HOSPITAL ENGINEERING

June 1979

International Federation Issue

The Journal of the Institute of Hospital Engineering I.F.H.E.

Interview with Eduardo Caetano IFHE President

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HOSPITAL ENGINEERING

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The Journal of the Institute of Hospital Engineering

International Federation Issue No. 30

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Front Cover: Eduardo Caetano, President of the International Federation of Hospital Engineering.

Institute News

Annual General Meeting

The Twelfth AGM of the Institute was held at 9.30 am on Friday, May 11, 1979 at the Spider's Web Motel, Watford.

The President, Mr J. R. Harrison, CBE, presided.

Apologies for absence were presented by R. G. Smith who had expressed his willingness to attend in his capacity of Honorary Librarian but it had not been thought that a special journey from Wolverhampton was necessary for this brief formal meeting and having regard to the Agenda.

The meeting commenced with the President calling on the Secretary to read the Notice convening the meeting.

Council Report and Financial Accounts

The President proposed that with the consent of the meeting that the Report of the Auditors be taken as read. Agreed.

The President proposed, W. Carr seconded, that the Report of the Council and the Audited Accounts of the Institute for the year ended December 31, 1978, be received and adopted. Carried unanimously.

The President invited questions relating to the Report and Audited Accounts and P. G. Gordon suggested that the Institute Secretary should be congratulated on restricting expenditure as he had.

Elections To Council

a. The President reported that in accordance with the Articles of Association the following members of Council would retire at the conclusion of the Annual General Meeting:
W. Carr, Nominated Member;
K. J. Eatwell, General Member;
K. W. Ashton, Area Member — Midlands;
J. W. Barnes, Area Member — Southern and South West;
J. Cadenhead, Area Member — Scotland.

b. The President announced that the following being the sole nominees in their respective categories were elected to Council unopposed:
W. N. Bewick, Nominated Member;
H. Waugh, Area Member — Scotland.

c. The President then called upon the Secretary to open the sealed envelope containing the Auditors' letter giving the results of the Ballots for a General Member, Area Member for the Midlands Branch and Area Member for the Southern and South Western Branches. The letter from the Auditors, who had opened all Ballot envelopes and conducted the count, revealed that the following had been elected:
K. J. Eatwell, General Member;
L. R. F. House, Area Member — Southern and South West;
C. Smith, Area Member — Midlands.

Auditors

The President moved, K. J. Eatwell seconded "that Messrs Moore, Stephens & Co be re-appointed as Auditors to the Institute and that Council be authorised to fix their remuneration." This was Carried Unanimously.

Any Other Business

The President asked if any member present wished to raise any matter under the heading of 'Any Other Business' but no such matters were raised.

President's Remarks

"This is the end of my period as your President. It has been a most enjoyable two years, during which I have made many friends and had the opportunity to take part in many activities. Just briefly, there have been the continued success of the Management Courses at Falfield; the popularity of our symposia; the continuing development of our activities in the International Federation; the establishment, thanks to the King's Fund, of the Bursary scheme; and our election as an affiliate of CEI. There has been a steady increase in our membership and in the quality and circulation of the Journal; and our finances are in good shape, as you will have seen from the accounts. I hope and believe that as a result of all these activities our standing and recognition in the engineering world has improved correspondingly.

These things have been achieved thanks to the hard work of many people: the Council and its Committees, the Branch Officers and Committees, and all the Members. I have enjoyed the support of the Past-Presidents, of our Honorary Fellows, and of many members of the Department and the NHS. And let me not forget the chairmen of our meetings, our Editor and publishers, the London Branch who organised this Conference and the speakers who gave us such excellent papers, and many others. I wish to thank all these people for the help they have given to me personally, and to the Institute.

Of them all, I refer to only two by name. Ken Eatwell, a member of Council since the earliest days, whom we are very happy to see here, and

well on the way to recovery from his very serious accident; and also John Furness. I never cease to marvel at John's cheerfulness, his off-the-cuff knowledge of any subject you fire at him, and the amount of work he gets through on our behalf. Neither I nor the Institute could have managed without him.

As to the future, perhaps I may refer to one matter which has exercised my mind a good deal — that is the scope of membership of the Institute. We have always been proud to be an engineering body and have grown up as such in the context of the Health Service. The present organisation of that Service, however, is on the basis of the overall works activity, embracing all those concerned with the various aspects of what is usually referred to as the NHS Estate. The private consultants, manufacturers, and others in our field, also are increasingly thinking in terms of the overall activity; and indeed as things become increasingly complicated and sophisticated, it is more and more difficult to separate consideration of the pipes, ducts and cables from the buildings they serve and from the uses to which those buildings are put.

It would be improper of me to try to advise your new President and Council, and I would not seek to do so: but I suggest that they may wish to consider whether a widening of our membership structure to a greater or less extent might bring into our ranks those engaged in the broader aspects of Health-Care, and who might further our aims and strengthen our activities.

My last and most pleasant duty is to induct my successor: I will not say 'introduce' him because he is already well known to you, and you will all have read the excellent write-up about him which Christopher Tanous did for the Journal. Suffice to say that Lawrence Turner has been associated with hospital installations for many years in the field of electronics, and has built up a group of companies of which he is quite rightly very proud.

It gives me great pleasure to pass this badge of office to him and to wish him every possible success — I am sure, Lawrence, you will enjoy your period of office as much as I have done."

New President's Remarks

Mr Turner spoke of his extreme awareness of the honour afforded him and suggested that certain days in one's life tended to stand out. For him the day of his first wage packet, his first car and starting his own Company had been such special days. Certainly today would take its place alongside, or ahead of these days.

Mr Turner appealed that he might be given the sort of support to which his predecessor had referred and spoke of his keenness to visit Institute branches.

Mr Turner referred to Institute events planned for the early future, the first being the '5 branch meeting' to be held at Basingstoke on May 19. Then there was to be the 'National' One-day Symposium on 'Electricity and Health Buildings in the 21st Century' to be held on June 6 with the first 'International Seminar' planned for August 28 to September 14. Then there would be another One-day Symposium on November 14. To all these events he looked forward.

Mr Turner then referred to his predecessor Richard Harrison and said that he regarded him as the archetypal President. He would himself have liked to refer to Richard Harrison's many qualities but even since his arrival at the Conference Hotel he had been approached by several who wished to have that opportunity and, accordingly he called upon Bill Carr to move a vote of thanks to the retiring President.

Mr Carr referred to Richard Harrison as being an Engineer of considerable prestige, having been amongst other things, President of CIBS and Chairman of the Association of Consulting Engineers. Mr Carr spoke, too, of Mr Harrison's considerable powers of leadership and how he had brought this prestige, leadership and many other qualities to work in the interests of the Institute. He had felt it an honour to serve on Council during Mr Harrison's Presidency and he was sure these sentiments were widely shared.

The new President then presented Mr Harrison with a 'Past Presidents' Jewel' and the meeting was declared closed.

London Branch Officers 1979/80

The Officers for the forthcoming year are:
Chairman, D. L. Davies;
Vice-Chairman, W. A. Askew;
Hon. Secretary, P. C. Vedast, 59 Oakfield Gardens, Edmonton N8 1NY;
Hon. Treasurer, W. P. Lawrence.

International Federation of Hospital Engineering Council Meeting – June 22, 1979

The next IFHE Council Meeting will be held in Amsterdam on June 22. The agenda will include the following items:

a. to receive a sub-committee report on 'Evaluation of the 5th Congress in Lisbon';
b. to consider recommendations of the 'Rules Committee' on amendments to Standing Orders;
c. report of the Vice-President on the organisation of the 6th Congress to be held in Washington in 1980.
d. report of the 'Education Committee' on progress and arrangements for the courses and symposia to be held in the UK during 1979.

Any Member organisation or Associate unable to attend the Council Meeting but wishing to contribute to the above discussions should inform the General Secretary immediately.

Spanish Association of Hospital Engineering and Architecture

The AEDIAH (Asociacion Española de Ingeniera y Arquitectura Hospitalaria) held its first annual conference and dinner at La Coruña on April 9, 10 and 11, 1979. Following reception and registration at the Hotel Finisterre, the conference was held in the University School of Architecture, La Coruña.

The conference under the presidency of D Antonio Bonnin Vila was a most successful occasion and the Spanish Association of Hospital Engineering and Architecture were pleased to welcome as their guest of honour Mr Eduardo Caetano, president of the International Federation of Hospital Engineering.

The success of the conference was due largely to the work of the Organising Committee under the chairmanship of Doña Maria Perez Sheriff. Our warmest congratulations go to the Asociacion Española de Ingenieria Y Arquitectura Hospitalaria for their rapid development and national recognition which the AEDIAH has gained.

Steam Engine

The Solar Energy Research Institute of Western Australia and a private

company, National Iron and Steel Pty Ltd, have leased a prototype Pritchard Steam engine to be used in solar energy research for two years. Their aim is to develop and assess a power unit to generate electricity in remote areas. Pritchard Steam Power Pty Ltd hope also to attract funds to enable final testing of a steam car.

French Minister to Deliver Lecture

Monsieur Pierre Aigrain, Secretary of State for Research in the French Government, has accepted the Fellowship of Engineering's invitation to deliver its third Distinction Lecture on Monday, October 1, 1979. The venue for this important function will be the Institution of Electrical Engineers, Savoy Place, London WC2R 0BL. The subject of the Lecture will be in the context of the relationship between government, academia and industry in France.

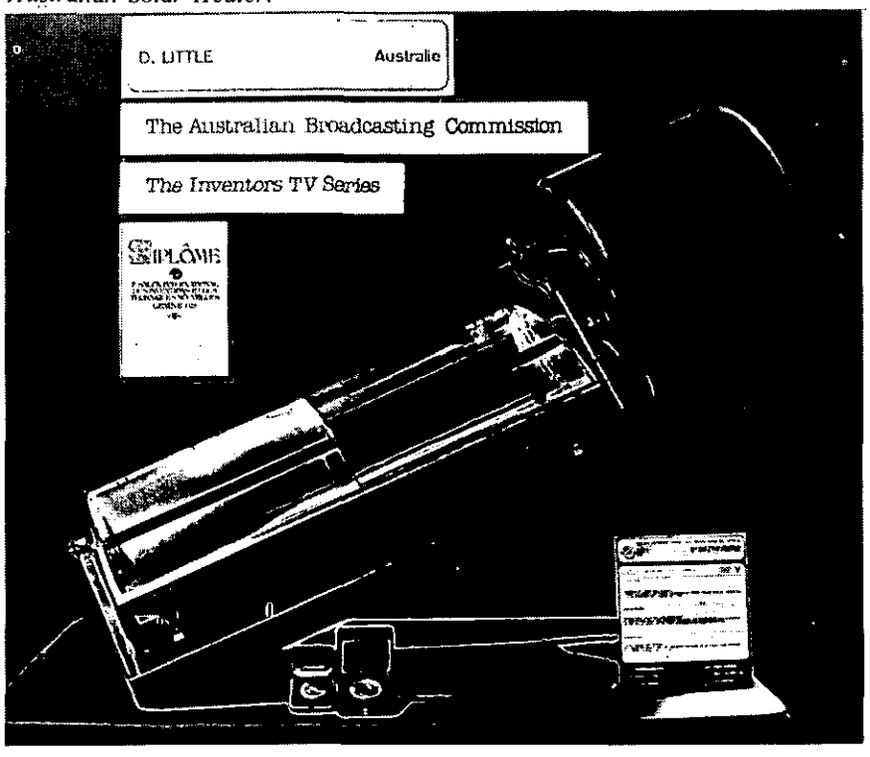
Further details available from: Fellowship of Engineering, 2 Little Smith Street, Westminster, London SW1P 3DL. Tel: 01-799 3912.

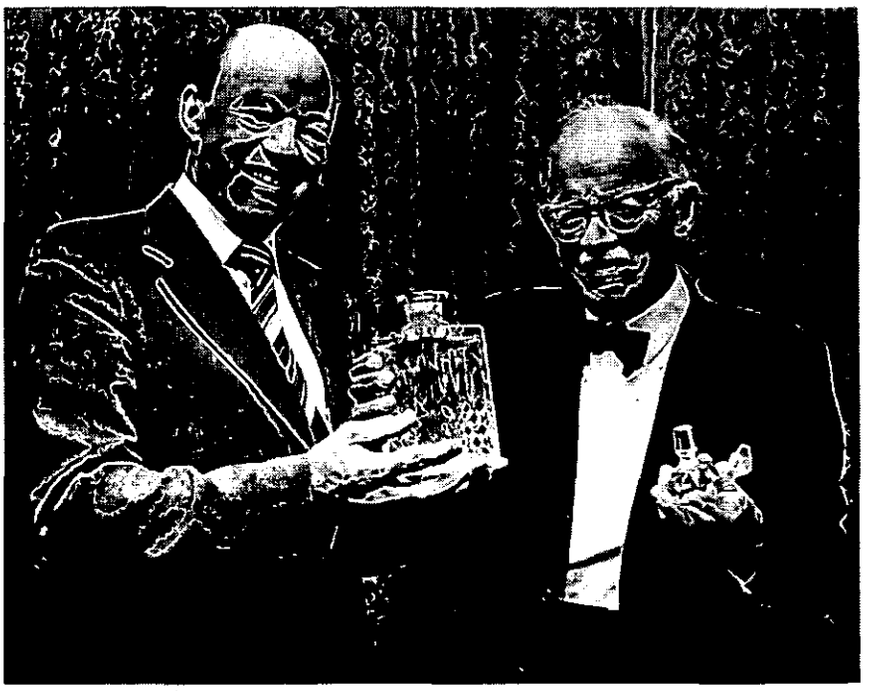
The Trac-Sun Solar Heater

Dave and Adrian Little, of Mount Isa, Australia, have received many enquiries following the appearance of their Solar heater on The Australian Broadcasting Commission's 'The Inventors' TV Series last year. The system is expected to retail for A$700.

The brothers have spent ten years thought and 12 months full-time hard work in producing their invention. Mr Dave Little estimates that the solar system could cut electricity bills by between 25 and 30%.

Australian Solar Heater.





Mr K. Wilson, Northern Regional Health Authority Regional Works Officer (left), presents Col A. P. Smith, Regional Engineer, with a decanter on behalf of his colleagues.

Regional Engineer Retires

Col A. P. Smith, OBE, CEng, BA, FICE, FIMechE, the Regional Engineer for the Northern Regional Health Authority, retired last month after 17 years' service. He joined the Health Service in the Northern Region in 1962 following a military career in which he gained the honour of prize cadet at the Royal Military Academy in Woolwich, saw service in many parts of the world and was Commander, Royal Engineers for the first Atom Bomb Trials for this country at the Montebello Islands. Since joining the Northern Region, he has made a considerable contribution as Regional Engineer in assisting his colleagues in other professions to meet the needs of health care for the community.

Among the major projects which have been completed and for which his department was responsible for the engineering design are the Darlington Memorial Hospital and Freeman Hospital.

CEI Convention on the EEC

The Council of Engineering Institutions (CEI), in conjunction with the Institution of Mechanical Engineers, is

convening a meeting of Presidents and Secretaries (or their representatives) of major professional engineering organisations within the member states of the EEC. The theme of the convention will be 'The EEC and some Implications for the Professional Engineer in the United Kingdom'.

The convention will be held on Tuesday and Wednesday, October 16 and 17, 1979, at the Institution of Mechanical Engineers in London. It is hoped that it will be possible to make arrangements for Corporation Members, Affiliates and Individual Members of CEI to be invited to attend at least part of the proceedings.

Further details available from: Council of Engineering Institutions, 2 Little Smith Street, Westminster, London SW1P 3DL. Tel: 01-799 3912.

Three Italian Hospitals to be Equipped with Scanners

Further orders for EMI-Scanner computerised X-ray systems (CT scanners) have been received from three major Italian hospitals in Lecce, Genoa, and Bologna. When these are installed there will be almost thirty EMI-Scanners in routine clinical use in Italy.

A spokesman for one of the Italian hospitals commented 'The EMI-Scanner systems bring immense benefits to doctors, patients, and hospital administrators alike. They reveal information about a patient's anatomy which we are unable to obtain by any other clinical procedure, showing us structures of the body which previously have been seen only at autopsy.'

The EMI invention of CT scanning originates from research begun in 1967. The world's first CT scanner was installed in a British hospital in 1971, and to date over 1,000 EMI-Scanners have been ordered by some fifty countries around the world.

Control of Building Services

The Chartered Institution of Building Services announces a symposium entitled 'Centralised Monitoring and Control of Building Services' to be held on Tuesday, October 2, 1979, at the Kensington Close Hotel, London.

Within the building services industry the need has been recognised to provide centralised information systems to aid the operation and management of large complex installations. Only in the last decade have the technology and supporting services been developed to design and install such monitoring systems which are at an acceptable cost and can offer reliability in operation. The programme will include the development of monitoring systems and the ability of modern systems to supervise other services.

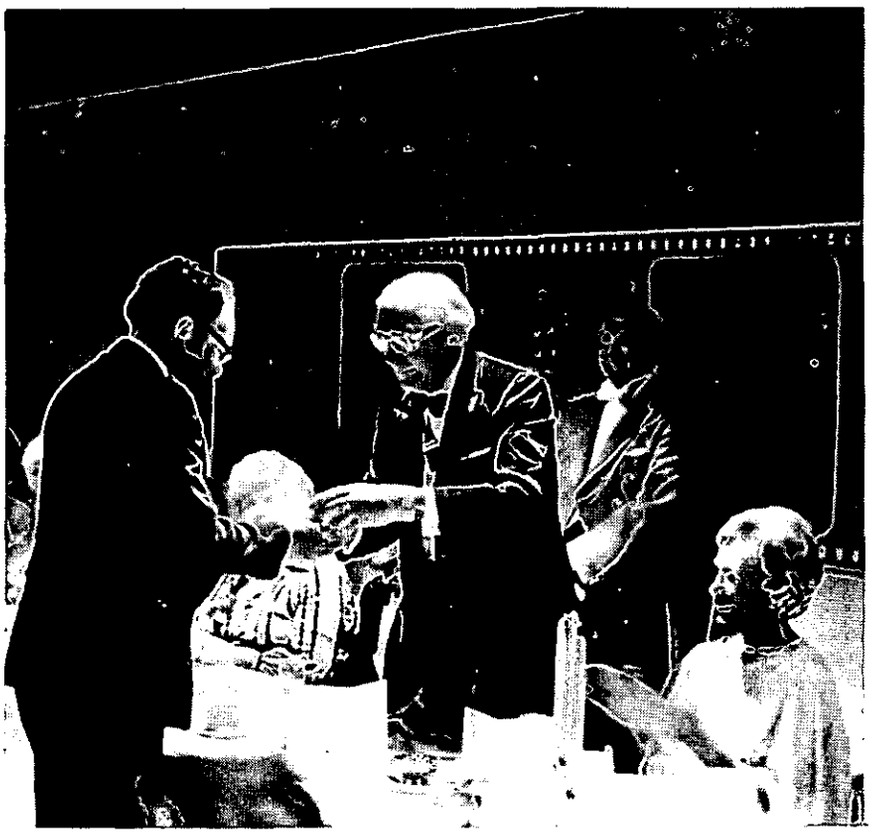
The registration fee is — Members of CIBS £35, non-members £45. This includes copy of preprints and proceedings; coffee, lunch and tea.

For further information please contact: Public Affairs Department, CIBS, 49 Cadogan Square, London SW1X 0JB. Tel: 01-235 7671.

Institute of Hospital Engineering Annual Conference 1979

The Annual Conference of the Institute was held from May 9-11 at the Spider's Web Hotel at Bushey in Hertfordshire, not far North of London, and just off the M1 motorway.

Some eighty members attended, and were not disappointed. The Conference was, as ever, smoothly organised by the Secretary to the Institute, Mr John Furness. There was a splendid selection of technical papers, given by some highly qualified speakers. The Conference was opened officially by Mr W. F. Hodson, a member of the North West Thames Regional Health Authority, who was introduced by Mr J. R. Harrison, President of the Institute. The first speaker was Mr P. D. Berry, an associate with York, Rosenberg Mardall, Consulting Architects, who spoke on *Site Inspection and Procedures* and he was followed after



Mr Terry Wagstaff receives the Northcroft Silver Medal from the President, Mr J. R. Harrison. This Medal is presented for the best paper printed in Hospital Engineering *each year.*

lunch by Mr R. D. Dann, Resident Services Engineer with Oxford Regional Health Authority, who spoke on *Site Progress and Valuation*. In the evening the President gave a reception for delegates and their ladies.

The next morning Mr J. D. Perret, Assistant Director, Corporate Planning, Thames Water Authority, was the first speaker on the day's theme *The Public Utilities — into the 21st Century*. He spoke on *Tomorrow's Water*, and was followed by Mr W. E. Francis, Assistant Director, Midlands Research Station, British Gas Corporation who spoke on *Gas — Today and The Future*. After lunch it was the turn of The Electricity Council, whose Energy Sales Manager Mr J. R. Platts, spoke on *The Assured Future of Electricity*. Later in the afternoon there was an Open Forum, chaired by Mr Tom Nicholls, Chief Engineer DHSS, who fielded a number of excellent questions, which he directed unerringly to the right speaker.

In the evening the traditional Conference Dinner/Dance was held, and members saw their wives again, after they had indulged in the second day of an excellent ladies' programme that had been specially arranged for them by Leslie and Dorothy Davies, and other members of the Sub-Committee of the London Branch. The dinner itself was a great success, and the good humour extended to a very warm reception to the speeches. This was no great problem to those present, anyway, since the main speaker was Eduardo Caetano, President of the International Federation, who spoke most effectively in proposing the toast to the Institute. His speech is reproduced in full on pages 9 and 10.

The President of the Institute, Mr J. R. Harrison, responded and proposed the toast to the guests, followed by Mr Hodson, who abandoned the more formal tones of his official opening the day before, and left all those present well entertained with a cheerful and amusing response on behalf of the guests.

The next pleasant moment came immediately afterwards, when the President presented the Northcroft Silver Medal Award for 1978 to Mr T. Wagstaff. This Medal is presented each year for the best paper in *Hospital Engineering*, and went to Mr Wagstaff for his paper presented at last year's annual conference, on *Noise Control in Health Buildings*. This was published in our issue of October 1978.

Conversation Piece. A cheerful group, with Mr Harrison, keeping Mr Caetano well amused. The others watching are Mr George Rooley, a Past-President of the Institute, Mr and Mrs Turner, John Bolton, Chief Works Officer, DHSS, and (back to camera) Dr Bernard Lucas, another Past-President.

After the dinner things became even more relaxed, and a good time was had by all until well after midnight.

The next morning the Conference organisers had been far-sighted enough to start proceedings at 10 am, although those members of the Institute present were expected to attend the Annual General Meeting of the Institute which started half an hour sooner.

To round things off on a very high note, the last paper of the Conference was given by the new President of the Institute, Mr Lawrence Turner, who was taking over that very day from Mr J. R. Harrison. Mr Turner is the Chairman of Static Systems Group Limited, and he was supported by his Technical Director, Mr R. Wootton. This was a well presented lecture on Micro-Electronics, Mr Turner's own speciality, which was amply illustrated with gadgets, and should even have included a BBC television film *Now the Chips are Down*, which deals with the Micro-Chip revolution. It was not possible to show it, however, due to an unfortunate last-minute accident to the projector. This sad loss was most skilfully covered by the speakers, who nonetheless managed to occupy their alloted time.

A more formal grouping, of the outgoing President and Mrs Harrison, and the new President and Mrs Turner, with Mr Caetano, President of the International Federation.

Eduardo Caetano

President I.F.H.E.

Christopher Tanous

It is one of the measures of a really distinguished man that he doesn't have to throw his weight about to prove his standing. Eduardo Caetano goes one better. He is a truly gentle man whose evident ability is balanced by a natural modesty which makes it inconceivable that he would ever indulge in such conduct.

Eduardo Caetano is Director of Installations and Equipment in the Portuguese Ministry of Health, a post of considerable influence which he has held since he was invited to join the Government Service in 1964 to set up the Department of which he is still head. He chairs two committees, on Hospital Programming and on Health Equipment, which between them set the standards for the construction and equipping of all new and remodelled hospitals, health centres and clinics. Portugal does not yet have a national health service as we know it in the UK, but the health care service has been developing steadily over the years, and the Ministry is looking forward now to a major reorganisation of its structure which will continue the movement.

Mr Caetano has wanted to be an engineer since before his teens, and showed a special aptitude for mathematics and science subjects at high school, although he was also a gifted linguist, which he remains, as evidenced by his excellent speech at the Annual Conference of the Institute (reprinted on pages 9 and 10. He then spent three years reading basic engineering at the University of Coimbra and three more reading electrical and electronic engineering at the University of Oporto.

By the time he had graduated it was 1947, and it was therefore possible to look overseas to gain more experience. After an unsuccessful attempt to go to England a friend in Lisbon suggested that he should consider the medical field, and that the United States would offer a good variety of experience. Soon he was in New York, helping on an engineering SOS service for hospitals and clinics, dealing with breakdowns of every sort of equipment. He also worked in Chicago and Cleveland, and returned to Lisbon after a year in which he had developed his own knowledge very considerably. From then for several years he divided his time between home and overseas, gaining further experience in several countries, including several months in London, some time in Germany and in France. During the whole period Mr Caetano was working for a major private manufacturing concern in Lisbon, initially as head of the electro-medical department, and subsequently as Works Director — a post to which he was appointed after only one year and at the age of 28, being in charge of 250 employees.

For the next 15 years Mr Caetano's working life had a pattern of five year cycles. After spending that time as Works Director he spent the next five years as a partner in another firm making heating and ventilating equipment, before setting up in 1960 as a private consulting engineer in his own right. Most of his practice, which is still in existence, was in the hospitals field, so it is no great surprise that in 1964 the Minister of Health asked him to join the Ministry early in 1965 and to set up the department of which he is still head.

Throughout his career Mr Caetano has paid frequent visits to Britain, and has had direct contact with the DHSS since 1967. In 1969 he spent ten days here as the guest of the Department.

Since that initial contact he has arranged a number of exchange visits between Portuguese and British engineers, and although these had to cease after the political upheavals of 1974, Mr Caetano hopes very much that they can soon be resumed.

International Federation

In 1970 Mr Caetano was invited to go to Rome for the first International Congress of Hospital Engineering, probably, he thinks, at the instigation of John Bolton, now Chief Works Officer at the DHSS. In Rome it was decided to found an International Federation of Hospital Engineering which had its first meeting in Paris in 1971, and was formally constituted the next year. The second congress was held thereafter in London, and the six founder members were Great Britain, France, Italy, Greece, Portugal and Sweden. Mr Caetano, now half-way through his two years as President, is particularly anxious to create further contact between member nations, and to bring in more countries to membership. He is regularly in contact with potential new members, and is looking forward particularly to the next International Congress in the United States of America in 1980, which he hopes very much will stimulate further interest, and therefore further membership.

So far, we have considered Mr Caetano's professional career. He is, however, a man of many parts. He is a prolific author, having written five books, two on technical subjects, and with another almost completed on *Nursing Unit Technology*. He has already written 10 chapters of the 12 that are planned. He has also written many technical articles, around forty in all, mainly in Portugal, some, we are pleased to say, in *Hospital Engineering*, and also some in French publications. More surprisingly, he has also written in his own national press on more philosophical subjects, especially on the relationship between the nation and the technicians who serve it. He is a keen environmentalist, and has written in defence of trees and old buildings.

Mr Caetano is married, and is very pleased that he spent his honeymoon in England. He has three children, with two daughters — the elder being an economist, is married, and has presented him with a granddaughter. His son is in his third year at university studying Fine Arts, and his younger daughter is planning to be a medical pædiatrician. Mr Caetano's main remaining ambition is to write more, and to have more time to do so. He would be very happy indeed if he could end his working career in applied research in the hospital engineering field.

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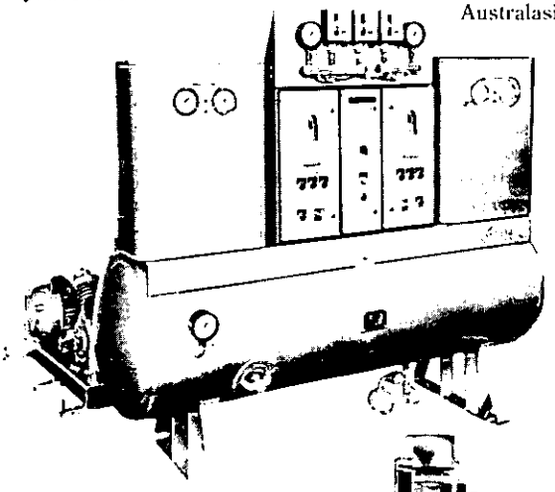

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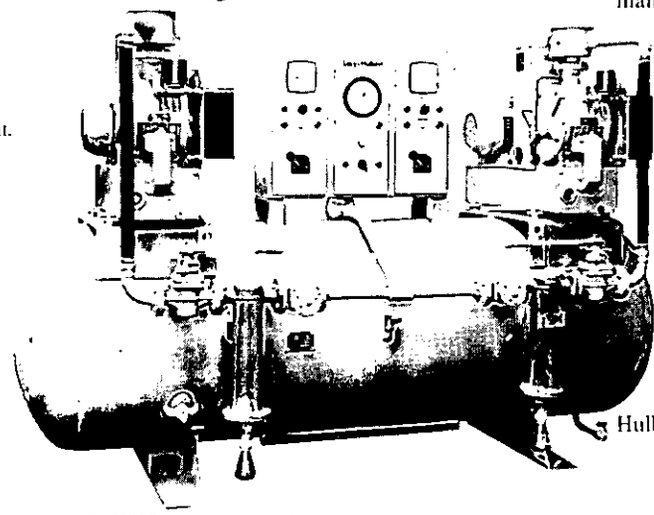

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Mr Caetano is President of the International Federation of Hospital Engineering and is Director of Installations and Equipment in the Portuguese Ministry of Health. In proposing the toast to the Institute at the Annual Conference dinner, he gave the following impressive and moving address — all the more impressive since he wrote his speech himself, in a far better English than anyone present could have attempted in Portuguese.

A View of Hospital Engineering from Lisbon

EDUARDO CAETANO

Mr President,
Ladies and Gentlemen,

I do want to thank The Institute of Hospital Engineering for having invited me to be a speaker tonight. I feel deeply honoured indeed with such a distinction.

Your Institute of Hospital Engineering is the oldest, as far as I know, and is certainly pre-eminent throughout the world, and of this I am positively sure. Your leadership in the cause of hospital engineering and your accomplishments in this field make your Institute, undeniably and unquestionably, the number one in the world. In fact, who else has devoted so much time and people to hospital research? Who else has achieved such volume of studies and performances as you did? Where else can one take advantage of training facilities as in Britain? Where else can one find such quantity and quality of hospital engineering documentation as in Britain?

It is without doubt that no other country has published as many technical books, monographs, booklets, brochures, journals, etc, concerning hospital engineering, as Britain has done for many years. In Europe you lead hospital engineering far in advance. There is a large gap between you and the other countries regarding research, documentation and training.

Besides technical reasons, there are others why I feel so touched by being here tonight. They are personal and historical reasons.

My father was an anglophile. He was in Flanders, France, next to the British Army sector, during the First World War. He taught me, when I was a child, to admire your love for truth, your fair-play, your commonsense and sense of humour, your courage and strength, your pragmatism, and your culture, both scientific and literary. So, I became fond of Britain when I was a youth.

During the Second World War I sided with the Allies and got a Cambridge certificate in English at the old University town of Coimbra. I suffered with the blitz of London and rejoiced when you, alone, won the battle in the skies of England. I accompanied you in mind when you slowly but firmly liberated Europe. I was most happy when you could settle a British base in the Azores in accordance with the oldest alliance in the world. As you know the alliance between Britain and Portugal is still alive — since 1373!

Our golden age, from the middle of the 15th to the middle of the 16th centuries, resulted in part from a marriage between our King John I and the princess of Lancaster. One of their sons, Henry the Navigator, was the head of the Nautical School at Sagres, where a large number of European scientists studied and taught in those days. From Sagres the Portuguese navigators discovered new lands and peoples.

When I married, 29 years ago, my wife and I spent our honeymoon in England. In fact there are many sentimental ties binding me to your country!

Since then I have come often to Britain and I am very pleased to count many friends here.

Professionally, my ties with Britain have been quite rewarding. They have helped me to increase my knowledge in hospital engineering. From 1969 to 1974 I sent several Portuguese engineers to England for training and I have arranged for some British

experts to lecture seminars in Lisbon. That co-operation was most useful indeed. I hope to be able to resume it again soon.

Small and less developed countries cannot afford to provide either training facilities or research work. Some, because they do not possess the experience, the technical background and the know-how, others, because they do not have the money and or the human resources to do it. They must count upon you. Surely, in these fields, Britain has a large task to accomplish in favour of those countries.

Nevertheless, as far as the applied research is concerned, I believe that some small countries can and should do it, in specific areas, mainly concerning existing potential resources. The same applies to some forms of training, specially planned for specific purposes. Here again your co-operation can be most helpful.

Everywhere we can see with joy that the status of the hospital engineer is climbing fast. More and more his role becomes more important and so increases his responsibility. For example, in Portugal now the director (or chief) of the Maintenance Service in a hospital belongs to the Hospital Management Board, compulsorily. The other members are the administrator, a doctor and a nurse, these two elected by the medical and nursing corps, respectively.

As we all know, a modern central general hospital today is a kind of microcosm, full of sophisticated equipment and engineering services. It will not be of great help for patients if the equipment and the engineering services are not working properly. For us, it won't be the cost invested that count mostly, but the human side. What is really important is to save patient's lives, to reduce their sufferings, to eliminate pain and to make illness more bearable. And to achieve that, the hospital engineer is constantly motivated by a real challenge — to keep building, equipment and engineering services working properly within a restricted budget. He must do it with technical skill but also with love. He will have his moments of tiredness, disappointment, depression and anxiety, but he will have also the strength to fight and win because his cause is the most beautiful that can be found in this world of ours — to help other men to defeat illness so that they can again, without pain, watch a child playing, admire a bird flying and enjoy the beauty of a flower. To smile again.

If we think about it, even for a few moments, we will find that our work is rewarding indeed. It is in direct opposition to the latent destruction of mankind, probably in march already.

The importance of hospital engineering applies also to our colleagues who plan, programme, design and build hospitals and other health facilities; manufacture equipment; and research, standardise and co-ordinate. These colleagues have upon their shoulders a very important part of the global task. They have the responsibility to avoid oversized hospitals or specific parts of the hospital, and under-used equipment. As we all know quite well it is a common hospital 'disease' to purchase very special sophisticated equipment so that the boss can show it, although actually it will be under-utilised. Duplication and multiplication of costly equipment is a common practice specially in teaching and big central hospitals. This 'disease' can be seen everywhere! It is our duty to fight and heal such 'disease' as much as to avoid lack of needed equipment. We, hospital engineers, should put all our strength to avoid over or under-sized building and equipment; in other words, we shall seek the truth.

Another field where we can apply our skill is that of remodelling old hospitals in order to make them technically more functional and humanely more pleasant. We shall not destroy them. Whenever possible we shall use them, doing the necessary ameliorations without unnecessary destruction. An old hospital is a monument in itself. Our sensibility should help to make decisions to preserve the old hospitals as much as we can. Here comes the problem lately raised by William Tatton-Brown: shall we transform the big Nightingale wards into two, three or four-bed wards, or keep them open? Shall we paraphrase "to be or not to be Nightingale" as a Tatton-Brown question? I am not preoccupied because I am sure that your wonderful common sense will bring the adequate solution.

Generally, we engineers are more pragmatic than our friends the architects. Usually they dream a little bit more than we do. The engineer prefers to standardise in order to get the benefits of the industrialisation. The architect prefers to leave his personal seal on each work he is involved with. Shall engineers be hostile to architects, or get along with them? Pragmatism or idealism? I believe that common-sense calls for an eclectic solution . . . We must destroy the image of the engineer as a computer. No! The engineer has also a rich intellectual life built upon a scientific and technical basis, and is, therefore, trained to find beauty easily!

Another important role of our work concerns the economic aspects of the hospital expenditures. Out of the four principal parameters concerning the everyday life in hospitals, engineers take care of two (buildings and equipment) and deal with part of the other two (personnel and supplies). The engineer must balance permanently the functional and economical aspects, and take adequate decisions based on good common-sense.

Regarding the future, our main policy will be to anticipate the days ahead when acute beds in hospitals get reduced to two per thousand with an average turnover of four to five days. Hospitals will be full of equipment and engineering services, demanding more hospital engineers with higher training. The fields of thermodynamics, the dynamics of fluids, and the electricity in the human body are just commencing to be explored. It is one of our tasks to work along with doctors in that exploration. In special cases it will be impossible to separate the job of the engineer from that of the doctor. Medical engineers will have a great and auspicious career. Health Centres and Rehabilitation Centres will be more and more crowded with equipment for preventive and rehabilitating medicine. Everywhere the equipment will be more automated and computerised.

I believe that we are becoming, in fact, more health engineers than hospital engineers. It is possible that in a future not too far away the International Federation of **Hospital** Engineering becomes the International Federation of **Health** Engineering.

I, as president of the IFHE, want to congratulate the president of The Institute of Hospital Engineering for the brilliancy of this 35th Annual Conference. Both the interest of the papers presented and the high qualifications of the speakers made the Conference a success.

I trust that The Institute of Hospital Engineering continues to organise conferences as fruitful as this one, and to promote the progress of hospital engineering as before, to the benefit of all health engineers.

Thank you,

Eduardo Caetano.

Papua New Guinea

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Papua New Guinea

This paper was presented at the Lisbon Congress in 1978 under the subject title 'Hospital Maintenance'. The author is regional works officer of South Western Regional Health Authority in the UK.

The Relationship Between the Design Process and Maintenance Practice

Conception et Pratique de la Maintenance

D. W. HANSON BArch(Liverpool) ARIBA FIOB AIHospEng

Synopsis/Résumé

Il faut donner au futur responsable de la maintenance de l'édifice l'opportunité de connaître le projet en cours de conception et de manifester ses commentaires à son sujet, car:
a. il pourra ainsi prévoir les problèmes de maintenance et possiblement les éliminer à travers le débat avec les concepteurs, et
b. il pourra aussi planifier au préalable la maintenance de l'édifice et faire les démarches nécessaires pour en assurer le financement.

Lors de la réception de l'édifice le responsable de sa maintenance doit recevoir un Manuel d'Informations sur l'Hôpital; le personnel de son équipe doit recevoir une formation adéquate avec la collaboration des fabricants de l'équipement, etc.

La stratégie de la maintenance et du remplacement des installations présente des aspects financiers et d'ordre pratique. Une bonne conservation et le contrôle des coûts sont d'une grande importance.

Il faut que les édifices existants durent plus longtemps, vu les pressions économiques et sociales en constante évolution; d'autre part, des changements permanents rendent difficile l'élaboration d'une politique positive de gestion du patrimoine.

Full Paper

This paper embodies the results of my experience as an Architect, firstly in private practice, and then in the National Health Service, and since 1974 as a Regional Works Officer whose duties embrace not only direct responsibility for the execution of health building projects, but also setting the standard for maintenance of the Health Service estate through the South West.

In this last task particularly, there is need to maintain very close liaison with Area Works Officers who are responsible individually to the Health Authorities of Gloucestershire, Avon, Somerset, Devon and Cornwall. I am grateful to my Area Works Officer colleagues for their contribution to this paper.

The first sections of this paper examine ways in which the designer can help reduce the maintenance liability. They are followed by an examination of the maintainer's approach to setting up a maintenance strategy once the building is handed over to him. The paper concludes by discussing some of the factors which influence long-term decisions about the use of buildings which in their turn can affect maintenance policy.

The Building User's Part

The building user may not be the building owner, nor is it always the case that the user is responsible for maintaining the building. Building owners, therefore, to ensure a successful outcome to the task of providing a new building (and here I mean 'successful' in the terotechnology sense), should make arrangements for these several complementary interests to be protected by an appropriate building professional.

This professional can be on the building owner's staff or be a Consultant appointment, but whichever method is used, I will call him the 'maintainer', concerned with the separate interests of the owner, user and maintenance staff.

The Maintainer then, is a Works professional experienced in estate management; and he should become involved right at the inception of a project for a number of reasons. In the case of an existing group of buildings to which an addition will be

made, there is bound to be an impact on existing traffic patterns, car parking, boiler services, catering facilities and so on. Certainly when the Contractor has cleaned up and gone, the Maintainer will have the task of keeping the building and the services it contains in good running order, and he may well have to increase his maintenance force to do it. If not, he will certainly have to increase his maintenance budget.

For many years, designers have tried to monitor the success of new capital works in the Health Programme by a 'feedback' system. This has been reasonably successful on the engineering services side, but not so from the building envelope point of view.

This last point (if any reasons were needed for the next suggestion) justifies the Maintainer having an opportunity to run through proposed design solutions and details, before the Architect's and Engineer's designs become enshrined as production drawings. It is quite possible this idea will be anathema to the dedicated practitioner who may not appreciate that in a large design organisation important design decisions can be taken by quite junior and sometimes inexperienced staff. As this is a fact of life, my suggestion is made in the expectation that by informal, and hopefully amicable discussion, maintenance liabilities can be minimised without in any way undermining the responsibility of the design professional. If an easy description of this suggestion is required, this could be called 'feed-forward'.

Many examples can be used to illustrate why there is a need for these discussions. It is right to pose questions about the use of softwood externally; roof and eaves detailing; adequacy of access to engineering installations; glass in the elevation as it affects energy conservation; and the results of designers in a central office not appreciating local weather conditions. It is not proposed to explore the right or wrong way of doing things, but they represent important topics for discussion.

The benefit of discussions from the designer's point of view is that they give him an opportunity to explain his difficulties in working to cost limits. These may put him in the position of having to specify a material requiring relatively high maintenance. It is difficult to accept such a point as a generalisation, so I will illustrate it by the example of a very large multi-storey new hospital at present under construction on the coast in my Region. Mill-finished aluminium windows were specified, as the cost limit was extremely tight. The job architect wished to improve the specification from mill-finish to anodised, but, as this would have added £50,000 to the cost at a time when savings were being sought, after receipt of tenders approval was not given. Of necessity, this is only a brief description of the background, but the situation must be familiar to all designers obliged to work within fairly tight cost limits. A careful consideration of the cost of the job as a whole produced no compensating savings, so that the specification had to remain as ordinary mill-finish. The maintenance manager as a result was faced with the prospect of either washing down the aluminium frames with soap and water twice a year, or not doing this and budgeting for the replacement of

these windows after about twenty years.

Considerations of public accountability can have their effect on installations contained in new health buildings. For example, I quote the effect of competitive tendering for services installations — specifically piped oxygen services. It is quite possible for Manufacturer 'A' to be successful in tendering for a job to be located on a hospital site where the oxygen installation is by Manufacturer 'B'. Work needs to be done on contractual procedures to eliminate this kind of difficulty, and also to bring the Contractor's expertise into close contact with the design team, before all the design decisions have been made. This would include specialists — like flooring contractors — because new materials and techniques are being developed all the time and it is easy for the designer to become out of date.

Handover

It is important that engineering and building maintenance staff are given an opportunity to familarise themselves with a building as early as is reasonable during construction. Arrangements have been made in my Region (and I know similar arrangements have been made in other Regions and the Property Services Agency) for early informal contact between maintenance staff and site supervisory staff. It is particularly important that there is close contact between them during the snagging stages, for few buildings pass the 'practical completion' stage free of defects.

At 'practical completion' the building is handed over to the owner and enters the commissioning stage. (The term 'commissioning' does not mean the contractual setting to work of engineering equipment, incidentally.) The new building now commences its life as a facility requiring maintenance, and it is of great importance to maintenance staff that comprehensive Project Information Manuals, including complete 'as fixed' drawings are made available to the Maintainer at handover by the design team. Sadly this is not general practice yet, but should be — how many of us would drive a new car away from the garage without an 'Owner's Handbook'?

The end-of-contract setting-to-work stage and post handover commissioning period are critical in the context of training maintenance staff and users alike. Manufacturers and designers should be involved in the process. At this time the users will familiarise themselves with the policies behind the design and equipment provided — failure adequately to do this can have serious consequences. As an example, the case of a hospital which has been open only three years, emphasises this point. Already the lining of the incinerator flue — the central element of a cluster of flues surrounded by a concrete windshield — is lying powdered and crumbled at the bottom, because the incinerator was run at temperatures greater than the maximum allowed for in the design. There was nothing wrong with the specification in fact. The problem arose because the use of disposable plastics had greatly increased after the design was completed, and to incinerate this material requires very high temperatures. Had the training described taken place, it is probable that instead of incinerating the plastic, it would have been separated out for collection by the Local Authority. As it is, an expensive repair bill has resulted.

Strategy for Maintenance

Good maintenance practice does not simply start with the handover of the building — it must be planned in advance, as early as possible. The process of designing a building should include calculating the running costs, which in themselves should include the cost of labour and materials required for maintenance. There are a number of ways of approximating such costs, including the use of the Bill of Quantities as an indicator. Take the Painter and Decorator Bill for instance, it is easy enough to calculate from this what the cost of interior and exterior redecoration will be, dependent on the time periods chosen for these tasks to be undertaken, and from this, labour and materials costs can be estimated. The maintenance manager's expertise, having gone through the job, will be to determine what strategy of maintenance is appropriate to that building. By strategy, I mean whether it is on a Planned Preventative Maintenance Programme, or one of the other methods between that, and Breakdown Maintenance. Equally, he will need to decide the proportion he will do from Directly Employed Labour and by outside Contractors. From these decisions, he can estimate the additional staff he is likely to need to cover the maintenance of this new building. Whatever the method chosen, the materials and labour needed will cost money, and this needs to be allowed for in the budget for future years.

Building owners should be educated to accept that maintenance is required from the first day a building opens, and should agree funds for this purpose. Unless this is done, 'backlog' maintenance begins to build up from the opening day, and will be a constant source of worry for the maintenance manager. Experience has shown, however, that sufficient money has never been made available. This produces the need to determine priorities. The Department of Health and Social Security have developed a system of maintenance management based on survey and programming techniques. This is called Estmancode and it has been adopted throughout the National Health Service. At present, budgeting is on an annual basis, which in itself results in difficult decisions for the maintenance manager who needs constantly to review the order of his priorities. It is salutary to compare the percentage of running costs annually devoted to maintenance:

MAINTENANCE EXPENDITURE TABLE

	Expenditure as a % of annual revenue	Expenditure as a % of capital value
Hotel Industry	10%	2.9%
PSA	8%	2.3%
NHS	4.5%	1.6%

To some extent these figures are conjectural, but represent the comparative expenditure pattern. The conclusion to be drawn is that where there is commercial benefit in good maintenance, it is afforded. It is hardly surprising that the backlog maintenance figure in the National Health Service is very high indeed.

As well as competing with other disciplines to secure funds, the maintenance manager is often faced with complex problems in carrying out the maintenance. Many attending this Congress will have had to remove walls to replace boilers in an old boiler house, one example of such complexities. Hopefully, my suggestion of early discussion between designers and maintenance managers will eliminate such difficulties.

Developing technology presents difficulties too, and here I instance

radiological X-Ray equipment. This is something which changes rapidly, and is for hospital design staff a particular headache, for model types are not identified until some 12 months before handover. As a result, purpose-made provision is not possible, but to provide infinite flexibility for installing the equipment when it is eventually delivered, can be very expensive. For the Maintainer, this creates difficulties, since the equipment needs to be replaced about every ten years. Frequently this equipment is very heavy and buried in the basement of the building, quite apart from the fact that the fixings for the new sets bear no relation to the old.

Good Housekeeping

As labour and material costs rise, specifications previously regarded as 'traditional' are being challenged. This can create difficulties where jobs designed many years ago are only now being brought into use. Floor coverings illustrate this point very well. An example can be quoted on one job where sheet PVC materials had been widely specified and only here and there had carpet been introduced, largely because of its higher initial capital cost. Studies carried out by the local Domestic Services Manager proved that maintenance of PVC sheet compared with carpet, was a third more costly per year, which resulted in an enormous figure over the life of the building. This was a case where clinical considerations were in the melting pot with original specification and running costs. Because of the advance in carpet manufacturing techniques since the original specification, no medical objections were raised against the type of carpet which was currently available, and this made it possible to introduce a lot more carpet into selected areas of the hospital.

The change in fuel cost and availability has caused maintenance managers to join with colleagues in other disciplines, notably Treasurers, to identify areas of high energy use, and take corrective action. It is very illuminating simply to carry out comparative running cost studies for similar establishments, and start with the simplest of checks where costs are shown to be high. This means instrumentation checks and flue gas analysis. Of course in efficiently run situations, additional savings can only be achieved by some capital outlay to improve the contribution made to environmental control by the building envelope itself.

There are many other illustrations which could be given where maintainers can achieve cost savings, like measures to conserve water; the use of flushing additives which result in a reduction in drainage maintenance; and the wholesale re-design of the areas around buildings to reduce grounds maintenance, but I believe the point will have been made without extending this section.

The Change in the Economy

The downturn in the world economy has had the effect, all over the UK and in other parts of the world, of forcing changes in long-term plans for the replacement of old buildings. Buildings which had been the subject of such plans had naturally only received a cosmetic form of maintenance for many years. Now that capital replacement has become an impossibility in a lot of cases, the existing buildings require very high maintenance expenditure to bring them up to a condition which will keep them in use to the end of the century and beyond.

It is interesting that not only economic forces have brought this change. The social conscience of the community has been stirred to conserve the heritage of our old buildings, and Planning Authorities have a difficult job in deciding whether to preserve a building on grounds of age, or adaptability, or both.

The Estate as a Whole

It is appropriate in the last section of this paper to broaden the subject to embrace Estate Management in its widest sense. There is a need for long-term planning in the use of buildings, so that, for example, the continued use of buildings with a high running cost is examined very carefully, and unwanted facilities disposed of. So often buildings are kept going by their users for sentimental reasons.

Unfortunately many factors bedevil long-term planning, especially population predictions, for instance the effect the post-war 'bulge' had on the demand for maternity services (and of course, later, schools). A rapid maternity hospital building programme was initiated, with the result that today we have more maternity beds than we need. By now, of course, the post-war 'bulge' of population has entered the stage of parenthood, but just as that occurred, the Pill had a dramatic effect on the birthrate, which upset all the predictions.

Another variable is the economic situation. It is a regrettable fact that politicians tend to use the building industry as an economic regulator. Were this not so, it would be more possible to say 'plan this building for a sixty-year life, then it will be replaced'. Early in 1969 an Operational Research study was commissioned to produce information for maintenance managers, so that they could read off a graph the cost of deferring, say, roof repairs for one or two years. The researchers were very enthusiastic and hit on the concept of working backwards from the closure date to determine the right level of annual expenditure on maintenance. It was suggested the ideal situation was, that on the last day the building was used, the last man out would slam the front door, and the building would fall down! There were many problems in working this idea (which you must admit has a beautiful simplicity about it), but the chief difficulty stemmed from complete uncertainty about the closure date of any building, which is largely due to changing economic circumstances.

Conclusion

This paper has attempted to illustrate the practical problems facing maintenance managers and the degree to which these can be lessened by informal contacts at the right time with building designers. The views expressed will not go unchallenged, for there are highly professional people amongst both designers and maintainers who believe they have a complete knowledge of the other person's problems.

The paper ends by discussing those important social and economic questions which face all communities. This is no time for anyone to squander valuable assets, whether these include fuel, individual buildings, or groups of buildings forming a community environment. The designer and maintainer can work together to ensure the best possible value for money which will have its reflection in the best possible service for patients, as well as the medical and nursing staff who are devoted to their care.

This paper was presented at the Lisbon Congress in 1978 under the theme 'Hospital Engineers in the Hospital'. The author is a director of the Medical Architecture Research Unit in London.

Multi-Professional Planning and Design Teams, Problems and Possibilities

RAYMOND MOSS MBE PhD DipArch(Sheffield) ARIBA(UK)

Synopsis/Résumé

Dans les dernières années il y a eu un mouvement constant pour former équipes multi-professionnelles de planification et projet d'hôpitaux.

Mais parce qu'il n'y a pas une langue technique et un système de référence communs, les équipes multi-professionnelles éprouvent une grande difficulté pour identifier les objectifs et méthodes. Il y a trop d'opportunités de malentendus et d'irritations parmi les membres des soi-disant équipes et ça affecte défavorablement la qualité du produit.

Cet exposé essaie d'identifier quelques de ces malentendus et irritations et propose la structure d'un cours de 'post-graduate'.

The Full Paper

In recent years the emphasis of the health care delivery system has shifted from hospital to community. But this was not the case in 1948 when, because of the war, the United Kingdom found itself with a National Health Service, but with no generally acceptable hospital design or model. In other words, although a building programme was in prospect, because there had been no hospital building there was no typical British hospital more recent than those which had been built 60-100 years earlier.

In a sense, therefore, the position in Britain then bore a close resemblance to the position in some developing countries now. The question to be answered was 'how best can a nation with little or no previous experience organise itself to produce with a minimum of delay, and at a cost it can afford, the health service buildings which it so badly requires'?

In that serious situation, Britain did something which today would be regarded as doubly dangerous—she looked overseas for hospital design ideas or models. Such a quest is doubly dangerous because firstly, it is most unlikely that a hospital designed specifically for one country will be equally appropriate in another, and secondly, to propose a hospital in isolation from community care provision is now regarded as both inefficient and extravagant. But comprehensive health care planning was not practised in 1948, so the situation was one of ignorance being bliss.

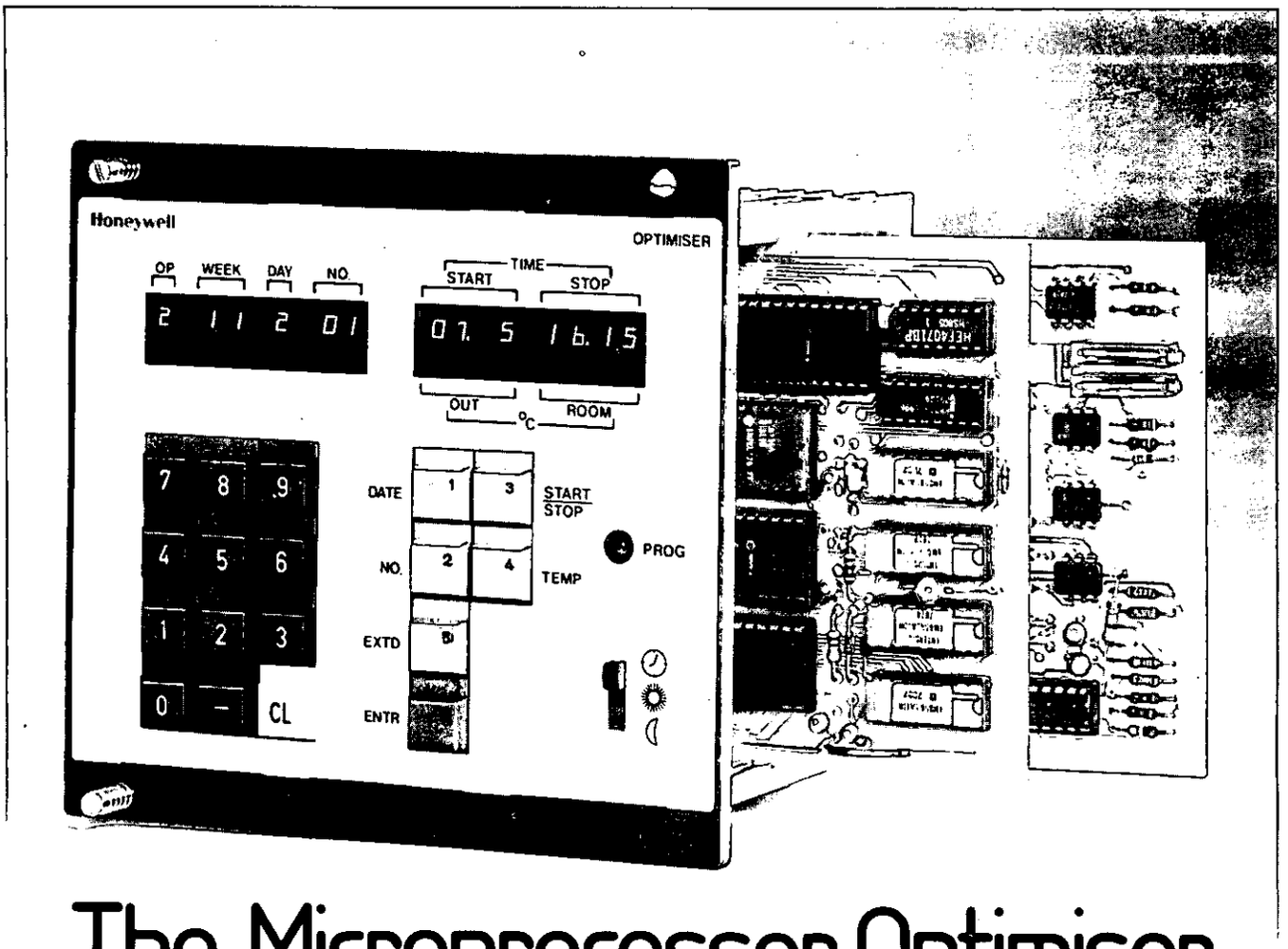
The war had in fact impoverished the nation to such an extent that, even though there was a need for new hospital building, there was no money to do it. And paradoxically it was this poverty which perhaps averted a number of major hospital building disasters. For, although the dangers inherent in simply copying another country's hospital were foreseen by a small number of people, it was the lack of money for hospital building that stemmed the demand for copies, which surely would have arisen if resources had been plentiful. In this respect, rich developing countries anxious to build hospitals in a hurry are at considerable risk.

The Research Programme

In a situation of minimal experience and no money to build anyway, there was time to think. Certainly one had to look abroad to assess the problems and possibilities and this was done, but in parallel with a home-based research programme. The first research unit, which was organised and financed properly and had responsibility for addressing itself to the problems noted above, was the Division for Architectural Studies of the Nuffield Provincial Hospitals Trust[1] and three particular qualities characterised their work. First, design solutions were based on a thorough understanding of function. Second, this thorough understanding was achieved by carrying out studies with a **multi-professional team.** Third, the construction and operation of live projects to demonstrate the team's findings was more dramatic than a written report.

That 'form follows function' was, for many years, a catchphrase among hospital planners in Britain. The implication here is that there is one 'best' plan for any given function — a 1:1 fit. The Nuffield Team contested this view by pointing out that 'the influence of design upon function may be very great', although hospital planners have generally wished to believe that function has dictated design, in the complex environment of the hospital.

This fundamental proposition changed the whole course of hospital planning, from one in which individual designers sought to create a hospital 'tailor made' to suit the individual process or activity, into one in which multi-professional planning teams, on the basis of their **combined** knowledge and experience, produce 'loose fit' designs. These can



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cope more easily with the rapid changes which occur, in medical and nursing practice and management. Now, these ideas are brought to bear as a routine when evaluating hospital planning proposals. In fact, designing for flexibility requires a deeper knowledge of user needs.

Multi-Professional Working

Hospital problems may be approached from two points of view. Referring again to the Nuffield Report,[2] 'One way is from the accumulated knowledge and experience of those whose daily work has been within the hospital or in hospital design; the other is by bringing to bear fresh minds and fresh methods from outside because people working in hospitals are often too close to their problems to view them dispassionately.' In the event the Nuffield team considered the two approaches to be complementary and aimed at a balance between the two.

If the Nuffield proposition is accepted, then from the viewpoint of a Nation or Region facing the challenge of producing a series or programme of hospitals, the supplementary question has to be asked 'how can such a blend of experience and innovation be achieved while at the same time making the best use of skilled manpower?' One answer is by making repeated and concentrated use of planning teams to instruct and guide a variety of design teams. The planning teams would consist of doctors, nurses, hospital administrators, architects, engineers and quantity surveyors, skilled and experienced in the problems of hospital design. They would be responsible for briefing and monitoring the progress of the designers who may or may not be experienced in hospital design. The job of the architect, engineer, surveyor or building economist on the planning teams is to ensure that the design and cost implications of decisions made by their medical, nursing and administrative colleagues are continually made clear. The job of the nurses, doctors and administrators is to bring to the table specialised knowledge and experience. Because they are not concerned with a hospital for themselves, they maintain a balanced view. This then is multi-professional working. Each team is representative of both user and designer professions, providing a focus of knowledge and experience across the board. They are continually refreshed by close contacts with hospital practice but are not involved in it day to day. Each is a point of reference for planning data, and one to which one speaks automatically on all matters concerning planning. In this collaborative endeavour the engineer has a unique contribution to make.

Roles of Individual Team Members

It is well worth considering for a moment the roles of the individual team members in more detail, and before anybody stops me to ask, "What about the patient?", let me say that for obvious reasons it is not possible to speak to **every** patient. Recent research has indicated that interviews with patients do not produce really useful planning data. So, from the planning team viewpoint and as we are all potential patients, the combined knowledge and experience of doctors, nurses and administrators, together with the environmental concerns of their design trained collaborators, is taken as representing the patient's total needs. This is **not** to say that surveys of patients' needs and desires are unnecessary. But it is to say that the results of such surveys are data additional to, rather than as a substitute for, the combined experience of the team.

Clearly, doctors are key members of the 'client group' on the planning team, and in the UK the planning doctor has emerged as a clear-cut figure who speaks on behalf of his medical colleagues on planning matters. For it is obviously impossible for every medical specialty to be represented on the team, and anyway practising clinicians are only likely to be involved in a major building project once in their lifetime. Hence they have no opportunity to accumulate experience. Further, they would be prone to impress their own individuality too strongly on the design of their own department — a problem frequently encountered in teaching hospitals. However, specialist advisers are co-opted on to planning teams from time to time to give specialist advice, but this is done alongside the planning doctor who, through regular contact with designers, is aware of the factors which constrain their work, and will act also as a foil to the more flagrant acts of individuality. Because they are a member of a multi-professional team, planning doctors are also well aware of the changing needs of nurses and administrators. In fact a 'proxy' medical client has emerged who, for the sake of clarity and convenience, speaks on planning matters on behalf of all other doctors with whom, one hopes, he is in continuous contact.

Nurses and administrators on planning teams fulfil a role similar to that of the planning doctor, but it is the planning nurse who frequently occupies the centre of the stage. The reason for this is twofold. Firstly, she spends more time than any other class of hospital user in contact with the patient, and secondly she is deeply involved in, and often responsible for, 'behind the scenes' organisation and preparation. The hospital administrator brings to bear his overall view of hospital organisation and management which includes special interests such as logistics and catering.

From what has been said it can be seen that multi-professional planning teams have on them people who may be regarded as 'proxy' clients, whose job it is to represent the views of all classes of hospital users, with whom they are in touch continually, and who are, at the same time aware of the designers' problems. In short, the planning team is in an ideal position to communicate three ways; with those who want hospitals (the clients); with those who pay for them (government or other corporate bodies); and with those who design and build them (design firms, employed consultants).

Works Professionals

So far this discussion has been concerned with client group representation on the planning team, but there is another component comprising works professionals. Architects, engineers and surveyors must also be represented if the communication of objectives from planning team to designers is to be as clear as the communication between the client group and the users.

A truly representative multi-professional planning team combines client and works professional groups into a balanced whole, with responsibility for preparing project policies and programmes. Further, the multi-professional planning team provides the focus for communication between hospital users on the one hand and the project design team on the other. This principle is illustrated in *Figure 1*.

Problems of Planning Teams

Even though multi-professional planning teams have been operating for

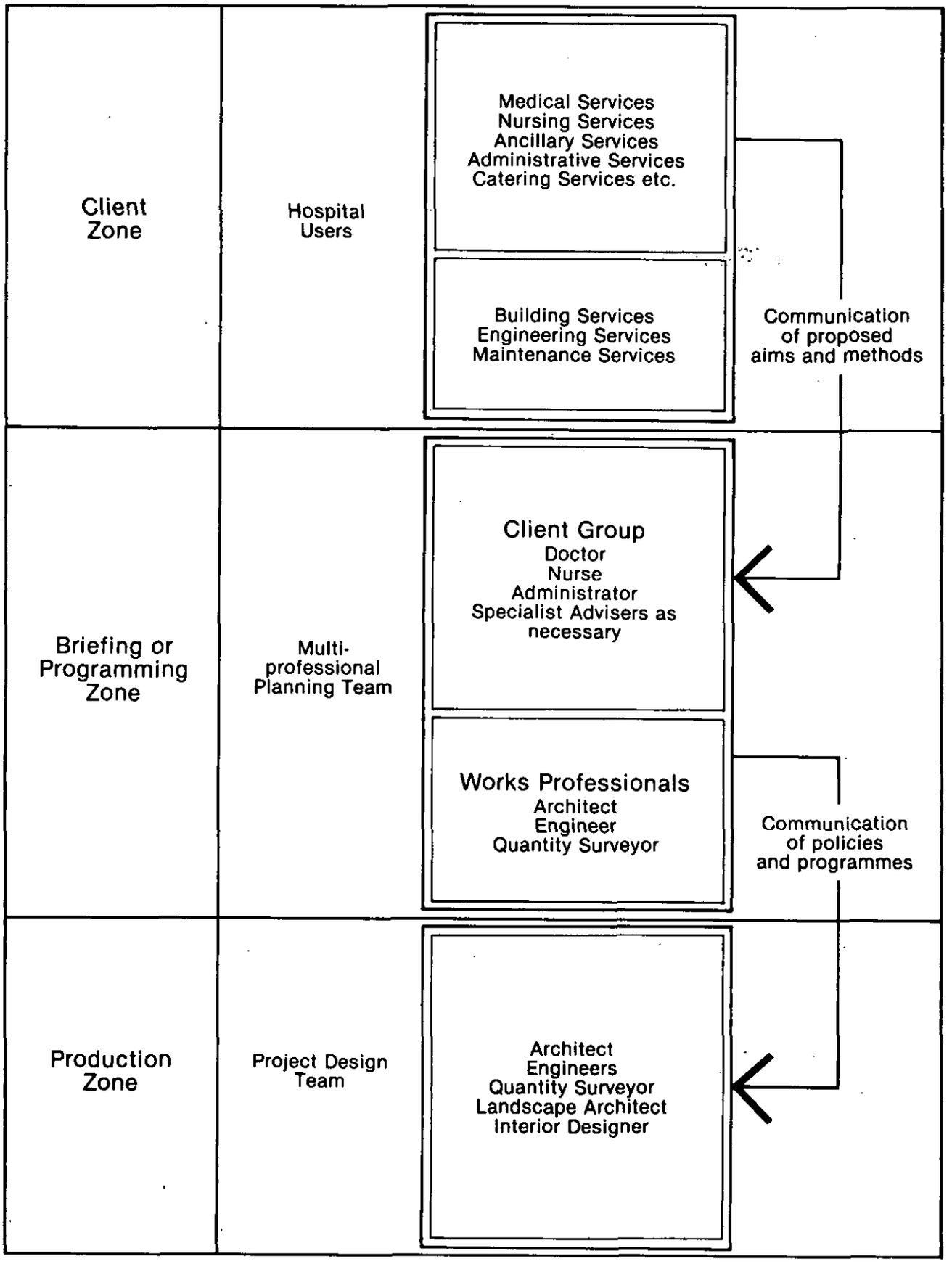
Client Zone
Hospital Users
Medical Services
Nursing Services
Ancillary Services
Administrative Services
Catering Services etc.
Building Services
Engineering Services
Maintenance Services
Communication of proposed aims and methods
Briefing or Programming Zone
Multi-professional Planning Team
Client Group
Doctor
Nurse
Administrator
Specialist Advisers as necessary
Works Professionals
Architect
Engineer
Quantity Surveyor
Communication of policies and programmes
Production Zone
Project Design Team
Architect
Engineers
Quantity Surveyor
Landscape Architect
Interior Designer

Figure 1.

some twenty years, and a firm belief in this method is still maintained in Britain, it would be foolish to suggest that these teams have not suffered from severe growing pains. It would be equally foolish to imply that the teams working currently do not have their problems, or that all the problems on inter-disciplinary working are understood. Recognising this, in 1971 the Health Services Planning and Research Steering Committee called for a memorandum setting out the need for, and possible basis of, a course of education and training for health planners, ie members of multi-professional planning teams. As a result of studying the memorandum the Committee agreed that a Study Group should be set up, and the Group reported in May 1972.[3] So, all research in this area is comparatively recent, and we are still learning fast.

The Study Group reported that the case for improving education and training for those professionals involved in Health Building Planning and Design has been made repeatedly over the last two decades and a number of courses have been held. But, there is evidence to suggest that in many cases these courses may have hindered rather than helped the cause of multi-professional collaboration and the identification of problems. In fact, it could be held that they have strengthened professional separation rather than blurred the edges of professional boundaries which was their purpose. At the time that short courses were being held, it was not really appreciated that it was insufficient merely to bring disciplines together to achieve collaboration. The Group submitted that it is necessary to weave together these skills into a new discipline of 'PLANNER'. As a basis for further discussion the Group attempted to identify some of the characteristics desirable in planners, and tentatively to suggest a basis for the development of an education and training programme.

For the most part the people serving on planning teams have learned the trade by practising it, building upon the particular sort of professional education and experience they happen to have received. It may be true that the most effective way of educating the members of the planning team is for them to teach each other, but this implies a basis from which a sympathetic approach to, and an understanding of, the problems of the other person can be developed, a willingness to attempt to evaluate previous work, and a continuity of association over a number of years. Unfortunately such conditions rarely exist. All too often planning team members come together with the prime purpose of putting forward their own 'professional' viewpoint, for example doctors act as a mouthpiece for their specialist colleagues apropos the particular subject under discussion. Architects are concerned either with the æsthetic quality of the environment they are creating, or perpetuating their traditional 'leadership' role. Engineers frequently separate engineering from building as a result of their concern to maintain their separate but equal status vis-à-vis architects. Surveyors concern themselves with controlling costs, frequently in a way which while valid to them appears to others to be against the concept of true value for money. Administrators lacking the necessary skills for design evaluation which would enable them to control the quality of the project concern themselves primarily with delivering the goods on time. Nurses, who perhaps more than any other members of the team represent the views of the widest range of user needs, in certain circumstances appear to be concerned with the status of the nurse.

On the other hand all these professions have legitimate and constructive contributions to make to the planning and design processes. However, for the production of an optimum design solution it is the bridging of the gaps between the areas of professional responsibility that become more important than narrow professional knowledge itself, if the final result is to represent a synthesis of many and often conflicting requirements.

Bridging these gaps appears to be a question largely of establishing a common technical language as a vehicle for understanding and defining finally common objectives. Without this common language it is not possible to approach sympathetically the problems of one's collaborators.

Hospital Building Design

At a general level, our understanding of the nature of the problems which confront us in health building design has come a long way in the last decade. We have a greater understanding of the hospital as a whole and of what makes it work efficiently. We know more about the design of departments and spaces, not only from a whole hospital point of view, but also from the user's viewpoint, and there are the beginnings of an ordered body of knowledge about our subject. But, if some progress has been made and there is considerably more information to draw on, one may well ask why the task of planning and designing health facilities has not become easier nor, why the results have not significantly improved?

The answer is not easy to find, and indeed there are many answers. The problem of the use and meaning of words can be identified easily, but perhaps a more fundamental cause of the widening gap between professions is increasing specialisation. Indeed, quite often planning and design teams are pulled apart by this specialisation, and by the use of jargon as a form of shorthand which goes with it. An editorial group preparing a glossary of hospital planning terms under the auspices of the King Edward's Hospital Fund for London found that some words were not capable of an agreed inter - disciplinary interpretation. Indeed, with the increasing sophistication of planning and design concepts the problem of language has become worse rather than better over the last few years.

In his paper to the RIBA Hospitals Course nearly twenty years ago, Professor Chester posed the question, "how does one plan for flexibility?" Hospital designers are still posing this same question, but what is interesting is that it now means something rather different. When the question was first asked, mention of the word 'flexibility' triggered off, at least in the minds of most people, the ability to move room partitions easily and to extend easily those departments which were expected to have a fast growth rate. But now the position is changed. At the time of writing the word 'flexibility', without further definition, means either everything or nothing, depending upon one's own interpretation.

Despite our growing knowledge of the whole hospital, a further result of specialisation is the concentration of design effort on the 'department' rather than on the whole hospital. This subordination of the whole to the part has been supported, in large measure, by short courses and guidance material on hospital design problems which have taken some particular department as the central theme. I will return to this topic later.

Team Fragmentation

Perhaps even more serious is the

destruction of any frame of reference or design method which **might** have emerged if the members of the planning team had been oriented in the same direction, or at least had a common basic training. Because the team cannot define common problems and procedures, the frame of reference disintegrates, and this complicates the moving back and forth which 'planning' or 'designing' involves. The result is that people who are supposed to be collaborators arrive at positions where they are actually opposing rather than supporting one another.

Team fragmentation and the current philosophy of learning by doing have denied planning team members the opportunity to discover as much as they should about each other, the real needs of users or the interactions between the closely woven patterns of activities which take place in a hospital. Learning by doing has become merely doing. There appears to be little hope of this situation being halted, let alone reversed, until a fully structured educational programme exists through which all members of planning/project teams can pass.

The potential element of conflict is not, however, equal between all the professions involved. Doctors and nurses on planning teams are responsible for the quality both of patient care and of the therapeutic environment. Engineers and architects are responsible for meeting these demands, and between them for designing artifacts not only for current users, but for subsequent generations of users. Hence, the users of health buildings identify engineers and architects as being the people who provide the plant that they use every day, and consequently hold them responsible for failure in any particular. As a result of their continuing responsibility, architects and engineers and to a lesser extent planning doctors and nurses, have developed certain common fields of interest such as user satisfaction, ease and cost of maintenance and environmental quality. Professional pride also plays an important part. Doctors, nurses, architects and engineers conceive the design and engineers, architects and constructors give birth to it. They tend to show the finished product to their friends and relatives from a number of different viewpoints according to their audience. Consequently they feel either pride or shame or both, but their responsibility for the whole thing remains.

On the other hand the surveyor or building economist sees his role as being to secure what he calls 'value for money' and no-one would disagree with this aim. The questions that arise immediately are, what does he consider to be value, and by what means does he set about achieving it in a way which he considers to be 'economical'. The methods employed are a natural end-product of a combination of his professional education, the disintegration of a recognisable multi-professional operational framework referred to earlier, and the excessive expectations on the part of administrators who have been seduced by an inadequate concept of cost.

For the most part the task of the surveyor has become cost 'control' in the shallowest sense of the word. The field he is expected to cover, ie building economics, cost planning, performance specifications and so on, requires a width and depth of knowledge which can only be achieved fully in a very sympathetic team. This is not intended as a criticism of surveyors but an analysis of a situation which develops frequently. One of the most serious results of this situation of potential conflict is that operational function and the design which is intended to serve it are being pulled progressively apart and hospital design and hospital operational efficiency are suffering as a result.

The administrator is cast frequently in the role of manager for the whole or part of the total design and building process and, because of his lack of knowledge of the design process, misunderstandings and the risk of friction often result. In many ways the administrator, in planning and design, demonstrates the same characteristics as the surveyor. It is interesting to note that administrators' training, like surveyors', has not concerned itself traditionally with either investigating user-requirements or 'the design process', as understood by the design disciplines. This has led to a situation in which the administrator has worked 'according to the book', ie a defined objective has to be reached on time within a defined cost. Certainly, some team discipline including time and cost constraints is vital, but these constraints should be based on a **real** understanding of the problems.

Although it may be true of other professions, it can be seen that the economist/surveyor and the administrator are involved in the project in ways which have no easily apparent consequences for the user of the building which has resulted from their efforts. This makes it less likely that they will identify with the project, either in the same way, or for as long as their colleagues. Hence a psychological factor operates which encourages the fragmentation of the team.

Problems and Possible Solutions

To summarise, it is possible to identify some of the problems:

Because planning is a multi-professional exercise, in the process of planning the 'gaps' between professional knowledge become more important than that knowledge itself;

Because planning teams lack a common language they are incapable of defining adequately their common objectives;

Because of the first two problems a hierarchy of words and meanings, and the frame of reference that goes with them have disintegrated; and

As a result function and design have become so divorced that function-based planning and meaningful objective evaluation have become increasingly difficult.

The gaps between the various professions in the design team would partially be filled by a common language, partially filled by a knowledge of the planning and design process, partially filled by theoretical exercises and partially filled by practical experience. But, the last should come last, whereas in the majority of cases it has come first. The sort of short courses which have been run in the past cannot reasonably be expected to bridge these gaps. It takes quite a while to gain even a nodding acquaintance with an understanding of the skills involved in the definition of problems and operations research, and topics such as the methodical collection, sifting, storing and application of data have hardly been touched.

The teaching of multi-professional groups is referred to as 'cross fertile' and even though it is still in its infancy some principles appear to be being recognised. First, such courses, where they do exist, are wide in scope and can be compared with urban design in relation to architecture, ie buildings are involved but not the design of buildings. Second, they are at post-graduate level, and are concerned with producing teams of people who have received their undergraduate training in different disciplines, and third, they

are concerned with evolving a 'theory' for a subject where none has existed previously.

All cross-fertile courses take a problem of great importance, eg planning or management, and use it as a focus for teaching and learning, but grave risks appear to be inherent in departing from the more well-worn academic channels. Unlike algebra or chemistry the subject matter itself remains undefined and without validation. To borrow from Stafford Beer, the great danger lies in making rotten things more efficiently rotten.

As a basis for the exploration of the education and training problem, the following basic structure has been operated at the Medical Architecture Research Unit since 1970.

There should be a central theme or core, and in the case of health facility planners it is suggested that this should be some systematic investigatory method to which all disciplines can understand and contribute;

Methodologies should be developed by students and teachers working together as a collaborative effort;

The inter-relationship between the parts and the whole should continually be stressed, and clearly understood by all parties to the process. And equally important, an understanding of the interaction between operational objectives on the one hand, and design implications on the other, is basic to any interpretation of the context within which planners work. (See *Figure 1* on Page 19);

Course content should be capable of modification either immediately or in the long term, and there should be regular 'feedback' from past students;

Fluidity of working should be maintained without damaging the internal cohesion of the group;

A close association with research and development groups should be maintained to try to balance theory and practice.

Since the first one-year, post-graduate, multi-professional course in health facility planning was held in 1970-71 some 100 students from fifty countries and all professions have taken the course, which mixes the practical and theoretical, the lecture and the seminar, visits to hospitals and planning authorities, and does not attempt to produce **better** professionals but **different** professionals called planners.

Indeed the course could be described as an expanding seminar with the practical and theoretical components varying in proportion to one another as shown in *Figure 2*.

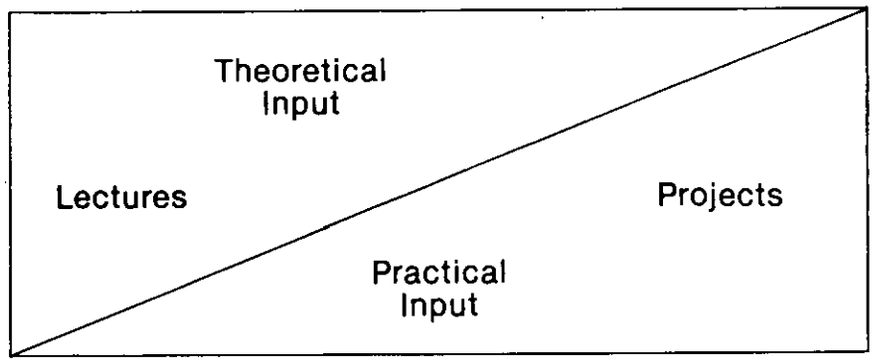

Figure 2.

This general format has been found to assist in achieving the aims of the course which can be summarised as follows:

to encourage the student to think of providing Health Care as a 'system' rather than a random collection of buildings;

to encourage the student to re-think and, if necessary, re-structure the complex multi-professional activities known as the design and planning process;

to illuminate the connections between operation and design in terms of professional input, and to demonstrate the importance of teamwork in briefing and evaluation;

to encourage the student to take an overview of both the problems and possibilities in the design of health buildings such as indeterminacy, flexibility, multi-use and value for money.

New Challenges when Money is Short

This paper must, of necessity, be considered only as a brief outline of the problems and possibilities — I would be most happy to discuss at length any aspects of the paper — but in conclusion I would like to mention a new aspect of the problem which has appeared recently as a result of changing economic circumstances in the UK.

Clearly one would not wish to retreat from the idea of multi-professional teamwork, but new problems are arising which one would do well to recognise.

Earlier in this paper I mentioned material for the guidance of health building planners and I had in mind principally the internationally well-known series of *Building Notes* produced by the Department of Health and Social Security in London and now undergoing a thorough review.

These *Building Notes* filled a huge gap. Planners were hungry for basic data, and the *Building Notes* provided it. While these data were being used to generate **new** buildings on **new** sites, all was well. Apart from the usual family squabbles — like the architect never allowing the engineer space for his services — things went well.

More recently however the picture has changed, and instead of planning teams concentrating their efforts on the production of shiny new buildings, money is short, and the emphasis now is on the redeployment and increased utilisation of existing building stock. And new conflicts are arising — for old buildings do not conform to the same space and money measures — and this brings users and designers into new relationships, for they are likely to be re-designing an activity, a timetable, an organisation as they are to be designing a building.

These new challenges call for planners who are more resourceful than previously, and engineers, with their sound mathematical grounding and knowledge of model building and systems analysis, have much to offer.

But a basic planning training is still essential to produce people with a theoretical knowledge robust enough to be generally applicable and not to let them down when they need it — there is nothing as practical as a good theory.

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[1]Nuffield Provincial Hospital Trust: Studies in the Functions and Design of Hospitals. Oxford University Press. London 1955.

[2]Ibid.

[3]Health Services Planning and Research Steering Committee: First Phase of an Investigation into the Education and Training Needs of Health Facility Planners. Report of the Study Group. Medical Architecture Research Unit, London. June 1973.

A Sub-Committee of the Hospital Engineering Society of Greater New York has prepared this report, which outlines what happened to hospitals during the blackout, and offers recommendations on how hospitals can be better prepared in the event of another major power failure.

Report to Greater New York Hospital Association on the Blackout of July 13-14, 1977

On July 13 and 14, 1977, the Metropolitan New York City area was subjected to a massive electric failure as a result of the breakdown of the Consolidation Edison Company generators in the area. The Hospital System was only one segment of the many services that were affected by this power failure.

In spite of the many problems that arose, the hospitals as a group met these problems with alternate solutions and continued to provide patient care. Due to the widespread looting and subsequent injuries, many emergency rooms were hard pressed. To the best of our knowledge, no fatalities were encountered in the hospitals as a direct result of improper treatment due to the blackout. The hospitals should, however, review their plans and physical plants and make improvements where necessary to prevent future problems.

The Greater New York Hospital Association, in its position as the major representative of the area hospitals, called upon the Chairman of the Engineers Advisory Committee of the Hospital Engineering Society to investigate, from a technical standpoint, the problems that the hospitals in the area incurred.

A Sub-Committee was established with the specific assignment of meeting these objectives. The Committee, which later included two representatives of the New York State Department of Health, and one representative of the United States Department of Health, Education and Welfare in the New York area (who were also conducting an independent study), met on several occasions to formulate a questionnaire to be filled out by member institutions of the Greater New York Hospital Association.

On September 2, 1977, a letter and questionnaire were mailed by the Greater New York Hospital Association to approximately 85 hospitals in the Metropolitan Area, requesting that the information be returned no later than September 16, 1977. Anonymity of the individual hospital was assured so that objective, accurate responses would be provided by the various hospitals. The letter and questionnaire were mailed to the Administrator of each Hospital so that he would know of its existence, and would be able to utilise any resources that he might have available at his hospital.

By October 3, 1977, some 55 responses were received, which were tabulated and analysed for their contents. (After the analysis was prepared, ten additional responses were received.)

The members of the Sub-Committee have thoroughly reviewed these questionnaires, with the objective of preparing a series of recommendations which would benefit the participating hospitals in the New York area. It is also believed that much of the information derived from this report may be of value to the National Fire Protection Association (NFPA), US Department of Health, Education and Welfare, New York State Department of Health, American Hospital Asso-

ciation and other interested agencies in the health field. Towards this end, this report is respectfully submitted.

M. Fischer PE,
Chairman, Sub-Committee
J. Alcabes PE
H. Bershad PE
R. Falaguera
F. Simon PE
R. Williams
A. Buff PE
J. Spacek
M. Grossman PE

Summary and Conclusions

In addition to specific recommendations, resulting from specific questions, as listed in the next section, the Committee makes the following general comments. Although conformity to and knowledge of applicable codes and standards is a requirement, the following areas are highlighted as a result of our investigation.

1. Emergency generators and associated equipment (such as transfer switches), are to be on a formal, written and supervised Preventive Maintenance programme;
2. Emergency generators and associated equipment are to be tested periodically. Test procedures should simulate actual power failure conditions;
3. The electrical load to be connected to the generator shall be known at all times and shall not exceed the nameplate rating of the generator;
4. All emergency generator systems should have an adjustable timer with a bypass to delay re-transfer from the generator back to the normal supply. This timer will permit the normal source to stabilise before re-transfer to load and help to avoid unnecessary power interruptions;
5. Institutions must have written blackout plans. Personnel of all disciplines should be familiar with the plan and are to be trained in blackout response. The Greater New York Hospital Association (or other regional or national associations) should formulate and distribute sample outline form blackout plans for the guidance of member institutions;
6. Administration should give full co-operation to the Engineering Department in necessary generator test programmes, emergency generator system modifications and training programmes;
7. Emergency generator systems are becoming more complex. Proper personnel should be available where possible or complexity should be discouraged.

Special Note:
Extensive testing of emergency power systems, particularly the distribution portion, transfer switches, etc., as necessary to assure equipment reliability, must be weighed against possible patient risk during such testing. Each institution must weigh the various factors, considering requirements and recommendations, and only then establish its own policy.

Questionnaire Analysis and Recommendations

Each question is listed as it appeared in the questionnaire with the results that were tabulated when 55 responses had been received. The analysis and recommendation appears directly after each question. Some questions do not lend themselves to tabulated answers. The tabulated answers may not always total 55 as some respondents did not answer every question. In some cases, one analysis follows and refers to more than one question. The analysis and recommendations were not affected by these late responses.

The Detailed Analysis of the Questionnaire

1. *Size of Institution: No. of Beds ..... Area ..... sq ft.*
   55 Hospitals and Nursing Homes responded out of 85 queried, with size as follows:

50– 200 beds	7 responses
200– 500 beds	23 responses
500– 700 beds	7 responses
700–1,000 beds	8 responses
1,000 or more beds	6 responses

2. *Type of Institution (specialty, general, teaching, etc).* .....
3. *Average or approximate age of buildings.* .....
   Age of buildings of responding institutions ranged from one to 100 years. They included specialty, general and teaching facilities.
4. *Do you have a blackout plan?* ..... *Yes* ..... *No* .....
   If yes, would you attach a copy.
   28 respondents had a Blackout Plan, 25 did not. The Committee recommends that every institution should have a written Blackout Plan, and that all those already having a plan should review them in 'light' of their July blackout experience. We recommend that the Greater New York Hospital Association (or other regional or national associations) formulate and distribute sample outline form blackout plans for the guidance of member institutions.
5. *Do you have an emergency generator?* ..... *Yes* ..... *No* .....
   All but one answered in the affirmative.
6. *What is (are) the size(s) of the emergency generator(s)?* .....
   How many transfer switches are there? .....
   The number of transfer switches in respondent institutions varied from one to 40, and often related directly to number of generators. The Committee recommends that the number of transfer switches to be used shall be based upon reliability, design and load considerations. Careful consideration should be given to the benefits of multiple transfer switches as compared to a single transfer switch with respect to the trade-offs among reliability, transfer switch and generator load characteristics, maintainability, and cost, energy conservation, testing, etc.
7. *What fuel does your emergency generator use and what is the storage capacity of the fuel tank?* .....
   ..... *Galls.*
   All generators in the survey were listed as diesel powered. General indications were that fuel storage capacity,

while widely varying, related well to generator size and use, and was in almost every case sufficient for at least 24 hours or more of operation.

8. *At what per cent capacity did you run your generator(s)* ..... %
What was your estimated *hourly fuel consumption?* ..... *GPH*
It is suggested that connected load and capacity be based upon manufacturer's recommendations, with some margin for future expansion of service.

9. *How often do you test your generators?*
Weekly .....
Monthly .....
Other .....

10. *How often do you test your generators under connected load?*
Weekly .....
Monthly .....
Other .....

The respondents tested their generators weekly in 53 cases, and monthly in 2. Of all of these, 26 tested under connected load weekly, 22, monthly, and 5 at other intervals. The interpretation of the phrase 'connected load' does vary and makes exact analysis of this response difficult. The Committee recommends that, at a minimum, all institutions must test in accordance with NFPA 76A, which was expected to be amended in November 1977 to require minimum of monthly load and weekly no-load operating tests, for generators and transfer switches, with a 30 minute exercise period. However, Administration should encourage the Chief Engineer of each respective institution to perform any testing, beyond the required minimum, as he may deem necessary to feel satisfied on equipment reliability in the particular installation.

11. *Do you ever simulate a blackout by disconnecting the main incoming service switch?*
Yes ..... *No* .....

22 respondents stated that their institution simulated blackouts, in tests, by disconnecting the main incoming service switch, while 31 did not. The answers did not indicate how often this was done, or, for what lengths of time. The Committee recommends that each institution consider performing such a test at least once a year, for a minimum of 60 minutes, with full blackout during this time period of all uncovered areas, and at a time of day and week to maximise familiarity of most staff with blackout conditions.

Extensive testing of emergency power systems, particularly the distribution portion, transfer switches, etc, as necessary to assure equipment reliability, must be weighed against possible patient risk during such testing. Each institution must weigh the various factors, considering requirements and recommendations, and only then establish their own policy.

12. *Were there any problems with the emergency generator system during the blackout such as:*

A. Delay in putting unit into service		*Yes* 5 *No* 48
B. Lack of Fuel		*Yes* 0 *No* 53
C. Battery problems		*Yes* 1 *No* 52
D. If two or more units, synchronisation		*Yes* 2 *No* 51
E. Excessive noise due to generator operation		*Yes* 2 *No* 51
F. Insufficient lubrication oil	*N/A* 4	*Yes* 0 *No* 42
G. Overheating of unit(s)		*Yes* 8 *No* 44
H. Broken belts, valves, gauges		*Yes* 0 *No* 53
I. Automatic starting		*Yes* 3 *No* 50
J. Transfer switches		*Yes* 6 *No* 47

13. *Were there any other problems with the emergency generator units themselves not mentioned above in question 12?* *Yes* 8 *No* 43
If yes, please explain .....

Problems, during the July blackout, reported by respondents, were mainly overheating of the generator units and/or the generator room; and delays putting units into service including problems with transfer switches and automatic starting. The systematic testing, under maximised loads, would reduce the possibility of such problems by highlighting their potential, and giving opportunity to correct in advance of actual occurrence, such as improving generator room ventilation.

14. *How long was your institution without primary electric service during the recent blackout?* ..... *hrs.*
As reported by the respondents, institutions during the July blackout were without primary (Con Ed) electric service from under 1 hour, in 5 cases, to as much as 21 to 36 hours in 16 answers. The Committee notes that this blackout result shows the likelihood of possible generator continuous usage for a longer time period than previously contemplated.

15. *Did you have any difficulty getting fuel for your emergency generator?* *Yes* ..... *No* .....
If yes, please explain.

Only two respondents reported difficulty in getting fuel.

16. *Do your OR Areas and Delivery Room Areas have battery powered lights?* *N/A* ..... *Yes* ..... *No* .....

17. *What other areas have battery powered lights?* .....

18. *Did battery operated equipment work?* *N/A* ..... *Yes* ..... *No* .....

13 hospitals reported that their OR and Delivery Room areas had battery powered lights in addition to generator coverage, 29 did not, and in 12 cases the question did not apply. The Committee suggests that these areas as well as additional special areas such as Catherisation or pacemaker implant areas, special procedure rooms, emergency rooms, boiler rooms, generator spaces, and main panelboard rooms should have automatic transfer battery lighting systems.

19. *Were there adequate extension cords and flashlights available at each nursing station?* *Yes* ..... *No* .....
30 respondents stated that adequate extension cords and flashlights were available at each nursing station, while 8 said their institutions were not so prepared. The Committee recommends that every institution thoroughly review the availability of sufficient extension cords and flashlights.

20. *Was anyone stuck in an elevator and, if so, how long did it take to get them out?*
Yes ..... *No* ..... *Time* .....
In 9 instances, institutions reported that persons were stuck in elevators in the July blackout, while 44 did not have this problem. The Committee notes that all institutions should have a written elevator emergency evacuation procedure and train staff in same.

21. *Were all emergency electrical outlets and switches clearly marked and if yes, how identified?* *Yes* ..... *No* .....
36 respondents noted that emergency electrical outlets and switches were clearly identified, 11 stated that they were not. The committee recommends that all such outlets and switches be clearly identified. When NFPA or other national association adopts a standard identification (red outlets and cover plates now being considered), the institutions shall adopt such system.

22. *Were the following areas/systems on emergency power?*

	N/A	*Yes*	*No*
A. OR	9	43	0
B. Delivery Rooms	19	32	0
C. ICU/CCU	10	43	0
D. Emergency Room	8	43	0
E. At least one X-ray Room and processor	3	39	9
F. At least one elevator	0	49	2
G. Telephones	1	52	0
H. Public address system	5	45	0
I. Nurse Call System	1	46	5
J. Air Conditioning for OR or Delivery	8	27	15
K. Medical gas alarms	7	40	2
L. Fire Alarm	0	50	2
M. Blood Bank	7	45	0
N. Exterior Lights	1	29	21
O. Boiler Plant	10	43	0
P. Premature Nursery	20	30	2

On emergency power coverage, all institutions, where applicable, had adequate coverage of listed areas in questionnaire, such as OR's, Delivery Rooms, and Boiler plants. However, 9 did not have any X-Ray Room and/or processor, 5 did not have nurses call system covered, 2 did not have the premature nursery powered or lit, 2 did not have the fire alarm connected, and 21 did not have exterior lighting. The Committee recommends that every one of these systems or locations be connected, regardless of code.

23. *To the best of your knowledge does your emergency power system meet the requirements of:*

A. The JCAH	*Not Certain* 2	*Yes* 51	*No* 4
B. The NYS Dept of Health	*Not Certain* 1	*Yes* 49	*No* 5
C. The NYC Bureau of Gas and Electricity	*Not Certain* 3	*Yes* 45	*No* 4
D. The NFPA (National Fire Protection Association)	*Not Certain* 2	*Yes* 48	*No* 5
E. The US Dept of HEW	*Not Certain* 8	*Yes* 44	*No* 3

24. *What were some institution-wide operational problems that you discovered as a result of the blackout?*
.....

25. *What changes would you like to see instituted in order to cope with these problems?*
Many institutions responded that additional areas and systems, although not necessarily critical or code required, should be on generator coverage. This may require enlargement of generator size and number. The Committee recommends that this should be thoroughly evaluated in each individual institution.
While most telephones functioned, in many instances the call director lights did not, leading to extensive confusion, and this should be corrected.
Respondents noted, in some replies, that External Disaster Plans were not invoked, although their Emergency Rooms received an unexpected and heavy in-load of patients.

26. *Do you feel there should be a revision to codes changing emergency generator requirements?*
Yes ..... *No* .....
If yes, what changes? .....
15 replies stated that there should be revision to codes covering emergency generator requirements, while 33 did not feel this necessary. Among the suggested changes, many mentioned increased coverage (eg some lights in all areas) and many requested weekly no-load and monthly load testing (as was expected to be adopted by NFPA in November 1977).

27. *Are various emergency telephone numbers distributed and easily accessible for key people?*
Yes ..... *No* .....

28. *When the blackout occurred, what manpower response did you get from your Engineering Department Personnel?*
.....

29. *What kind of assistance did you get from the Fire Department?*
.....
From the Police Department? .....

From the NY Telephone Co? .....
From Con Edison? .....
From your Elevator Service Co? .....

52 respondents stated that emergency telephone numbers were distributed and easily accessible for key people. Most answered that Engineering Department personnel responded very well to the July blackout. Most institutions did not require special help from the Police or Fire Departments, Telephone Company, Con Edison or their elevator service company; when necessary, the response was generally good.

30. *What codes do you follow regarding your emergency generator and its coverage?*

While most respondents indicated compliance of their emergency power codes, including particularly NFPA, the Committee still notes a large number who answered that they were not certain, or were not in compliance. We urge that **all** hospital Engineers, and Administrators responsible for Engineering, have copies of the applicable codes, be familiar with their contents, and understand the compliance of their own institutions.

31. *Would you summarise your institutional response to the blackout as*
..... *excellent* ..... *very good* ..... *good*
..... *fair* ..... *poor*

38 respondents answered that their institution's response to the July blackout was 'excellent', 11 said it was 'very good', and two said 'good'. The Committee notes that, in some cases, these comments might apply to the entire institution, while in other responses it might apply only to the Engineering Department.

32. *How can the Greater New York Hospital Association help you to cope with possible future blackouts?*

.....

33. *What suggestions would you have that might help other institutions in the event of possible future blackouts?*

.....

The following are answers to questions 32 and 33 that appeared quite frequently in different form. The Committee took the liberty of editorially compiling and combining them.

a. Greater New York Hospital Association can prepare an outline blackout plan to include testing procedures, sample log forms for testing, training programme for personnel, etc.

b. Greater New York Hospital Association should prepare Continuing Education programmes for administrators and engineers to keep them informed of the latest code requirements for emergency generator systems as well as the latest state of the art.

c. Greater New York Hospital Association should prepare a seminar as soon as possible to discuss this report as well as any new developments in codes arising from the NFPA Fall meeting in Atlanta on November 14, 15, 16 and 17, 1977.

d. Each institution should have a full library of all applicable codes.

Product News

Hire Boiler Availability Increased

George Cohen Machinery Ltd, a member company of The 600 Group Ltd, has taken delivery of the first of 12 new European treble-pass, fully wet back, automatic oil-fired package boilers for its hire boiler fleet. The additional units, which will complement the existing hire range, are being built by B & E Boilers Ltd, of Bracknell, and feature the latest Hamworthy AW series rotary cup, fully modulating oil burners suitable for firing fuel oils having viscosities from 35 to 3,500 seconds, Redwood No 1. An important benefit arising from the introduction of the Hamworthy AW oil burner is its ability to better emission limits laid down in the Clean Air Act by as much as 50%.

George Cohen Machinery, operators of one of the largest fleets of hire boilers in the UK, is regularly called upon to supply, on hire, boilers for a wide range of applications and can offer models from 2,000 lbs/hr up to 25,000 lbs/hr. In addition to boilers, the company also operates a large hire generator fleet having capacities between 40 and 500 kVA.

For additional information about this hire service, please contact: George Cohen Machinery Ltd, 23 Sunbeam Road, London NW10. Tel: 01-965 6588.

New Scottish Offices

Haden Carrier Maintenance Company announced the opening of their new Scottish offices and servicing facilities in East Kilbride. From the premises at 25 Carron Place, Kelvin Industrial Estate, East Kilbride (Tel. East Kilbride 43964), the company will offer its specialist skills in the maintenance of mechanical and electrical services to buildings throughout Scotland includ-

ing the Highlands and Islands. The Lothian Region will continue to be served from the Edinburgh Branch.

Hoffmeister Reflector System

Allom Lighting, who are UK Agents for Hoffmeister KG products, announce that the HNK reflector system has been granted a British Patent, number 1527274. The system does away with the need to use crown silvered lamps, and provides the much cheaper alternative of GLS lamps with E27 and E14 caps.

Further details are available from: Allom Lighting Ltd, Coombe House Annexe, St George's Square, New Malden, Surrey KT34 H2. Tel: 01-942 3631.

New Flooring Leaflet

Five different flooring systems and four floor coatings for areas in schools, hospitals, laboratories and other institutions where hard-wearing and/or chemically resistant and easily cleaned flooring is required are described in a new four-page illustrated colour leaflet.

There are two heavy-duty 12 mm-thick floors — one mastic, the other cementitious for more oil-resistance. The three epoxy resin-based floors are: 1 mm-2 mm medium-duty chemical resistant; 6 mm heavy-duty slip-resistant; a slip-resistant highly chemical/water/oil resistant surface. The four coatings provide varying degrees of chemical-resistance, anti-dusting and slip-resistant characteristics.

Further information from: Shell Composites Limited, Galvin Road, Slough SL1 4DL. Tel: Slough 71711.

New Catalogue of Standard Pipe Supports

The 1979 edition of Industrial Hangers Ltd's 190-page catalogue contains descriptive information and technical data and covers the full range of standard pipe supports. Standard suports, clips and brackets now available run close to 150 different types.

A copy of the catalogue is available from Industrial Hangers Limited, IHL House, Beaumont Road, Banbury, Oxon OX16 7RH. Tel: 0295-53914/57401.

Flexible Cooling Tower

The CXE range of cooling towers has been used in installations where complaints of excessive noise have been made to the local planning authority. Its lower sound level makes it a practical alternative to the usual solution of adding attenuators to an existing tower.

Other areas where the tower has application include hospitals, libraries, schools, office blocks and any industrial premises where low noise levels are a pre-requisite.

Further details of the range can be obtained from. Film Cooling Towers (1925) Ltd, Chancery House, Parkshot, Richmond, Surrey. Tel: 01-940 6494.

New Square Down-Pipe

A new 65 mm square UPVC rainwater pipe system has been introduced to the building industry by Marley Extrusions Ltd. It replaces their existing range of rectangular components and is an adaptable addition to Marley Extrusions' UPVC eaves gutter system.

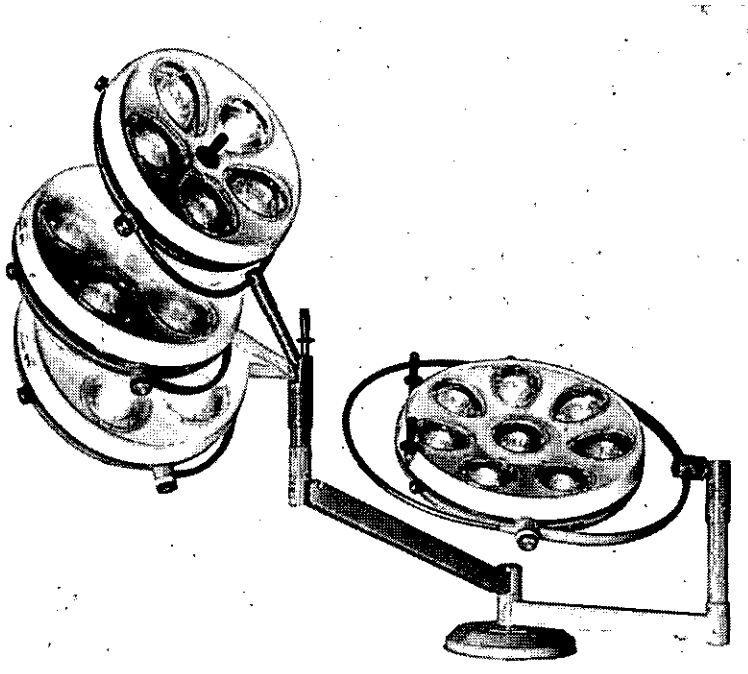
Available in white and grey, the new 65 mm pipe and fittings have greater visual appeal than their rectangular forerunners and they complement the popular Marley Classic, Anglia Mk 2 gutter sections and Deepflow Box Eaves Unit.

Further information is available from: Marley Extrusions Ltd, Lenham, Kent ME17 2DE. Tel: 0622 54366.

DKK Superhalogen Operating Theatre Lamps

Staniforth and Peacocks Associates have introduced in the UK the complete range of DKK Superhalogen Operating Theatre Lamps. Hitherto, the use of halogen bulbs has resulted in glare, excessive heat and incorrect colour temperature, but the special bulbs in DKK lamps are fitted with a ceramic cap which results in a colour temperature of 4,500 k and a life expectancy of 2,000 hours without reduction of light intensity. Adequate spares and service facilities are available from Newcastle, Manchester, London and Cardiff.

Further information is available from: Staniforth Peacocks Associates, 62 Brighton Road, Surbiton, Surrey. Tel: 01-390 3760.



DKK Super-halogen Operating Theatre Lamps.

New Safety Officers Handbook

Safety Equipment Centres, the nationwide distributors of a complete range of Safety Equipment and Signs, have produced a new 4th Edition of the 'Safety Officers Handbook.'

In full colour this publication comprises 76 pages of valuable information on Fire Fighting, Eye, Ear and Respiratory Equipment, Protective Clothing, Footwear, Gloves, First Aid and Ambulance Room supplies, Janitorials and many other items plus a full range of Signs and Packaging Labels.

To obtain your free copy send your name and address to: Safety Equipment Centres, SEC House, 33/37 Elm Road, New Malden, Surrey, or Tel: The Librarian on 01-942 0093.

Teletracer Pocket-Pager Systems

Cass Teletracer pocket-pager systems have replaced other systems at the Northwick Park and the St Alban's City hospitals.

The model selected for the Northwick Park Hospital is the Teletracer N7 with a single operator station, transmitter and 300 pocket-pagers, or 'bleepers'. As installed this model can page up to six groups with a maximum of 12 receivers in each group: in this way the members of a cardiac arrest team, for instance, can all be paged simultaneously. Built in to this system is telephone interfacing: paging can proceed from any four telephone extensions at a time — by-passing the operator station and eliminating congestion. This Teletracer N7 has a 1,000 channel capacity should more pocket-pagers be needed.

A smaller model is the Teletracer N6 with seventy receivers which was selected for the St Alban's City Hospitals. A single group call facility here comprises twenty bleepers for a cardiac arrest team.

Further information from Cass Electronics Ltd, Crabtree Road, Thorpe, Surrey. Telephone: Egham 6266.

New Enclosed Low Surface Temperature Radiators

The basic model of Hudevad Low Surface Temperature (LST) radiator introduced early in 1978 has been further developed. In addition to the protective front plate, this unit is now available with an aluminium top grille, a galvanised steel bottom grille and end plates, or any combination of these additional protective features. The LST unit can therefore be supplied as a totally enclosed cabinet to provide high output with safe surface temperatures, particularly for hospitals and homes for geriatric or mentally handicapped patients. The method of mounting the radiator has been modified to reduce overall thickness, and assembly has been simplified so that the unit can be quickly converted to a standard radiator if ward/room use changes.

Further information is available from: Hudevad Britain, Hudevad House, 262 Hook Road, Chessington, Surrey KT9 1PF. Tel. 01-391 1327.

New De-Alkalisation Plant

Dunster & Margerum Ltd has added standard de-alkalisation boiler feed equipment to its range of water treatment plant. The company specialises in de-alkalisation and the new range of standardised equipment, claim the manufacturers, will reduce costs to the customer and provide shorter deliveries.

There is a growing demand for de-alkalisation as packaged boilers become more sophisticated in design, and performance efficiencies increase. The larger number of closely spaced fire tubes and the higher heat transfer rates associated with current boiler design demand high quality feed water.

In addition there is a growing need to conserve energy through greater efficiencies. De-alkalisation reduces maintenance of process plant and condensate heating equipment by eliminating corrosive conditions in the steam and condensate.

For further information contact: Mike Harvey, Dunster and Margerum Ltd, D&M House, 1 Silver Road, Norwich, Norfolk. Tel. 0603 60734.

Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

To place an advertisement in the next issue of **HOSPITAL ENGINEERING,** appearing on **AUGUST 3, 1979**
Contact: **Linda Abrams,**
EARLSPORT PUBLICATIONS,
17 St. Swithin's Lane, London EC4
Tel. 01-623 2235
by **July 20.**

SHEFFIELD AREA HEALTH AUTHORITY (TEACHING)
SOUTHERN HEALTH DISTRICT (TEACHING)

NATIONAL SELF-FINANCING INCENTIVE BONUS SCHEME FOR NHS MAINTENANCE DEPARTMENTS

PLANNER MANAGER

Salary: £4,497 to £5,073 plus bonus payments (current maximum 15%).

The successful candidate will be accountable to the District Works Officer (or his nominated officer) and will assist with the local implementation of the National Incentive Bonus Scheme and manage a team of planners/estimators. It is anticipated that experience as a Planner Manager will be useful in career progression to a post of Senior Engineer.

Training will be given and attendance will be arranged at courses organised nationally by the DHSS at Slough and the Hospital Engineering Centre, Falfield.

Candidates must hold an ONC in Engineering or a higher qualification. (Alternative qualifications, as determined by the Secretary of State, may be acceptable). An apprenticeship in mechanical or electrical engineering and five years' relevant experience should also have been completed.

Application forms and job descriptions are available from District Personnel Officer, Northern General Hospital, Sheffield S5 7AU. Telephone 387253, ext. 760. Closing date: June 15, 1979.

MID-SURREY DISTRICT OF THE SURREY AREA HEALTH AUTHORITY
West Park Hospital, Epsom

ENGINEER

Required to assist the Senior Engineer in managing the operation and maintenance of all Engineering Services at West Park Hospital, Epsom.

Applicants should hold an Ordinary National Certificate in Engineering or an equivalent qualification, have completed an apprenticeship in mechanical or electrical engineering and have five years' relevant experience.

Hours: 38 per week, plus "on-call".

Salary scale: £4,851-£5,427 p.a. inclusive.

Application form and job description available from the District Personnel Department, Epsom District Hospital, Dorking Road, Epsom, Surrey. Tel. Epsom 26100, ext. 357/369.

Brighton Health District

DISTRICT WORKS DEPARTMENT

Applications are invited for the following positions, based within District Works Offices.

Engineer (Maintenance)

£4,497-£5,073 pa.

Minimum qualifications are Mechanical or Electrical Apprenticeship ONC or equivalent.

Engineer (Projects)

£4,497-£5,073 pa.

Minimum qualifications as above. Electrical experience preferred.

The posts will carry substantial responsibilities and only experienced engineers should apply. Experience in building services preferred.

Full job descriptions and application forms or any informal enquiry, can be obtained by telephoning Brighton 606305 Ext. 11 or by post to District Works Officer, Ref JT/JL, District Works Department, 'B' Block, Brighton General Hospital, Elm Grove, Brighton BN2 3EW, Sussex.

Closing date June 22, 1979.

CAMDEN & ISLINGTON AREA HEALTH AUTHORITY
South Camden District

SECTOR ENGINEER

to be directly responsible to the District Engineer for all electrical and mechanical engineering in the University College Hospital Sector. Applicants should have relevant experience and be qualified to HNC standard in Mechanical or Electrical Engineering or alternatively hold a C & G certificate Nos. 293 or 255, including certificate in Industrial Administration or a qualification of comparable standard.

Preference will be given to candidates (M/F) from the North East Thames Region.

Starting salary £5,682 inclusive of London Weighting.

Applications in writing to the Personnel Officer from whom a job description is available together with an application form, University College Hospital, Gower Street, London WC1E 6AU.

Please quote reference: SE/bp.

CLWYD HEALTH AUTHORITY
CLWYD SOUTH DISTRICT

SENIOR ENGINEER

Required for the Clwyd South District's Sub Group of Hospitals and Clinics, for the Engineering Maintenance, Operations Programme, and Small Capital Works.

Responsible directly to the District Engineer, applicants must have experience in both Mechanical and Electrical Services.

A Mechanical or Electrical Apprenticeship will be desirable. HNC in Mechanical or Electrical Engineering, complete with appropriate endorsements, or an equivalent City & Guilds qualification or other approved qualification is essential.
Salary Scale: £4,938-£5,718.

Application form and job description available from the District Personnel Department, Clwyd Health Authority, Clwyd South District, 16 Grosvenor Road, Wrexham, Clwyd. Tel No: Wrexham 56551. Closing date: June 15, 1979.

Electrical Engineer

(2 POSTS)

Applications are invited for the posts of Electrical Maintenance Engineer. The post located in Gt Yarmouth, the second post located in Lowestoft.

Applicants must have completed an apprenticeship in Electrical Engineering, hold the minimum of Ordinary National Certificate in Electrical Engineering and have a minimum of five years' experience in electrical maintenance work and the design and installation of new works.

Salary Scale: £4,497 to £5,073 plus up to 15% additional payment for management incentive bonus scheme.

Application forms and job descriptions from: The District Works Officer, Gt Yarmouth & Waveney Health District, 7th Floor, Havenbridge House, North Quay, Gt Yarmouth, Norfolk. Tel No: Gt Yarmouth 50411, ext 39

EAST CUMBRIA HEALTH DISTRICT
(S.E. CUMBRIA SECTOR)

SENIOR ENGINEER

The person appointed to this important post will be responsible for the Engineering Services (both Electrical and Mechanical) in the South East Cumbria Sector, based at Westmorland County Hospital. The Sector covers a wide geographical area and premises include Hospitals, Health Centres and Staff Houses.

Applicants must have served an electrical or mechanical apprenticeship (or have undergone alternative practical training), have at least five years' post-apprenticeship experience and possess HNC/HND Mechanical/Electrical Engineering (Electrical preferred) with endorsements in Industrial Administration, or equivalent qualifications.

Preference will be given to non-assimilated personnel in the Northern Region.

Salary £4,938-£5,718 p.a. There is an Incentive Bonus Scheme in operation for which a supervisory allowance is payable.

Further details from Mr. C. Young, District Works Officer, East Cumbria Health District. Tel. Carlisle (0228) 23444, ext. 448.

Application form and Job Description from the Personnel Officer, District Offices, Cumberland Infirmary, Carlisle. Tel. Carlisle (0228) 23444, ext. 469. Closing date June 8, 1979.

SALFORD AREA HEALTH AUTHORITY (TEACHING)
AREA WORKS DEPARTMENT

Vacancies exist for the following Professional and Technical posts:—

1. Engineering Officer

(commissioning) West Salford Sector.

2. Engineering Officer

Worsley Sector.

3. Building Officer

West Salford Sector.

4. Building Officer

Area Headquarters.

The salary scale for all these posts is that of Engineer/Building Officer under the new structure, i.e. £4,497-£5,073 per annum plus a productivity allowance expected to be in the region of 13%.

Further details and a job description can be obtained from:—

Mr. K. Wright, Area Works Officer, Area Works Department, Salford Area Health Authority (Teaching), Jesson House, 78 Manchester Road, PENDLEBURY M27 1FG.

SULTANATE OF OMAN
MINISTRY OF HEALTH

Applications are invited from suitably qualified candidates for the post of:—

HOSPITAL ENGINEER

at Qaboos Hospital, Salalah

Qualifications and Experience:—
Applicants must hold a Higher National Certificate in Electrical or Mechanical Engineering (or equivalent) and should, preferably, be Members of the Institute of Hospital Engineers. They must be experienced maintenance engineers with a thorough practical knowledge of Central Air-Conditioning Plant, H.V. Autoclaves, Steam Boiler Plants, Laundry Plants and all other associated hospital equipment. They should have experience in the control of maintenance staff and maintenance programming. Preference will be given to those who have worked in a similar position for at least five years.

Salary and other Benefits:—
The post carries a salary of Rials Omani 500.00 per month (R.O. 500 equals approximately £680.00 at 27.4.79). Other benefits include free accommodation, free medical treatment and fifty days' paid annual leave. The appointment will be on one year's contract renewable on mutual agreement.

Applications, giving details of educational qualifications and experience, names and addresses of two referees, together with photo-copies of certificates and testimonials should be sent to the undermentioned for forwarding to the Ministry of Health in the Sultanate of Oman for selection:—

Student Supervisory Services,
Marks Barn House,
Crewkerne,
Somerset
TA18 7TS

Closing date for applications: June 30, 1979.

Senior Engineers and Senior Building Officers

£5,292-£6,072 inclusive*

Minimum HNC and completed apprenticeship.

Engineers and Building Officers

£4,851-£5,427 inclusive*

Minimum ONC and completed apprenticeship.

These posts, which offer a firm career foundation to enthusiastic and ambitious persons, involve the operation and maintenance of building plant and services, and the supervision of labour. Day release facilities available.

**Additional allowance of 15% may be payable in each case.*

For more details and an application form please contact: Mr G. A. Glessinger (Engineering) or Mr R. J. Allen (Building) at The London Hospital (Whitechapel), London E1 1BB. Tel: 01-247 7557.

Tower Hamlets Health District

The City & East London Area Health Authority (T)

UNITED ARAB EMIRATES

AL QASSIMI HOSPITAL, SHARJAH

The above British-managed 100-bed General Hospital requires a

Deputy Hospital Engineer

Salary: 4,762 Dirhams per month
(Approx. 7.5 Dirhams = £1.00)

The Post will be vacant — August 1979.

Broad Terms and Conditions:

Contracts	Initially for 24 months, renewable by mutual consent.
Taxation	There is no income tax in the United Arab Emirates.
Travel and Leave	Free air travel at beginning, mid-term and end of contract. Leave may be taken after 28 weeks' work.
Gratuity	A gratuity of one month's salary for every completed year of service, on completion of contract.
Accommodation	Single status accommodation provided free of charge.
Medical Care	Free for Officers.
Salaries	Paid monthly in arrears.

Method of Application:

Please telephone 01-630 4511 ext. 208 for an application form. If further details are required please ask for ext. 255. Forms to be returned to Dennis Debenham, Personnel Officer, Allied Medical Group Limited, 18 Grosvenor Gardens, London SW1, within 10 days of the advertisement appearing.

SOUTH DISTRICT WORKS DEPARTMENT

ENGINEER

required at

GRANTHAM HOSPITAL

to assist the Senior Engineer at this acute hospital which is being progressively rebuilt and offers a full range of engineering experience.

Applicants should be qualified to OND or ONC standard (or equivalent) and have served a mechanical or electrical engineering apprenticeship.

Preference will be given to existing NHS staff.

Salary Scale: £4,497 to £5,073 with additional on-call, overtime and bonus allowances, as appropriate.

Application form and job description available from The District Personnel Officer, South District Offices, South End, Boston, Lincolnshire. Tel: Boston 66505.

SUNDERLAND AREA HEALTH AUTHORITY
AREA WORKS DEPARTMENT

Due to promotion and reorganisation of the existing Engineering staff, the following vacancies have occured in the Engineering Section of the Works Department:

SENIOR ENGINEER

£4,938-£5,718 plus incentive bonus scheme.

Duties include the operation and maintenance of Plant equipment and services in a multi-functional Hospital Unit comprising the Sunderland Royal Infirmary (base), Eye Infirmary, Children's Hospital and Havelock Hospital plus Health Centres, Clinics and Residences.

Qualifications: HNC Mechanical with an Electrical endorsement or HNC Electrical, with Mechanical endorsement or Equivalent qualification and endorsement in Industrial Administration.

ENGINEER

£4,497-£5,073 plus incentive bonus scheme.

Duties include the operation and maintenance of plant equipment and services at Ryhope General Hospital with a possibility of gaining experience at other hospitals within the Area.

Qualifications: ONC Mechanical or Electrical or Equivalent area a minimum.

Application forms and job descriptions can be obtained from Area Personnel Department, District General Hospital, Kayll Road, Sunderland. Closing date: June 15, 1979.

EALING HAMMERSMITH AND HOUNSLOW AREA HEALTH AUTHORITY (TEACHING)

HOUNSLOW HEALTH DISTRICT

West Middlesex Hospital

Isleworth, Middlesex

ENGINEERING OFFICER

£4,851-£5,427 (inclusive of London Weighting)

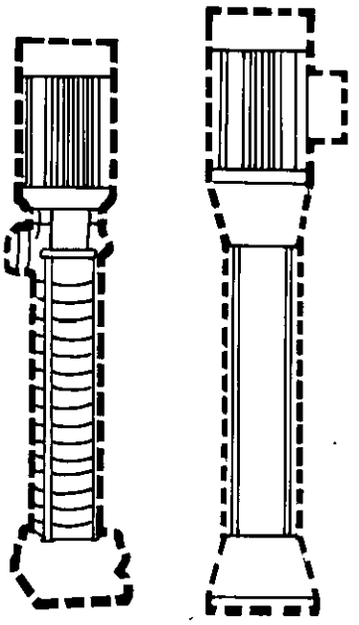
Applications are invited from suitably qualified and experienced people to assist Senior Engineers with the management of mechanical and electrical staff engaged upon day-to-day breakdown and planned preventive maintenance works. The successful candidate will be responsible for the operation of Bonus Schemes, ordering of materials and maintaining safety standards.

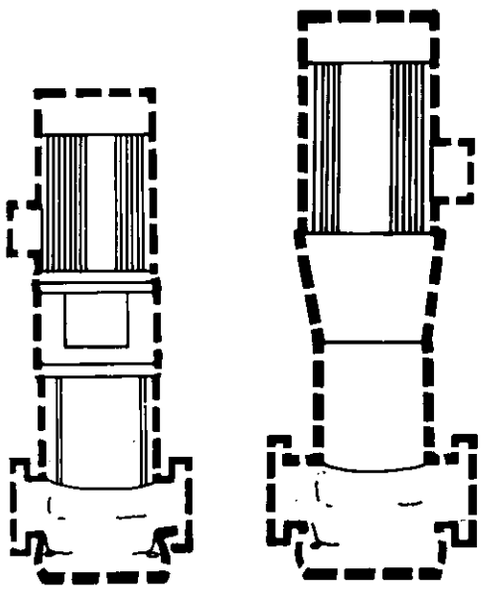
Applicants should hold ONC or higher in Engineering or an alternative equivalent qualification or have completed an apprenticeship in mechanical or electrical engineering and have five years' relevant experience.

Application forms and job descriptions from: Mrs. Heather Rodgers, Deputy District Personnel Officer. Tel: 01-560 2121, Ext: 663.

Closing date: June 12, 1979.

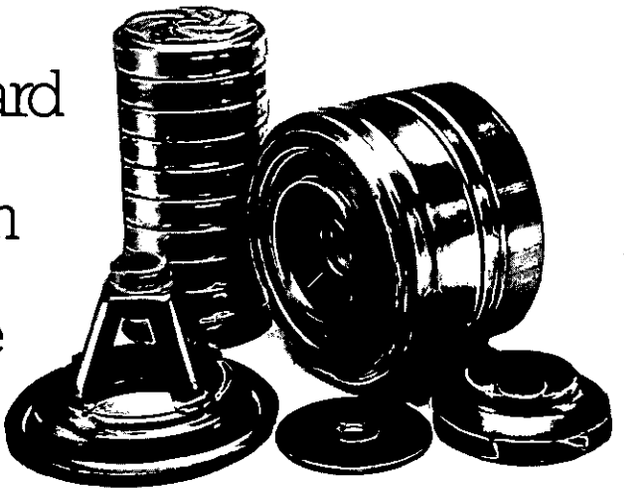
For many years there have been pumps which look like our 'CP' units.





Now there are some which look remarkably like our 'CR' units...

...but don't be fooled by outward appearances, it's the stainless steel and tungsten carbide components inside which make **Grundfos** the best pumps in the world.



GRUNDFOS

Often imitated, never equalled.

Grundfos Pumps Ltd. Head Office: Grovebury Road, Leighton Buzzard, Beds. LU7 8TL. Tel (0525) 374876. Telex 825544.
Northern Area: Gawsworth Court, Risley Road, Risley, Warrington, Cheshire. Tel: Padgate (0925) 813300. Telex 628162.