mind that this building which fails on **all** three ideals as a work of art was awarded the Civic prize for the Street Architecture.

BOULEVARDE OF MONSTROSITIES.

Another building that gives a similar lie to its construction by faking stone courses in cement, is Shell House, North Terrace, which suffers also from a forced and monotonous relationship of windows, window space and solid wall—a glorified pigeon coop.

Farther along that boulevarde of architectural monstrosities, nay, oddities, come all the pomp and circumstance of the facade of the Masonic building with its out of scale and disproportionate treatment of front compared to its ridiculously narrow depth.

In that Sargossa of architectural tangleweed, that constitutes the Adelaide Hospital, arises a new threat to our aesthetic susceptibilities in the shape of the New Nurses Quarters, which would appear to repeat most of the worst features of the existing buildings. This building is being financed with public money, yet so much has public appreciation been dulled by an effete and impractical education system that not one word of protest has so far been voiced. [There has now.—Ed.]

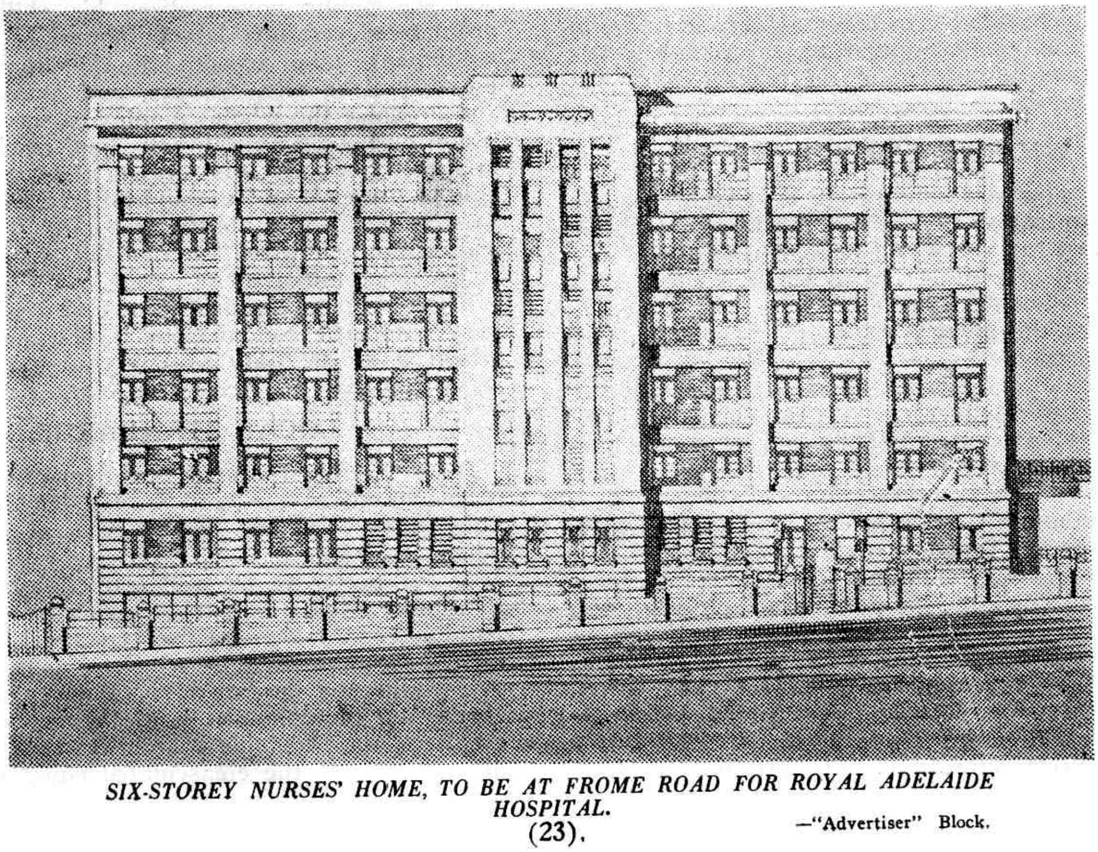
These, and many other buildings in Adelaide, represent the Gotterdammerung in architecture.

ALL EMBRACING.

It has been suggested earlier architecture embraces all departments of living and demands an intensive research into every activity of civilised man. It discovers and stresses what is important in the life of the community, relating it to those things which are essential to the proper function of this life.

Architects are bound by sincerity in planning. Their buildings must work. No building must "happen" as they have done in the past. Every part must be planned to form a coherent design working in relationship with every other part. Any attempt to copy buildings of an age which is foreign in spirit and methods to our own, is an **artistic lie** of the greatest consequence. It is a setback to the tradition of building sincerely, sanely, in the manner most suited to the problems in question, using materials in the best aesthetic means suited to their various uses. A tradition which twentieth century architects elsewhere are succeeding in building—sincere, practical and beautiful, with no striving after ancient or modern styles, for copying is not creative, nor is it sincere.

The twentieth century architect could possibly design better Georgian Houses than the Georgian did, seeing that all the rooms faced the right way, making the four elevations work and so forth, but



SIX-STOREY NURSES' HOME, TO BE AT FROME ROAD FOR ROYAL ADELAIDE HOSPITAL.

—"Advertiser" Block.

these Georgian Houses would be dead, devoid of sincerity, and without the charm of the old buildings or the new. We are not Georgians or Greeks and we have different needs from theirs. We do not feel as they felt, for we are part of a different —an industrial civilisation. If we copy their buildings we are lying.

BETTER LIVING.

We have enormous scope for design—everything that is made falls within the architect's province. The amenities of life which this tradition of architecture can supply, will enable human conditions to improve, and if our education facilities improve and the ordinary people come to prefer planning to muddling, we can even add to this.

If these values have become obscured and our architecture of late years become chaos, it is the fault of our course and training system.

Our architecture has been in a state of chaos! Take the squat, heavy, shambling vulgarly pretentious Parliament House of recent construction. Take also, the more recent new branch of the Commonwealth Bank.

These are historical and architectural lies and setbacks of the first magnitude. If archeologists and historians of the future were to discover the remnants of these buildings, they would imagine that Adelaide was founded by a contemporary of Christopher Columbus, rather than by Colonel Light.

Latter day buildings of this type with their elaborate and useless festoon of the "Orders" are reminiscent of a wedding cake—and like too much wedding cake, they can make us aesthetically ill.

In addition to this and in spite of its initial planning, Adelaide has as many sub-standard homes in proportion to its population, as the older Australian cities. Yet, what of the plans to do something about it?

WHY B.E. (ARCH.) FAILS!

Let us now examine the B.E. (Arch.) course.

An examination of most of the known architectural courses in the world fails to reveal any with the amount of engineering to which student architects in Adelaide have to devote their time. In most cases the amount of engineering is but the merest fraction.

It is rumoured that buildings overseas are still standing up satisfactorily. It is even said that they are more functional. Some unkind people have been known to say they are much better architecturally.

The amount of overburden engineering matter means that an Adelaide student has far less time to spend on purely building construction methods, design and his other architectural subjects. For the sake of some six weeks' work on which he may not even be examined, the student is compelled to take various engineering subjects and forced to cram them for the whole year and thereby penalise his architectural work.

These architectural subjects are not as fully developed as they should be and other essential subjects are not included at all.

Where are our Theory of Colour Design, Theory of Functional Building Design, Evolution of Modern Architecture, Industrial Design, Furniture Design and Interior Decoration, Landscape and Garden Design, a full development of Acoustics, Sound Insulation, Heating, Air Conditioning and so on through a list as long as my arm.

These are the subjects that are going to make us architects, but they are jettisoned so we can obtain a degree which is a contradiction of terms.

WASTED KNOWLEDGE.

What use is this extra engineering knowledge? None.

If a man is an architect in a small way and has sufficient time to devote to engineering, he is doing small jobs where engineering knowledge is not needed. If he is an architect on big jobs where engineering is required, he is so occupied with the purely architectural problems of design that he employs the consulting engineer. This is what happens in most architectural offices today!

A specious argument often put forward, is that during the depression, people regarded an architect as an unneccessary luxury and that later, during the war, the army did not give commissions to a B.Arch. on enlistment as they did to a B.E.

Prior to the depression, the architect had so forgotten his true function and cloaked his ability to plan under a pattern-book of the classic orders and other useless ornament that the public forgot his practical purpose and necessity.

The story is different today, for overseas the twentieth century architect has come to the fore and the public now realises his ability "to coordinate successfully labour, materials, mechanical equipment, take account of the limitations imposed by the site, climate, and available funds, and organise the whole complex to serve a socially useful purpose simply directly, and efficiently. The architect does all this and at the same time, is able to preserve and to emphasise human and spiritual values." This ability was used by the American army, and what America did yesterday, Australia does tomorrow.

There were other professions also who did not get automatic commissions in the army, besides which it is the duty of our course to fit us to serve humanity in Peace, not War.

LOCAL STANDARDS.

It has been also stated that overseas firms have been amazed at the variety of Adelaide students' knowledge. This, of course, was in that period when architecture was obscured by the "styles." It is far better to be well trained in one sphere than to be a Jack-of-all-trades and a master of none. No longer can we disguise our lack of complete knowledge with the false whiskers of the "Orders."

I would not be fair if I failed to admit that very often the customer is as blameworthy as the architect for Adelaide's architecture. This is a direct result of the emasculated education system which has already developed such a Forest of Ignorance for our Public Men. The remedy for this is to incorporate a sense of the humanities and fine arts in our secondary education.

The architect of today and the architect who will justify his existence tomorrow will be the one who develops surface and the building materials used as distinct from uneconomical "styles."

Is it too much to ask that our course be revised as an **architectural** course and not just a B.E. course, with some assorted architectural subjects thrown in for good measure?

Is it too much to ask that we be fitted properly to guide and help humanity to attain the ideal of Better Living, and so justify our existence?

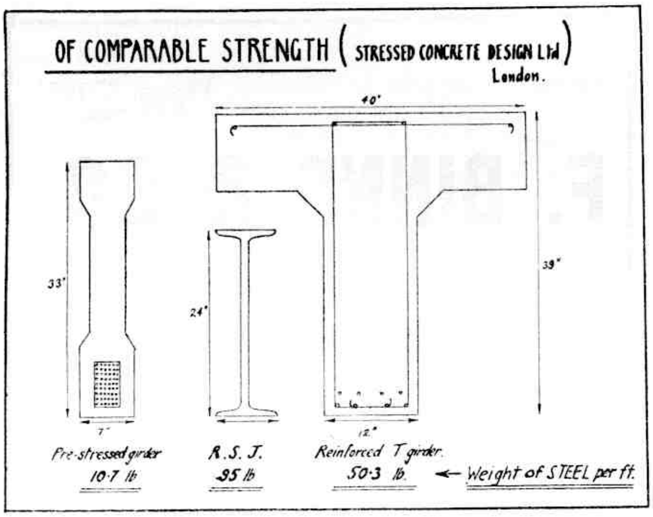
The End.

The Technique of Pre-Stressed Concrete

By J. N. Bateman

I should think, at some time, you've picked up a row of books, by putting your hands at either end and pressing them together. But have you ever thought why you can do this?

The row of books constitutes a beam, when you support it at the ends; and in the normal way, without the compressive force, would collapse, as the mere weight of the books produces compression in the top and tension in the bottom, and a row of books can't stand tension.



When you push hard enough to lift the row as a whole, however, you produce enough compressive stress to counterbalance the tension below the neutral axis, so that the whole of the row is under compression, which it can stand.

In much the same way concrete is strong under compression, but relatively weaker under tension. Thus even reinforced concrete beams tend to crack across the bottom, before the reinforcment has stretched enough to carry the load.

But, if you create a large artificial compressive stress in the bottom fibres, by pre-stressing the bottom reinforcing rods, your beam can stand a large load and still be everywhere in compression.

TWO METHODS.

There are two techniques used in making such beams:—

- An arched bed is used. The reinforcing rods are stretched over catches on the bed. The mould is placed around the bed and the concrete poured in. (German method.)
- A flat reinforced girder is made in the normal way and after it has set, the bottom reinforcements are tightened up and held tight in the girder by wedges. (British method.)

In both cases hydraulic jacks are used to stretch the rods and an arched girder is produced, with large compressive stress in the bottom fibres.

This may all seem a deal of jigging-pokery to go through, when normal reinforced girders have been doing their job for so many years. But the extra strength for size and thus material saved in doing a specific task is well worth while.

Compare the weights of steel used (shown in diagram) and you can see why, with the shortage of steel during the war, I.G. Faben Industries

Editor's note.—The Editor offers his humblest apologies to John Bateman for not being able to reproduce his carefully drawn plan of the I.G. Faben pre-stressed concrete plant.

started replacing the R.S.J's in their gantries, carrying the pipes from building to building, with pre-stressed concrete beams.

HOW TO DO IT.

The procedure and lay-out in making these beams was, to my mind, neat:—

(a) The rods were measured and cut to correct length.
(b) Their ends were oxy-flame heated, and pushed into the shape of rivet heads by an automatic hand rivet hammer.
(c) The rods were stretched over escarpment shaped catches on the girder bed by hydraulic jacks.
(d) The sides of the mould assembled and bolted up.
(e) The other, unstressed, reinforcements put in place.
(f) The concrete poured from the mixer into a hopper on a hand truck, and wheeled to the girder bed.
(g) The hopper lifted off the truck, by the crane, and poured into the mould.
(h) The concrete well settled in the mould by electric vibrators.
(i) When the mould was full, the fresh girder, mould and all, was covered by wooden arches brought in by the crane, and the cracks between arches sealed with canvas strips.
(j) Then the steam was turned on under the arches and the girder left to steam dry over night (with no possibility of the concrete freezing).
(k) Next morning the arches, the mould, and then the girder would be removed, while the process started on the other bed all over again.

A.U.E.S. COMMITTEE MEETING.

Not being able to afford the usual committee photo, we got some broken-down hack artist to portray one of the meetings as he saw it. The points above disprove the widely-held theory that the A.U.E.S. Committee were a bunch of "old" women.

The "New Look" In Engineering Education

By F. J. S.

IT is generally admitted that growing old is a common experience among human beings. The first pair of long trousers, the first girl friend, the first son or daughter, the first grey hairs, all mark progressive steps along this path. We look forward eagerly to each birthday, but the hangover when it is passed persists for long after. Nobody likes growing old, but no one likes being young.

Perhaps the most obvious sign of the passing eons is the method in which we are taught. With prolonged concentration, we learn to read and write "cat" long after we have learnt to chase or cuddle cats. Elementary book-keeping comes long after we have learnt in a practical manner to perform economic miracles with our weekly allowance. However, in general, we are still taught under the threat of punishment if we don't learn.

We very slowly develop the desire for knowledge, long after the knowledge has been impressed upon us.

However, when we come to the University we should do so because we seek something. It may be social life—it often is—or it may be learning. We do not want to be taught; we want to learn.

Unfortunately, our Australian Universities still think they are schools. They want to teach us. Perhaps the best example of this is compulsory attendance at lectures. Compulsory attendance in primary schools is probably necessary because a lot of pupils don't want to be there. If given the chance, they wouldn't be.

WE WANT TO LEARN."

But by the time we go to the University we want to learn. I therefore suggest a new type of education. A standard set of books be set for each subject for the year. If no books suitable are available, some poorly-paid lecturer would surely be willing to write one. Professor Sir Kerr Grant, could find no suitable text book for Physics I. He wrote one: all Physics I. students are thankful.

With this text book as a target for a year's studies, we would be able to learn at our own convenience.

This need for a standard text book is greatly felt.

To further supplement this text book, lectures should be on a rostered basis. Months ahead, we could see what lecture is occurring, and when. With lectures not compulsory, we could attend when we needed further information. For example, if I am clueless on compression reinforcement in steel, I look up the roster and see that this is being covered in a lecture on August 17th. I attend this lecture. I am enlightened. (I am surprised.—Ed.)

"I AM NOT WASTING MY TIME."

However, if I find the text book and references suitable, I do not attend the lecture. Perhaps I play golf; or perhaps I attend lectures in the Faculty of Arts, but certainly I am not wasting my time listening to a lecture I don't want to attend.

Of course, these ideas are not my own. In European Universities, lecture attendance is, in general, not compulsory, and the spirit of learning is much keener. A lecturer can find out how good or bad a lecturer he is by comparing the average attendance with the enrolled size of the class. We would be able to move into much smaller classrooms than we occupy at present.

Moreover, if this idea was adopted in Engineering lectures, which can be fairly simply put on paper, students would be able to further their general education by attending lectures in other faculties. This would enable the complaint that engineers are generally ignorant to be remedied.

How about it, Faculty? How about some standard text books, so we know what we are supposed to do; how about non-compulsory rostered lectures, so we can attend when we want?

What's this "Culture"?

A few words taken from a Sydney newspaper about the new University of Technology being established at Ultimo, Sydney.

"The University of Technology at Ultimo is determined to turn out something better than skilled technologists. All students, whether they're going to be mining engineers, electrical engineers, or what have you, must compulsorily take a course in the humanities, which include economics, recent history, applied psychology, language and literature.

"There's one aspect of the language course that could profitably be adopted by our more ancient halls of learning. It's called fundamental expression, but is means that the students are not regarded as mutes, who know, but may never tell, but as people who'll have to put their ideas into words and talk with their fellows.

"The students are also taught how to write reports and letters, and to write up their experiments intelligibly.

"By the time they get through they should be top-drawer citizens, well rounded in their minds."

SPORT

Covered by your Sports Reporters—

JIM SLATTERY, WARD HILLIER, JIM WHITTLE.

sub-editorial

WEDNESDAY AFTERNOON

AT least once in his life, every engineer will be called upon to move a mountain or turn the wheels of industry. Such duties require much more than mere academic ability. Physical well being is as essential for moving mountains as for moving furniture. The actual manual energy exerted unfolding and refolding a blue-print must be enormous. Men have failed under the stress of lesser strains.

To acquire this energy so necessary for our future duties, we must play more sport. Not only the vigorous and energising games of billiards and pin-ball machines, but all sports should be available to us. Our cry should no longer be "a slot machine in every classroom" or "a billiard table in every basement." We must expand. A cricket pitch in every class-room or a lacrosse field in every laboratory, would be ideal, even if impractical.

We want organised faculty sport. We want a chance to meet engineers of other years in a friendly setting. We want to meet types from other faculties in the same friendly settings. This can only be done if some of the great burden is taken off our shoulders, and we have Wednesday afternoon free for sport throughout the whole University.

Surely, no faculty is so heavily laden with work that practical classes must be held five afternoons a week. With some organisation, surely Wednesday afternoon could be freed for pleasure.

JIM SLATTERY.

Rowing

ONCE again the Inter-Faculty Tyas cup for fours has been won by Engineers. This is the twelfth time of possession.

The contest took place on October 4th, between two Med. and three Eng. crews. Briefly—Eng. A defeated Med. A and Eng. C defeated Med. B. Then Eng. B defeated Eng. C and in the final, Eng. A defeated Eng. B. Engineers won the cup last year and also held it pre-war, the contest being suspended during the war years.

Crews were as follows, reading bow to stroke:— C. Hahndorf, Carthew, Giles, Murrell, Boyce (cox); B. Sutherland, Severin, Adams, Sainsbury, Anderson (cox); A. Scott, Moffitt, Reynolds, Forbes, Phillips (cox).

Basketball

THE keen eyes and brilliant initiative of engineers shows itself on the sportfield, as in the classroom. Therefore it will be seen that in most sports, engineers are well represented. In baseball, for example, we have one-third of the A team who are members of the faculty. Maurie Page, "Champ." Brokensha, and Doug Othams are names well known on the home diamond.

Further down, in other grades, we find Kev Harnett, Jack Fahey, and Paul Backhouse as regulars in the District B's. Down in Metro C, under the fatherly guidance of Des Roach, we find a hard-living, hard-drinking, easy-defeated group of ball players. Last, but not least, we find the Metro D's. Captain of this mob is Slattery. Then comes Stan Scarman, Eric Storr, and Bob Reed. All these are occasionally seen around the Engineering building, some more than others.

—J.S.

Football

THERE are well over one hundred engineers who play Australian Rules Football for sundry teams. To list all the names would be quite beyond the scope of this report. However, it is interesting to note that at least two engineers represent their districts in the S.A. National Football League. They are, Kutcher, centre wingman for Sturt, and H. A. Hillier, centre wingman for Glenelg. In the Amateur League, State side too, the engineers were represented by A. L. Dowding, centre wing. At least four engineers were chosen for the Inter-Varsity side to play in Sydney this year, but who actually made the trip, I am not certain. Those chosen were, P. Butterworth, D. Davies, A. L. Dowding, and D. Giles.

It is not surprising that from this wealth of talent, the engineers were able to defeat Science in the Annual Inter-Faculty match, the only one of its kind in the University.

The team was (in no particular order):—

Copley, Giles, Harley, Quintrell, Otto, Bray, Brame, Bahr, Anderson, Hillier, Dyer, Casling, Watson, Burton, Shapley, Fuller, Robertson, Johnson. Butterworth also came on in the last quarter.

After being down in the first quarter, Science held the lead at half-time, 6—7 to 6—6. By three-quarter time their lead had increased from one to four points. However, in the last quarter, engineers playing methodical football, after having let Science increase their lead, kicked four goals, one behind to wind the game up—approximately two goals, three behinds in our favour. The exact scores are not certain. This is the fifth year in succession that Engineers have won.

—H.A.H.

Baseball

THIS newly fledged club has attracted a large number of engineers to play this great game. Club secretary is Jim Slattery, and an ex-engineer, John Thompson, leads the first team to its many victories. Among players we have Ron Calder, Kev. Harnett, Vern Tolcher, Alan Godfrey, John Laver, Warren Quintrell, and John Scarce.

—J.S.

Cricket

IN spite of new schedules, some have still made time to represent the immortal X.Y. Throgmorten at cricket. Although not possessing any outstanding players, the Faculty has a few consistent ones.

Both Dowding and Davies played the whole season in the A's and are to be congratulated for obtaining Club letters; whilst Stagg, Whittle and Page, played most of their games in the B's.

Dowding and Whittle were chosen for the Inter-Varsity match in Melbourne, and featured in a last wicket stand of about 40 runs—2 short of that required for victory! The former also bowled well.

Congratulations go to Stagg for an excellent performance as captain of the B's.

It was disappointing to find such a few from Engineering playing last season, and it is hoped more will be seen this coming one.

Perhaps it would be possible to arrange a cricket match in the first term each year—Staff and Practising Engineers v. Students. Such a game would be most enjoyable to both parties and it would be ideal if all lectures could be cancelled, and a "real day" made of it as in the Law Field Day.

What about it, you committee men?

—J.W.

Rugby

NO Inter-Faculty matches have been played this year—not as far as engineers are concerned, anyway. Someone must have bungled.

Comparitively few engineers have played for Varsity teams, viz., Lawton and Murrell in the A's, and Mattner and Forbes in the B's. All were selected to play during the Inter-Varsity here, but Mattner was not able to attend.

Old Collegians have had to carry numerous engineers during the season; the senior team including Perkins and Probert, while the juniors (!) had Scott (captain), Allardice, Buckley, Johnson, Severin, Stanton and Adams.

Athletics

AS in all sports, engineers are strongly represented in the athletic field. In the Inter-Varsity Athletic team this year, five of the nine members were engineers. Engineers hold many Varsity, State, and Inter-Varsity titles. They won the Inter-Faculty Mile Medley Relay on Sports Day this year, defeating the nearest team by fifteen yards.

Their individual achievements are listed below and it is obvious from this list of performances that the engineers are the backbone of the A.U.A.C. What is more appropriate then, than the interest shown by the Dean of the Faculty of Engineering, Professor E. C. Spooner, who, I believe, will be the President of A.U.A.C. this coming season.

J. D. Copley.—"Suffers from a moustache neurosis." Blue. South Australian representative at all three post-war national track titles. State 440 yards hurdles champion and Varsity record holder and 440 yards champion. Represented Varsity in Brisbane this year in 440 yards and 440 yards hurdles. Represented Australian Universities in Australian Universities v. New Zealand Universities meet in 440 yards and 440 yards relay at Sydney this year.

H. A. Hillier

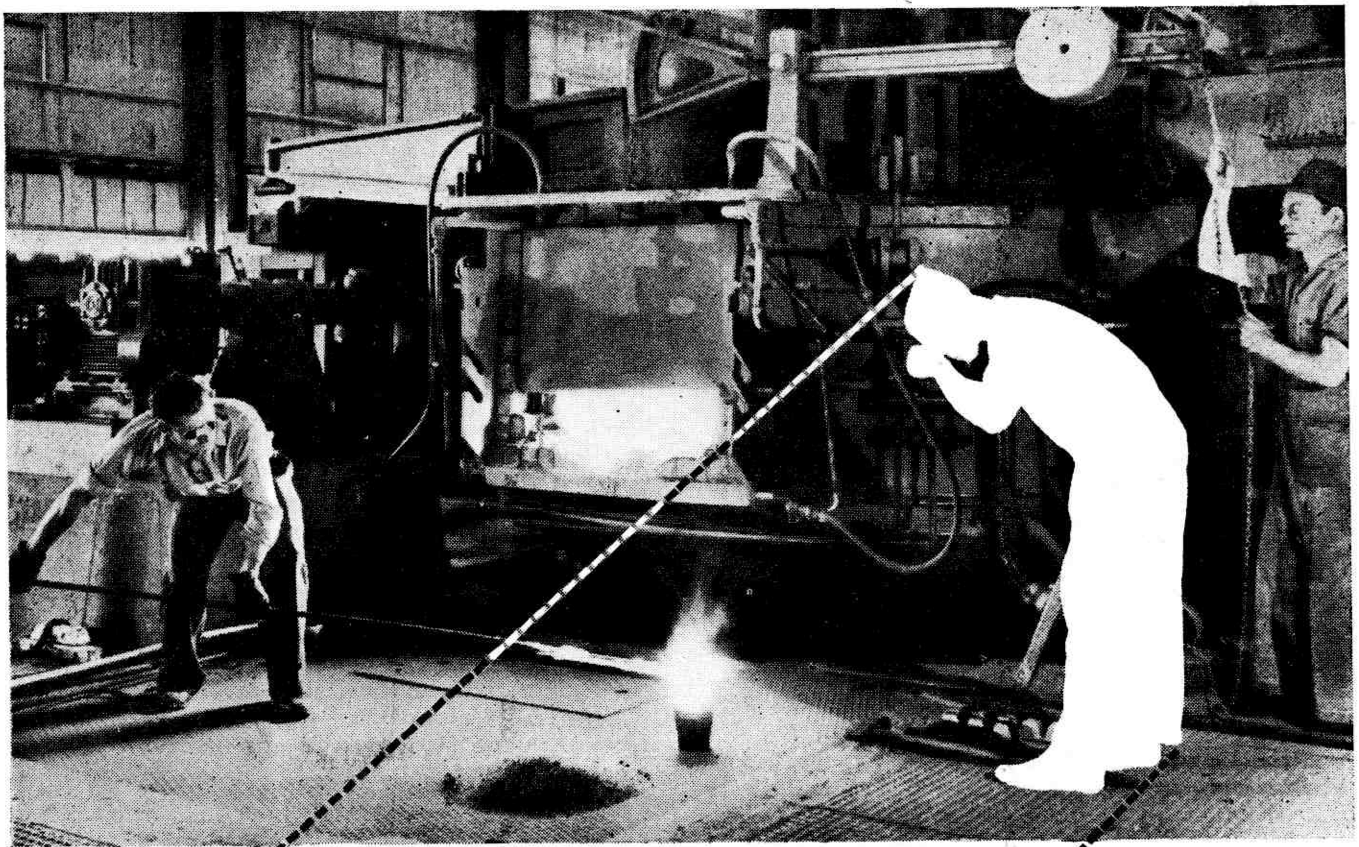
J. K. Probert.—"Needs a keeper at a meet." Blue. State Discus and Broad Jump Champion and runner-up in hop-step-and-jump. Varsity champion in these events. Represented Varsity in Brisbane this year in discus, broad jump, high jump, hop-step-and-jump and the 220 yards in the relay. He won the hop-step-and-jump just failing to break the Inter-Varsity record. Represented Aus. Universities at the Aus. Universities v. New Zealand Universities meet in the hop-step-and-jump at Sydney this year.

P. Brokensha.—"Restricts himself to too few events." Club letters. Holds the University Broad Jump record of 22 ft.-6½ ins. He represented the University in Brisbane this year in the broad jump, 220 yards, and ran the 880 in the relay. Ran second in the Invitation 880 yards at the Australian Universities v. New Zealand Universities meet in Sydney this year.

H. A. Hillier.—("One race man."—Ed.) Club letters. Winner of the 100 yards championship in 1948 and 1949. Represented Varsity in Brisbane this year in 100 yards and the 220 yards of the relay. Won the Invitation 100 yards at the Aus. Universities v. New Zealand Universities meet at Sydney this year.

A. C. Dinham.—"A record breaker . . . at practice." Club letters. One of the State's leading pole-vaulters, discus, and javelin throwers.

—H.A.H.



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