HOSPITAL ENGINEERING

April 1978

The Journal of the Institute of Hospital Engineering

Trees for Health Service Estates

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Editor
Christopher Tanous

Art Editor
David Shilling

Advertisement Manager
Janet Rich

All correspondence relating to the Journal should be addressed to:

'Hospital Engineering',
Earlsport Publications,
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The Institute of Hospital Engineering,
20 Landport Terrace,
Southsea, Hants, PO1 2RG, England
Telephone:
Portsmouth 23186 (STD 0705 23186)

Secretary
J. E. Furness, VRD*

HOSPITAL ENGINEERING

Vol. 32 No. 3

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The Journal of the Institute of Hospital Engineering

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Institute News

34th Annual Conference

Royal Hotel, Cardiff, April 26-28, 1978

The Conference
is the 34th Annual Conference of the Institute and will be held at the Royal Hotel, Cardiff.

The contributions being made by the Department of Health and Social Security and the Welsh Health Technical Services Organisation are noted with appreciation by the Institute.

Conference Registration
Application forms have been sent to members, and are available from the Secretary of the Institute.

VISITORS from other societies and organisations, and from the hospital service, are welcome to attend any session of the Conference.

Payment of expenses — Hospital Service.

In accordance with the authority given in Circular HM (54) 55, officers may be granted special leave with pay to attend conferences on work with which they are concerned. Travelling and subsistence allowances at the usual rates may be paid to officers, provided that approval to attend has been obtained from the Employing Authority.

Conference Dinner Dance
will be held at the Royal Hotel, Cardiff, on the evening of Thursday, April 27, 1978.

Ladies' Programme
A special and very full Ladies' programme has been arranged An introductory meeting will be held in the Royal Hotel on the first morning of the Conference.

Hotel Accommodation
Special arrangements, and terms, have been agreed with the Conference Hotel in regard to accommodation for delegates and wives. For details see Conference Application Form.

Tickets
for the Conference and the Conference Dinner Dance, and registration for accommodation at the Royal Hotel, should be obtained by application on forms available from The Secretary, The Institute of Hospital Engineering, 20 Landport Terrace, Southsea, PO1 2RG.

International Fire, Security and Safety Exhibition and Conference

April 24-28

This year's International Fire, Security and Safety Exhibition and Conference (IFSSEC '78) is to be held at Olympia in London, from April 24-28.

IFSSEC makes it possible for managers and all others concerned with business efficiency to see the latest equipment and services available in the three areas of 'Loss, Prevention and Control', and listen to International experts.

Some 250 companies will be taking stands in the exhibition.

For United Kingdom managers, IFSSEC '78 is of special significance in the light of the Health and Safety at Work Act. Indeed, one of the early conference sessions is devoted to a survey of what is expected of management under the terms of the Act and the recommendations of the Robens Committee.

Other sessions cover a wide range of topics and continue throughout the week in two of the halls at Olympia. They include the monitoring of safety precautions and of management performance, the development of fire and intruder alarms, and several sessions on fire problems and security.

Tickets and full information on IFSSEC '78 can be obtained from the organisers, Victor Green Publications Limited, 106 Hampstead Road, London NW1 2LS. Tel. 01-388 7661.

Report of the Council for 1977

Council has pleasure in submitting a report of activities during the year.

Council and Council Committees, met on 27 occasions during 1977.

The year again showed a steady increase in membership, 127 new members being elected, whilst the category of 25 existing members was revised.

Discussions continued between the Institute and the Council of Engineering Institutions with regard to the establishing of a formal relationship, as a result of which it is intended to place an appropriate Resolution before the Institute membership.

The Institute remained a member of the Technician Engineer and Technician Sections of the Engineers' Registration Board and, thus continued to sponsor members for registration with the appropriate Section of the Board.

During the year, Council considered the Clauses in the Articles of Association of the Institute relating to categories of membership, and proposed amendments to certain of these Clauses which will be placed before a General Meeting of the Institute.

The 1977 Annual Conference of the Institute was held in Pitlochry and was most successful, attracting a 'best ever' attendance. As is usual, now, a separate lades' programme was arranged and was much appreciated, some 40 ladies enjoying these activities.

Three separate one-day Symposia were again held during the year, at the Institution of Electrical Engineers, Imperial College and the Institution of Mechanical Engineers, attracting attendances of 130, 200 and 240 respectively. Such is the success and drawing power of these now well-established events that a further three such one-day Symposia are planned for 1978.

Continuing discussions with the King Edward's Hospital Fund for London reached a fruitful outcome, so that in December the Institute was able to announce the establishment of an annual 'Hospital Engineering Bursary'. The Rules of the Bursary and attendant Bursary Competition were publicised in the December Issue of the Institute Journal.

The 'Keele' Engineering Management Courses were moved to the NHS Hospital Engineering Centre at Falfield in 1976, of course. Nevertheless, the Institute continues to have some involvement in aspects of these Courses and is most pleased to have the opportunity to make this contribution.

The Institute continues to be represented on Council of the International Federation of Hospital Engineering and indeed, of course, each quarterly Issue of *Hospital Engineering* constitutes the official publication of the Federation. The Federation continues to grow in numerical strength and, in turn, the circulation and distribution of *Hospital Engineering* grows also. IFHE is now keen to inaugurate Courses for 'senior echelon personnel' of Federation members and, at IFHE request, the Institute is investigating the possibility of staging the first of such courses in the UK in 1979.

The Northcroft Silver Medal for 1977 was awarded to Mr. J. De Vries, of Holland, for his Paper entitled *A New Concept of Energy Supplies for Hospitals.* Mr. De Vries is an Overseas member of the Institute of longstanding and it is hoped that he, and Mrs. De Vries, may be able to attend the Annual Conference of the Institute to be held in Cardiff during which the actual presentation of the Silver Medal will be made.

One of the highlights of the year was the obtaining of Past Presidents' and Branch Chairmen's Jewels of Office, which proved to be extremely decorative. Branches made separate arrangements to cover the cost of their own Jewels from within their respective membership and, collectively, the Jewels are most acceptable additions to Institute memorabilia.

The Institute Honorary Librarian reports an active year. There were certain additions to the Library and a list of all books held was distributed to members in the Journal. In addition to increased borrowings, the Honorary Librarian enjoyed increased correspondence with, and requests of advice from, the 'four corners of the earth', not least from members of the International Federation.

Following the change of Publishers (October 1976) every effort was made to improve the Journal and Council is confident that members will share their view that new Publishers have achieved this object, particularly in regard to visual appeal and in that section of the Journal which is devoted to 'Institute News'. Needless to say, in this last respect, Publishers are dependent on a flow of material from Branches and from individual members.

The Institute was invited to submit written evidence to the Committee of Inquiry into the Engineering Profession and the Institute's submission is being published in *Hospital Engineering* (see page 4 of this issue).

Again, the Institute was invited by Government Departments to offer comment in various fields during the year.

Representation on the Watt Committee for Energy continued as did the Institute's participation in an appreciable number of British Standards' Institution Committees, and the Institute continued to support the Building Services Engineering Society, which was re-named the 'Building Construction Forum'.

The Role and Activities of the Institute of Hospital Engineering

Council of the Institute is conscious, at all times, of the responsibility to consider the proper role of the Institute, its aims and correct functions.

For ease of reference, and as these are not in the possession of all members, it is appropriate, perhaps, to commence by quoting from The Memorandum of Association of the Institute, which reads:

'The objects for which the Institute is established are: —

a. To promote the science of Hospital Engineering which science involves the design, construction, employment and maintenance of plant, equipment, machinery and apparatus used in the engineering and associated services of hospitals, clinics and laboratories.

b. To promote, advance and assist in the education of students in the profession of Hospital Engineering and technology in all its branches by every expedient means, and, in particular, by conducting appropriate examinations to test the suitability of candidates for admission to membership of the Institute.

And as ancillary to, and in furtherance of, the foregoing objects but not otherwise:

c. To promote and encourage throughout the world the acquisition, exchange and spread of knowledge and information about, and research into, Hospital Engineering and technology in all its branches and all machinery, apparatus, instrumentation and other equipment used in the same.

d. To provide and promote, or assist in providing and promoting, conferences and discussion on all aspects of Hospital Engineering and technology in all its branches and to provide a medium for discussion between persons interested in or connected with the same, whether on a professional or industrial basis.

e. To publish and promote the publication of literature of all kinds in relation to Hospital Engineering and technology in all its branches and to maintain technical libraries of catalogues, design and other matters.

f. To encourage the discovery of, and investigate and make known, the nature and merits of inventions which may seem capable of being used by members or others, including physicians and surgeons, concerned with the furtherance of medical knowledge and allied subjects or the administration of hospital and allied institutions with a view to the use thereof by members and others gratuitously or upon such terms as seem expedient.

g. To establish, maintain, control and manage branches of the Institute in the United Kingdom and elsewhere as may seem expedient, and, from time to time, to determine the constitution, rights, privileges, obligations and duties of such branches, and, when thought fit, to dissolve the same or modify such rights, privileges, obligations or duties.

Subjects are raised by Branches, or individual members, and submitted for the consideration and comment of Council, from time to time, and it is Council's experience that, on occasions, a subject referred does not fall within an area that should properly be considered by the Institute. Again, a subject may be referred to Council, certain aspects of which may properly be considered and yet other aspects of which should not receive the Institute's attention.

It must never be overlooked that prior to the Institute becoming an Incorporated body and, subsequently, registering as an Educational Charity, it was a pre-requisite that the Institute give up its seats on Whitley Council Committees and forgo any involvement in negotiations or any other activity of a 'trades union' nature.

On this understanding, and after very prolonged consideration, a Certificate of Incorporation was issued to the Institute, as at January 1, 1967, at which time the new Memorandum and Articles of Association became operative and thenceforward it was incumbent upon the Institute to conduct its affairs within those terms.

From that date, the Institute accepted the proper role of a 'learned society' and turned its head against any involvement in negotiations, discussions on subjects that might be deemed to be of a 'trades union' nature.

Where a subject may relate to the proper recognition of a grade of member, the Institute should take such action as is necessary to inform the authorities of the qualifications and standing to be expected of such membership, and seek the proper acknowledgement accordingly because such action does not fall within the area of 'trades union activity'.

Perhaps an example of a subject that falls within the 'grey area' referred to earlier is that of 'Organisational Structure' referred to Council by a Branch recently.

Council ruled that it was proper, and indeed a responsibility, to discuss this subject insofar as it might influence, or affect, the standard of 'hospital engineering' in any particular circumstance. Insofar, however, as the subject related to the 'conditions of service' of personnel, Council ruled that it was quite improper for the Institute to concern itself with these aspects.

It must be clearly understood that *if the Institute, or its Branches, stray* from the undertaking freely given in this respect, the consequences for the Institute, and its future standing, could, and would, be most deleterious.

Council, and Branches, then, have a grave responsibility to members, past, present and future, to ensure that their 'stewardship' is proper and correct in this and in other respects.

As indicated at the beginning of this Article, Council hold it its duty to bring this to the attention of all members.

Evidence to the Committee of Inquiry Into the Engineering Profession

Preface

The Institute is pleased to have been invited to submit evidence to the Committee and it would be prepared to supplement it with oral evidence if required to do so.

The Institute of Hospital Engineering was incorporated on January 1, 1967, having taken over the assets and liabilities of the Institution of Hospital Engineers which was first formed in 1943.

The aims of the Institute are the advancement, development and application of engineering science in health care, and the management of engineering and allied staff employed in this work in Great Britain and abroad.

Its membership is drawn from within the Civil Service Health Departments, the National Health Service, Consulting Engineering firms, contractors, manufacturers, and other organisations engaged in health care work at home and abroad.

The Institute is a Founder Member of the International Federation of Hospital Engineering which was formed in Rome in 1970. The Federation now has 22 member countries spanning the world from New Zealand to the United States of America.

The Institute does not engage in trade union activities; many of its members are members of trade unions of their own choice.

The Institute's President until April, 1979, is J. R. Harrison, Esq, CBE, CEng.

In preparing this evidence the Institute has kept in mind the following key areas of interest to the Committee: —

- Manpower
- Image of the Profession and recruitment
- Education and training
- Registration and licensing

The Institute's Evidence

1. Introduction

1.1 Engineering in the National Health Service (NHS) covers a very wide range of plant, equipment and services and for the guidance of the Committee these are listed in Appendix A to this paper.

1.2 The engineering manpower employed in the Civil Service Health Departments and the National Health Service (NHS) includes professional engineers, design technicians, technicians in management, practical technicians and craftsmen. The following briefly explains the functions: —

Professional Engineers

Management
Research and Development
Design
Estate Management
Planning

Design Technicians

Employed in the Civil Service Health Departments and the Regional Health Authorities (RHA), Common Services Agency, Scotland (CSA), and the Welsh Health Technical Services Organisation (WHTSO). They generally work under the direction of professional engineers.

Technicians in Management

Employed in Area Health Authorities (AHA) in England and Wales and Area Health Boards in Scotland. They will manage the operation and maintenance of the engineering services in a large hospital or group of hospitals (Sector) or a District. At District level they could hold the top Works management post with responsibility for building and engineering works.

Summary of Conclusions and Recommendations

		Para.
1.	The introduction of registration is generally favoured.	1.6
2.	There may be a need for licensing but the Committee should consider the practical problems and the cost.	1.7
3.	There is a need for part-time courses or Open University type courses to train maintenance managers.	2.3
4.	There will be an increasing demand for "Practical Technicians" to maintain and calibrate controls and instruments.	2.5
5.	There needs to be more guidance from Institutions about the type of training and experience which is acceptable for corporate membership.	3.4
6.	The ratio of technicians to professional engineers should be increased in many offices designing building services.	3.6
7.	There is an urgent need to complete the transition from the National Certificate courses to the Technical Education courses.	3.7
8.	There needs to be an acceptance of an overlap of responsibilities of the technician and the professional.	3.8

Practical Technicians
These are mainly employed at Area and District level to maintain and sometimes develop sophisticated control equipment, instruments and medical equipment. Although they carry out repairs etc., they require to be educated to technician level.

Craftsmen
These are fitters, electricians, and other similar artisans who will usually have served a craft apprenticeship.

1.3 We would agree with the need to maintain high standards for the designation 'professional engineer'. Those standards should be related to professional excellence in a broad sense and not narrowly related to academic attainment.

1.4 The National educational system provides a sifting point at age 17 or 18 which separates those who go to university from those who don't, and it is now the point for identifying the future professional engineer. Those aspiring to be engineers who do not satisfy the university entry criteria are by and large destined to become technicians or technician engineers. Experience has shown that many of these mature and develop a professional approach to their work and eventually rise to senior engineering positions and to a status which warrants recognition as professional. Of course, many do not.

1.5 We would not advocate reverting simply to the system pre-CEI where almost anyone acquiring an HNC could become a corporate member of one of the senior institutions. What is needed is a set of objective criteria which will separate out those who can demonstrate that they are capable of practising professionally, more accurately than the present degree plus specified experience does.

1.6 The introduction of registration is generally favoured in order to identify the name 'Engineer' with professional status, and for 'Technician Grades' to be recognised as an important section of the engineering manpower and that they are not professionally qualified, although they have received technical training.

1.7 With regard to licensing; because the life of the patient is increasingly becoming dependent on the continuity of engineering services and because of the greater emphasis now being placed upon the need to work safely, the Health Service has been, and is still, developing permit-to-work systems. These systems use such titles as 'Authorising Engineer' and 'Authorised Person', both of which are given to people who have not passed any special examinations but who will have been given a short course of training and deemed to be competent. The Committee may feel that licensing is appropriate to this kind of activity, but the Institute would ask that account be taken of the difficulties which will arise from the cost of ensuring that a licensed technician is always available, and whether a hospital could be expected to cease functioning because of the absence of a licensed technician.

2. Operation and Maintenance Engineering

2.1 The need to re-examine the criteria by which professional engineers are recognised is well illustrated in the field of engineering maintenance in hospitals and industry. Here a wide range of knowledge is called for rather than the specialist knowledge deriving from an engineering degree. But also required are the ability to manage a work force and a substantial budget, to be accountable for safety and reliability of major plant and installations, to be able to present the enginering view alongside other professions in forming corporate strategy, and to be able to act quickly and correctly in an emergency.

2.2 In the NHS for instance the post of Area Engineer carries a salary of about £9,000 a year. The post holders are responsible for all the engineering services and equipment in the hospitals in a geographical area approximating to a county. They may each have an annual budget of over £2 million and a work force of over 100. The minimum qualification requirement for the post is corporate membership of one of the chartered engineering institutions. They will be supported by technician engineers and engineering technicians but these can only progress to the Area Engineer post if they hold a professional qualification, which is almost impossible for them to acquire at present without an engineering degree.

2.3 Some colleges are now recognising this difficulty and are providing day-release and block-release degree courses, but they are only available in the large population centres. It is a very arduous and protracted struggle to acquire a degree in this way and it is very doubtful whether the studies are the most appropriate for developing better engineering managers. It is highly likely that other fields of study such as quantitative methods in the management of maintenance and plant operation and in meeting statutory requirements would equip them better for the higher posts; we suggest that part-time courses, or those of the Open University type, might be designed for this need.

2.4 Producing future senior maintenance managers by selecting promising school leavers for full time degree courses is not likely to be very successful, since when they graduate they will have had little or no practical experience. Even those who have followed courses of the 'sandwich' type will not have held any position of real responsibility. Unlike those graduates who enter the fields of design, research, production, or teaching, where they can soon make a useful contribution, and within two or three years can expect to take on a position of substantial responsibility, the graduates entering the maintenance field require many years of experience before they can be given responsibility for a block of work. Their first appointment is likely to be in a junior management post normally filled by a technician, and consequently they are very likely to move across to design or production when they can become Chartered without senior management experience, and where the short-term career prospects are better. Of the 2,000 managers and supervisors in the maintenance and operation function in the NHS, only those in the top 135 posts are required to be Chartered. When the time comes to fill such a senior post, the employer may well find that the man most suitable for the post is not the graduate in whom he has invested so much money, but one of the several senior technician engineers who has developed through experience and in-post training into one of sound technical and managerial judgement. The posts require that the incumbents are Chartered Engineers in order to indicate that they are recognised by their profession as being fully equipped to undertake the level of responsibility, to relate to other professionals, and to ensure that engineering is given its proper consideration in the corporate strategy of the enterprise.

2.5 In recent years medical diagnosis and therapy have become increasingly dependent upon complex engineering equipment, and much of the building services, plant, and systems now include controls which require testing, maintenance, and adjustment by by people requiring more advanced technical knowledge than, and training and experience which is different from, that obtained by fitters and electricians who have traditionally maintained pipework systems and electrical installations. Some of this equipment is maintained by manufacturers, and the NHS has been developing an in-house service using technicians with ONC or HNC in electronic or mechanical engineering. As a large number of controls and instruments do not currently receive the required degree of maintenance, testing and calibration, there must be a large expansion of the number of these 'Practical Technicians' to be employed in the NHS as funds become available.

3. Engineering Design

3.1 Engineering design in the NHS is essentially the interpretation of the health care needs in engineering terms, the design of systems to satisfy these needs, and the specification and selection of plant and equipment designed by manufacturers.

3.2 The Department of Health and Social Security (DHSS) carry out a small amount of design, mainly in connection with research into and development of new applications. The *bulk of engineering design is undertaken* by the 14 Regional Health Authorities (RHA) in England, the Common Services Agency (CSA) in Scotland, and the Welsh Health Technical Services Organisation (WHTSO) *in* Wales. *This is carried out partly* in-house and partly by use of consulting engineers. The number of engineers employed in these organisations is of the following order: —

	Chartered Engineers	**Technician Engineers**
DHSS	60	60
RHAs/ CSA/WHTSO	400	800
	460	860

3.3 The most useful courses of training for engineers engaged on the design of mechanical services have been those based on heating, ventilation and air conditioning; these were mainly at Diploma level which, by themselves, did not qualify for membership of a Chartered Institution. Engineers holding the senior posts in the NHS are required to be members of Chartered Institutions, and therefore Diploma or Certificate holders have been encouraged to pursue further courses of study in order to qualify for corporate membership of the Institution of Mechanical Engineers. Since the Degree in Environmental Engineering and the Chartered Institution of Building Services have become established, the NHS has accepted corporate membership of the CIBS for all senior posts.

3.4 In the past, the NHS has required electrical engineers in senior posts to be Chartered Engineers and corporate members of the Institution of Electrical Engineers, but the IEE has often had doubts about whether the experience gained by students in the NHS equips them for membership, even though they satisfy the academic requirements. There have been a number of discussions between engineers in the NHS and the IEE on this question, and whilst the IEE is able to demonstrate that NHS engineers have been elected, it is still not possible to give a student any assurance that his experience will qualify him. This Institute is convinced that the range of electrical equipment used in hospitals is wide and complex enough to provide the required experience and that it is necessary to employ some Chartered electrical engineers to hold senior posts and to give professional guidance to the many technicians employed.

3.5 The majority of Chartered mechanical engineers employed in the NHS, up to the late 1960s, were those who gained membership through the *HNC* or *HND* route, and the technicians were those who did not meet all the academic requirements for membership. In 1969 the DHSS, with the Polytechnic of the South Bank, arranged a special course in Environmental Engineering for NHS students, with a planned intake of fifteen a year. The DHSS and RHAs have also sponsored other students on mechanical engineering and electrical engineering degree courses. There has been *little* or no *planned recruitment for* technician students since the Environmental Engineering Degree Course was introduced, and since the future of technician courses became uncertain following the Haslegrave recommendations.

3.6 Much of the engineering design work can be, and is, carried out by technician engineers under the supervision of Professional Engineers and consideration *should* be *given* to increasing the ratio of technicians to professionals from the present 2: 1 to something like 3: 1, provided the technician engineer is recognised for the job he is employed to do and is given worthwhile career prospects.

3.7 Because of the time it takes to train a technician in health building services, there will be a back-log of demand due to the lack of recruitment referred to in paragraph 3.5, and it will be some years before it will be possible to shift the emphasis referred to in paragraph 3.6. There is therefore an urgent need to complete the transition from the National Certificate courses to the Technical Education Council courses, so that firm training programmes and career prospects can be offered to new recruits.

3.8 There is a tendency, at present, for professional engineers to expect always to be in a superior hierarchical position relative to the technician engineers engaged in design, but many technician engineers are adequately trained for the type of design work on which they are engaged and they are equally capable of taking responsibilities which some professional engineers in middle management are expected to take. There needs to be an acceptance of an overlap and the Committee may like to know that this occurs in the NHS Authorities, at Technical Officer/Main Grade level, in the salary range £5,085 - £5,991 (1976 salary levels). The full range of salaries in the NHS is from £1,293 for a Junior, to £11,900 for the most senior engineer.

3.9 A proportion of all NHS design work is carried out by consulting engineers who recruit and sponsor students for both professional and technician levels and, at least in the larger practices, their hierarchical structures are similar to those of the NHS.

4. Interchange of Staff

There is some movement of staff between the NHS and the consultants and on occasions there has been staff movement to and from industry.

5. Research and Development

Research into new applications of engineering plant and services and their evaluation is mainly carried out for the NHS by the DHSS; the DHSS therefore requires a relatively high proportion of professional engineers trained in the analytical approach to engineering, who can issue guidance material and statistical information for use by engineers in the NHS and in private practice.

6. Engineers in Management

Appendix B shows the top structure in the DHSS, RHAs, CSA and WHTSO, and the Committee may be interested to know that, of the top posts shown, the Chief Works Officer at the DHSS, the Director of Works at WHTSO and seven of the fourteen Regional Works Officers are Chartered Engineers.

Appendix A

Engineering Services in Hospitals

Mechanical	**Electrical/Electronic**
Central Heating	General Lighting
DHW Systems	Road Lighting
Steam and Condensate	Power
Cold Water	Emergency Lighting
Drinking Water	Emergency Power
Natural Gas	Fire Alarms
Oxygen	Internal Telephones
Nitrous Oxide	GPO Telephones
Vacuum	Radio and TV Distribution
Ventilation	Security Alarms
Air Conditioning	Clocks
Pneumatic Tubes	Fans
Vacuum Cleaning	Staff Location
Central Soap Supply	Crash Call Systems
De-Ionised Water	Automatic Control Systems
Chilled Water	Lifts, Hoists, Escalators
Fire Services	Monitoring Services
Sanitary Services	Electronic Controls/Equipment
Boiler Plant	Generators
Incinerator Plant	HV Distribution and Sub-Stations
Laundries	
Sewage Plant	

Appendix B

Top Management Structures in the Health Service

Department of Health & Social Security

- Chief Works Officer
  - Chief Architect
  - Chief Engineer
  - Chief Surveyor

14 Regional Health Authorities in England

- Regional Works Officer
  - Regional Architect
  - Regional Engineer
  - Regional Quantity Surveyor

Building Division of the Common Services Agency Scotland

- Director of Building Division
  - 5 — Assistant Directors

Welsh Health Technical Services Organisation

- Director of Works
  - Chief Architect
  - Chief Engineer
  - Chief Quantity Surveyor

Letter to the Editor

From the Chief Architect,
Dept. of Health and Social Security.

Dear Sir,

Health Building Overseas

A chance for UK firms

The proposed reorganisation of the works group of the Department of Health and Social Security has given us the opportunity to form a new multi-disciplinary branch dealing specifically with health building overseas and having the task of co-ordinating the Department's work in this field so that it is better able to promote the interests of British consultants and construction industry.

The Department of the Environment is responsible in government for the sponsorship of the construction industry both at home and abroad, but the DHSS *is dealing directly with* overseas governments and the UK construction industry in all matters connected specifically with health building.

The DHSS is actively assisting building professionals and contractors engaged in overseas health work by making available to them our research data and experience in health building design and the establishment of this new branch will make us able to deal even more effectively with increasing requests for assistance.

However, our ability to promote UK interests depends to a great extent on our knowledge of the experience, capabilities and geographical interests of the consultants and contractors concerned. Of course, we already know many of the firms working overseas and have good relations with them, but there must be many firms, in the professional, manufacturing, and in both building and building services industries, whom we have not yet met. We would like to hear, therefore, from such firms giving brief information about their past and current *experience* in health buildings, spheres of activity and areas of future interest. Some indication of the capacity of the firms, and in the case of consortia, the likely partners, would be useful to us.

This information will ensure that our records are as complete as possible and that we can more fully appreciate problems and learn of successes. It goes without saying that this information will be treated in the strictest confidence.

I should, perhaps, add that, whilst we will continue to mount short-term studies for overseas authorities, we have neither the resources for, nor the intention of, undertaking work which consultants would normally carry out. Rather, we would hope that our efforts would result in more opportunities and greater successes for UK consultants and contractors in this extensive, though by no means easy, market.

Firms which have information which would be useful to us should write (concisely please) or telephone to: P. L. Ward, Health Buildings Overseas, DHSS, Room 610, Euston Tower, 286 Euston Road, London NW1 3DN. Telephone: 01-388 1188, extension 374.

Yours faithfully,
HOWARD GOODMAN
Chief Architect

Mr. Barnard is head of Hillier Landscapes, Winchester.

Trees for Health Service Estates

RICHARD J. BARNARD

Most of us have, at some time, spent many a pleasant hour walking through woods and forests, or resting beneath the canopy of a mature tree.

Trees play an important role in the scale of rural and urban landscape, as well as contributing a functional value by filtering noise and absorbing dust and smoke, whilst supporting insect and bird life.

No better impact is gained than by the planting of well-chosen specimens to humanise hard landscapes of buildings and roads. Within the hospital complex trees should be planted to give scale to existing buildings, offer focal points and retain peaceful areas for patients and staff to occupy whenever possible. Selection for soils and climate must be considered, and also the needs of the patients, scented flowers for the blind, bold courtyard trees for sitting under during summer.

At relatively little cost we are able to create the clinical factory into an attractive environment. Many new hospitals and ancilliary properties administered by the Health Service offer the Landscape Designer an ideal opportunity to select trees for the overall scheme working to a predetermined budget.

However, where extensive building programmes have been carried out to existing units, often the original trees are removed, or heavily topped to accommodate buildings, and budgets to refurnish landscaping are often forgotten.

To assist in achieving correct selection of trees, and subsequent harmony within the site, general guidelines should be followed, always keeping in mind that trees are long-term subjects, living often between 50-100 years.

Firstly we must consider site factors, soil types, climate and aspect.

Soils

Most soils can be categorised as loamey, chalkey, clayey, or sandy, although many variations exist within these groups.

pH is the term used to measure the hydrogen ion concentrate in the soil. A pH reading of 7 is neutral. Below this the soil becomes increasingly acid, and above, progressively alkaline.

A soil test is always advisable to ascertain the pH before planting is carried out. The addition of organic manures to light soils which are subject to drought is beneficial to help retain water, as well as providing essential plant foods.

Climate

Wind, in relationship to buildings, can cause problems in establishment. Correct staking must be carried out to allow for the anchor roots to grow undisturbed into the soil. Stakes should be placed on the windward side of the tree.

Lack of sunlight, and an often associated problem — lack of water — affects plant growth, and can ruin the ultimate shape of a tree. As a general rule, evergreens are best suited for these positions.

Atmospheric pollution affects trees in many ways, poisonous gases escaping through the soil — therefore it is necessary to know the whereabouts of services before planting.

Heavy deposits on leaves from trees planted near incinerators or other furnaces results in early leaf-fall and, eventually, stunted growth.

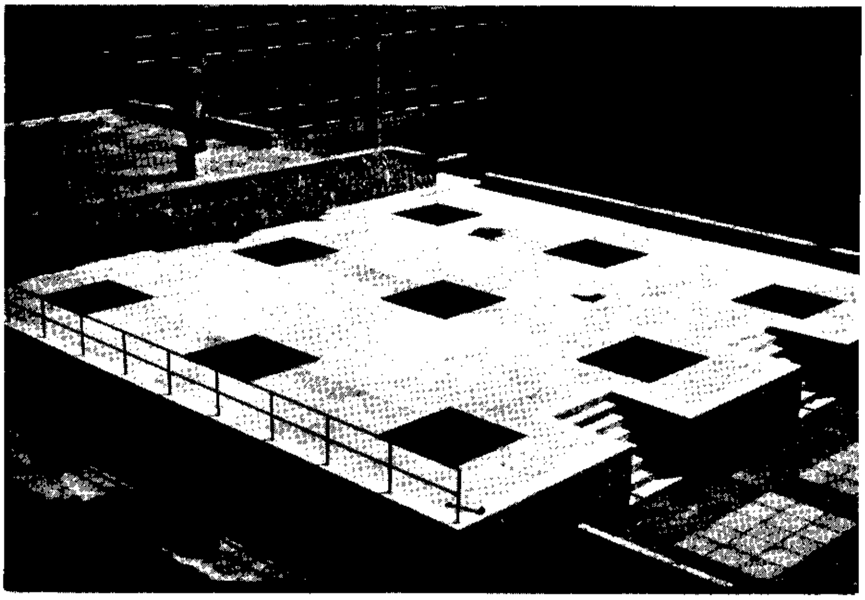
Finally, frost can harm newly-planted trees. In severe weather lifting of the soil occurs, and one must not delay in firming down the soil immediately round the tree before the roots are exposed to the air.

Aspect

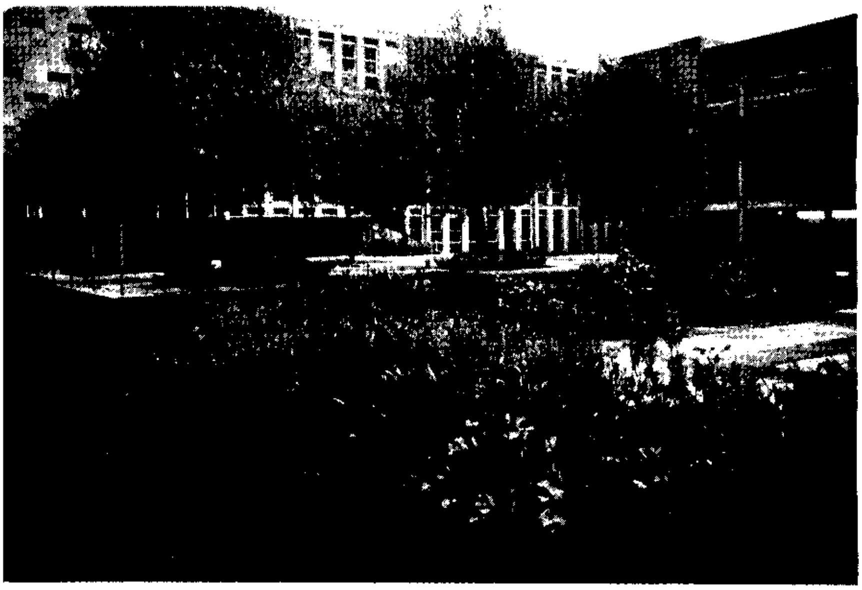
Planting near buildings is dependent on the light and moisture available. Generally the soil is poor close to site excavations and building works. Often the surface is either paved or covered in tarmacadam. When this occurs good site preparation is important, often necessitating the addition of new topsoil.

Take care the tree will not eventually shade windows and require topping. In some cases shade may be welcome, as in courtyard planting where seats can be positioned under their canopy.

Underground services are all important to the smooth functioning of any hospital, and trees must be positioned well away to prevent interference. Poplars, willows and elms are species to be avoided.



An example of the imaginative planting of an otherwise bare and unattractive courtyard, which has been transformed into a pleasant and relaxing area which will improve the environment, even for those who only have sight of it.



Selection of Trees

Selection of trees should be through a reputable nurseryman — the size and form quoted when ordering. Most trees grown conform to the British Standard 3936[1] and this should be used where applicable.

In most positions the standard or selected standard tree will, in a correctly prepared site, establish quickly and give pleasure for a low capital outlay. However, when planting to combat vandals, or to achieve a focal point, the larger extra heavy standard would be a wise selection.

Specification of Trees[2]

Form of tree which is to be stated in Bill of Quantities	Circumference of stem measured at 1m from ground level	Minimum overall height from ground level	Approx. upper overall height from ground level	Clear stem height from ground level
ORDINARY NURSERY STOCK Supplied Bare-Root (unless otherwise specified)				
Light standard tree	6—8cm	2.50m	2.75m	1.50—1.80m
Standard tree	8—10cm	2.75m	3.00m	Minimum of
Selected standard	10—12cm	3.00m	3.50m	1.80m
ADVANCED NURSERY STOCK having been transplanted or undercut as a standard tree on the nursery; supplied bare-root (unless specified root-wrapped or balled)				
Heavy Standard	12—14cm	3.50m	4.25m	Minimum of
Extra Heavy Standard	14—18cm	4.25m	5.00m	1.80m

YOUNGER NURSERY STOCK:

"Transplant" is defined as a young tree that has been transplanted or undercut at least once. The age and height shall be specified. The height is up to 90cm.

"Whip" is defined as a young tree that has been transplanted at least once, not necessarily staked, without significant feathered growth or head. Recommended heights are 0.90—1.20m, 1.20—1.50m, 1.50—1.80m, 1.80—2.10m, 2.10—2.50m. The height required is to be stated, but shall not be less than 0.90m or more than 2.50m.

"Feathered tree" is defined as a young tree that has been transplanted at least once, with a reasonably straight and upright central leader of not less than 1.8m, and furnished with lateral shoots to near ground level. Recommended heights are 1.80—2.10m, 2.10—2.50m, 2.50—3.00m. The height required is to be stated.

Semi-Mature Trees Planting

The carefully sited semi-mature tree is unique in its ability to contribute a mature effect on any building development. Its use is also warranted where immediate screening is desirable — or may be insisted on by planning authorities. It must be remembered, however, that semi-mature trees (over 6m high) represent upward of 25 years' care and attention. They are, therefore, not cheap and may not be available in a wide selection of varieties.

Planting Procedure

The first year following planting is vital for the establishment of the tree.

Many deaths which occur during that period are due to inadequate site preparation or lack of subsequent maintenance.

If the planting forms part of a contract and is to be let to a landscape contractor, all relevant documents must accompany the letter of intent. No contractor should be expected to tender without a comprehensive Specification, Bill of Quantities and Drawing.

Where landscape contractors are not known to the client, a useful booklet *Who's Who in the Landscape Industry* can be obtained from the General Secretary of The British Association of Landscape Industries.[3] This includes all recognised landscape contractors, showing the approximate area in which full members undertake work, the type of work, and the person to contact.

When the work is to be undertaken by own staff, guidance to correct procedure should accompany a verbal instruction.

Site Preparation

Season

Tree planting is normally carried out between October and March inclusive. Deciduous trees can be planted throughout that period except in times of hard frost, waterlogged soil or high winds. Evergreens are best planted whether in autumn or spring, when the soil is warm enough to encourage root growth.

Containerised trees are available when planting outside this season due, perhaps, to late finishing on a building programme, or for ceremonial plantings, although it increases the necessity for regular maintenance to ensure survival.

Topsoil

If possible, trees should be planted into existing topsoil, allowing for the addition of an organic manure and fertiliser. On difficult sites topsoil may have to be imported, and this should conform to BS 3882.[1]

Tree Pits

When planting into existing topsoil the pit should be excavated to allow adequate room for the spread of roots. As a general guide Standard Nursery Trees should be planted in a prepared pit 900mm × 900mm × 450 mm deep. The bottom of the pit should be forked over to break up the subsoil, and in clay soils, when glazing of the sides has occurred, these should be pricked with a fork.

All extraneous matter, such as bricks, large stones, perennial weeds etc, must be removed from site and replaced with new topsoil.

A layer of organic manure, 75mm, should be spread over the base of the pit before backfilling with a layer of soil.

Planting

The first principle is to plant trees at their original soil depth as grown in the nursery, and this can be seen by the soil mark on the stem. Correct positioning to create the best effect from a particular point can be obtained by turning the tree until satisfied.

All newly-planted trees must be staked to prevent unnecessary root movement during establishment. The number of stakes per tree is dependent on the size of the tree, generally 1 no per Nursery Standard and 2 no Extra Heavy Standard.

Types of stakes are Larch or Sweet Chestnut and should be round with pointed ends with the lower 1 metre peeled and dipped in a non-injurous wood preservative. Generally 3-4 metre length stakes are adequate having a minimum 75mm diameter at the top.

The stake should be driven into the tree pit prior to planting to a depth of ½ to 1 metre from the top of the hole.

Position the tree in the pit, spreading out the roots on a slight soil mound. When single staking allow for a distance of approximately 25mm between stake and tree stem to secure 2 no tree ties, one just above ground level, the other below its lowest branch.

Backfill the tree pit incorporating approximately 1/15 volume of a handy peat bale to the topsoil, alternatively shaking and treading the soil around the tree. The addition of a slow release fertiliser to a mixture at 50 grammes per square metre is beneficial.

Finally, the ties should be secured by placing a buffer, preferably rubber, between the tree and stake, prior to attaching the rubber or plastic strapping round the tree, nailed to the stake. Ties should be adjustable as growth occurs.

Tree Guards

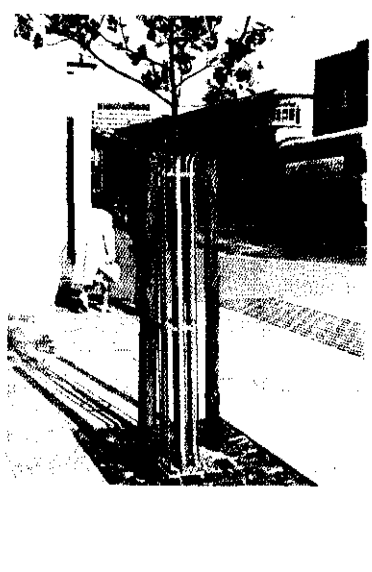
In vulnerable positions tree guards are necessary, and these should also be fixed firmly to the stakes. Generally 225mm diameter and 1.9 metres high. See *Figure 4*.

Mulch

A 75mm mulch of either a coarse peat, forest pulperised bark or farmyard manure is beneficial to the tree if spread over the tree pit. This will reduce weed growth and retain moisture during dry spells.

Should the tree be planted during a dry spell watering immediately after planting is essential, prior to applying the mulch.

Figure 4. A young tree well guarded.



Maintenance

A tree is a living thing and preventive medicine should be prescribed for active, healthy life.

Following planting, watch for dry spells. Adequate watering of five gallons per Standard tree daily could be necessary, with overhead spraying during the cool of the day.

Check regularly for broken or diseased branches, and prune back to the nearest bud, or remove them completely. Do not leave snags which can cause easy entry for pests and diseases — remove them flush with the stem and seal with a pruning compound.

Keep a weed-free area immediately around the tree to reduce competition from other hungry plants, and prevent the lawn mower from giving passing blows eventually leading to ringing the tree, which will result in certain death.

Preventive maintenance should be carried on throughout the life of a tree — regular checks, periodical feeding, treatment of wounds, pests, diseases, bolting and bracing. A formidable task for any person, therefore consult a qualified Tree Surgeon[4] if problems arise.

Selection of Species

The list overleaf includes varieties of trees which will prove invaluable for health service estates.[5]

References

1. **British Standards Institution,** British Standards House, 2 Park Street, London W1. *Specification for Nursery Stock No. 3936: Part 1: 1965 Recommendations for Tree Work No. 3998: 1966.*

2. **Horticultural Trades Association,** 18 Westcote Road, Reading RG3 2DE. *General Conditions for the Supply and Delivery of Nursery Stock.*

3. **British Association of Landscape Industries,** The Coach House, St. Ives, Bingley, Yorks. *Who's Who in the Landscape Industry.*

4. **The Arboricultural Association (Incorporating The Assoc. of British Tree Surgeons and Arborists),** Brokerswood House, Brokerswood, near Westbury, Wilts. BA13 4EH.

5. **Hillier Nurseries (Winchester) Ltd.,** Winchester, Hants. SO22 5DN. *Hilliers Manual of Trees and Shrubs* (published by David and Charles).

S = Silver or Grey
R = Red or Purple
Y = Yellow or Golden

SPECIES		SOILS				CLIMATE				HABIT		FORM			CHARACTERISTICS				
		ACID	CHALK	CLAY	TOLERANT OF ACID & ALKALINITY	URBAN	COLD EXPOSED	DAMP SITES	SEASIDE	FASTIGIATE	PENDULOUS	SMALL 10m –	MEDIUM 10 – 20m	LARGE 20m +	BOLD FOLIAGE	COLOURED FOLIAGE	FRAGRANT FLOWERS	ORNAMENTAL FRUITS	AUTUMN TINTS
ACER davidii	Striped Bark Maple			✓		✓						✓						✓	✓
ACER negundo	Box Elder	✓	✓	✓		✓							✓						
ACER platanoides	Norway Maple		✓	✓		✓								✓					✓
ACER platanoides Columnare			✓	✓		✓				✓				✓					✓
ACER platanoides Crimson King			✓	✓		✓								✓		R			
ACER platanoides Schwedleri			✓	✓		✓							✓			R			
ACER rubrum		✓		✓		✓								✓					✓
ACER saccarium pyramidale	Sugar Maple			✓		✓				✓				✓					✓
AESCULUS carnea	Red Horse Chestnut		✓	✓		✓							✓						✓
AESCULUS hippo. Baumarii	Horse Chestnut		✓	✓		✓								✓			✓		
ALNUS cordata	Italian Alder			✓		✓		✓					✓					✓	✓
AMEZANCHIER lomarckioi	Snowy Mespilus	✓		✓		✓		✓				✓							✓
BETULA costata	Birch	✓	✓	✓	✓	✓	✓	✓					✓						✓
BETULA pendula Youngii	Weeping Birch	✓	✓	✓	✓	✓	✓	✓			✓	✓							✓
CARPINUS betulus fastiagata	Hornbeam		✓	✓		✓				✓				✓					✓
CATALPA bignonioides	Indian Bean Tree	✓	✓	✓	✓	✓							✓		✓			✓	
CERCIDIPHYLLUM japonicum		✓		✓									✓						✓
CERCIS siliquastrum	Judas Tree	✓	✓									✓							✓
CRATAEGUS x lavallei	Thorn		✓	✓	✓	✓	✓	✓	✓			✓							✓
CRATAEGUS prunifolia			✓	✓	✓	✓	✓	✓	✓			✓						✓	✓
CRATAEGUS monogyna stricta			✓	✓	✓	✓	✓	✓	✓	✓		✓						✓	
DAVIDIA involucrata	Hankerchief Tree		✓			✓							✓						
EUCALYPTUS gunnii	Gum					✓			✓					✓		S			
FAGUS sylvatica Dawyck	Dawyck Beech		✓	✓	✓		✓			✓				✓					
FRAXINUS ornus	Marna Ash		✓	✓		✓	✓		✓				✓						
FRAXINUS oxycarpa "Raywood"	Claret Ash		✓	✓		✓			✓					✓					
GLEDITSIA tricanthos	Honey Locust	✓	✓			✓								✓					
LIQUIDAMBER styraciflua	Sweet Gum	✓		✓										✓					
LIRIODENDRON tulipifera Fastigiatum	Tulip Tree		✓			✓				✓				✓	✓				
MALUS floribunda	Crab		✓	✓		✓					✓	✓					✓	✓	
MALUS tschonioskii			✓	✓		✓						✓			✓			✓	✓
PRUNUS avium Plena	Wild Cherry		✓	✓		✓							✓						
PRUNUS hillieri Spire			✓	✓		✓				✓		✓							✓
PRUNUS SARGENTII			✓	✓		✓						✓			✓				✓
PYRUS salicifolia pendula	Weeping Pear		✓			✓		✓			✓	✓				S			
QUERCUS cerris	Turkey Oak		✓	✓	✓				✓					✓					
QUERCUS rubra	Red Oak		✓	✓	✓			✓	✓					✓					✓
ROBINIA pseudoacacia Frisia	Golden Acacia	✓	✓			✓						✓				Y	✓		
ROBINIA pseudoacacia Rozynskyana		✓	✓			✓						✓							
SALIX alba Sericea	White Willow	✓		✓		✓		✓	✓				✓			S			
SORBUS aria Descisneana	Whitebeam		✓	✓		✓	✓		✓				✓			S		✓	✓
SORBUS aucuparia Sheerwater Seedling	Rowan		✓	✓		✓	✓	✓	✓				✓					✓	✓
SORBUS aucuparia Embley			✓	✓		✓	✓	✓	✓			✓						✓	✓
SORBUS Mitchellii			✓	✓		✓	✓		✓				✓		✓			✓	
SORBUS Joseph Rock			✓	✓		✓	✓		✓		✓	✓						✓	✓
TILIA euchlora	Lime		✓	✓		✓							✓				✓		
TILIA platyphyllos Rubra	Red Twigged Lime		✓	✓		✓								✓			✓		

Mr. Wilson has been a consultant to Oscar Faber and Partners, Consulting Engineers, since 1972 when he retired from the Department of the Environment. He has very wide experience of managing major construction works and of purchasing supplies.

Project Management in the Building Industry

W. L. WILSON BSc(Eng) FIMechE HonFCIBS PresASEE FRSA

Introduction

This article has been produced out of a somewhat lengthy experience in the building industry. That experience covered most phases of the business, from investigation, design, construction and commissioning to furnishing. It involved a wide spectrum of activity, from explosive factories to office accommodation, from coal cleaning plants to research establishments, and from irrigation to atomic weapons. In these diverse activities all the professions were involved — Architects, Engineers, Surveyors, Chemists, Physicists, Administrators and so on — and, happily, I was able to observe the developing situations. Over the intervening years I have seen a number of factors promoting success — or making it more probable. Project management has been one of them.

Others worthy of more than a passing word but out of the context of this article are, of course, selecting people with the right personal characteristics, and putting them in jobs they like, erecting organisations to suit people rather than fitting people to organisations, building manageable things with manageable facilities, and — almost above all — being good rather than clever. It will be observed that I have made no mention of specialised training. This is quite deliberate, founded on the principle that Architects, Engineers, etc should be trained as such, and that if they are truly professional they will temper and widen their skills out of their own motivation, rather than because of external forces.

A Project Manager as described in this article does not mean a Project Architect or Engineer, Job Architect or Resident Engineer. It means, as will be seen below, the professional man responsible — and wholly responsible — for completion to time and to a price and performance, of a building or series of buildings (and contents) linked or interlinked as the case may be. In this position the man (or woman) involved will be concerned primarily with the interests of the owner. It follows that one facility he must have to pursue his job with any chance of success is the right to allocate or withdraw funds to meet the needs of the job. He must have real responsibilities in the realm of financial control and they must be seen as such. His power to refuse to countenance expenditure might well be greater than his power to approve it — but he certainly must have some powers for positive action.

There is nothing new in all that follows — it has all been said before. The reader might well ask why then should it all be said again, howbeit in different words. To which there are two replies, first that repeating the self-evident promotes acceptance, and second, that industrial projects which use project management are usually finished in what appears to be half the time of building projects, which on the whole do not use it.

Historical

The conventional process of building is more lengthy and complex, it is thought, than its divers and various practitioners readily acknowledge, maybe because familiarity breeds acceptance. By conventional process is meant the activities involved in the appointment of consultants — architectural, structural and services engineering, quantity surveying, the competitive tendering procedures for main and sub-contractors, and all the intermediate activities of client discussion, feasibility studies, sketch plans, working drawings, bills of quantities and so on. Some years ago an informal study of all that was involved showed that material activities up to the point of placing orders actually could be numbered in hundreds. Indeed, the result was so astounding that most of those viewing it really had no great wish to look twice. It is reasonably fair to say that no building project of £1 million-plus is (as distinct from can be!) completed in less than five years when the conventional processes are used. The following, it is suggested, is not untypical of time scales in such a case — and this presumes two nonsenses, one, that land is available; and, two, that there are no planning procedures!

Appointment of architect, engineer, quantity surveyor, structural engineer	3 months
Sketch plans	3 months
Working drawings and bills of quantity	12 months
Tenders and order	4 months
Start on site	2 months
Contract period	24 months
Delays	8 months
Partitions, furnishing	6 months
Testing, commissioning	3 months
	65 months

The eight months of delays quoted is not an exaggeration. Not so very long ago examination of a wide spectrum of contracts showed an average overrun of construction time of about one-third, and an average overrun in cost (exclusive of inflation) of a like fraction. The truth of the matter is probably, given the proper introduction of the two nonsenses excluded above, some changes of mind by the clients, some design reviews, all sanctified by an examination of cost limits and re-tendering, that no job of any size can really be completed in less than seven years. If this is generally true of the conventional process, the cost to the nation must be immense. No economy, with or without the impact of inflation, can afford to pour out cash for five, six or seven years with no sign of return unless, of course, it is happily looking forward to a sojourn in Carey Street. That the problem exists is recognised — hence the growth of package deals, develop/construct and negotiated contracts of various kinds. Insofar, however, that the conventional process will persist for a very long time, more needs to be done to make it more effective. Project management consistently, properly and skilfully applied on behalf of clients could make a material, timely and economical step in the right direction.

Incidentally, what has been called the above 'conventional' process of building has no parallel in other construction businesses — the chemical and petrochemical industries, shipping, the aircraft industry and so on. Is it because it cannot be afforded, in time, in money, even in effectiveness?

A great deal has been written and said about project management, mostly on the fundamental importance of the subject. It might be thought that little time has been spent on what it is, and even less on practice. These suppositions, if true, are not matters for great surprise or disappointment. After all, such a concept has to grow in context where the historical role of co-ordinator has been undertaken by the architect and in an arena where other professions—for instance quantity surveying and building services engineering — have been increasing in influence and effect. Confusion on the relative eminence of the roles of the professional, the designer, the resident engineer, the clerk of works, has not helped; nor, it is thought, has the 'fixed price' contract, with total responsibility (theoretically anyway) vested in the main contractor, encouraged the appointment. Undoubtedly and clearly the separation in the business between the 'design' professions and 'construction' at large is hampering in more ways than one. Indeed, support for the 'design/construct' contract probably often stems as much from the clumsiness of the separations as it does from any likely improvement in technological, time or price considerations. Given the promotion and appointment of 'project managers' as described later, not only would works thereby benefit, but specialist professionals might find their individual roles more satisfying, rewarding and more effective. At the very least clients would recognise a centre of responsibility and all concerned would see a point at which the buck would stop — for at least a critical examination.

An Introduction to the Project Manager

A project manager must be seen to be responsible for the achievement of a task, to time, to a price and to a stated performance inside politics and guidelines laid down by top management. Guidelines and limitations clearly stated by top management are of vital importance since no project manager can ever, repeat ever, be given total and absolute responsibility. On the whole, guidelines should be:
(i) the financial control required;
(ii) support staff and space limitations;
(iii) degrees of authority for change of any kind;
(iv) identification of the responsible senior manager and/or committee and his/its superior responsibilities;
(v) a clear understanding of the relationship between 'line and staff' responsibilities, if any; and
(vi) any strategic principles.

In the construction field a project manager should, for preference, be responsible for all activity from initial brief to commissioning. If he can be made responsible in addition for feasibility and design studies at the one end and furnishing at the other, so much the better. But whatever the case, it must be borne in mind that any omission in the continuity of the process, initiation to occupation, can only increase the possibilities, indeed the probabilities of failure.

To be quite clear, the responsibility in question involves the right, in fact, the obligation, to make decisions of any kind within the rules and limitations laid down by top management. Such a right to make decisions includes the right to ignore or overrule specialist advice, or any other advice for that matter, except that coming from a superior officer in line. It follows that calculated decisions made in the light of all the known and assessed facts are more important than 'professional' pedantries and opinions. Facts must, on the whole, outweigh opinions. Truly, the totality is more important than the sum of the parts. Beyond all else, the project manager's loyalty must be to the client, user, customer and nowhere else. He must be knowledgeable in building, and hence a professional. Who employs him is a matter of indifference given these two conditions.

The Role of Top Management

Top management, whoever it might be, must retain unto itself:
(i) the setting of targets, preferably agreeing with those asked from and proposed by the project manager;
(ii) the retention of contingencies in money, time and performance;
(iii) the allocation of resources including the use of external resources;
(iv) any statement of principles — relationships, staff rules, technological standards, etc;
(v) its position as court of appeal;
(vi) its right to monitor and audit using techniques of management by exception as much as possible.

On the other hand it must:
a. allow the project manager to get on with his job;
b. must not interfere without clear and just cause;
c. not behave capriciously in the allocation or withdrawal of staff or any other resources;
d. accept fully its proper responsibilities for failure;
e. be quite clear what its own task is; and
f. delegate clearly, wisely and as fully as possible.

The Task of the Project Manager

It follows from the foregoing that a project manager in the building industry must, by one means or another, control a staff of:
(i) architects, engineers, quantity surveyors and support staff engaged on the design and procurement processes;
(ii) as and when necessary, estate surveyors, specialist engineers, interior designers;
(iii) resident engineers, clerks of works, commissioning engineers;
(iv) progress and allied staff.

Clearly, all need not be continuously under his comprehensive day-to-day control at all times. Some, indeed, may be employed in specialist central groupings and so have other duties, but all involved must be identified with him for the project and all must use his system of communication and records for the service. His authority for his job must be wholly accepted by all.

In particular, everybody must use and support his information centre, which must comprise the forecast and progress control for his job. It must operate from a network system of some kind, preferably one with critical path characteristics with full feedback of any impedance to plans. Plans are not only impeded by delays of various material kinds; overlooked and late decisions are also factors. Timeliness of decisions, then, must be a key part in the daily activity of a project manager.

The primary tasks of such a man are to:

(i) identify what decisions have to be taken, when and by whom;
(ii) ensure the decisions are sensible and practical, interlock, and are taken in the correct sequence;
(iii) ensure that the events which flow from the decisions actually take place to time;
(iv) recapitulate and review to ensure that the whole plan and its components are progressing in the proper and timely manner.

Whether or not a project manager should always be a specialist operator as such, eg a quantity surveyor on the job, is an issue — but one best decided by circumstances. Possibly for small simple jobs in some circumstances and situations, he should be a specialist in order to economise on staff. For large complex jobs his specialism ought perforce to be of secondary importance, and so totally subservient to his management activities. Whatever the case, he must be familiar with the task in question and well-versed in the technologies of production, design and construction, and be skilled in the art of working with and using people. He must be decisive and skilled in critical analysis.

Decisions and Timing

In decision-taking the starting point is not a view on what must be done next, but rather what has to be achieved. To be more explicit, a building is not completed until it is furnished, staffed and operating in the required way. This is a matter that is perhaps less remembered in the building industry than in, for instance, the Merchant Navy. Few buildings go through the equivalent of the measured mile trials, and just as few go through shake-down voyages in the way ships do. Conceivably, indeed positively, these are techniques to which project managers and owners should pay increasing attention. But to continue with the decision-making process, and by way of example, the time at which the funiture is required in the building creates the following reverse sequence and decision points and hence timings:

1. installation of furnishings;
2. delivery of furniture, etc;
3. placing of orders;
4. tender period;
5. contract documents;
6. particular design;
7. interior design;
8. appointment of designers.

These events are in reverse order of action in line with the terms of the opening sentence of this section. A brief examination of them highlights the amount of time that can be involved in such a relatively simple matter, and, of course, from them can be calculated the last moment at which the designers should be appointed. As a further example, the key component might be a specialist machine, a reverse order sequence might be:

(i) machine in operation;
(ii) machine on test;
(iii) power supplies checked and tested;
(iv) utilities checked and tested;
(v) machine installed;
(vi) machine delivered;
(vii) machine ordered;
(viii) machine out to tender;
(ix) machine specified;
(x) machine conceived.

From this, the time to begin design and the design requirement can be determined. These factors can and do appear on critical path networks, but the point being stressed somewhat is that no activity takes place without a decision; decisions involve people, argument, facts and assemblies of facts and discussion. They take time, often become obscured, sometimes conflict with earlier decisions. It is the project manager's task to create the proper climate, time and representation for decision-taking and to see that they are taken, are well understood and implemented.

It is well to reiterate here that clients are deeply involved in the decision process, a matter overlooked not a little. It must then be a responsibility of the project manager to bring in the client at the right time. In the two cases mentioned — furniture and machine — the client would be particularly interested, and may indeed wish to embroil his specialist staff (personnel departments on the one hand, maintenance departments on the other) — an arrangement that can bring complication and review and change rather than relief.

Decisions are mostly concerned with future events and are, therefore, part of forecasting. They should be little concerned with the past or the present and must, of course, be directed towards what is realisable. On the whole, in the taking of any decision, the project manager must make provision for later alternative lines of action which might make good any failure arising from primary decisions. But insofar as his role involves forecasting, his machinery of control must be so based, and not founded on historic data. In other words, past progress might have interest or comparative worth, but signals indicating future progress are much more relevant.

Tools

The tools of the project manager's trade must be:

(i) a basic simple programme showing the elements of the total process for which he is responsible, eg feasibility, land search, design, procurement, construction, testing, commissioning and operations;
(ii) a programme in detail for each element, showing key decision points and activities;
(iii) a flowsheet or diagram of some kind showing how the project is to function, any areas vital to operations and any construction phasing;
(iv) staff and labour forecast needs to satisfy the programme;
(v) a budgeting, estimating and costing system for each component in the programme and for the whole;
(vi) a progressing system that will show the construction position accurately at any time by reference to:
  a. design information;
  b. the physical situation, eg foundations placed, columns erected, etc;
  c. labour and staff employed compared with forecast;
  d. monies committed and expended;
  e. external factors, eg plant fabricated off site;
(vii) a means whereby information can be transmitted quickly, and with point, to those managers and/or designers working for him.

Situations which are going bad or are likely to go bad must be identified and transmitted quickly and clearly to those involved, in order that remedial action can be mounted. Progress meetings too often concerned primarily with history, even with successes, are not a solution to this problem. A skilled officer continuously examining and recapitulating on information available — and reconciling it — might be. A tool and/or facility which a project manager must have, almost beyond all others, is one which identifies change of any kind, and measures the likely effects in terms of time, money and performance.

It is as important to uncover and apply attention to unauthorised change as to that which is properly conceived and ordered. The cost of change stemming from junior officers of clients, drawing board fancies and off-the-cuff uncalculated decisions on site and elsewhere, is considerable, insofar as the effect gets converted not only into late, hastily computed variation orders, but more often than not into 'claims'.

In change of any kind the seen effects can be measured; the side effects very often are material, overlooked and undervalued. Actual completion times and costs in the UK are usually quite different from those quoted in contracts. Inflation, strikes, misunderstandings and many other reasons (even lack of project managers) play their part. It is certain that changes of intention play a major part. Hence the need for an effective control facility.

Reflections

This paper does not pretend to be comprehensive nor does it lay down any particular techniques which the project manager should adopt. It does endeavour to identify basic principles and thereby suggests that a trained, logical, ambitious, professional man can become a competent project manager, providing he:

(i) submerges his specialist inclinations in a sensible way;
(ii) behaves in a timely and logical manner;
(iii) keeps his eyes and ears wide open;
(iv) learns to work with and lead staff of various professions;
(v) clearly understands his responsibilities.

Given these qualities, forms, schedules and systems are of the second, even third, order of importance. Finally, knowledge, commonsense and practice are more important than special training.

Almost as a postscript — project management need be in no way impeded by the existence of contracts (main or otherwise), or commissions entered into on an all-embracing basis, ie total responsibility, as in the case of the fixed price contract. In such cases the project manager's task is primarily one of monitoring and auditing to ensure that the suppliers' promises are being and will be kept. It is important for monitoring and auditing to be conducted in such a way that responsibility is in no way removed from the supplier. In other words, interference by the project manager and his agents must be minimal, and impedance to progress less! Management of orders placed on this basis is, in fact, quite difficult. Indeed, arguably the most vital task for the project manager in this context is to ensure that the supplier provides sufficient human resources in quality and quantity to do the job. Once instructions are issued by a project manager in such cases, the probability is that the terms of the contract have been flouted, ie the agent has been constrained in satisfying his side of the bargain. Difficulties follow — quite inevitably.

Equipment safety is as much a human problem as a technical one. The very process of technical development tends to isolate and distance the members of one group of workers from another. As a result, effective supervision and control of equipment is frequently lost.

The author makes recommendations that will assist the maintenance of safety standards by increasing the understanding and co-operation of all those involved in the operation and maintenance of medical equipment.

He is a director of Osbourne Shircore (Technical and Management Services) Ltd, a research and design company based at Slough in Berkshire.

The Control and Safety of Medical Equipment

RICHARD S. SHIRCORE BSc

The central theme of this article is that the growing division of labour within hospital staffs, coupled with their drive for professional autonomy, will exacerbate the problems inherent in using advanced technology in hospitals. It is ironical, but the modern hospital, dedicated to the preservation of life and the promotion of health, is also an environment fraught with danger. Its very power to promote well-being can have catastrophic results, if neglected.

Following serious accidents involving medical equipment, it has become commonplace for the committee of enquiry to urge 'better communications amongst those concerned'. To this end the establishment of joint consultative or supervisory boards are urged to oversee future safety arrangements. Valuable as the work of these boards is, the organisation of health care personnel needs to be considered at a fundamental level, along with why such 'supervisory' or 'consultative' boards are becoming such a necessary feature of hospital life.

Implicit in the recommendations for improved communication is the notion that existing management and safety arrangements are sound, and that only various forms of adjustment to existing arrangements are necessary to improve matters. It seems to be forgotten that, in matching the technological revolutions of the last thirty years, hospitals have witnessed an explosion of occupational specialities. Take, for example, the developments of the semi-conductor and list the number of new occupations this has created, and the extent of the development is easily demonstrated. The creation of these new occupational groups have added to an already high level of specialisation in hospitals, and in consequence to the communications and liaison difficulties.

At the most basic level the division of labour within the hospital divides personnel into those who maintain equipment (engineers and technicians) and those who operate it (primarily within the clinical setting). This simple division is compounded by subdivisions into specialities, and then again by rank and differential levels of training and expertise.

The net result of such haphazard development is mirrored in the loss of control for individual items of equipment. The de-fibulator, for example, can have up to six different occupational groups involved in its operation. Doctors use it, nurses set it up, it may be moved by porters, cleaned and checked by CSSD, and maintained by the hospital engineers and the manufacturers. Not surprisingly, if complaints are received over its performance and functioning, the identification of the origin of any particular fault is almost impossible to pinpoint.

Each individual, working as he does within his own 'speciality' can with some justification announce: "It's not my fault, try further up/down the line . . .".

In the minds of many, 'professionalism' is a concept with no negative attributes. The 'professional' status is regarded as the only occupational goal worth attaining. It is believed to raise the status of the discipline and its practitioners, with subsequent advantages in securing financial and other resources for the development of their particular science. It is considered such advancements can do nothing but good for the standards of patient care.

In real terms its effects may not be so benign. It is less generally accepted, and acceptable, that the drive for professionalisation in the style prevalent in the health service actually hinders communication between groups and unnecessarily complicates organisational arrangements. This is because for some health service staffs the definition of professional status is inseparable from the idea of 'self-management'. It is the idea of 'self-management' which they cherish above all other considerations, and which is regarded as proof of their status, and not such concepts as scientific advancement or increased resource allocation. The net result is of numerous specialities, which in themselves sow the seeds of communications difficulties, but which are made worse by each speciality having its own leadership structure making its own decisions on management policy.

The result of this style of organisation is that individuals concerned with day-to-day tasks relate in the first instance only to their own kind. They adopt the notion their superiors will relay vital information to those whom it may concern. This pattern of behaviour, for example, is most noticeable in the convention that juniors of one occupational group do not report an engineering fault to the appropriate department themselves, but seek to relay the message through their superiors, whom they assume will act on the information. The results in the light of the McShewan case needs no elaboration.

The initial training of many health service workers rarely helps foster mutual respect and understanding between groups. Specialities invariably seek to impress in the minds of the recent entrant the unique contribution of their speciality to the health care process, often to the detriment of others. Clinical staff, for example, doctors, nurses, physiotherapists, are instructed to look towards the patient as their focal point. The patient/practitioner relationship is stressed as being the only feature of their work that needs to be developed. For engineers concerned with supplying the infrastructure of services and therapeutic equipment this is a grave dis-service. Stressing the needs of patients and practitioners necessarily downgrades the role and importance of the very facilities that enable therapy to function. It leads to a cavalier attitude by staff to the importance of becoming even remotely self-sufficient in equipment operation and basic maintenance. The learning of basic principles of equipment handling is disregarded, as being irrelevant to the needs of the 'profession'. Clinical staff may have lectures headed 'The Psychology of Inter-Personal Relationships', aimed at increasing their ability to cope with the recalcitrant patient, but few get the opportunity to learn about the technological needs of maintaining a modern hospital.

To counteract these increasing problems, the engineering profession could do much itself. Few instruction manuals written to accompany new equipment ever find their way to the location of the equipment. More often than not it is filed away in the works office. Secondly, all too often, the manual is written in a manner that suggests the author was under the impression no one under HND level engineering would operate the equipment.

Designers also have the habit of using symbols to designate functions. Unfortunately, few clinical staff appreciate the significance of such advances. Many would welcome the printed word. Less æsthetically pleasing, but much easier to understand.

At a more ambitious level, serious consideration needs to be given to the establishment of an authoritative, centralised hospital 'control' operating 24 hours a day, embracing communications and monitoring functions. A modern district hospital handles as many telephone calls and crisis situations as any of the emergency services, yet the hospital remains the only one which has not the capability of monitoring its own performance.

There is not enough space to develop the responsibilities and scope of a centralised control fully, but in respect to equipment safety the control could play a significant role. Staff of any speciality would have an identifiable point to which to pass on information regarding possible malfunctions or faults. Control would be in a far stronger position to put a stop on the use of particular pieces of equipment until it has been properly checked. Furthermore, it would ease the problems associated with faults that at present occur out of 'normal working hours'.

The demands society is making on the hospital service are not going to diminish. The pressure to increase the use and effectiveness of available resources will continue. The existing arrangements governing equipment safety will become increasingly inadequate as demand for services rises. If accidents are to be kept to an acceptable minimum and public confidence is to be ensured, now is the time to take a long, hard look at the problems of controlling technologically-based medicine to allow the time necessary to arrange alternative strategies.

Solar Energy for the Boiler House Economic Practicabilities

J. R. FIELDING TEng(CEI) MIHospE MIPlantE MIWM

Publications on energy conservation are only too frequent in these present times of spiralling costs and threatened shortages. In fact, every practising Engineering Journal publishes at some stage a thesis on Energy Conservation and what we should aspire to, whether it be changing fuels, insulating systems, the choice of energy tariffs — or just doing without.

In more recent months, publicity has also been given to more unconventional but established means of energy production — such methods as harnessing wind energy or wave energy. Solar energy is also receiving much attention, and it is this about which we are concerned in this article.

How many practising Engineers/Managers take the vital step and invest capital in the relatively new concepts of today's energy conservation, without seeing proof of feasibility? It is true that man has used energy from the wind, sea and sun for decades, but not ever before for the same pressing reasons of economics.

Methods of Adoption

Numerous applications of solar heating are available, most of which are based on the principle of heat transfer through a liquid medium. Practical applications for the solar system include pre-heating of calorifier systems for domestic hot water, pre-heating of ventilation/air conditioning systems, space and process heating.

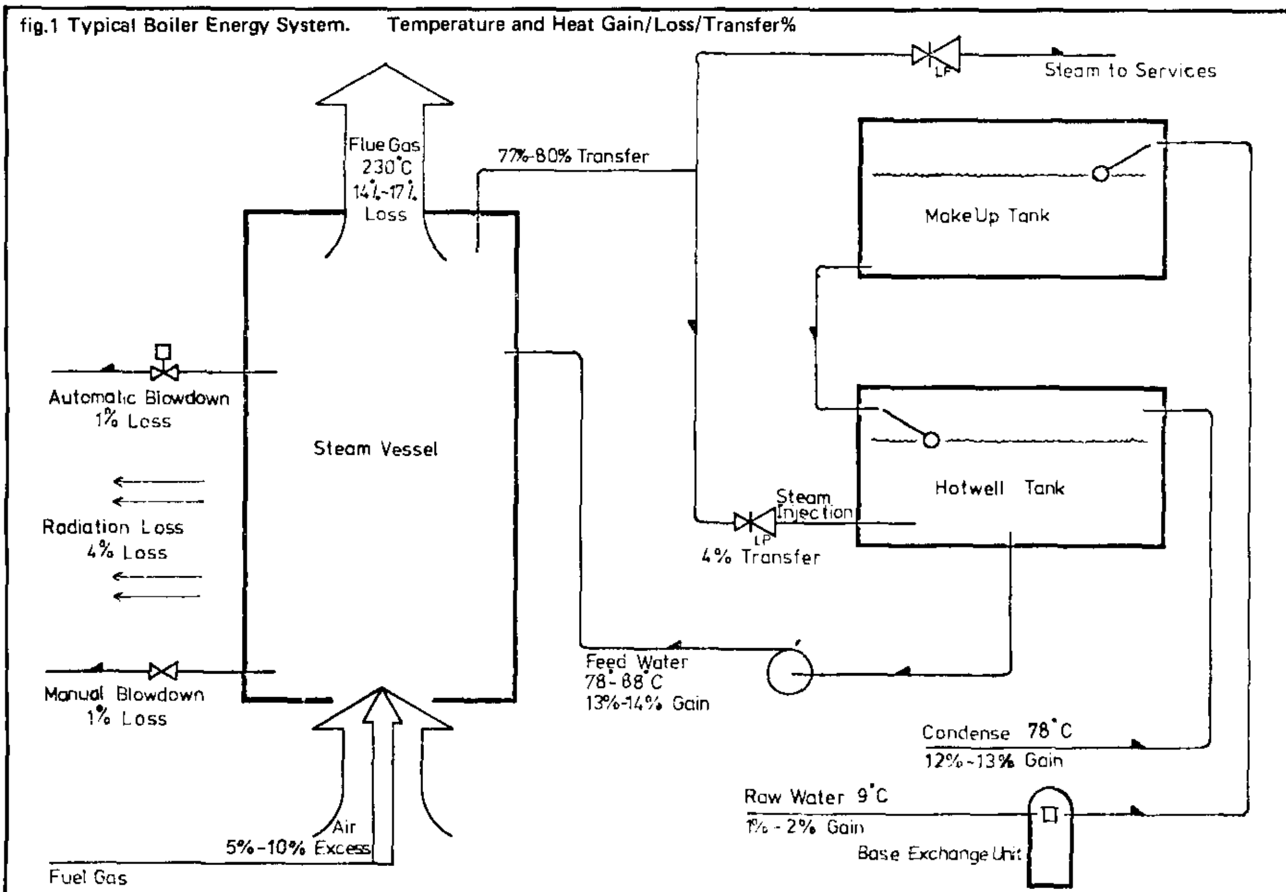
Let us consider the pre-heating of treated/untreated water for a typical steam boiler plant, with the emphasis on the economical and engineering constraints.

Steam Raising Plants

Although the need for centralised steam raising plants is very much under scrutiny at present, they are likely to be with us for some considerable time. Most steam raising plants have a condense return, depending on the process in use, which reduces the amount of raw water (make-up) required for a boiler. This return is normally within the region of 60% to 80% of the total boiler feed water required, at a range of temperatures depending on the method of return and time it takes. Obviously, the higher the temperature of the condense return, the less the amount of energy required to reheat feedwater to the required boiler feed temperature, up to the point where too high a condense temperature will waste heat through flashing off to atmosphere.

We can see from *Figure 1* a typical boiler system which

fig.1 Typical Boiler Energy System. Temperature and Heat Gain/Loss/Transfer%



shows the relevant flow and temperature sequences. It is generally at this stage that conservation of energy becomes more direct, by means of insulation, combustion efficiency and provision of temperature controls.

Typical feed water installations consist of a supply of mains raw water, through a softening plant where the quality of water does not meet required standards, to a receiving tank. From this receiving or make-up tank, the water at below ambient temperature passes to the hotwell tank to mix with received condense for feeding to the boiler. The temperature at this stage is usually maintained between 76°C to 88°C by additional heating, normally steam injection, then chemically treated as necessary on distribution to the steam vessel.

Application of Solar Systems

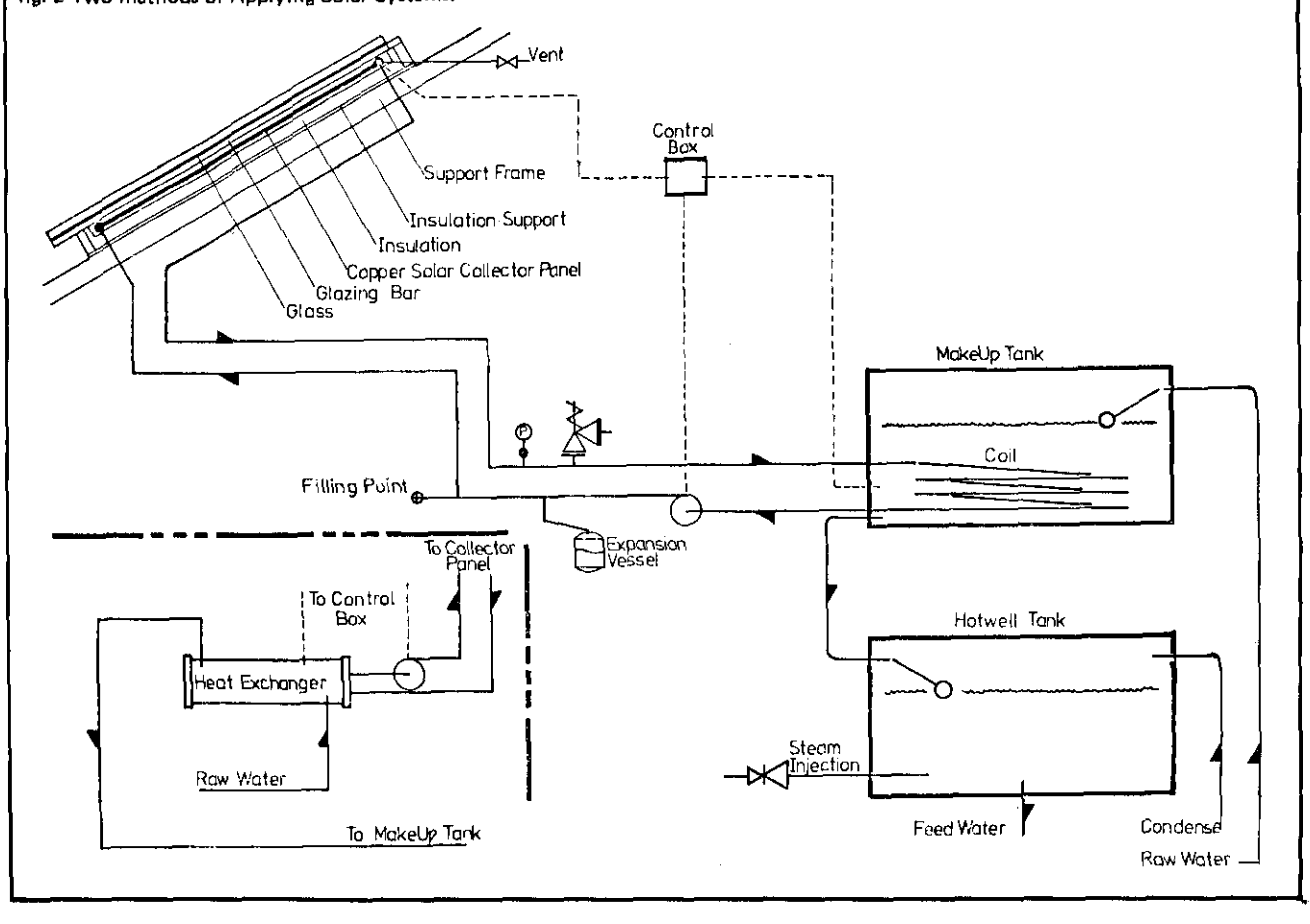
It is claimed that Britain receives 900 kilowatts of radiation per square metre each year, most of which arrives in the summer and none where there is heavy cloud. The most conventional type of collector panels are of the 'flat plate' type, painted black with insulated back and fitted under a glass screen; the absorption emittance factor ratio should be stated, which should be over five. Panels of this type have efficiencies of over 50% so that one square metre of such a panel should collect at least 450 kilowatts a year.

Other statistics obtained by the Building Research Establishment state that about 3.5 gigajoule of solar radiation occurs on each square metre in an average year in the UK. With collector panels of areas four square metres can be expected to operate at an annual efficiency of 35% and so will supply 5 GJ (1400 kWh or 48 therms) of heat annually. With a typical installation of twenty panels, the minimum heat collected can be expected to be 28 MWh. This is 8 MWh less for the same installation claimed by other associations in the first reference.

If solar panels are to be mounted on top of flat or pitched roofs, then the roof should remain structurally safe despite the fairly considerable extra weight. Panels should be fixed securely due to the risk of high winds. The one essential for a solar installation is that the panels should face within 20° of due south, as the bulk of the usable radiation is received during the two or three hours on either side of noon. A glycol-water mix in the panel system will avoid freezing; this water mix in the solar circuit is pumped around the system when the temperature differential is advantageous. BRE Digest 205 recommends that a pressure valve be incorporated into any sealed system, with a pressure indicator to check that there are no leaks. In an open system, where a header tank is fitted, no pressure release valve need be fitted. The use of dissimilar metals within the system should, however, be avoided because of the probability of corrosion.

A solar system will be of greatest benefit where there is a quantity of water which can be delivered to the hotwell tank at an improved temperature than before, thus saving the total amount of heat energy required to raise the temperature within the hotwell to that acceptable for boiler feed. There are a number of ways in which this can be achieved, the most practicable methods are shown in *Figure 2.* The solar system fluid temperature will require

fig. 2 Two methods of Applying Solar Systems.



monitoring by way of a thermostat, so that circulation to the raw water heat exchanger commences only when the heat transfer is advantageous.

Despite the recent development of solar energy, it is still at an early stage in this country and, therefore, experience on which to base estimates of long-term performance and economics should be approached with caution.

Existing Heating Cost

The proof of the system can only be judged by its application to quantifiable applications. For this exercise, a typical boilerhouse was chosen, where such a system can be considered.

Briefly the installation consists of:

4 No Economic Boilers 7 MW. Typical load 8500 kg/hr @ 8 bar
Fuel: Natural Gas/35 sec oil standby
2 No Hotwell Tanks, 7,000 litres, retained at 78°C
1 No Raw Water Tank, 2,000 litres, recorded at 9°C
Condensate return 65% at 80°C
Current steam cost £1.70 per 500 kg.

(i) Boiler Steam Heat Content

Heat content of 8,500 kg/hr steam at 8 bar
Specific enthalpy of saturated vapour × kg/hr steam
2,771 kj/kg × 8,500 kg/hr = energy available
(2,771 × 8,500 = MJ) ÷ 3.60 = 6,542.6 kWh.

(ii) Condense Heat Content

Heat content of 5,525 kg/hr condense at 80°C
specific enthalpy of saturated liquid × kg/hr condense
336 kj/kg × 5,525 kg/hr = energy available
(336 × 5,525 = MJ) ÷ 3.60 = 515.7 kWh.

(iii) Raw Water Heat Content

Steam production − condense return = raw water
8,500 kg/hr − 5,525 kg/hr = 2,975 kg/hr
Heat content of 2,975 kg/hr raw water at 9°C
specific enthalpy of saturated liquid × kg/hr water
37.8 kj/kg × 2,975 kg/hr = energy available
(37.8 × 2,975 = MJ) ÷ 3.60 = 31.2 kWh.

(v) Fuel energy requirement

Heat content of steam − Heat content of feed water (condense + raw water) = heat content of fuel required
6,542.6 kWh − 546.9 kWh = 5,995.7 kWh
5,995.7 kWh = 204.6 Therms at 100% efficiency
∴ at 81% efficiency = 7,402 kWh = 252.6 Therms
Fuel cost 252.6 therms @ 10p × 8,736 hrs = £220,670.

(vi) Heat Content available to Feed Water

Condense + raw water from (ii) and (iii) = 546.9 kWh.

(vii) Heat required to Feed Water

Specific enthalpy of saturated liquid × kg/hr water − heat available
(327 kj/kg × 8,500 kg/hr = MJ ÷ 3.60) − 546.9 kWh = 225.0 kWh
225.0 kWh = 348.3 kg/hr steam to hotwell.

(viii) Costs of Pre-Heating Feed Water

kg/hr steam to hotwell × Cost at £1.70 per 500 kg
348.3 × .34 = £1.18 per hr at stated load.

Analysis of the Costs

Any improvement in raw water temperature will reduce the heat required to attain the required feed water temperature, and therefore lessen the amount of steam consumed by direct injection to the hotwell. Under the stated load, 1,965 MWh of steam energy will be used annually for hotwell pre-heating, at a cost of .53p for each kWh. This is £10,414 annually, for the pre-heating of boiler feed water relating to the production of 3,042 × 10^{8} kg of steam annually, the cost increasing proportionate to the increased loading of the boilers.

From available statistics, a solar collecting system with a collector panel area of 80 square metres can produce 28 MW with a probably maximum of 40 MW. With steam injection costs established at .53p per kWh, the following annual savings can be attained:

28 MW × .53p kWh = £148

or 40 MW × .53p kWh = £212.

Alternatively, if we consider that the steam saved results in a direct saving of fuel used, excluding overheads, then the following annual savings would apply:

28 MW = 3.20 kWh × 8,736 hrs = 954 therms @ 10p = £95
or
40 MW = 4.57 kWh × 8,736 hrs = 1,362 therms @ 10p = £136

The probable cost related to previous installations for a solar system consisting of twenty 4 square metre solar collectors, associated pump, controls and pipework, may be taken as £8,000, which only gives a 2.7% payback return over 37 years, equal to 2% saving of steam costs to the hotwell.

Although a steam load of 8,500 kg/hr was taken as the average load, during a winter season, the peak demand could reach 16,500 kg/hr. No further energy would be available from the solar system, yet an increase in raw water demand to hotwell would follow. The percentage saving against steam demand to hotwell will, therefore, be less.

Conclusion

The consideration of a solar system for such an application would prove an interesting experiment, being the introduction of an additional source of fuel and not just the conserving of existing fuel. Because of the more immediate savings available from other forms of energy conservation, the cost of solar heating in British latitudes at the present level of technology, and of such an installation cannot be justified by the savings.

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Preview

British Hospitals Exhibition-'78

Over 300 companies from the UK and overseas are to take part in this year's British Hospitals Exhibition (Olympia, London, June 5-8, 1978).

The exhibition, which this year celebrates its twentieth anniversary, is once again being sponsored by the Institute of Health Service Administrators and supported by all the main trade associations in the field.

As in previous years, the British Hospitals Exhibition will concentrate on the enormous range of equipment, materials, supplies and services which are essential to the efficient running of hospitals, nursing homes, health centres, etc. The vast majority of exhibitors will be introducing new or improved products and back-up services used in the day-to-day running and maintenance of hospitals, an area of health care expenditure which currently totals some £1,250 million in Britain alone.

Companies taking part in BHE '78 range from leading suppliers to smaller, specialist companies from both the UK and overseas. Exhibitors in the latter category include companies from France, Italy, Switzerland, South Africa and Australia, as well as from Denmark, who are mounting an important Government-sponsored participation.

Amongst numerous products that will be displayed at the show are accident equipment, ambulance equipment, anæsthetic equipment, beds and bedding, catering equipment and foods, cleaning equipment and services, clothing/uniforms, communications systems, aids and equipment, computers, disposable products, drainage and waste clearance systems, emergency services equipment, flooring materials, fracture equipment, fire detection systems, invalid equipment, laboratory equipment, laundry equipment/services, lighting, maintenance services (domestic and management), medical equipment/supplies, medical records, operating theatre equipment, office equipment, physiotherapy equipment, refrigerators, resuscitation equipment, sterilisation equipment, surgical equipment / dressings / instruments, stretchers, theatre equipment, training equipment, trolleys and trucks, vending machines and ingredients, ward equipment and supplies, X-ray (dental and portable) equipment.

To coincide with the exhibition the show sponsors, the Institute of Health Service Administrators, are to hold at Olympia on 6 and 7 June what promises to be one of the most important health-care conferences ever staged in Britain. The conference programme will be far-reaching in its examination of future trends in hospital and health service organisation, management techniques and funding and will include an overview on the National Health Service by The Rt Hon David Ennals, MP, Secretary of State for Social Services; Sir Douglas Black, MD, PRCP, President of the Royal College of Physicians, speaking on the impact of medical advances and technological changes in health care today and tomorrow; Dr David Towell, PhD, of The Nuffield Centre for Health Services Studies, talking on strategies for changing attitudes of staff of all disciplines and the public towards the care of patients in large institutions, like mental hospitals; Dame Elizabeth Ackroyd, DBE, President of the Patients' Association and a Member of the West Riding Community Health Council, speaking on the subject 'Health Care and the Public' and The Rt Hon Patrick Jenkin, MP, Opposition Spokesman on Social Services posing the question 'Can we afford a Free NHS?'

Many other leading trade associations will be holding conferences and meetings during the show and, because of the premier size and scope of the exhibition, a significant attendance of overseas visitors is anticipated by the organisers including inward missions from a number of important developing countries.

Main Exhibitors

Said to be the only company in the UK that offers a complete package with the process of silver recovery, D. PENNELLIER AND CO LTD derive their income from the retention of an agreed percentage of the value of silver recovered from X-ray departments. The service involves no investment whatever on the part of the hospital. Visitors to the exhibition will have the opportunity of winning a 'SILVER INGOT' in a raffle which will be held daily.

A new range of floor sweepers will be shown for the first time by VITOPAN LTD, together with their existing range of cleaning materials and pre-measured chemicals.

CROTHALL AND CO LTD — the largest company of this type specialising in the management and supervision and provision of domestic and housekeeping services. (Part of Pritchard Services Group). Their services are of particular help to administrators in hospitals dealing with psychiatry where old buildings and poor facilities lead to standards below nationally accepted norms.

NEIL AND SPENCER LTD, the largest UK manufacturer of laundry and dry-cleaning machines in its 40th year, are launching two new machines, the '860 FASTWASH', a completely new wash plus finish system producing high quality with economy, and 'SOLITAIRE 6', 6 kg loading closed circuit perchoroethylene dry-cleaning machine which requires no outlet to atmosphere to comply with the latest fume emission restrictions.

Celebrating its 25th anniversary, LABORATORY AND ELECTRICAL ENGINEERING CO will be showing for the first time the GA3 Automatic CO^2 INCUBATOR and post-mortem stand.

From WARWICK SERVICE SYSTEMS a world premiere for 'BRUTE' and 'EAGLE' heavy and light duty mops recently re-designed by ERIC NEALE of Jensen car fame. On their stand a special test bed for a new range of WRINGERS.

An entirely new vacuum range of cleaners from the USA known as 'TAILORMATE' will be featured by CLARKE-GRAVELY (UK) LTD.

The DYLADE COMPANY LTD, whose slogan is that they are 'world leaders in the design and development of dialysate supply and monitoring equipment', are showing the 'DYLADE MODEL DS'. Automatic re-use of dialysers thus effecting considerable savings in the cost of dialysers, also now available with ultra-filtration and positive pressure.

From ROBOSERVE LTD — 'STAX', the in-cup system using a fully insulated disposable cup for tea, coffee, cold drinks: just add your own water. On show will be the latest vending machine in their range, the 'MULTI-CHOICE 32', a drinks machine with 32 selections. Roboserve provide a design and building service for canteens, kitchens and rest areas.

'MULTI-DUCT' trunking systems can revolutionise the installation of electrical and medical gas services in hospital wards; it is on display for the first time from CONTARNEX LTD.

The 'LINK 1000', a two-way speech system from NELSON TANSLEY LTD.

On show for the first time at a Health Care exhibition will be the latest development from WITTENBORG AUTOMAT LTD 'MODEL 480'. A combination refrigerated merchandiser capable of dispensing both bottles, plastic and paper cartons and packaged snacks, it is the only vendor available on the market with this facility.

C. A. W. STANBRIDGE LTD, one of the leading innovators of technology and sophistication in sluice room equipment will be displaying their range of bed pan washers, which includes a new steam disinfection cycle machine.

MANOR DYNAMICS LTD and MARGAIL PLASTICS LTD. Being demonstrated will be the Renal Hypothemia unit, the RHV 101 developed to meet the requirement of a new technique in kidney surgery pioneered primarily by MR JEA WICKHAM, MS, FRCS, Consultant Urologist, St Bartholomew's Hospital, London. Both companies provide a research and development facility for the medical profession.

NEW PRINTED FABRICS developed in conjunction with interior designers in the National Health Service will be shown for the first time by MOYGASHEL LTD in addition to a wide range of flame retardant fabrics in 122 and 183cm widths.

Patient handling and support equipment especially in bathing are the speciality of MECANAIDS LTD. Equipment being displayed include a POOL LIFT for lifting the disabled into and out of hydrotherapy pools. MECANAIDS AMBULIFT for general lifting particularly heavy patients. Over 10,000 have been sold. A NET SUSPENSION BED, a means of prevention and treatment of pressure sores. And the HI-LO bath, which can be raised and lowered to provide a suitable working height for nurses. At Stoke Mandeville hospital over 2,500 lifts have been made with the POOL LIFT in the last two years. The HI-LO bath is being exhibited for the first time. Continuous demonstrations.

MARKUS sliding doors are unique in the world due to the patented sliding door construction which allows easy opening and closing no matter what size. Ideal for operating theatres, X-ray doors and cold room doors. A selection will be displayed by MARKOS HERMETIC DOORS LTD.

A full complement of Axminster, Wilton Tufted and Bonded carpets, along with specially produced products for hospital authorities will be displayed by FIRTH CARPETS LTD. New on show will be 'READY-FLOOR' designed specifically for hospitals.

THE LAWCO BARNET BOX is a new product from LAWTONS OF LIVERPOOL LTD. It is a self-assembly container for the disposal of medical sharps. Also being shown, the LAWCO CARRIBOX for autoclaving instruments, the LAWCO LIBRARY BOX for housing medical journals, books, etc, and LAWCO STOCKBOXES for easy access storage of any small items used in the medical environment.

ELECTROLUX (COMMERCIAL EQUIPMENT) LTD will be exhibiting a range of laundry equipment which will include washer extractors, hydro extractors, drying tumblers and a small ironing machine. The latest model being shown is the WASCATOR HIGHSPEED WASHER EXTRACTOR FL803.

'LUXLINE' and 'LUXRAIL'. Both new products from BBI LIGHTING. Careful research has led to an integrated ward services system, which includes all electrical requirements, nurse call, radio, TV, and telephone control.

C. E. KING LIMITED will be featuring for the first time at any exhibition a new development; a range of OPERATOR PROTECTION CABINETS designed for use with their ELECTRONIC TABLET COUNTING MACHINES, which are designed specifically for hospital requirements. Also on display will be VOLUMETRIC LIQUID FILLING EQUIPMENT for both sterile and non-sterile applications.

FURNITURE PRODUCTIONS (BRADFORD) LTD will be exhibiting a full range of seating and tables currently available on DOE/DSA call off. There will be several products of special interest to hospitals.

Surgical instruments, autoclaves and special fabrication of artificial bone replacements will be featured on MACARTHY'S SURGICAL LTD stand.

THOUSAND AND ONE LAMPS LTD will be exhibiting for the first time a revolutionary design of overhead light fitting. Spring balanced and easy to clean. A dimming unit can be supplied which provides a night light facility. It may be used as a patient reading lamp and also for examination purposes.

New from MEDISCUS PRODUCTS LTD the Mk V MEDISCUS AIRBED developed in conjunction with the Royal National Orthopædic Hospital at Stanmore for the prevention and treatment of burns and plastic surgery cases in Intensive Care. The DATANOMICS PRESCRIPTION READER, prescriptions inserted in to a reader in the ward are displayed in the pharmacy monitor without the patient's card leaving the ward.

Two new models of REFUSE COMPACTION EQUIPMENT will be exhibited by REED MEDWAY

SACKS LTD together with products from the KLEENSAC SYSTEM OF WASTE DISPOSAL which include paper shredders.

SUPREME PLASTICS LTD will be showing an extensive range of re-sealable polythene bags. New at the exhibition will be 'LAMIGRIP', a laminated re-sealable pouch which is completely air and water tight. Many of the products are designed for use specifically in hospitals.

SNAKE BITE KIT—POISON PACK — INDUSTRIAL KIT. Part of a new range of VIVO specialised emergency kits from INDUSTRIAL MEDICAL SERVICES (PTY) LTD of SOUTH AFRICA. These are emergency kits for industrial and domestic use. Each case contains equipment, supplies and instructions to deal with emergencies.

From WILMAT SALES SOUTH a range of pedestrian and rider electrically operated platform trucks and tugs, stacker trucks and pallet trucks.

WADER MARKING LIMITED are showing two sizes of a heat-seal press together with the materials it uses to mark, label patch and repair all types of textiles and, in particular, linen marking.

'ACOUSTIC FLOORING' one of the many ranges of floor covering products from MARLEY FLOORS LTD. Many hospitals are appreciating the sound insulation qualities of the HD ACOUSTIC range. Nine other ranges will be exhibited including anti-static flooring. MARLEY FLOORS LTD produce specific flooring products with hospitals in mind.

BEDS for nurses, doctors and patients from MYERS COMFORTABLE BEDS, purpose-designed bedding, in particular long-stay patients' beds and beds with anti-incontinence and fire retardant features.

The ERCOL MODULA RANGE of occasional armchairs and settees have been designed specifically with the needs of hospitals in mind. A new feature is the seat suspension system which is almost indestructable. The MODULA RANGE is built for longevity, all upholstery covers are zip-fastened for easy dry-cleaning and replacements.

Re-design and improvements will be featured on the WALKA TRUCK, TOWTUG and RIDA TRUCK from UPSON ELECTRIC VEHICLES. The WALKA TRUCK has been fitted with a new buffer, additional safety features are also included.

FRANK WILSON (FILING) LTD will be showing the RAILEX, ROTA-SCAN AND RAILEX MEDIFILE filing systems designed for hospital medical records, health centres, doctors' records and hospital administration filing systems.

'DRUG SAFES' highly recommended by the Police throughout the UK will be displayed by HOSPITAL METAL-CRAFT LTD as well as an extensive range of hospital ward, theatre and departmental steel furniture and equipment, all of which have been specifically designed for hospital use.

FIRE RETARDANT SACK HOLDERS are now recognised as a safety measure in hospitals where paper and plastic sacks are being used. WYBONE INDUSTRIAL SALES LTD have a range of sack holders conforming to hospital memorandum No. 16.

New from J. and S. DAVIS LTD a small autoclave and PORTABLE ENT ELECTRIC DRILL both being exhibited for the first time, designed and manufactured in the UK.

CAPE ENGINEERING CO LTD are of the world's foremost suppliers of health care equipment. New products which will be on display will be the CAPE 2000 intensive care ventilator, the CAPE SUCTION PUMP Mk 2 and TTL VENTILATION FAILURE ALARM. In addition, patient transport and recovery trolleys, plastic holloware accident and emergency equipment, storage and handling equipment and systems.

A new cubicle curtain track system from ANTIFERENCE LIMITED.

SWIFTS OF EXMOUTH will be displaying their range of MELAMINE tableware and exhibiting for the first time an entirely new detergent 'AUTOGLAN' specially developed for washing melamine, it does not contain Chlorine or Caustic substances.

New lightweight non-toxic food processing tables which meet world-wide health regulations, will not crack, splinter, swell, absorb liquids or odours or harbour bacterial and lasts far longer than plastic or wood, from W. W. CHAMBERLAIN AND SONS LTD.

VANTONA GROUP LIMITED are for the first time exhibiting as a group (five companies) and will be exhibiting new sheets in linen with recent amendment to PAS 17 and new jacquard woven flame retardant counterpanes and cubicle curtains.

From LUXAN MEDEX LTD, new disposable surgeons' gowns and new theatre face mask designed to reduce the problems of skin irritation.

ALBRIGHT AND WILSON SERVICE PRODUCTS LTD are showing three new chemical products for automatic dishwashing, kitchen cleaning, general hygiene and floor care. Of particular interest is SURGIMATIC a new product for use in all instrument washers. It is a low foaming liquid detergent.

A new HYDRO-MASSAGE bath unit and a new 'ARJO SHOWER CABINET' with an integral transport system designed and made in Sweden, particularly suited for the physically and mentally handicapped, is being displayed by ARJO of READING.

INSULPAK LIMITED will be displaying their range of expanded polystyrene disposable cups and containers for hot and cold foods.

The largest independent microfilming service bureau in the UK, MAB SERVICES LIMITED will be showing how a quick filing system for little capital expenditure can be achieved on their microfilm service. 3,000 documents in a box four inches square.

W. E. BROMBLEY AND SONS SUPPLIES LTD will be demonstrating a range of cleaning equipment. Of particular interest is a sponge mop that will successfully withstand autoclaving, easy change of heads and handles that are colour-coded to ensure their correct use.

AUTOMATONSINTERNATIONAL (DISTRIBUTORS) LTD specialise in providing 'IN HOUSE' laundry systems. New equipment includes automatic programming and automatic injection of additives. The IPSO 850 and IPSO SYSTEMATIC will be introduced to the health care industry for the first time. Also on display will be the KLEEN KING liquid brush —

a high-powered controlled jet of cold water and cleansing agent.

Completely new from HILLE INTERNATIONAL, 'CAMBRELLE', revolutionary moulded-in upholstery which is hard-wearing, warm to the touch, easy to clean, attractive and durable. The HILLE INTERNATIONAL polypropylene chair programme includes a wide range of styles, bases and finishes developed from the original famous polypropylene chair design.

From SIDDALL AND HILTON, a range of hospital ward furniture. Being demonstrated will be a motorised mortuary lifting trolley.

REMPLOY LIMITED re-employs disabled people. Their rehabilitation equipment is designed for the disabled and elderly. Their complete range of Orthopædic made-to-measure appliances and immediate splints and supports will be on display. All of their products are approved by the Department of Health and Social Services.

From DENMARK a new 'SUCTION BOOSTER' and 'PEEP VALVE' being exhibited by AMBU INTERNATIONAL (UK) LIMITED, together with resuscitation equipment, anæsthetic valves, training systems for expired air resuscitation, external cardiac compression and ECG monitors; all the equipment conforms to British standards.

A small operating theatre will be exhibited by PERMATEMP MEDICAL EQUIPMENT LTD, displaying the advantages of modular theatres above conventional methods of building; they are of a unique design and specifically answer the problems of providing surgical accommodation in problem areas.

SMITH'S ELECTRIC VEHICLES LIMITED will be featuring the 'SMITH'S CABAC' battery operated vehicles for use within hospital grounds and on the public roads, a wide variety of bodies are available; a new differential slip unit has been developed which reduces torsional stresses and provides battery economy. Battery operated vehicles have a vital role to play in hospitals where their cleanliness, quietness, utter reliability and safety make them uniquely suitable for internal transport of every kind.

From AUTOMATIC CATERING SUPPLIES LTD a full range of catering, medical and general disposables. Over 1,000 different disposable products are available from 28 depots with a 24-48 hour delivery. New at the exhibition a 60 ml smooth wall GALLIPOT for CSSD use.

From CRAWLEY (REFRIGERATION) LIMITED the 'ACROWKOOL' general-purpose water cooler, provides cool drinking water for up to 200 people per hour at a low cost.

ARMITAGE SHANKS LTD will be showing a range of sanitary ware approved by the DHSS with their INTEGRATED PLUMBING SERVICES UNIT. Products are tested before delivery to site. For the disabled the CLEVELAND SHOWER BATH will be exhibited.

HOMA CASTORS LIMITED will be showing a range of castors and wheels with unique highly specialised products designed and engineered for long trouble-free life in hospitals.

NEW 'BRIM COFFEE' approved by the DHSS, a coffee with a mixture of grain extract which provides significant cost savings. Continuous sampling on the stand. A range of CONVENIENCE FOODS will be exhibited and the details of RECIPES available from GENERAL FOODS CATERING SERVICES.

Equipment for the DISPOSAL of 'SHORT-LIFE' hospital products will be shown by PERMAPURE (COMMERCIAL) LTD, the equipment being exhibited requires little or no maintenance.

HALO SIGNS LTD specialise in the production of HOSPITAL SIGNS as well as industrial and safety signs.

The PLANET RANGE of light fittings designed for all types of requirements including infra-red and fluorescent systems. PLANET PRODUCTS are produced in AUSTRALIA.

Product News

Extension to Pullen Hydropak Range

The 'Hydro-pak' range of pressurised water supply units, manufactured by Pullen Pumps Ltd, has been extended with the addition of both intermediate and larger models with increased capacities of up to 1,000 gal/min and increased heads of up to 500 ft. These improvements have been achieved by the integration into the overall package of both Pullen 'HV (high head) and 'KH' (high output) pumps.

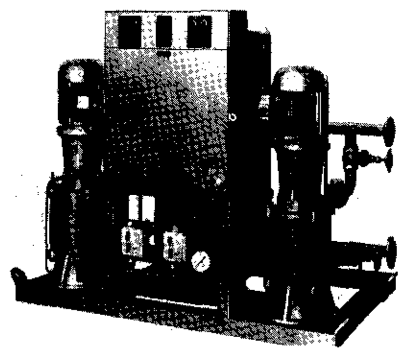
Thus six further units have been added to the 'Hydro-pak' range which is now available in a total of 12 sizes.

The Hydro-pak is designed to provide a completely pressurised water supply. It comprises either two or three close-coupled centrifugal pumps, interconnecting pipework, together with valves, membrane tank and control panel. Smaller and lighter than conventional pressure sets, the design techniques employed eliminate the need for an air compressor and its associated controls, thus reducing both capital and running costs.

The Hydro-pak is similar in operation to conventional packaged pressure sets in which an air cushion is supplied by a compressor that replaces air lost by absorption into the water. However, the design of the Hydro-pak's membrane tank eliminates these losses by the provision of a sealed air cushion, which is pre-charged to the correct pressure on assembly. The use of an air compressor and associated controls is also eliminated.

Two systems are available to meet differing customer requirements. The first is a two-pump duty and standby

The 'Hydro-pak' unit fitted with type 'HV' high head pumps.



system in which both pumps are sized to provide the maximum demand, and where the function of each pump can be interchanged. The second is a three-pump duty, back-up and standby system which also contains the same flexibility.

The duty and back-up pumps are sized to provide the maximum demand when in joint operation and the standby pump is sized to provide 50% of this.

Pullen Pumps Ltd, 58 Beddington Lane, Croydon, Surrey CR9 4PT. Tel. 01-684 9521.

New Digital Multimeter

The Alpha III Multimeter.

The latest digital multimeter, from Gould Advance Ltd, the Alpha III, embodies many of the advanced technological concepts used in the recently introduced Beta instrument, but its design and performance have been tailored to compete with analogue instruments at the low-cost end of the multimeter market.

Unlike the earlier Alpha I and Alpha II, the new instrument has a full 1999 scale length. The bright, three-and-a-half digit display uses high-brightness light-emitting diodes, combining good legibility under high ambient lighting conditions with low power consumption. The Alpha III will operate for more than fifty hours from one set of four replaceable SP12 'C' cells; alternatively, a battery eliminator is available for mains operation.

Like the Gould Advance Beta, Alpha III uses a state-of-the-art large-scale integrated circuit combining all analogue and digital functions, including an on-chip oscillator, high-impedance input, automatic calibration and zeroing and multiplexed digital outputs. The resulting low component count leads to reliability and ease of maintenance, and the Alpha III carries the Gould Advance two-year guarantee for low cost of ownership.

There are 25 ranges of ac and dc voltages, ac and dc current, and resistance. All resistive ranges are protected to 250V rms. Typical accuracy is 1%. The display includes decimal points and polarity indication, and over-range is indicated by all decimal points being lit.

Alpha III is housed in a case measuring 246 × 180 × 72 mm. A combination of push-button switches and rotary knob is used for range selection. A quick-release rear panel houses the throw-away batteries and current-protection fuse. A simple tilt stand is provided. The weight of the Alpha III is 1.2 kg.

Accessories available include the battery-eliminator unit, a high-voltage probe for measurements up to 40 kV, an rf detector, and a carrying case for the instrument and its accessories.

Gould Advance Limited, Roebuck Road, Hainault, Essex. Tel 01-500 1000.

Method of Maintaining Operating Theatres' Air Pressure

A Balanced Pressure Valve, which controls air pressure at the required levels in operating theatres, has recently been designed by Escomat Ltd.

The valve, which can easily be fitted into a theatre, provides an economic method for ensuring satisfactory pressurisation.

The Escomat Pressure Valve is designed for a situation where accurate controlled air flow patterns are required.

The valve is pre-set at the required pressure and once this level has been reached the unit only opens sufficiently to release enough air to maintain it.

Response time is fast, so that if a massive air loss, due to a door opening for example, causes a fall in pressure, the valve immediately closes to prevent a reverse flow occurring.

Pressure levels can be easily adjusted to meet changing requirements.

The standard Escomat Pressure Valve (806mm × 180mm) takes a standard size louvred grill. Valves in other sizes are available on special order.

Anæsthetic gases can be removed by a special extract flange which is fitted to the valve. They are then directed away into the atmosphere.

The Escomat Pressure Valve costs approximately £37. It has been used in both the Wellcome Foundation Ltd, and Permatemp Medical Equipment Ltd, Modular Operating Theatres.

Escomat Limited, 26a Cleaver Square, London SE11. Tel. 01-735 8647.

Luminaires for Hospitals and Health Centres

A new catalogue entitled 'Luminaires for Hospitals and Health Centres' has been published by Hume Atkins (Lighting) Limited. The 16-page catalogue introduces many new items into their range and contains photographs, descriptive copy, specifications and drawings.

The luminaires have been designed to meet most of the present Department of Health and Social Security lighting requirements and some have been given both the British Standard Kitemark and Safety Mark.

Val Goodman, Hume Atkins (Lighting) Limited, Halight House, Oval Road, Croydon, Surrey CR0 6BN. Telephone: 01-688 5126/7 or 01-688 5644/5.

Forced Convection Oven

Thomas Collins & Co Ltd, of Bristol, are manufacturing the forced convection oven in two sizes, both can be heated by natural gas, bottled gas or electricity, and they are designed to cook, bake or thaw and cook frozen foods.

They are already in use in well-known hospitals, bakeries and kitchens in this country and abroad and demonstrations can be arranged by appointment. They are suitable for the preparation of bread, cakes, pasties, sausage rolls, pies, savouries, meats, full meals, etc etc.

Thomas Collins & Co (Bristol) Ltd, 16-19 Midland Terrace, Fishponds, Bristol BS16 3BZ. Tel. 0272 655391.

Intermediate and "Press" Switches Available

Intermediate and 'press' switches are now available in MK's Sonata and Albany plateswitch ranges.

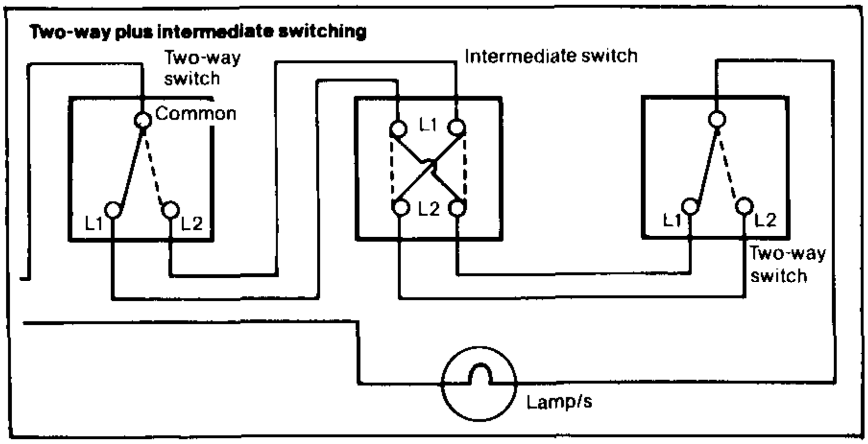
The intermediate switching facility extends the principle of two-way switching to enable any number of inter-connected switches to control the same lighting circuit. Thus a room with three doorways could have a lighting switch by each door to control the same fitting.

Albany is MK's comprehensive range of metal plate wiring accessories, popular with architects and designers for interiors requiring an extra touch of elegance. There is a choice of two finishes, matt chrome and satin brass.

Sonata is the 'fashion' plateswitch range — the moulded switch plate has a recess into which fits a fascia panel completely concealing the fixing screws and presenting an attractive square-cut profile. The fascia panels are available in matt chrome and satin brass.

The new Sonata and Albany intermediate and 'press' switches are single-gang flush-mounting units, fully rated at 5A for inductive, fluorescent or resistive loads.

MK Electric Limited, Shrubbery Road, Edmonton, London N9 0PB. Tel. 01-807 5151.



Choosing the Right Light

A pocket-sized leaflet, produced by strip lighting manufacturer, Linolite Ltd, is designed to provide both specifiers and installers with a guide to the company's complete product range.

The leaflet, entitled 'Choose the Right Light', is sub-divided into five product categories: functional and decorative lighting; shaver-socket fitted luminaires; general display lighting; picture lights, and luminaires for reading and viewing; and signs and sign lighting.

Each product description comprises a concise summary of the luminaire or sign and its function, together with a line drawing, and full details of dimensions, colour, switching, lamp type and fixing position.

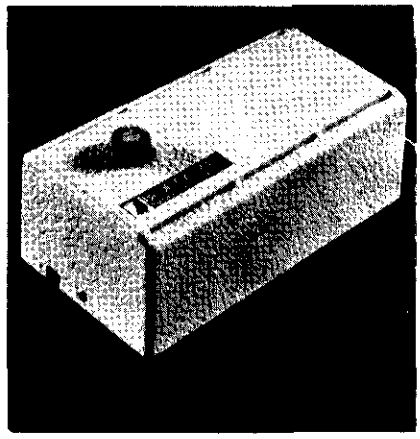
Copies are available on request from Linolite Ltd, Pier Road, Feltham, Middlesex TW14 0TW. Tel. 01-890 8142.

Smoke and Gas Alarm

Delavan-Watson Ltd, of Widnes, Cheshire, has introduced a new smoke and gas alarm designed to operate at extremely low levels of concentration for installation in homes, schools, laboratories, caravans etc, where early warning of smoke or gas accumulation is essential.

Known as the Blue Canary, the Delavan-Watson smoke and gas alarm operates within the recognised lower flammability limits of a wide range of gases and can detect very small amounts of smoke.

Operated from a standard 220V ac mains supply, the Blue Canary gives an audible 'buzzer' warning in the event of smoke or gas accumulation. Provision is also made for 'remote'



Delavan-Watson's smoke alarm.

warning devices to be operated by means of external connections on the unit which provide a 120mA output signal.

Lightweight and compact in size, the Blue Canary alarm is finished in a light grey stippled cover and can be installed in any required position, such as a kitchen, boiler-house or garage.

The design of the Blue Canary allows it to be installed as a permanent fixture or as a semi-portable unit.

Delavan-Watson Ltd, Gorsey Lane, Widnes, Cheshire WA8 0RJ.

New Ethylene Oxide Gas Steriliser

An ethylene oxide gas steriliser for the sterilisation of items that cannot withstand moisture and heat in excess of 55°C has been designed and introduced by Dent & Hellyer Limited, of Andover.

The new ethylene oxide gas steriliser, called 'Dentethox', is being manufactured to meet the needs of modern hospitals, laboratories and similar manufacturing facilities which require effective sterilisation of heat sensitive items such as heart lung units, electrical and electronic apparatus, pre-packaged disposables, rubber and plastic items, bedding, clothing and powders.

Features of the new machine include a series of fail-safe devices to ensure efficient operation, easily serviceable or replaceable solid state components, a comprehensive operator control panel and an automatic gas supply changeover control. Various chamber sizes are available.

Dent & Hellyer Limited, Walworth Road, Andover SP10 5AA. Telephone: 0264 62111. Telex: 47430.

Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

DUDLEY AREA HEALTH AUTHORITY

Assistant Hospital Engineer

required to assist the Hospital Engineer in the organisation and maintenance of all engineering services at the Guest, Limes and Burton Road Hospitals. Applicants, male or female, should hold an ONC in Engineering, or an alternative acceptable qualification, and have completed an apprenticeship in mechanical or electrical engineering or have otherwise acquired a thorough practical training. A special interest in Energy Conservation would be desirable.

Salary scale £3,063-£3,507 per annum, plus supplements up to £499 per annum and incentive bonus scheme allowance.

Application form and further information from the Area Personnel Officer, 6 The Broadway, Dudley, West Midlands DY1 4PY, telephone Dudley 56911 ext 218, to whom completed applications should be returned by April 24, 1978.

WEST MIDLANDS REGIONAL HEALTH AUTHORITY
Regional Works Department
Regional Engineers' Division

Applications are invited for the post of

SITE ENGINEER

Grade II

at Dudley District General Hospital to supervise the installation of the mechanical and internal drainage services associated with Phases III A and B of the development, the approximate value of these services being £3m.

Candidates must:
a. have served an apprenticeship in mechanical engineering;
b. hold the Ordinary National Certificate in mechanical engineering and have at least five years' experience as a Clerk of Works, Site Supervisor or Foreman of Works for engineering services of large buildings, or have not less than ten years' experience, including the writing of reports as a Clerk of Works, Site Supervisor or Foreman of Works for engineering services of large buildings;
c. have an appreciation of the principles of design of mechanical and internal drainage services.

Salary: £4,554 (x 5) - £5,514, plus Phase II.

For further details and an application form, please write to (quoting ref G94A): Regional *Personnel Officer*, West Midlands Regional Health Authority, RHA Section, 200 Broad Street, Cumberland House, Birmingham B15 1SW, or telephone: 021-643 5781, Ext 69.

Application forms to be returned by April 24, 1978.

HIGH WYCOMBE DISTRICT
Wycombe General Hospital

HOSPITAL ENGINEER

To be responsible for the safe and efficient running of the mechanical and electrical services of a district *general hospital, a number of* smaller hospitals and day centres. The Hospital Engineer also provides emergency cover for a number of community domestic properties.
There is a supervisory involvement *in the running of* an incentive bonus scheme at the District General Hospital.
Applicants (male/female) should have sound experience in all aspects of mechanical and electrical engineering and proven managerial experience.
Minimum qualifications: Engineering apprenticeship and an HNC or City and Guilds qualification as laid down in PTB 261.
Salary (24½ points and over): £3,615-£4,140 per annum Stage I supplement £291 plus 5% plus responsibility allowance £147 per annum plus incentive bonus payment.

Application forms and job description available from District Works Office, Shrubbery Road, High *Wycombe, Bucks. Tel.* H.W. 26161 ext 211.

Buckinghamshire Area Health Authority

CALORIFIERS +
Tel.: 0272-666651
CALENGE LTD.
1 Victor Road
Bristol
BS3 3LW

LANCASHIRE AREA HEALTH AUTHORITY
Blackpool Health District

Assistant District Engineer

Salary: £4,371 x 5 - £5,262 plus enhancements

Applications are invited for the above post to assist the District Engineer in the management of engineering services in this large Health District. Minimum qualification HNC or HND in Mechanical or Electrical Engineering, with endorsements in Industrial Organisation and Management or acceptable equivalent qualifications and have served a formal apprenticeship in either mechanical or electrical engineering. Sound experience in all aspects of maintenance and operation of mechanical and electrical services together with management ability are essential.

Application forms and job descriptions available from the District Personnel Officer, District Offices, Victoria Hospital, Whinney Heys Road, Blackpool FY3 8NR. Telephone: Blackpool 34151, Ext 206.

Closing date: April 28, 1978.

Index to Advertisers

Page

Shanning International Limited

A WORLD UNDER PRESSURE

A.P.S. GROUP

The A.P.S. Group is expanding, Shanning International Limited continues its progress as one of the leading U.K. Companies in the total equipping of hospitals and medical centres overseas. The following medical staff are required to join a young enthusiastic team to play significant roles in the growth of the Company.

HOSPITAL CONTRACT CO-ORDINATOR

To co-ordinate the efforts of departments in the Group and liaise with outside contractors involved in hospital building and equipment. The applicant should have commercial experience and, above all, organising flair with the ability to communicate with and motivate people at all levels. U.K. and some overseas travel will be involved.

HOSPITAL CONTRACT SITE ENGINEER

Experienced site manager to take full responsibility for the installation and commissioning of medical furniture and equipment on major hospital projects overseas. A Hospital and Para-medical equipment engineering background would be a distinct advantage. The majority of time will be spent abroad.

Write or telephone in the first instance to Mrs. Helen Clift:
Hertfordshire House, Wood Lane, Hemel Hempstead, Herts. HP2 4SU
Telephone: Hemel Hempstead (0442) 47311. Telex: 826628

KING'S HEALTH DISTRICT (TEACHING)

ASSISTANT ENGINEERS

Salary: £3,893-£4,360 inclusive.

The minimum requirement for these posts is an ONC in Electrical/Mechanical Engineering or equivalent qualifications. The jobs offer excellent training opportunities and full support given for further studies. Previous experience or maintenance engineering (mechanical/electrical) preferable.

Application form and job description for the above posts from Nigel Sewell, Assistant Administrator, Dulwich Hospital, East Dulwich Grove, London SE22 8PT. Tel. 01-693 3377, ext 3209.

ST. PAUL'S SCHOOL
Lonsdale Road, Barnes SW13

requires an

ENGINEER

who has served an engineering apprenticeship and who has experience of electrical installations and building maintenance, to join the School Maintenance Staff.

The successful applicant will assist, as a main part of his or her duties, the Resident Engineer who is responsible for the efficient functioning of all plant and apparatus, the systematic management of exterior building maintenance and the control of the Maintenance Staff. The successful applicant would be considered, besides other applicants, for the post of Resident Engineer upon the retirement of the present incumbent.

Accommodation available. Age range 35-45.

Pensionable. Salary according to experience and qualifications.

Applications in writing, with the names and addresses of not less than two referees, to the Bursar.

Closing date for applications April 28, 1978.

AN OPPORTUNITY ARISES FOR AN

EXPERIENCED ENGINEER

to take responsibility for the mechanical and electrical services and the buildings at the Dental Estimates Board's offices at Eastbourne.

The successful applicant will be responsible for the work and control of the Board's maintenance team. His or her duties will include the operation of preventative maintenance schemes for the mechanical and electrical services and the buildings. He or she will also be involved with new engineering and building work, including liaison with architects and consultants as necessary.

Applicants must have at least HNC in mechanical or electrical engineering or acceptable alternative and have had wide practical training and experience, including maintenance of air conditioning plant.

This is a permanent and pensionable post in the National Health Service with good conditions of service. Salary scale £4,029 to £4,554 per annum plus supplements totalling £499 per annum. The person appointed may receive assistance with removal expenses.

Further details and application form are obtainable from The Establishment Officer, Dental Estimates Board, Eastbourne, Sussex BN20 8AD (telephone 0323 25552, extension 27).

To place an advertisement in the next issue of **HOSPITAL ENGINEERING,** appearing on **May 5, 1978,** please contact: **EARLSPORT PUBLICATIONS,** 17 St. Swithin's Lane, London EC4, 01-623 2235/8, by **April 20,** latest.

HOSPITAL ENGINEERING

SUBSCRIPTION ORDER
for non-members of the Institute of Hospital Engineering wishing to subscribe to the Journal

Please send me one year's supply of Hospital Engineering commencing with the .... issue.

Annual subscription:
£14.50 UK; £17.50 Overseas; $40 Americas

Name ....

Address ....

....

Please make cheques payable to:

Hospital Engineering
17 St. Swithin's Lane
London EC4
Telephone: 01-623 2235

Closing dates

Recruitment advertisers are requested to set closing dates no earlier than three weeks after publication date of the Journal.
Monthly publications do not receive preferential treatment by the Post Office and circulation lists in hospitals also delay receipt of the Journal by many potential applicants.

STRIKE A LIGHT

For matchless illumination of some common steam trap arguments, look no further than two of our technical books.

The latest, our Practical Study 18, reflects a properly growing interest in saving energy in steam systems. Reinforced by independent university test data, it offers seasoned comment on which types of trap do or don't waste energy, and why. Among other things, it shows a simple test rig by which you can make up your own mind.

"Practical Steam Trapping" extends your grasp by suggesting the most suitable types of trap for the commonest applications. It's run through 15 editions with umpteen revisions, helping hundreds of thousands of engineers world-wide towards greater *efficiency, higher production and minimum trouble.*

The authority for both books comes from our 45 years work for steam users and from our design and manufacture of more types of traps than anyone else supplies —though no more than can actually be needed.

These free books will shed light even if you use someone else's traps. *But if they should incidentally cause you to change your buying habits, we* can hardly be held responsibile.

spirax sarco

Please post me ☐ copies of PS 18 about checking and reducing possible energy losses for steam traps and ☐ copies of 'PST.'

Name

Business

Address

HE 478

Spirax Sarco Limited Charlton House, Cheltenham GL53 8ER. Phone (0242) 21361. London: 41 Curzon Street W1Y 7RE. Phone (01) 499 1671