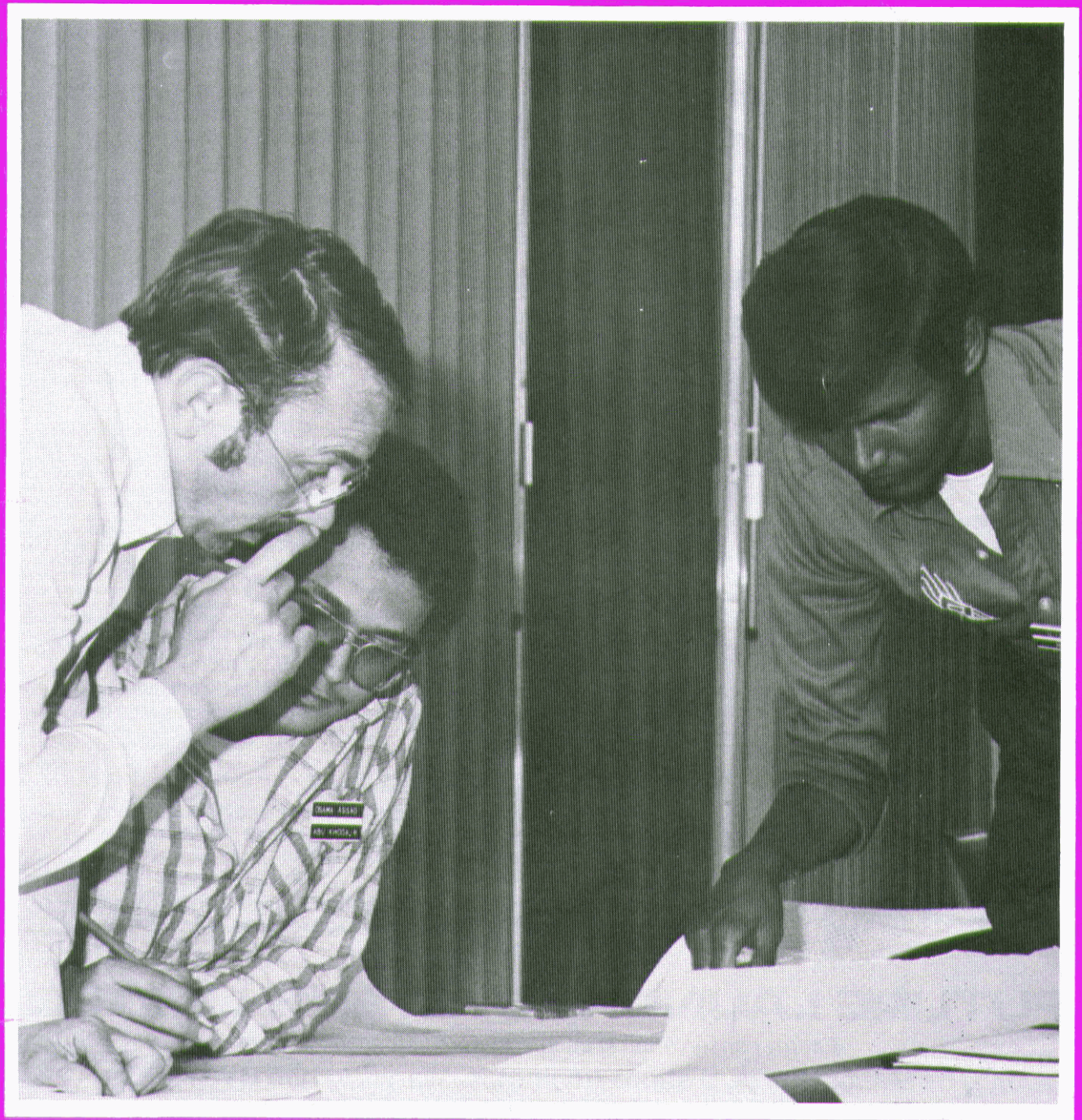
The Journal of the Institute of Hospital Engineering June 1983

HOSPITAL ENGINEERING

International Federation Issue



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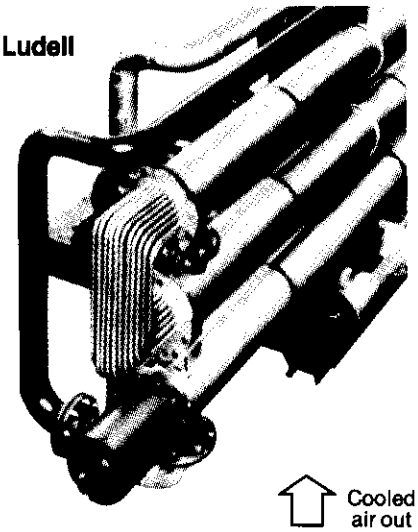

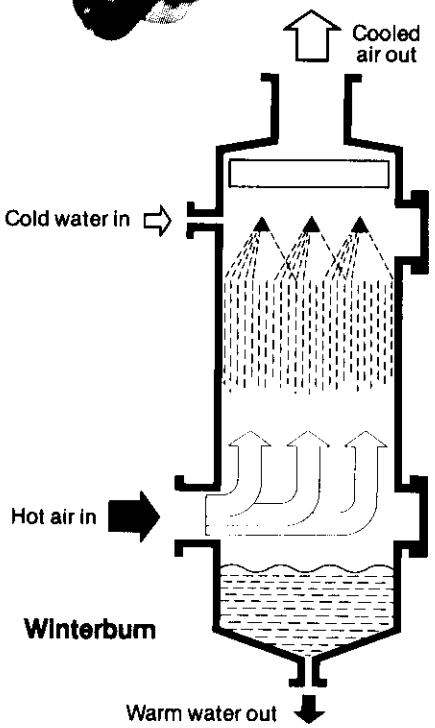

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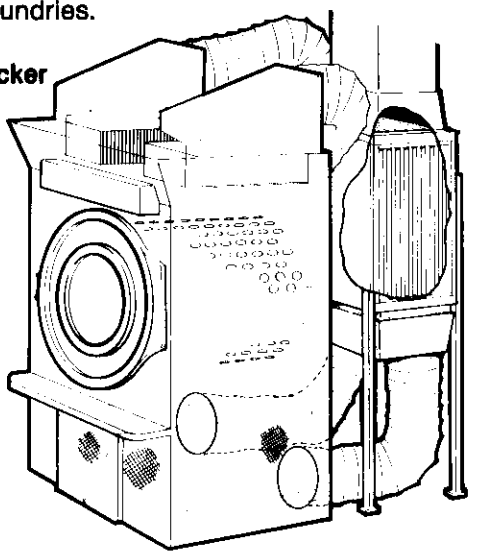

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HOSPITAL ENGINEERING

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

Contents

Volume 37 No. 5 **June 1983**

Front Cover: Students on one of the previous International courses for students from overseas, held at the Hospital Engineering Training Centre at Falfield in Gloucestershire. The development of Management Effectiveness courses over the last 20 years is discussed in the article on pages 12 and 13.

Neither the Institute nor the Publisher is able to take any responsibility for views expressed by contributors. Editorial views are not necessarily shared by the Institute.

Institute News

Report of the Council for 1982

Council, and Council Committees, met on a total of 28 occasions during 1982.

The membership of the Institute increased with 160 new members being elected, whilst 15 members had their category of membership upgraded.

The Institute continued to enjoy its contribution as as Affiliate of the Council of Engineering Institutions and its representations was increased to service on 3 CEI Committees. Representation continued, also, on the separate sections of the Engineers Registration Board. Connectedly, the year saw the coming into being of the Engineering Council and representatives of the Institute attended numerous meetings in this connection. As we go to print, the precise functions of the Engineering Council are still developing although its first Policy Statement has been printed in full in the Institute's Journal. Meanwhile, a close watch is being maintained on the Institute's precise role in the new structure.

Related to the Institute's Affiliate membership of CEI, the latter announced that existing Chartered Engineers would be permitted to add the name of an Affiliated Institution to the CEng register, as an addition to the original sponsoring body and to date some 150 members have chosen to add "The Institute of Hospital Engineering" against their names in the Register in this way.

The Lucas Scholarship Fund having been established, the first two Awards thereunder were made which permitted two young members of the Institute to attend the Annual Conference, expenses paid and this innovation will be repeated in 1983.

The Northcroft Silver Medal Award for 1982 is made to R. R. Morgan for his Paper entitled "Mobile Radio Communications" which appeared in the November issue of *Hospital Engineering*. The presentation of the Silver Medal was made to Mr Morgan at the 1983 Annual Conference Dinner. *(Continued on p. 3)*

One-day Symposium — Wednesday 6th July 1983

"HOSPITAL LIGHTING"

The Institute of Marine Engineers
Conference Centre, 76 Mark Lane, London EC3

Since hospital lighting standards were recommended in 1968 there have been important developments in light sources, equipment, lighting techniques, approaches to building design and legislation. This Symposium is arranged to help architects and engineers, engaged in design, upgrading and maintenance of hospitals, understand the changes and their effect on lighting design, operating costs and patient care. The speakers have been actively engaged in these developments for a number of years.

PROGRAMME

10.00 Coffee

10.31 OFFICIAL OPENING by L. G. HADLEY Esq. CEng, FIMechE, FInstE FCIBS MConsE FIHospE President, The Institute of Hospital Engineering
CHAIRMAN for the day:
PETER T. STONE Esq BSc ABPsS FCIBS
Reader in Vision and Lighting, Department of Human Sciences Loughborough University

10.35 INTRODUCTION TO THE CIBS GUIDE
Speaker: P. A. LOVETT Esq. MCIBS
Department of Health and Social Security
Member of the CIBS Panel

11.15 NATURAL LIGHTING IN HOSPITAL DESIGN
Speaker: G. G. MAYERS Esq Dip Arch (UCL) RIBA
Superintending Architect
Department of Health and Social Security

12.00 COLOUR DISCRIMINATION
Speaker: DR. D. A. PALMER DSc FInstP
Senior Lecturer
Institute of Opthalmology

12.45 Lunch

14.15 RECENT DEVELOPMENTS IN LUMINAIRE DESIGN
Speaker: G. DANIELS Esq MCIBS
Technical Manager
Moorlite Electrical Ltd
Member of CIBS Technical Committee

15.00 PRACTICAL APPROACH TO HOSPITAL LIGHTING DESIGN
Speaker: G. DANIELS Esq MCIBS
Technical Manager
Moorlite Electrical Ltd
Member of CIBS Technical Committee

15.45 OPEN FORUM

16.30 Close

Reduced Rate Rail Fares and Hotel Accommodation — Substantial rail fare reductions available for delegates attending this Symposium.
The following are examples of second class fares to London (for first class add 50%) Grampian Region — £49; Glamorgan — £19; Cornwall — £30; Oxfordshire — £7.
Forum Hotels in London are prepared to offer delegates a reduction on their normal rates. Application forms to obtain these reductions may be obtained only from The Institute of Hospital Engineering.

N.B. Please note that tickets are available ONLY from The Institute of Hospital Engineering (Tel. Portsmouth (0705) 823186)

To: The Secretary, The Institute of Hospital Engineering, 20 Landport Terrace, Southsea, PO1 2RG.

Please send to me ..... ticket(s) for the ONE DAY SYMPOSIUM entitled "Hospital Lighting" to be held on Wednesday 6th July 1983.

I enclose £ ..... to cover cost at £40.25 (including VAT of £5.25) (includes morning coffee and lunch). No fees will be returned for cancellations (in writing please) received after midday on Thursday 30th June 1983. VAT Registration No. 339 3963 20.

NAME (in capitals please) .....

ADDRESS.....

.....

Position.....

Report of the Council (continued)

The 1982 Annual Conference was held at the Hilton International, Stratford-upon-Avon and attracted a very good attendance. Once again a separate Ladies programme was arranged and was well received and Council wishes to acknowledge its indebtedness to members of the Midlands Branch in this connection, particularly, and, indeed, for the outstanding support the Branch gave to the Conference as a whole.

Three One-day Symposia were held during the year, when new venues were tried, including the Barbican and Kensington Town Hall. Once again, these events were fully supported, indeed attendance being oversubscribed.

The Institute continued to be a member of, and have representation on Council of, the International Federation of Hospital Engineering. In fact, as well as representation on Council, a member of the Institute is Honorary Treasurer of IFHE and two other members have accepted invitations to be Honorary Auditors for the Accounts of the Federation.

The International Federation continues to grow to the extent that it held it necessary during the year to revise its Statute and the Standing Orders governing its modus operandi.

The Institute was delighted to be invited by IFHE to organise and hold the Second International Seminar for Senior Hospital Engineers and this was staged at the Hospital Estate Management and Engineering Centre at Falfield from 18th April - 7th May.

It is entirely appropriate, here, to record the very considerable contribution made to the International Seminar by the Works Group, DHSS and, for that matter, to this Institute's own Annual Conference and One-day Symposia and Council wishes to record its deep appreciation in these respects.

The Institute's Scottish Branches held a successful Joint Conference in Glasgow in the late autumn to which, again, DHSS contributed a substantial "in-put".

The Institute Library continues to function and the new Honorary Librarian, D. L. Hall, has already made a marked contribution. Mr Hall is in discussion with Council over the developing "Library Service" and its most beneficial role for members, and other, in the future.

In peripheral activities, the Institute's opinion continued to be sought in various quarters. Representation is maintained on certain BSI Committees and on the Watt Committee on Energy whereon the Institute's voice is heard to increasing effect.

Towards the end of the year Council determined that because of the Institute's continual growing strength, and volume of activities, it had become essential to register for the purposes of Value Added Tax. Such registration took effect as from 1st January, 1983. As the Institute is an Educational Charity VAT registration WILL NOT EFFECT ANNUAL SUBSCRIPTION RATES, but inevitably, it MUST affect fees charged for Conferences, Seminars, Symposia and like events.

Council is confident that members will share the view that the year was one of further progress.

Valediction

A farewell article from John Constable, CBE, the retiring President of the Institute.

How very quickly the last two years have passed, and what a good discipline it is to look back and see what has been achieved during that time. In 1981 at the start of my period in office the major event which lay ahead without doubt was the restructuring of the NHS itself. Most Health Authorities have by now appointed their chief officers and determined the main outlines of their structures for management, some have yet to determine the precise division of functions between District and Units and an unfortunate few have yet to fill their Chief Works Officer post. The diversity of structure will be unfamiliar to a service which has been steadily working towards national solutions for more than thirty years. I hope that the considerable benefits of centralisation eg. national standards, will not be lost in the search for the benefits of de-centralisation.

The other restructuring which lay ahead was that of the engineering profession itself as a consequence of

the Finneston Report. As I write the Engineering Council is in existence, the sub-structure of its five Groups is slowly emerging. Although the time scale for the effects of these changes is more long term than that of the restructuring of the NHS, it will eventually affect engineers in the Service just as greatly.

Council's principle concern has been to ensure that the specialist interests of the Institute, and particularly those of the non-chartered engineers, were adequately safeguarded in the new structures of the Engineering Council and its Groups.

Within the Institute itself there has been a steady expansion of membership and of activities. It is pleasant to report that despite the obvious difficulties of the present times, our membership has broken the two thousand barrier for the first time. Branches are undertaking more visits and lectures, and at national level, more symposia are to be held to meet the demands.

So much for the past — what about the future? Probably the major problem for the Institute is whether its role should remain broadly the same with efforts concentrated on improvement or whether the role should expand to fill either a wider view of the functions of a professional institution or expand to meet the full needs of the NHS Works Service. Although there is some sadness as I come to the end of my period of office there is satisfaction in passing to Laurie Hadley, as incoming President, an Institute which has not only overcome potential difficulties but in difficult times has made positive progress. I wish the Institute continuing success, and may each member gain satisfaction from his efforts, for that will also be good for the Service and for the Nation.

London Branch AGM

The London Branch AGM took place on the 22nd March and was followed by a presentation and discussion about the new HVCA handbook DW 142 covering all aspects of duct work specification and construction. We were fortunate in having John Gardener, the Chairman of the Committee responsible for the production of the document, also Ken Eatwell, who was a member of the Drafting Committee. The discussion dealt with many aspects of duct work design and installation also the problems of its integration into a complete air carrying and conditioning system.

It is hoped that the presenters will prepare a paper on the subject for publication in the Journal.

North Western Branch

The Branch Annual General Meeting was held on Tuesday 22nd March, 1983, at Bolton Medical Institute with an attendance of 39. After the AGM a paper was given by Mr D. Forrest, Principal Assistant Engineer with NWRHA, on the Regional Monitoring System for Sterilizers. Mr Forrest's talk was well presented and illustrated and proved to be both informative and enjoyable.

The final meeting of the Branch session took place on Thursday 14th April with a visit to the new Greater Manchester Police Headquarters. This proved to be extremely interesting, as the building houses the computerised telephone switching system which is the focal point of the police communications network in the Greater Manchester area. Members were also shown the building services plant room and the purpose built radio and telephone communications vehicle which is designed for use with major police operations, disasters etc,. The programme for the evening was very well organised and presented by the Communications Officer Inspector G. Winnard who was ably assisted by Sergeant K. Blackey.

Midlands Branch AGM

The Annual General Meeting of the Midlands Branch was held at Aston University, Birmingham on Tuesday 22nd March, 1983.

On behalf of Council, Mr. John Constable, President of the Institute, presented Mr R. G. Smith, retired member, with an Illuminated Address for his services to the Insitute over many years and especially for his work in setting up the Institute Library. Mr. Constable, on behalf of the Midlands Branch, wished Mr Smith many years' happy retirement. Colleagues from CIBS joined the meeting for the Paper following, which was given by Mr G D Braham CEng, MInstE, MInstR, MCIBS, MBIM, of the Electricity Council.

The whole evening was kindly arranged by the Midlands Electricity Board.

West of Scotland Officers 1983/4

Chairman: B. D. Edgar Esq.
Hon. Treasurer: A. C. MacFadyen Esq.
Hon. Secretary: R.W Gardner Esq. 1 Stanmore Crescent, Lanark.

Engineering Council

Council is delighted to announce that the Institute of Hospital Engineering has achieved a direct voice and representation within the administrative structure of the Engineering Council.

As a result Malcolm Brooke, District Works Officer, Great Yarmouth and Waveney Health Authority and member of Council of

Forthcoming Branch Meetings

Southern Branch *Hon Sec: R. P. Boyce Chichester (0243) 781411*

13th July	Use of Microprocessors in Sterilizers	Royal County Hospital Winchester

East Anglian Branch *Hon Sec: M. Brooke Great Yarmouth (0493) 50411*

23rd July	Telephone Call Monitoring Systems	District Hospital Great Yarmouth

6 Branch Meeting

Saturday 18th June, National Hospital, Queen Square, London WC1.

Those wishing to attend any of the above meetings please contact the relevant Hon. Branch Secretary.

the Institute has been nominated to become a member of the Engineering Council's Board for Engineers Registrations which for all time will set the standards, academic and otherwise, that will be required for registration at all three levels of Chartered Engineer, Technician Engineer and Engineering Technician.

As a consequence Malcolm Brooke will also serve on the Engineering Council Group 2 Executive Committee.

International Federation News

IFHE President visits UK

Mr C. Sonius, President of IFHE, and Mrs Sonius from the Netherlands attended the UK Conference in Manchester on 11th to 13 May. It is 40 years since the United Kingdom Institute of Hospital Engineering was set up and to mark this occasion Mr Sonius, on behalf of IFHE, presented the Institute with an embossed binder in which to keep the future minutes of Annual General Meetings.

French Association Study Day

ANIEHP, the French Hospital Engineering Association is to hold a series of study days and General Assembly in Paris on the 12th–15th December 1983.

The final programme has not yet been decided but it is expected to cover hygiene, hospital architecture, the use of automatic transport in hospitals, hospital records information and communication systems and the planning of equipment.

The General Assembly of the ANIEHP and the National Congress of the French Hospital Association will also take place. Both organisations will hold a Gala evening, the ANIEHP on the Tuesday, and the FHF on Wednesday 14th.

Journées d'Etudes de la ANIEHP

Les prochaines Journées d'Etudes se tiendront à Paris du 12 au 15 Décembre 1983.

Le programme définitif n'est pas encore arrêté mais le thème comprendra l'inaugaration FHF, l'Hygiène, la Planification des Equipment l'Assembleé Générale ANIEHP, l'Information Automatiques a l'Hôpital, les Statistiques Hôspitaliers et l'Architecture Hospitalière.

Il y aura, en plus, deux soirées de Gala celle de la FHF se tiendra le Mardi soir, celle de la ANIEHP, la soirée suivante.

Fifth Meeting of AEDIAH

Theme: To plan, programme, protect, build, operate and maintain with minimum cost.

Date: 6 & 7 May 1983, in Barcelona.

The theme will be developed in three parts:

Session 1: Day: 6th (morning)
To plan and programme with minimum cost.

Session 2: Day: 6th afternoon)
To protect and build with minimum cost.

Session 3: Day: 7th (morning)
To operate and maintain with minimum cost.

Each panel has four lecturers, including Eduardo Caetano and Bruno Massara, both members of IFHE's Council.

Besides the three sessions, an Inaugural Conference *'In-house training in hospitals'*, and a Closing Conference 'The Hospital of the Future', chaired by the General Secretary of the IFHE, Mr Joâo Lopes-Galvao.

An account of the fifth Annual Meeting will be published.

V Reunion Anual de AEDIAH

Tema: Planificar, Programar, Proyectar, Construir, Funcionar, Mantener a coste mínimo.

Días: 6 y 7 de Mayo de 1983, en Barcelona.

Se desarrollará en tres paneles:

Sesion 1. Día 6 por la mañana
Planificar y Programar a coste mínimo.

Sesion 2. Día 6 por la tarde
Proyectar y Construir a coste mínimo.

Sesion 3. Día 7 por la mañana
Funcionar y Mantener a coste mínimo.

Cada panel tiene 4 conferenciantes, entre ellos los miembros del Consejo de IFHE, Sres. Eduardo Caetano y Bruno Massara.

Además de los tres paneles, habrá una conferencia inagural *"Heurística Hospitalaria"*, y una de clausura "El Hospital del Futuro", a cargo del Secretario General de IFHE, D. Joâo Lopes-Galvao.

Se editará el "libro de la V Reunión Anual".

Portuguese Association Symposium

APEH, the Portuguese Association of Hospital Engineering is to hold a symposium in conjunction with the IFHE on the 27th and 28th October, 1983.

The aim of the symposium is to 'foster exchanges between hospital engineering technicians' and is open to members of APEH and members of all Associations affiliated to the IFHE.

The theme is 'Safety in Hospitals' and covers such topics as architecture, fire hazards, the use of electricity and the safe use of equipment.

There is no registration fee for the symposium, however, there is a limit of 150 on the number of participants.

Further information is available from APEH, Avenida Miguel Bombarda, 133-5°B, 1000 Lisboa, Portugal. Tel: 010-351.1.545947.

Narrow Escapes from Australian Bush Fires

On hearing the news of the catastrophic bush fires that had hit South Australia Joâo Galvao, General Secretary of the IFHE, wrote to Mr Don Reed, Federal President of the Institute of Hospital Engineers (Australia) on behalf of the IFHE to express the concern of hospital engineers throughout the world.

Mr Reed's reply was reassuring. 'It was very fortunate that none of our Institute Colleagues have been directly affected by the bush fires, although it came very close in at least two incidences. One was Fred Green, where they dropped fire bombs to assist in burning back on the fire, the other was Chris Ford of South Australia, where the fire was within four kilometres of his home, then it turned in the other direction with a change of wind.'

This article was first presented as a paper at the 2nd International Seminar for Senior Hospital Engineers on Appropriate Technology.

The Author is Regional Works Officer with the South West Thames RHA and Treasurer of the IFHE.

Health Care Design

The Role of Works Staff

B A HERMON CBE CEng

The Organisation in England

There are 192 District Health Authorities accountable to the Secretary of State for Health and Social Security through 14 Regional Health Authorities. The District Authorities have a large amount of autonomy, but the Regional Authorities are expected to agree the District strategic plans and annual programmes, and monitor their achievement. Whilst there are two fairly distinctive roles at the two levels, there is a monitoring link between them which is reflected in the role of the Works staff at Regional level.

Works Staff at Region

The staffing arrangements vary in detail between Regions but the professions and specialists employed are similar. Every RHA has a Regional Works Officer, Regional Architect, Regional Engineer and Regional Quantity Surveyor. The number of staff below this level varies quite widely but in my Region, which is probably average, we have architectural staff, engineering staff and quantity surveying staff. *(See Figure One).*

Sommaire en Français

Le Rôle du Personnel chargé des Travaux au Niveau Régional Communication présentée par B. A. Hermon, CBE CEng

Cette communication a été présentée pour la première fois lors du Second Séminaire International pour Ingénieurs Hospitaliers des Grades Supérieurs.

Dans cette communication, Monsieur Hermon analyse le rôle du personnel régional chargé des travaux en Angleterre. Sur le plan du contrôle, ce personnel constitue le trait d'union entre les 192 Autorités Locales de la Santé et les 14 Autorités Régionales de la Santé par l'intermédiaire desquelles il rend compte au Ministre d'Etat chargé de la Santé Publique.

Si les dispositions prévues en matière d'effectifs varient selon les différentes régions, les spécialités et les professions représentées sont partout les mêmes. Chaque autorité régionale de la santé emploie un responsable régional des travaux, un architecte régional, un ingénieur régional des travaux, un architecte régional, un ingénieur régional et un métreur-vérificateur régional, ainsi qu'un personnel auxilaiaire dont les effectifs varient selon le cas.

Au niveau régional, les travaux se divisent en 5 fonctions principales:

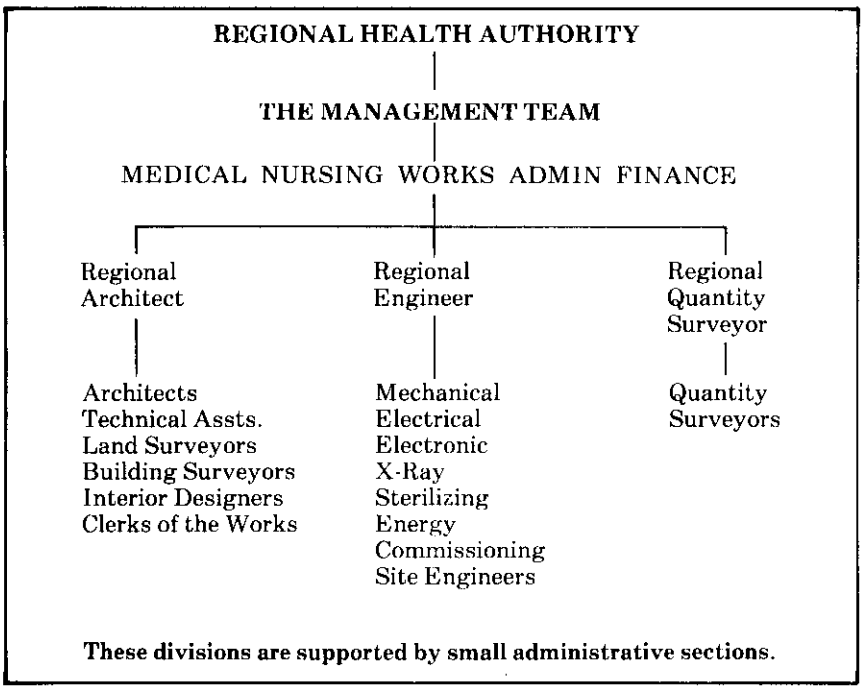
1. Travaux d'investissements — Ces travaux se décomposent de la manière suivante: planification et programmation de futurs travaux éventuels, et étude et supervision de tous les aspects des contrats.
2. Service de consultation pour la détermination des politiques à adopter et l'évaluation des choix disponibles en matière de soins.
3. Analyses et conseils relatifs aux options susceptibels de permettre de suppléer aux carences du service de la santé ainsi que coordination des plans locaux et contrôle de l'utilisation optimale du domaine.
4. Mise à disposition de spécialistes en mesure de fournir des conseils sur la conception, d'étudier de nouvelles techniques et de formuler des directives concernant leur mise au point, dans le cas où l'autorité régionale n'est pas en mesure de fournir ces services.
5. Contrôle de projets d'investissements spécifiques délégués, ainsi que du niveau général et du rapport coût/efficacité des travau d'investissements dans leur ensemble.

Ces fonctions se divisent en deux grandes catégories:

1. Fonctions non associées à la conception.
2. Conception directe et supervision de l'exécution des contrats. Ces activités nécessitent l'emploi d'un personnel directement chargé de la conception, lequel n'est pas normalement prévu au niveau local dans des domaines tels que: programmation des investissements, services de consultation, architecture, aménagements internes, arpentage des terrains et propriétés, expertise de bâtiments, métrage, certains aspects de l'électronique, conservation de l'énergie, ingénierie des transports mise en service technique, études de hautes tensions et supervision des contrats.

Presque tous les fonds consacrés aux travaux d'investissements sont octroyés par le Gouvernement aux Autorités Régionales de la Santé. Celles-ci définissent leurs propres programmes d'investissements, les projets d'une valeur supérieure à 5 millions de livres sterling étant soumis à l'approbation du Ministére de la Santé Publique; pour les études de projets, elles font souvent appel à des entreprises privées qui agissent toujours selon les instructions et sous le contrôle de l'Autorité Régionale; cette Autorité se charge également d'aviser les concepteurs des exigences juridiques et des régles de l'art à observer.

La dernière partie de la communication traite sommairement de la formation et du recrutement du personnel.



The Functions of the Works Department

The main Works functions at Region are:

a) Capital Works — Direct design work on a substantial proportion of all buildings and engineering work required by the Authority and by Districts, and liaison with professional consultants on the remainder.

b) input to health care policies

c) input to planning

d) providing advisory services to Regions and Districts on all environmental matters

e) monitoring the cost and standards of Works functions carried out at Districts.

Capital Works

This can be separated into two broad functions:

The planning programme activities required to determine what work shall be done, when it should be done and how. These activities are closely linked with other managerial and advisory functions to be described later.

The design and supervision of contracts which entails early discussions with the client groups to establish the requirements, making feasibility studies, determining the general approach to layout, design and construction and preparing full designs, working drawings, and bills of quantities on which tenders are based and from which the contractor can execute the contract. The designers also ensure that the contractors are supplied with all relevant information and deal with technical queries as they arise; they are also responsible for seeing that the work is completed and the engineering services tested and commissioned ready for handover to the DHAs for them to put into operation.

Input to Health Care Policies

Much of the work required for the Authority to determine policies and possibilities for health care require a considerable input from Works professionals to varying degrees, and covers such aspects as location, environmental conditions and operational aspects.

Input to Planning

The strategic plans should identify the deficiencies in the health-care service and the input from Works staff to this activity is minimal, but as soon as service plans are drawn up, to overcome the deficiencies, there is a need to consider the way in which resources are best provided and an input from Works staff is essential in terms of analysing and advising on the available options.

Works staff at the Districts need to produce a strategic plan which shows how the estate is to be used, maintained, contracted or developed over the planning period. The staff at Region are expected to coordinate the District plans and ensure that the best use is being made of the estate.

Advice and Development

The RHA needs to employ specialists who can provide valuable input to design as well as research new techniques, and to lay down guidelines for their development. DHAs cannot provide this service and need to look to Region for advice in such functions as architectural, engineering and quantity surveying services in general, medical engineering, transport engineering, fuel technology, interior design, landscape architecture and land and property transactions, in support of their function to operate and maintain the plant, services, buildings and grounds and to execute minor capital works.

Advice falls into two main categories:

i) Capital Works

ii) Operation and maintenance of plant and engineering services and maintenance of buildings and grounds.

Monitoring

Works staff are engaged in monitoring specific delegated capital schemes and the general standard and value for money of capital works generally. They are also responsible for monitoring the standard and cost of maintenance, energy consumption and the effectiveness of estate management generally.

Division of Functions

The functions can therefore be collected under two broad headings,

non-design functions and

direct design, and supervision of contracts.

Non-Design Functions Introduction

The non-design functions are an essential part of the responsibilities of the RHA. If direct-design staff were not employed, the RHA would still require Works staff to perform these functions and it is likely that even

more staff time would have to be devoted to it because, at present, some of these functions are carried out during the design process on both regional and delegated schemes.

Input to Health Care Policies

An inherent part of Works professional training is the provision and control of an environment in which conditions will be conducive to good health. These skills are seldom exploited to the full at present because capital investment has to be kept to a minimum (often to the detriment of future maintenance requirements), many essential and attractive elements like landscaping have to be kept to a minimum and it is difficult to look to improved standards in other ways e.g. the provision of clean air through air-conditioning, except where it is very essential, or the reduction of noise transmission from inside and outside buildings. Nevertheless, professional advice is sought on many aspects of environmental matters affecting health care.

Input to Planning

The term "Planning" here is related to the planning of the health & safety and the broad planning of the capital programme arising from the service plans. It is with the latter that Works staff are mainly concerned.

Works staff need to determine how best to satisfy the health care need; they examine existing building stock and engineering plant and services to see whether they can be adapted or whether it is necessary to provide new buildings and services. The siting of proposed developments and the economic use of land and property are also fully considered.

Any proposals to develop buildings and/or sites are considered in the light of legislation and local planning requirements governing location, transport policies, parking, height and mass of structures, clean air, noise etc. Consideration is also given to the effect that the external environment is likely to have on the siting of a hospital e.g. pollution from factories or other process plants and noise from aircraft or main traffic flow.

All the above planning considerations are usually undertaken by quite senior professional architects, engineers and land and quantity surveyors, in addition to their activity on direct design.

Capital Programming

When the capital programme is being drawn up or revised, Works staff feed in the estimated cost of new schemes, their forecast planning and design time, their start dates and the spread of expenditure. For schemes in progress, they estimate the carry-over commitment from the previous year and the probable rate of progress throughout the programmed year. These tasks have become more difficult with the introduction of cash limits, as the likely expenditure of claim settlements and the effect of price increases on fluctuating price contracts now have to be included.

Advisory Services

Because the design process involves an input from a variety of people with special professional skills and to varying degrees, and because the DHAs need to draw on this knowledge, the employment of certain Works specialists can be justified at Region. These skills and the service they give are outlined in the following paragraphs:

Architecture

Apart from the part they play in planning, programming and direct design activity at Region, the architects are called upon to advise the DHAs on many aspects of their proposals and to give general and specialist advice. In many cases they produce feasibility studies for the DHAs to decide whether to proceed with schemes and on what basis.

Interior Design

Professional interior design has developed considerably over the last two decades and interior designers are now accepted in the NHS as vital members of the design team. Apart from their direct design activity they provide essential advice in all contract work including close coordination with the Supplies Department on the choice and purchase of furniture and fittings. The DHAs, when undertaking their minor capital upgradings or redecorating programmes, need to draw on this advice but each DHA could not justify the full-time employment of professional interior designers.

Although DHAs have sought advice from the RHA interior designers and have asked for schemes to be produced, they have carried out numerous other upgrading, redecoration, and refurnishing schemes many more of which would have benefited from such expert advice. As more and more rehabilitation work is carried out, as comparisons are made between redecorations and schemes in new buildings and because existing buildings will have to remain in service for some considerable time, there may well be an increase in the demand on the services of the interior designers by the DHAs.

Land and Estate Surveying

This is an activity which is an essential pre-requisite to the siting and design of buildings. It is also necessary to call upon the services of estate surveyors whenever consideration is being given to the purchase or sale of land and property. The DHAs could not justify the full-time employment of land surveyors and they therefore call upon the staff at Region when they require help to obtain land survey information.

Building Surveying

Building Surveyors are a very important component of the Works organisation because of the breadth of their operations. They are not only specialists in assessing the condition and value of buildings but they also produce schemes and specifications for builders work content of schemes in which the replacement of engineering services would be the major element. They are also trained specifically to interpret building regulations and to keep pace with their change.

The Building Surveyors are often called upon at short notice to survey property which the RHA and DHAs are interested in purchasing, and the decision as to whether the Authorities shall purchase will depend largely on their report.

Quantity Surveying

The scope of work expected from quality surveyors goes far wider than preparing bills of quantities for projects. They are experts in building economics, cost analysis and cost control and have a major part to play in monitoring the cost of all works undertaken in the Region to ensure that cost limits are being adhered to and that value for money is being obtained. DHAs often call upon the

services of the quantity surveyors to prepare estimates of costs or to comment on estimates prepared by others.

Service functions can be met by any number of building solutions, e.g. altering an existing building or constructing new premises which in turn may be of different sizes, shapes or siting. The Quantity Surveyor's ability to value the available options and to suggest alternatives, allows the Authority to make the choice on cost effective grounds and provides a record of the reasons to justify that choice.

Quantity Surveyors are also experts in contract matters and are a key profession when negotiations take place with contractors, arising from contractural disputes. Even when firms of consultants are employed, they look to the RHAs quantity surveyors for guidance on how far the RHA would wish to go in pressing for improvements in claim settlements or whether a matter should be allowed to go to arbitration. These are always delicate negotiations which must be handled by experienced people. There are also matters of procedure in difficult situations (such as bankruptcy of a contractor) when the guidance of an experienced Quantity Surveyor can avoid the unnecessary extension of liability by the Authority.

Electronic Engineering

The use of electronics in engineering services, plant and equipment has expanded significantly over the last ten to fifteen years and it has become important for the Region to have continuously available well qualified advice backed up by experience. Whilst the DHA's can justify the employment of electronic technicians to undertake the maintenance of services and equipment they seldom justify employing a Chartered Electronics Engineer. This engineer builds up a valuable liaison with the scientific service and manufacturers of electronic controls, communication equipment and medical electronic equipment.

Energy Conservation

The need to conserve energy is accepted worldwide as also is the need to make the best use of scarce manpower skilled in energy technology. Whilst the Districts should have technicians to identify and execute energy saving schemes they will usually need the back-up of a skilled professional at the RHA. There is still a lot of work to be done for many years to come. Savings will become increasingly more difficult to achieve because of the need to replace old plant and equipment and to fit more sophisticated controls for which expert advice will be necessary.

Transport Engineering

In this country the health authorities are responsible for the ambulance services. When the number of ambulances is added to other transport in hospitals and cars used by nurses visiting patients in their homes, the total number of vehicles is quite large. The London Ambulance Service alone has over 1,000 ambulances.

The organisation of maintenance, preparing specifications for the purchase of vehicles and inspecting special vehicles during manufacture are activities which benefit from expert advice which is best employed at the RHAs.

Engineering Commissioning

With the capital investment in engineering plant and services now averaging around 40% of the total estate and with the rapid increase in energy costs over the last few years, greater empahsis is being placed on ensuring that new services, plant, equipment and controls do perform according to specification and are properly regulated to operate at peak efficiency; this is known as engineering commissioning.

Maintenance staff are continuously stressing the importance of the information flowing out of engineering commissioning to help them with their task of maintaining both condition and performance of the services.

Engineering commissioning must be backed up by quite expensive test equipment and instrumentation. DHAs cannot justify being equipped to deal with the full range of engineering services — they call for assistance from Region from time to time.

High Voltage Engineering

Most large hospital sites in this country are now supplied from the electricity grid at 11,000 volts which is run to one or more sub-stations to reduce the voltage. This arrangement requires a complex system of switching which is very safe providing the switching operation is carried out by competent engineers/technicians who are backed up by professional advice.

Hospital Technical Memorandum No. 21, issued by the DHSS in 1970, recommended a "Permit to Work" system which required "Authorised Persons" to be appointed at DHAs and an "Authorising Engineer" to be appointed at Region. The Authorising Engineer should be a Chartered Electrical Engineer and his role is to ensure that Authorised Persons are properly trained, competent and properly instructed about the particular system; he also checks that the switching stations are properly equipped and the permit to work system has been set up.

Contract Supervisors

All contracts for the construction of buildings and the installation of engineering services are supervised by clerks of works and site engineers employed by the RHA. It is their job to see that the contractors provide the quantity and quality of work specified in the contract documents.

The Design Function

Almost all the money spent on capital works is allocated to Regional Health Authorities from Government funds. The allocation to the Authorities in England for the financial year 1981/2 £505m. The individual allocations vary from £19m to £64.4m.

Each Region determines its own capital programme but the programme for major projects is submitted to the DHSS who have to approve projects over £5m.

The design of projects carried out either by the RHA's own staff or by private firms of consultants. The proportion varies but usually over 50% of the programme will be executed by private firms.

When private firms are employed they are briefed and monitored by RHA Works staff who are experienced at questioning excessive demands and therefore refining the brief to reduce the amount of unnecessary work with which private firms are often faced when they are briefed directly by the users.

The practice followed by RHAs on projects from inception to completion and occupation is as follows:

The Project Team

Project teams usually consisting of a medical officer, nursing officer, architect, engineer, quantity surveyor and an administrator will be responsible for carrying projects forward from the brief provided by the RTO through the procedural stages and in particular for seeing that the plan for work derived from a comprehensive management control plan is executed within the timing and cost intended.

Stages — Conception to Evaluation

Building projects should be taken from conception to evaluation in a series of inter-connected stages:

Stage 1 — Outline project intentions
Stage 2 — Planning — project and first scheme
Stage 3 — Design — scheme only
Stage 4 — Contract and Construction
Stage 5 — Commissioning
Stage 6 — Evaluation.

These are given in more detail in Appendix 1.

Design Standards

Designers have to keep in mind a number of different Central Government laws and local council by-laws. There is the Health & Safety at Work Etc. Act, the Fire Precautions Act and other related legislation. There are British Standards Institution codes of practice and other guides to good practice issued by the professional Institutions and research organisations. The DHSS issues Hospital Building Notes which give guidances on the ocntent of hospital departments and Hospital Technical Memoranda which give technical advice on a number of specialist building and engineering matters.

Research and Development

Whilst some RHA do a little research into design and building methods most research and development is arranged by the DHSS but controlled by a committee which has health authority senior staff on it together with DHSS officers and others. Research projects are undertaken by research establishments, universities, consulting architects, engineers and surveyors and Works staff from the DHSS, Regions and the Districts. This work has led to the issue of much of the guidance material referred to above and to development such as the Nucleus Hospital.

Training

RHAs recruit their designers from schools, universities and private practice and other public authorities. Young people beginning a career will be sent to schools of engineering or university whilst architectural students are usually taken into an RHA office for design experience during their academic studies.

Post-graduate training and updating is carried out by attending short courses and conferences organised by a number of institutions and private firms but the courses which are perhaps most beneficial are those organised here at the Hospital Estate Management and Engineering Centre.

Appendix 1 — Summary of Stages:- Planning

Stage 1: Outline Project Intentions

		Additionally — for schemes selected for DHSS approval to Stage 1:
1A	*Relationship to Area and Regional Strategy* (HBPN 2). Preparation of outline project policy	in consultation with DHSS (RPD).
1B	*Briefing of Project Team*	
1C	*Outline Management Control Plan* for whole project	
1D	*Assessment of Functional Content* (HBPN 3)	in consultation with DHSS (RPD)
1E	*Site Appraisals*	in discussion with DHSS (HB)
1F	*Cost and Phasing* (HBPN) Preliminary costing, using Departmental Cost Guide for whole project, based on anticipated phasing. On-costs to take account, where practicable, of site conditions and expected phasing costs. Consideration of contracting procedure Estimation of revenue costs (where possible with anticipated extra costs of particular phasing or, for example, deep planning)	
1G	*Approval*	(i) submission of outcome of Stages 1C — 1F to DHSS (RPD) (ii) formal meeting with DHSS (if necessary) (iii) approval by DHSS (RPD)

Stage 2: Planning — Project and First Scheme

		Additionally — for schemes selected for DHSS approval to Stage 2:
2A	*Management Control Plan* Firm up project summary plan produced at Stage 1C. Subsidiary plan for first scheme up to start on site. Bar charts or network diagrams for following schemes (if any)	
2B	*Site Selection* if not already made	in discussion with DHSS (HB)
2C	*Planning Policies* (HBPN 2) Whole hospital; departmental, as necessary to assess areas including additional accommodation and additional engineering.	
2D	*Selection of Building Shape* Prepare preliminary site development plan	
2E	*Development Control Plan* (HBPN 5, DN 5) Based on 2C planning policies, 2D preliminary site development plan, provisional schedules of accommodation and preliminary sketches of major space-consuming departments for first scheme	
2F	*Confirmation of Functional Content* *Final* check before client's brief in respect of functional content is frozen	
2G	*Budget Cost* (HBPN 6) Up to date assessment of project and final assessment of individual schemes, areas and costs based on information provided by DCP Revenue estimate (first scheme)	
2H	*Selection of Contract Method* EEC Directives 71/305 and 72/277	
2J	*Approval*	(i) submission of outcome of Stages 2A — 2H to DHSS (HB) (ii) formal meeting with DHSS (if necessary) (iii) approval by DHSS (HB)

Stage 3: Design and Cost Planning

(Relevant phase or scheme only)

3A *Notional Cost Plan* Based on an apportionment of the Budget Cost total between blocks of work and broken down into elements.

3A *Detailed Design Brief* Departmental policies (HBPN 2) Schedules of accommodation (BNs and DNs)
Activity and room data. Major group 2 equipment list.
Note: "Client's brief to include information in 3B is now frozen".

3C *Sketch Plans* DNs, room data sketch designs

3D *Equipment Schedules* ENs

3E *Check* that accommodation provided in the design matches the approved client's brief

3F *Detailed Design* Production Material (and cost planning); Engineering Detail (and cost planning); Final MDB schedules; Preparation of OJ notices (when applicable); Bills of Quantities and engineering documentation.

3G *Pre-tender Estimate and Summary Cost Plan* ⌀

3H *Approval* *

3J *Preparation of Tender Documents*

Stage 4: Contract and Construction

NOTE: Tender invitations at commencement of Stage 4 (EEC Directives 71/305 and 72/277)

4A *Contract* Details of tenders and cost analyses ⌀ (HBPN 6)

4B *Construction*

Stage 5: Commissioning

(to start any time after Stage 3E)

Team Appointment and Briefing
MCP including closures or changes of use
Preparation of Revenue Estimate (details to RHA)
Preparation of Operational Handbooks ≠
Fixing of Establishment, Staff Assembly and Training
Preparation of Final Equipment Schedule and Orders
Equipment and Supplies Assembly and Storage
Engineering Commissioning
Cleaning
Opening, Public Relations and Publicity

Stage 6

EVALUATION (of finished scheme some 9 months or so after being brought into use)

≠ sometimes referred to as Commissioning Manuals
* by DHSS for schemes selected for its approval to Stage 3
⌀ submission of information to DHSS.

The July and October Courses in Developing Management Effectiveness to be held at HEMEC Falfield will mark the 21st year of the courses. The authors have been associated with the courses for a number of years.

Developing Management Effectiveness — 20 years on

The Keele/Falfield Courses

J K CLARK FIHospE and J M GOUGH MITD MIPM

During the 20 years of the Keele/Falfield courses there have been continual alterations and amendments to meet the changing conditions in the NHS. Among these changes has been the transfer from Keele University to HEMEC, Falfield in 1976 and the gradual change of the course content from technical to management subjects. The early courses, designed for Engineers at Group Hospital and Assistant level, were altered to provide for Regional Authorities and Consulting Engineers staff. More recently the building professions have been included and now the courses are truly representative of all levels and categories of the Works Organisation.

Sommaire en Français

Stages Keele/Falfield — Amélioration de l'Efficacité des Gestionnaires

Ces stages fonctionnent depuis 21 ans; dans cet article, les auteurs expliquent les raisons de leur succès et de leur popularité.

Le titre — Amélioration de l'Efficacité des Gestionnaires — définit déjà en partie l'objectif des stages, lesquels sont destinés à aider ceux qui y participent à acquérir une plus grande efficacité sur le plan de la gestion. L'accent est mis sur la participation, le temps consacré aux cours théoriques étant réduit au minimum. Parmi les matières traitées figurent la communication, la présentation, le travail de groupe, les relations industrielles, les prises de décision et la préparation de rapports.

Ces stages stimulent l'intérêt et soulèvent l'enthousiasme des participants, lesquels proviennent de divers secteurs de l'Ingénierie Hospitalière. Tous les groupes acceptant les tâches et responsabilités attribuées et participent activement; ils savent qu'ils sont susceptibles de faire des erreurs, mais ils ne craignent pas que leurs fautes soient corrigées devant tous pour encourager les autres. Selon la philosophie qui inspire ces stages, bien que l'enseignement des techniques de la gestion ait sa place, il s'agit surtout de faire appliquer ces techniques dans un milieu pédagogique où aide et conseils sont disponibles, et de rendre les stagiaires conscients de la nécessité de s'en souvenir et de s'en servir dans le milieu du travail.

Deux stages sont prévus au courant de l'année, l'un à l'intention des cadres supérieurs et l'autre à l'intention des cadres moyens.

Toutes les demandes de renseignements concernant ces stages et les propositions de candidats doivent être adressées à: The Principal, Hospital Estate Management and Engineering Centre, Eastwood Park, Falfield, Wotton-under-Edge, Gloucestershire GL12 8DA. (Téléphone: 0454-260207).

The fact that these courses appear to meet a particular need and have proved to be a success can hardly be denied, if only for the reason that they are still in demand after 20 years. Having been involved with these courses for a number of years, it may seem surprising to confess that it has always been difficult to define precisely why they have been such a success, why they are so popular, or what makes them tick.

The answer has always seemed difficult to put into words. Nor is this difficulty confined to the Course Directors and Tutors. Over the years visitors from various disciplines and professions have sampled the courses and while appreciating the obvious spirit and enthusiasm, have been unable to define or quantify their appeal. A few have condemned the courses without being specific and ignored their popularity and continuing success.

The aim of the course is partly defined in the title, 'Developing Management Effectiveness', and the course is designed to help those attending to become more effective in using management skills. To this end, emphasis is placed on participation, coupled with a minimum time spent on formal lectures. The list of subjects include those which any aspiring manager would recognise as being basic to his needs: communication; presentation; group working; industrial relations; decision making and reporting.

The lectures are given mainly by the tutors, who are all experienced managers, with additional input by experts from both within and outside the NHS. The varied exercises provide the opportunity for participating in the practice of management skills.

The course content looks normal and perhaps even over-ambitious if the time available is considered. Many who attend are already well qualified in Management Studies and it would seem as though the courses might be considered basic compared with the subjects they have already studied.

From what has been said the course does not seem very different from many others. Neither does it begin to provide any answers to the basic question 'why are these courses so successful?'. It may be that there is no single answer to the question but rather a series of associated answers which overlap each other in features peculiar to these courses. As the course content seems normal then perhaps the treatment of the subjects and the techniques used could provide some answers.

One possible answer is undoubtedly the spirit and enthusiasm generated by the course members. Most of them are strangers to each other, drawn from various disciplines in the works profession and yet within hours of the course opening the various groups have appointed committees and are hard at work, arranging the various duties and assignments. And this is late on Sunday evening! These groups continue to meet, regardless of time, as long as there is work to be done or decisions to be made. The amount of work done in this fashion is quite remarkable. All groups accept the tasks and responsibilities with enthusiasm and participate knowing that they may make mistakes and yet are willing to have their faults corrected 'for the encouragement of others'. The team spirit becomes very evident at an early stage. Clearly this round-the-clock pace can only be maintained for a given time and usually increases in momentum culminating in the final reporting session on Thursday. This is then largely off-set by the formal Course Dinner on Thursday evening when the course members and tutors relax in the company of the invited guests and perhaps reflect over the achievements of the week. The winding down process is continued on Friday in a discussion forum with invited guests who are successful managers in their own field answering the questions.

Another possible answer must be the skill of the team directors and tutors: a blend of individual character and personality, but all members of a team, determined to make it a success. Their spirit and enthusiasm comes across to the course members and plays a large part in the success. In each course there is a point at which it starts to run almost on it's own. This point varies every time, but is quickly sensed by the directors and tutors who then know where and what guidance is required.

There still remains the difficulty of providing a precise explanation of the success of these courses which has not been fully answered in this article. What can be stated with certainty is that they are successful in their aim which is not so much to teach management skills as to apply those skills in a learning situation where help, advice and encouragement are readily available and to create an awareness that these skills must be developed and applied back on the job.

A measure of this success must be the enthusiasm generated by the course members. It is not unusual to meet individuals long afterwards who are still enthusiastic about the course and still remember their experiences. That such an impression is made on so many must provide yet another answer to the basic question.

The 1983 Courses

The programme for the 1983 courses is now well in hand. The Advanced Course in October is aimed at senior managers and although superficially appears similar to the July Middle Management Course, the handling of subject and the project are appropriate to the much greater experience of the senior management.

It should be stressed that the inclusion of members from all works disciplines is now well established and is of considerable importance, in that Engineers, Architects, Surveyors, etc., can mix and learn from each other, to the benefit of the Service.

Broadly speaking the courses are split into the following categories:

Middle Management Course — K15
10th to 15th July.

Senior Engineers and Senior Building Officers; Engineers and Staff up to and including TA1; Foremen with potential for promotion.

Senior Management Course — K16
16th to 21st October

Senior RHA Works Staff; District Works Officers; Works support staff above Senior Engineer and Senior Building Officer. Others who have previously attended the Middle Management Course.

There is an in-service fee chargeable per course member which is £120 inclusive of food and accommodation for English and Welsh Authorities. The unsubsidised fee applicable to Scotland and Northern Ireland is £240. For those outside the Service the charge is £320.

Enquiries and nominations for the courses should be addressed to the Principal, Hospital Estate Management and Engineering Centre, Eastwood Park, Falfield, Wotton-Under-Edge, Gloucestershire, GL12 8DA. (Telephone: 0454-260207).

This article was first presented as a paper at the 1982 International Federation of Hospital Engineering Congress in Amsterdam.

The author is from Denmark.

Energy saving from very high temperature refuse burning

AAGE OLESEN

In our industrialised society, the combustible content of refuse, in the form of plastics, paper and timber etc., is so high that refuse can be considered a supplementary source of energy, the use of which will result in direct savings for society.

In Denmark the combustible content of domestic refuse is about 2000 Gcal per ton, which is equivalent to one fifth of the content of fuel oil.

Investigations have shown that about 1 ton of refuse will provide about 200 kg fuel oil. Other investigations have shown that about 300 kg refuse will save about 100 litres fuel oil.

The value of burning refuse depends obviously on how much refuse you have, and how you usually get rid of it. When you realise that we calculate at the moment that for each hospital bed there is produced 3–5 kg of refuse per day, that it has always been a problem in the past to get rid of it, and that we know it will burn, then surely you will appreciate that it must be a profitable business for us.

Refuse, however, is a very inconsistent fuel. It varies very much from one load to the next and from season to season. In order to burn it a specially constructed furnace is required, so that the necessary control over the heat generated is provided for. This is also true for the boiler plant.

Hospital Refuse

The amount of refuse accumulated in our hospitals has, for many years, been a source of concern, in that the risks of infection during transporting and storage have been considerable, and we have been unable to control satisfactorily the conditions at the refuse tips.

Incineration in refuse plants has been known for many years, originally as a satisfactory method of refuse disposal. However, the increasing use of plastics and similar materials in hospitals have made many of the old incinerators useless. This is why in 1973 we experimented in our hospital with a new method of incineration where we not only could burn the refuse, but could also remove the resulting gases.

Seasonal variations and extremes in loading

The amount of refuse produced varies very little throughout the year, and the production of heat is relatively constant. This, of course, contracts with the actual need for heat, which varies from season to season, the minimum being required in summer.

Use of the heat produced

The heat produced in refuse incineration can be used for district heating, or for the generation of electricity, or a combination of the two. Where it is possible to use refuse incineration for district heating, this is preferable from an economical and practical point of view, and is the most common solution in Denmark.

It is therefore an advantage to find users who also have a substantial summer requirement for the heat produced, industrial concerns with large plant, swimming pools, cooling absorbtion plants etc., to make sure that the seasonal variations are

Sommaire en Français

Economie d'Energie grâce à la combustion de déchets

Aage Oleson

Dans cet article, l'auteur montre qu'il est possible de réaliser une économie d'énergie considérable grâce à la combustion des déchets provenant des hôpitaux.

Des études ont montré que, pour chaque lit d'hôpital, 3 à 5 kg de déchets sont produits par jour. Cependant, les déchets constituent un combustible peu homogène dont la composition varie d'une charge à l'autre; il faut également tenir compte des variations saisonnières. Il est donc nécessaire de disposer d'un four spécialement conçu pour réguler la chaleur produite.

Cela fait déjà un certain temps que le problème de l'accumulations de déchets dans les hôpitaux soulève l'inquiétude. les risques d'infection au cours du transport et du stockage sont considérables. L'éenergie produite par l'incinération des déchets peut servir, en été, au refroidissement des installations d'absoprtion et, en hiver, à complémenter le chauffage central.

L'article contient des calculs détaillés concernant des chaudières expérimentales, ainsi que des schémas et graphiques illustrant les économies réalisées.

En conclusion, l'auteur présente une expérience de huit années ayant permis d'économiser environ 25% du coût de chauffage annuel dans un hôpital de 150 lits.

1.	Net investment		
	total investment	D.kR.	2.000,000
	less — energy grant	—	620,000
	oil filled boiler	—	500,000
	net investment	D.Kr.	880,000
2.	Net savings		
	Based on the incineration of alternatively 900 kg and 1,200 kg of refuse per day.		
A.	900 kg refuse per day is equal to 300 litre oil at 3,60 D.Kr./litre for 250 days =	D.Kr.	270,000
	plus savings for refuse removal	—	100,000
	gross savings	D.Kr.	370,000
	less — repairs to incinerator	—	20,000
	½ time assistant	—	50,000
	net savings (A)	D.Kr.	300,000
B.	300kg extra of refuse saves approx. 100 litre oil at 3,60 D.Kr./litre for 250 days =	D.Kr.	90,000
	net savings (B)	D.Kr.	390,000
3.	Economical viability		
	net investment	D.Kr.	880,000
	expected life duration		15 years
	annual savings (A)	D.Kr.	300,000
	annual savings (B)	D.Kr.	390,000
	costs repayed in approx.		3 years

Calculations are based on use for 6 hours per day, during which time we incinerate approximately 1,200 kg refuse.

Table One: Incinerator plant's Economic Viability.

All this has meant that our incinerator was more expensive and took much longer to build than is usual. After the installation had been in use for approx. half a year, it was possible to calculate that 300 kg of paper and plastic waste give the same amount of energy as 100 litres of fuel oil. This is what the suppliers of the plant promised. On the other hand the plant requires more care and attention that we had reckoned on, and it has been necessary to employ one man part-time on this.

We started by building a small experimental boiler based on the gas generator principle, much used during the war, when gas was used as a fuel for motor cars. The problem was how to attain the high temperatures necessary in the outlet of the boiler to ensure that the gases passing the outlet will be ignited and be removed completely. One can choose one of several possible methods for both attaining and maintaining the high temperatures necessary, but after investigation we decided that there were definite advantages to be gained in constructing our boiler with special heat resisting bricks. The more insulating the material is, the more heat it can absorb and retain. It will, therefore, be self-accelerating up to a very high temperature.

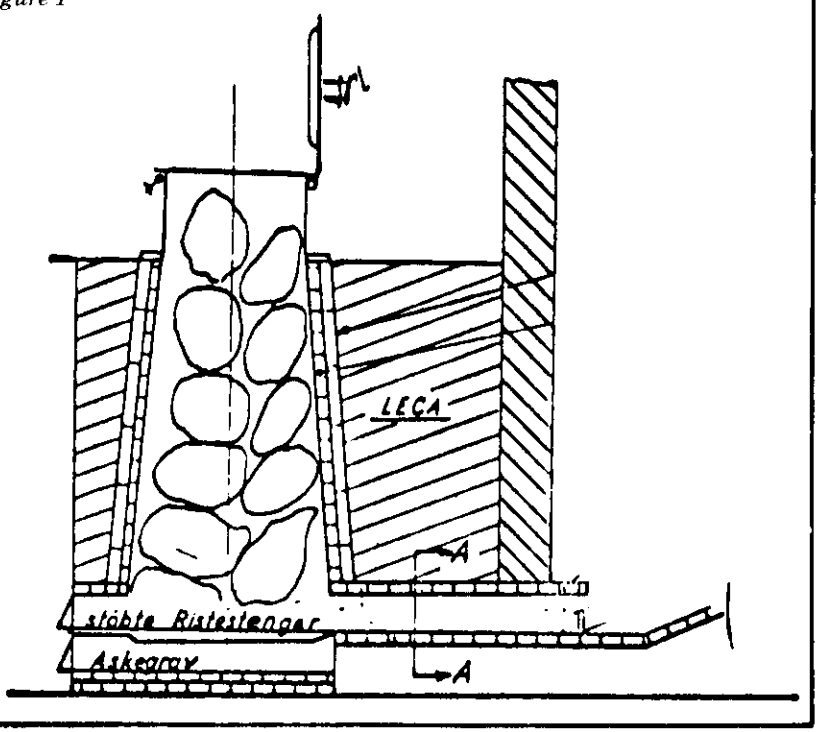
evened out, and to minimise excess heat condensation in summer.

In winter, however, it is often necessary to supplement the refuse at peak periods to provide the heating required.

For this you can either have a separate peak load oil fired boiler or you can compress the refuse into bricks in a press, so that in summer bricks can be produced for use in producing heat in winter during peak periods.

Our plant eventually comprised a crusher and an intermediate container with a conveyer belt connecting to the feeding arrangement whereby the refuse is stacked into the furnace. The furnace is a bricked fire chamber, with a moveable grate for continual transport of refuse through the fire chamber to the slag remover. The warm gases given off during burning are led off from the fire chamber through a cylindrical afterburner and on to an oil filled boiler and a cyclone separator to finally be exhausted through the chimney.

Figure 1



The ideal temperature of between 1000° and 1200°C will burn off the gases to the desirable extent, and experiments with the small boiler showed that it was possible to attain these temperatures.

As can be seen in *Figure two*, the furnace is made of two sections: an incinerator section and afterburner or gasification section. The furnace is filled with refuse in the incinerator section and ignited manually, the refuse then being allowed to burn and produce heat and exhaust gases. The outlet begins at the bottom of the incineration chamber — the combustion zone — and the warm exhaust gases and heat produced during incineration heat up the special insulating bricks so that only a few minutes after the furnace has been lit, the temperature in the afterburner or gas producing section will already be up to 1000°C. This temperature can be maintained for as long as there is a reasonable amount of combustible material in the incinerating section of the boiler.

As can be seen in the drawing, the exhaust gases go into the channel. Depending on the rate of combustion, the primary air added to the boiler, the compression in the outlet and other factors, the exhaust gases pass through the gasification zone at relatively high velocity. With the eventual addition of secondary air, the rate of combustion will increase and appear almost explosive, resembling very much the flames produced in a large oil burner boiler. As a result of this we have been able to construct the incinerator plant in conjunction with an existing boiler plant, so that the afterburning channel is placed between the incinerator and the boiler. When the incinerator functions as it should, and refuse is manually placed on the grate every half-hour and hour, it is possible to satisfactorily fire the water boiler, as the volume of the flames will completely fill the incineration chamber in the boiler.

It is possible to draw the flame developed from the combustible gases directly to an attached boiler, by which I mean one with the furnace combined with the boiler. Of course, it is also possible to blow the flames directly into the chimney. Depending on the amount of secondary air added the gases can be cooled so that only a few metres after the extremely high temperatures have been reached, the temperature of the exhaust gases in the outlet will be down to 350°C.

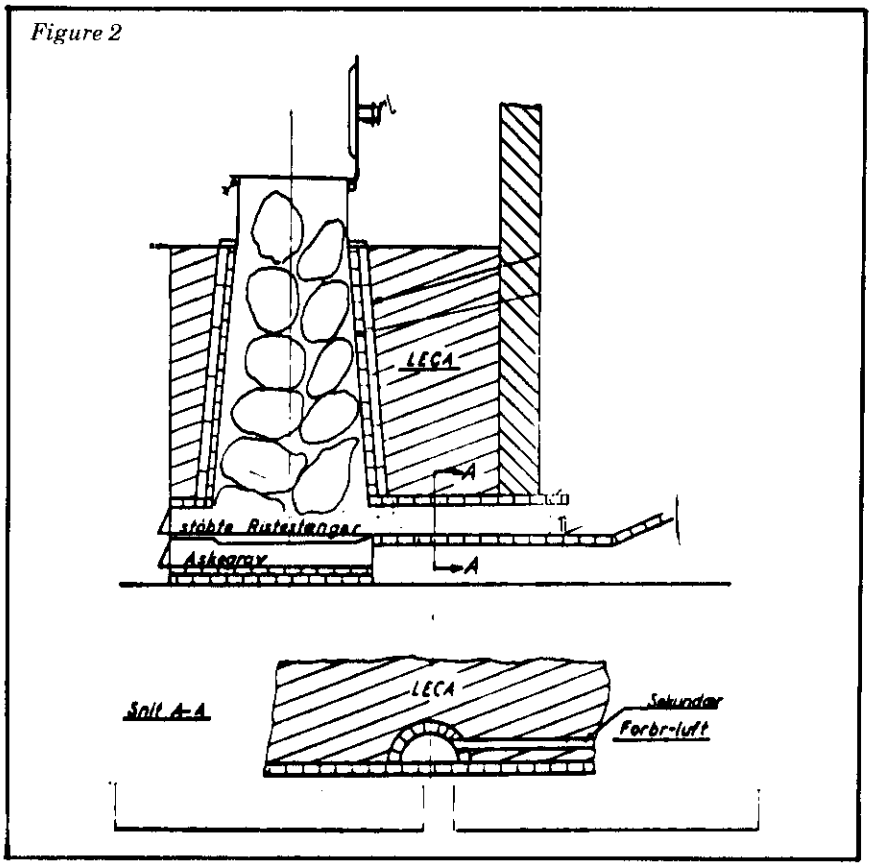
A model of the furnace was built, without regard to the possibility of using the heat generated in the incinerator. That is to say, the exhaust gases were led directly out to the chimney. This model was later changed so that the exhaust gasses were led from the chamber/outlet directly into the water boiler, utilising the heat produced by the combustible gases.

The refuse is loaded down into the incinerator packed in sacks. (There is room for 10-12 sacks). Then the incinerator is fired normally from below by the fire grate. It is important to make sure that easily ignitable materials such as paper, cardboard or wood are placed at the bottom. As the incinerator heats up and burns, the surrounding brickwork absorbs heat from the exhuast gases. The brickwork around the outlet chamber and the brickwork in the incinerator itself have different functions. That in the incinerator is to prevent loss of heat. In the outlet chamber it has a more insulating function, because the very highly insulated brickwork will absorb heat, not transfer it to the surroundings, but try to contain it. Therefore the accelerating effect takes place where the brickwork reaches a temperature of 1000-1200°C.

When the exhaust gases from the incineration chamber move towards the chimney, they pass by a small chamber where the brickwork is very hot, so that all the exhaust gases are drawn in and swirl around the hot brickwork. The brickwork is almost white hot and all the exhaust gases burn. It is a very turbulent effect, in that at a specific place in the chamber secondary air is added to ensure that the gases are agitated and come in contact with the white hot brickwork. That is the principle of the boiler. The combustion chamber should be elongated so that all the exhaust gases should be in contact with the brickwork. The volume of the chamber should be comparatively small, so that the exhaust gases will be forced to come in contact with the white hot brickwork.

Another model has an incorporated boiler, a sort of compact version in which the incinerator and boiler are directly combined. This model is also suitable for use in all situations. It can be installed in a field, it can be installed in a cellar. It can be put simply anywhere you wish. This model does not have to be very big but can be, and will have the capacity you wish. As in the first model, it has

Figure 2



a compartment where refuse is loaded, and ignited. The refuse in burning gives off gases which are forced through the chamber into the boiler compartment itself, and burn in the normal way. Also, as in the first model it is possible to use one or two small oil burners to help keep the temperature at the required level, both in the exhaust duct and at the moment of ignition in the incineration section. This last model can also be provided with a direct exhaust to the chimney, (that is without the boiler unit), or directly over an existing water boiler.

We can see from *Table two* that the investment, which is in any case minimal, can pay for itself within $1^{1}/_{2}$–2 years.

In order to maintain the optimum temperature in the incineration and exhaust channel, two small oil burners can be installed which start and stop automatically. The energy required will be minimal and ensures the total combustion of the gases.

Drip firing of both oil fuel and chemical refuse is also a possibility as long as the quantities are not too big.

Conclusion

It is well worth while to invest in the utilisation of heat from the combustion of refuse.

We have eight years experience and have saved approximately 25% of the annual heating costs at a 150 bed hospital.

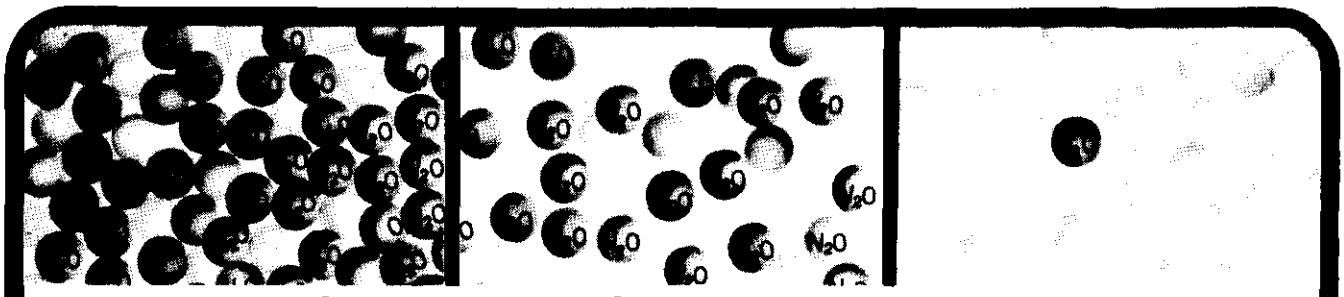
We have disposed of our refuse both pathological and more industrial refuse, without risk to the surrrounding area.

References

Civil engineer Lasse Knudsen, West Incineration, Engineer Sven Jensen, Flugger A/S.

Table 2 **CALCULATION FOR OUR OWN MODEL**

Investment	D.Kr	250,000
Savings 1		
With incineration of approx. 500 kg refuse per day = 500 kg equivalent to minimum 100 litres oil x 250 days		
oil price, D.Kr. 3,60 per litre =	D.Kr.	90,000
savings in refuse removal	-	70,000
total savings	D.Kr.	160,000 per year
Savings 2		
With incineration of approx. 500 kg refuse per day = 500 kg equivalent to 150 litres oil x 250 days		
oil price, D.Kr. 3,60 per litre =	D.Kr.	135,000
savings in refuse removal	-	70,000
total savings	D.Kr.	205,000 per year
For looking after the incinerator a half time assistant is necessary, who cost approx.	D.Kr.	50,000 per year



Results of over 100 surveys of anaesthetic gas pollution in operating suites.

Active Scavenging of Anaesthetic Gases by Howorth

There's a lot we could say about the Howorth Active Scavenging System for Anaesthetic gases but really the figures say it all. Even the 3 ppm can often be leaks in the anaesthetic circuitry!

Write for full details of the Howorth system or request a survey of your operating theatre, induction and recovery rooms, dental clinic or maternity unit.

HOWORTH AIR ENGINEERING

Howorth Air Engineering Ltd., Surgicair Division, HE982, Lorne Street, Farnworth, Bolton, BL4 7LZ.
Tel:- Farnworth (0204) 71131. Telex:- 635242 Howair G.

125 YEARS OF AIR ENGINEERING

Product News

New Export Washer-Sterilizer

The new Phoenix washer sterilizer for surgical instruments has been developed by Dent & Hellyer Limited specifically for export markets. It is robust, simple to operate and maintain, and it will accept instruments direct from the operating theatre.

The Phoenix is fully automatic in operation. When the machine is loaded and the 'start' button is pressed a cold water pressure spray comes into operation. This is followed by a 10 minute soak period during which a powerful agitator loosens any remaining solids. Next is a hot wash at 65° followed by cold water rinsing with ejector-assisted draining.

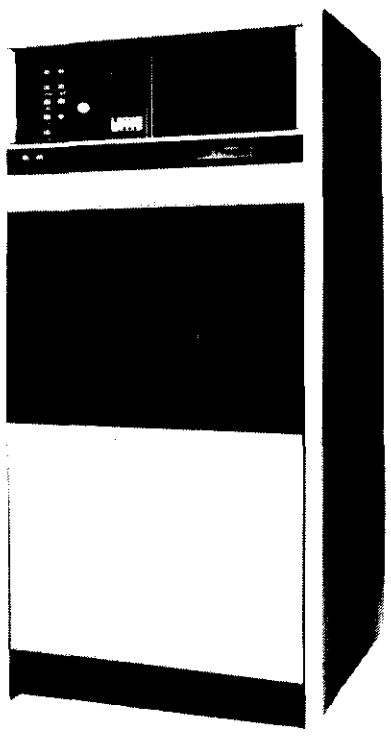
In the sterilizing stages air removal is followed by steam sterilization at 134°C for a minimum of 3 minutes. After vacuum drying air is admitted via a bacteria-retentive filter. To handle instruments which are already clean, there is a separate 'start' button to initiate the sterilizing cycle only.

The 4.7ft^3 (132 litre) chamber is stainless steel and has a stainless-clad hinged door with comprehensive safety interlocks. Thick insulation is provided to reduce energy consumption.

The machine is housed in a plastic coated steel cabinet with stainless steel front panels. It incorporates an ergonomically designed control panel with temperature and pressure gauges, plus indicator lamps to show cycle progress.

Further information from: Mr I. D. Stewart, Dent & Hellyer Limited, Walworth Industrial Estate, Andover, Hants, England SP10 5AA. Telephone: Andover (0264) 6211 Telex: 47430.

The new Phoenix washer-sterlizer from Dent and Hellyer Limited.



Skirting outlet for British Telecom LJ2 jack plug

Gilflex-Key Ltd has introduced a new accessory for its system 3500 skirting trunking capable of housing the British Telecom LJ2 jack plug outlet. It is believed to be the only one available on the market that allows fitting of the jack plug without disturbing the power cabling.

Made from the same colour PVC as the skirting, it fits neatly over the two-compartment trunking and is held in position by four screws. Segregation between power and telecommunications cabling is maintained, separate compartment covers permitting access to the cabling as required.

New Transparent Canopies brochure

A four page full-colour brochure is available from Transplastix Ltd. describing their custom-made Transparent PVC Canopies. Designed individually, and fully complying with Building Regulations, the Canopies give maximum natural light plus weather protection.

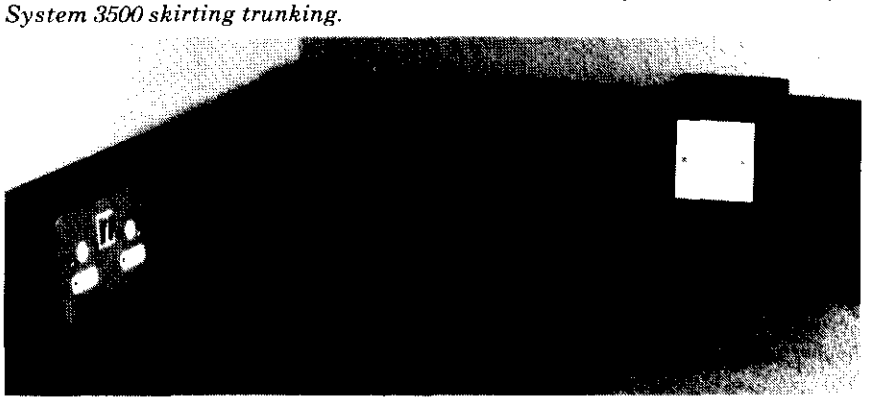
Typical arrangements are illustrated, and Transplastix offer working drawings, steelwork calculations, etc, to assist with planning permission. Erection teams are available if required.

Further information: Transplastix Ltd, 21 Dean Street, Newcastle-upon-Tyne NE1 1PQ. Tel: 063 612448-9.

Special ballvalve solves water industry headaches

The damage caused to pumps and the problems associated with dribble flows from conventional ballvalves in water treatment plants is a major headache in the water supply industry. Arclion, the latest ballvalve manufactured by the Suffolk-based company of Warners offers a simple means of overcoming this problem, without the need for elaborate and expensive electronic

The new outlet facility for the British Telecom LJ2 jack plug for Gilflex-Key's System 3500 skirting trunking.



devices. The Arclion ballvalve provides a full flow of water at all times by restraining the operation of the ballvalve until the water in the main tank has been drawn off to a predetermined level. The ballvalve then opens to its full extent, until the storage tank is full, when the water supply is shut off. It is a system that puts an end to the excessive starting and stopping action to which water booster pumps are subjected when conventional ballvalves are used.

The Arclion ballvalve provides a full flow of water at all times. The operation is straightforward. The ball floats in a separate canister. At the base of this canister is a valve operated by a float beneath. As water is drawn from the tank, the ballvalve remains shut, the ball continuing to float in the canister. As the water level reaches the required depth, the lower float opens the valve, emptying the canister and causing the main ballvalve to open. Then the lower float rises with the water level and closes the valve. This means that the ball is not raised until water overflows the rim of the canister, so causing the ballvalve to shut off cleanly.

Arclion delayed action ballvalves are available in sizes from $^{3}/_{4}$ ins. to 6 ins., and are of copper and gunmetal construction, conforming to appropriate British Standards. The Arclion needs only minimal maintenance, and has already been approved by several bodies, including the Thames Water Authority.

Introduced originally as a low-cost installation for cold water systems only, modified ballvalves for hot water systems are also available on request, and at little extra cost. Optional extras are also available in the form of floatswitch attachments to operate from the ballvalve arm. Fixed extensions to increase further the drop in water level beyond that of the standard assembly are also obtainable, provided such extensions are fitted during manufacture.

Arclion delayed-action ballvalves have been found to be invaluable when incorporated in automatic pumping, and booster systems, water softening plants, water chlorination plants, and by water treatment specialists.

For further information, contact Michael Warner, H. Warner & Son Ltd, 3 Foundation Street, Ipswich IP4 1DT. Telephone Ipswich (0473) 53702. Telex: 987703 CHACCM G.

Dudley Hospital Fire & Plant Alarm and communications systems

Dudley's new district general hospital has arguably the most reliably monitored and controlled medical centre in Britain as a result of the installation of electronic fire, plant, security, communications and other electronic systems.

The principle factor behind this is that West Midlands regional health authority arranged for Statiscan TDM systems to constantly monitor for fire over the 50 acres of hospital complex and residential blocks.

The cost and practical advantages of TDM (time division mulitplexing) come from the fact that the amount of cabling required to cover the entire sites with electronic status signals transmitted to a central console, is seven-eighths less than cabling in a conventional control system. Statiscan TDM is designed and installed at Static Systems Group, Wolverhampton. It is the only such system approved by the Fire Offices Committee.

Two Statiscan TDM systems at Dudley Hospital are based on a single three-core cable. One system in the main hospital blocks transmits 300 signals from different points back to the master annunciator panel in the main block's telephone exchange. The second transmits 200 signals from the residential blocks to the same master annunciator.

The systems break down the total 500 signals from hundreds of monitoring points into discrete time segments for onward transmission. A normal system would require two cables per signal.

The main hospital block TDM system has the capacity to monitor and control up to 31 fire 'sectors'. Each sector unit would control door closures, vent shutdowns etc in case of fire. all alarms sound automatically with a pulsed alert signal at the commencement of fire and a steady signal when evacuation is called for. Switches on the master annunciator allow manually switched evacuate signals to be sounded in any selected sector.

The residential TDM system has the capacity to monitor fire in up to 32 sectors. A mimic indicator of the system is installed at the residences' entrance.

The main block Statiscan TDM system cost £90,000 in March 1979 and the residential system £30,000 in December 1980.

Communications and other systems

Other systems installed by Static Systems Group include: an electronic medical gas alarm system which constantly monitors the volume and pressure of gases available in different containers around the hospital and — by three different levels of alarm — informs porters, theatres and wards of unacceptable levels.

Further information from Static Systems Group, Heath Mill Road, Wombourne, Wolverhampton WV5 8AN. Telephone 0902 895551. Telex: 339796.

New Dudley Hospital has advanced Fire & Plant Alarm and Communications Systems.

Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

Oldham Health Authority

SENIOR HOSPITAL ENGINEER

(Design and Planning)

Building Services Engineer wanted by the District Works Department for our small house design team. The person will work at the Works Headquarters and be responsible for the design and specification of mechanical and electrical services of department renovations and minor new schemes.

The successful applicant should have substantive practical experience of building services but applicants with allied engineering experience will be considered.

A minimum qualification of HNC mechanical or electrical plus endorsements in complimentary subjects is required.

Salary scale £8,010 - £9,271 per annum plus 15% bonus allowance.

Application form and job description available from the Personnel Department, Oldham Health Authority, District Headquarters, Oldham Royal Infirmary, Union Street West, Oldham OL1 1NB. Tel: 061-624 0544 Ext. 227.

Closing date 24th June, 1983.

East Cumbria
HEALTH AUTHORITY

ASSISTANT WORKS OFFICER

Grade 2 (£9,262 £11,490)

The particular responsibilities are operations and maintenance, duties include acting as Sterilizing Engineer, energy management, and the design and execution of minor new works.

Applicants should be suitably qualified officers under the National Agreements, currently employed within the NHS at third-in-line or above, who have not yet been substantially placed during the current reorganisation.

East Cumbria Health Authority provides a service to 180,000 people in a geographically large district, with a District General Hospital, Psychiatric Hospital and eight small peripheral hospitals.

The post is based at Cumberland Infirmary, Carlisle, situated on the fringe of the Lake District National Park, with easy access by road (M6) and rail (Inter City) to the main centres in the UK.

For further information, or to arrange an informal visit, contact W. I. McLauchlan, Works Officer (Units) on Carlisle (0228) 23444 Ext. 448.

Application forms and further particulars from G. M. Blamires, District Personnel Officer, Cumberland Infirmary, Carlisle, Tel. Carlisle (0228) 23444 Ext. 458.

Closing date for completed applications 24th June, 1983.

St. Luke's Hospital

Senior Engineer

An enthusiastic and innovative Engineer, qualified to HNC or equivalent level, is required to ensure the day to day efficient working of plant and engineering services to hospitals associated with the St. Luke's Unit. Which is largely concerned with the provision of the District's Psychiatric Services and include the District C.S.S.D. Department.

Currently a major upgrading scheme is being undertaken on the St. Luke's site and the successful candidate will be expected to take an active interest.

Salary: £8,010 - £9,271 p.a. + 15% bonus.

Informal enquiries welcome, please contact the Unit Works Officer, Mr. Robin Stimpson, South Cleveland Hospital, telephone: (0642) 813166.

Application form and job description available from Personnel Department, District Offices, Poole Hospital, Nunthorpe, Middlesbrough, Cleveland. Telephone: (0642) 320000

Closing date: 24th June 1983.

STHA

South Tees Health Authority

Blackburn, Hyndburn and Ribble Valley Health Authority

SENIOR ENGINEER

To be responsible for the Engineering Services in one of four Units within the District, comprising one acute hospital with an ESMI Unit, four Ambulance Stations and the entire Community Properties of the District, both Health Centres and Clinics, within an area of approximately 250 square miles.

Salary £8,010 - £9,271 plus 15% bonus.

Applicants must have completed an apprenticeship in either mechanical or electrical engineering, holding an HNC with approved endorsements subjects or an acceptable equivalent plus experience of modern planning of maintenance, control and deployment of direct labour and contractural staff with a flair for administration.

Application forms with job description available from the District Personnel Officer, District Offices, Queen's Park Hospital, Blackburn, Lancs. Tel: Blackburn 661311. Ext: 281/223.

Closing Date for applications with two technical referees 24th June, 1983.

Herefordshire Health Authority

We are seeking an enthusiastic SENIOR ENGINEER to join our expanding Works team in the Rural/Psychiatric Unit.

SENIOR ENGINEER

A wide range of experience can be gained in all aspects of engineering maintenance. Applicants must hold a Higher National Certificate in Mechanical Engineering or Electrical and Electronic Engineering together with, in each case, Certificates of a Technical Collage or a College of Further Education of an appropriate discipline together with Industrial Administration if these were not taken as subjects of the course.

Salary on a scale £8,010 to £9,271 plus a management allowance for involvement in maintenance staff incentive bonus scheme.

Information sheet, job description and application form from: Mr R D Rose, District Works Officer, 'Firbanks', St. Mary's Hospital, Burghill, Hereford. Tel: 0432 760324.

Closing date: 24th June, 1983.

Help the buildings that help the people.

'Job satisfaction' is something that everyone wants, but few really achieve.

As a Building Services Engineer with the West Midlands Regional Health Authority, you'll find it comes in two different forms.

Professionally, your skills will be used to the full as you get to grips with a wide range of projects. With a capital budget approaching £70m, over 1,000 health establishments, including 220 hospitals with 39,000 beds, you'll certainly not want for challenge, tackling complex problems involved in the mechanical and electrical support services.

Whilst on a more personal level, you'll experience the deep satisfaction of knowing that your specialist knowledge makes no small contribution to the well-being of the 5 million people in the West Midlands region.

It's a unique opportunity, and, it must be said, it offers a promising future. As long as people get ill, they need hospitals. And hospitals don't just need doctors and nurses – but Engineers as well.

Right now, our hospitals and our people need the following specialists.

Principal Assistant Engineer (Ref G79A) Planning

***Salary £11,515-£13,920 p.a.**

Applicants must have a thorough knowledge of building services design, as responsibilities involve overseeing the engineering content of projects throughout design, construction and commissioning stages. Naturally, this involves briefing and liaison with other professional parties, both internal and external, so your technical expertise should be backed by an approachable, yet decisive, nature.

Principal Assistant Engineer (Ref WE55) Operations & Maintenance

***Salary £11,515-£13,920 p.a.**

To lead a team responsible for promoting and monitoring the effectiveness of works mechanical and electrical maintenance procedures in a hospital environment.

Candidates must have broad experience in Energy Conservation techniques, practical experience of micro-computers and programs, budgeting and accounting systems, establishing performance indices for works maintenance cost effectiveness, preparation of statistical data and the operation of preventive maintenance systems and incentive bonus schemes.

Also essential is the ability to discuss with, and advise, senior officers on a wide range of engineering management techniques.

Main Grade Engineer (Ref WE54) Operations & Maintenance

***Salary £6,284-£11,451 p.a. (according to qualifications and experience.)**

Applicants should have the ability to develop, promote and monitor the effectiveness of works maintenance procedures in hospitals. Essentially, you must have practical experience of micro-computers in a works environment and the knowledge to develop computer programmes for the manipulation of statistical data for establishing performance indices. Experience in maintenance programming and incentive bonus schemes within the hospitals is desirable, and an ability to present written and oral reports to senior management staff is essential.

Qualifications Required

PRINCIPAL ASSISTANT ENGINEERS.

To apply for these posts, you should be a corporate member of either I.C.E., I.Mech.E., IEE, IERT or CIBS.

MAIN GRADE ENGINEER.

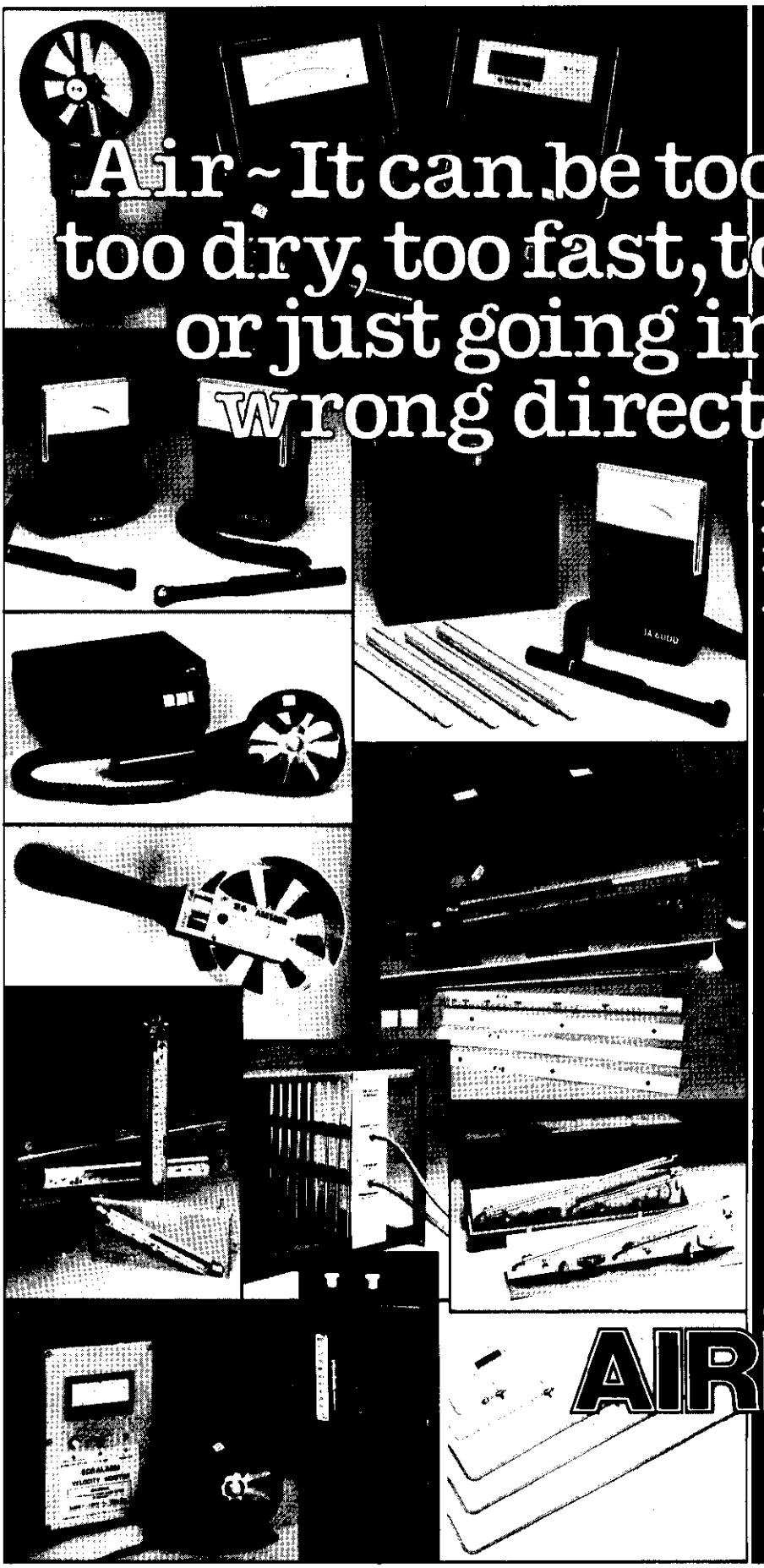
You should be a graduate or corporate member of either I.C.E., I.Mech.E., IEE, IERT or CIBS. Alternatively, you may possess an Associateship in H & V from the Polytechnic of the South Bank.

*Prospects within the Health Service are good. Promotion is possible to positions curently carrying salaries in excess of £15,000. *Salary scales quoted will apply from 1st July, 1983.*

For job descriptions and application forms, please write or telephone (quoting the appropriate reference number) to:-
Personnel Division, West Midlands Regional Health Authority, 1st Floor, Cumberland House, 200 Broad Street, Birmingham. B15 1SW.
Tel: 021-643 5781 ext. 39.

Closing date for receipt of completed applications: 1st July, 1983.

West Midlands Regional Health Authority



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Wherever air is on the move, in a production process or simply in a heating and air conditioning system, it needs to be measured – accurately.

If it isn't, efficiency can suffer, costly excess energy consumed and environmental hazards increased.

As undisputed leaders in air measurement technology, Airflow Instrumentation have perfected a range of efficient and easy to use portable, or permanently installed instruments for measuring air and gas velocity, pressure, and humidity. The range includes air velocity monitors, ductwork leakage testers, filter loss gauges, pitot static tubes, mechanical and electronic anemometers, manometers.

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