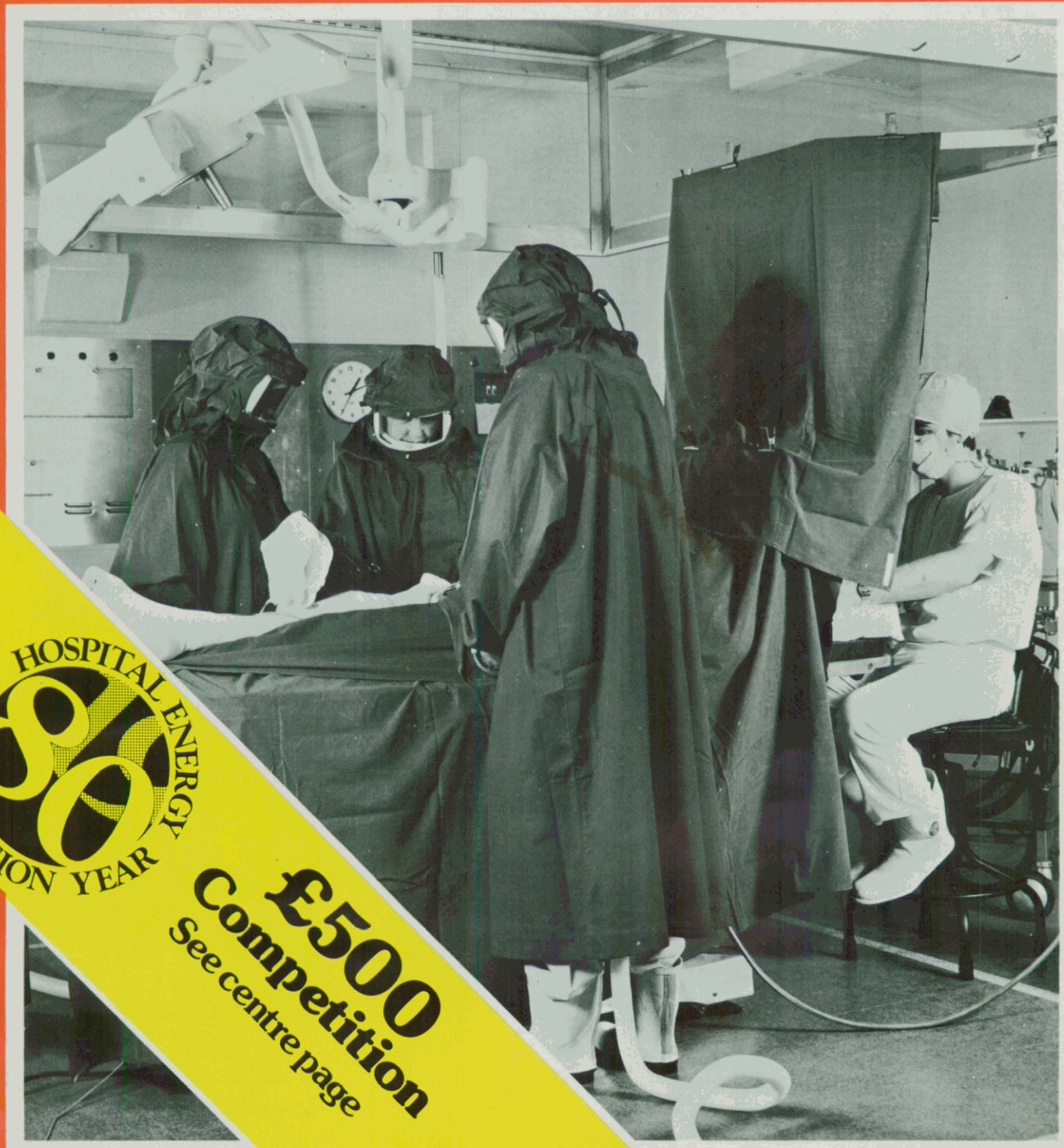
The Journal of the Institute of Hospital Engineering March 1980

HOSPITAL ENGINEERING

International Federation Issue



HOSPITAL ENERGY CONSERVATION YEAR 80

£500 Competition

See centre page

Air Flow Patterns in the Operating Theatre

APRIL						1980
SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

SYBRON | Drayton Castle

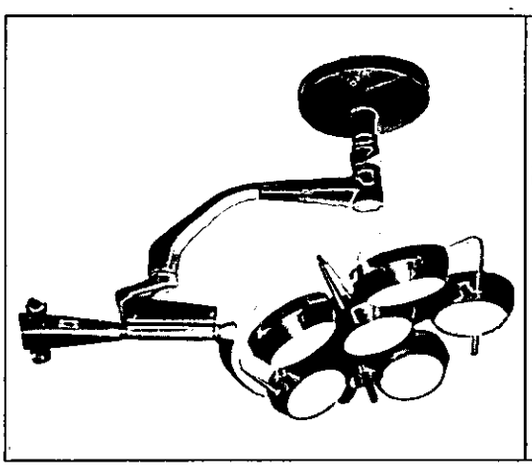
IS ON THE MOVE.....

..... to our new Headquarters at:
Tweed Road, Clevedon, Avon, BS21 6RR
Telephone: Clevedon (0272) 871331
(10 Lines). Telex: 44322,
Cables: Dracas Clevedon Avon.

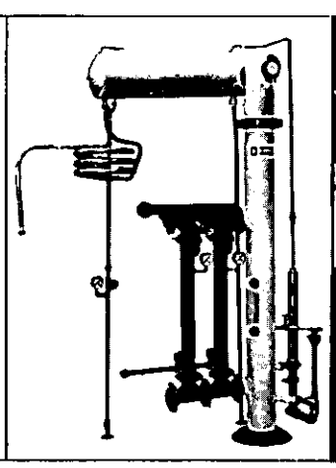
This includes our Sales and Marketing, Service, Finance and Administration offices and our enlarged Spare parts depot.

We are confident that through this expansion, we shall be further able to strengthen the support capability available to our customers.

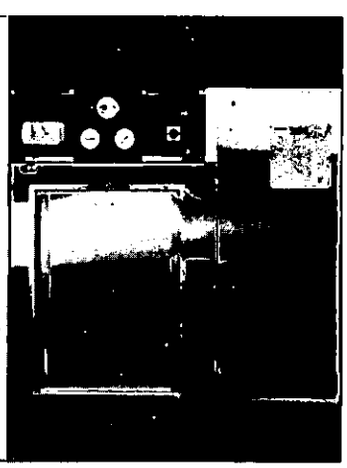
Our new factory in Scotland, with its larger and improved manufacturing facilities gives us the opportunity to meet the needs of the expanding health care market on a world wide basis.



Daystar Surgical Lights.



Barnstead Distillation Equipment.



Powerclave Sterilizers.

'Hospital Engineering' is published monthly, except in January, by Mallard Publications

Individual copies cost
£2.45 UK postage paid

The annual subscription is UK: £21.00
Overseas: £25.00 Americas: $56

Average circulation per issue
(January–December 1978): 2,347

ABC

Editor
Christopher Tanous TD

Advertisement Manager
Barbara Wilby BA

All correspondence relating to the Journal should be addressed to:

'Hospital Engineering'
Mallard Publications
17 St Swithin's Lane
London EC4, England
Telephone: 01-623 2235

UK ISSN 0309-7498

Printed by JB Offset Printers
(Marks Tey) Ltd
Station Approach, North Lane
Marks Tey, Colchester, Essex

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

Secretary
J. E. Furness VRD*

Hon Librarian
R. G. Smith CEng FInstE MCIBS FIHospE
Dryhill, Cold Slad
Crickley Hill, Witcombe
Glocestershire

The International Federation of Hospital Engineering
126 Albert Street
London NW1 7NF, England

HOSPITAL ENGINEERING

The Journal of the Institute of Hospital Engineering

International Federation Issue No.33

Contents

March 1980

Volume 34 No. 2

Institute News

Hospital Engineering Course in Portugal

The first intensive course to be held in Portugal on Hospital Engineering was mounted earlier this year under the auspices of the International Federation. The course ran from January 14 to February 8, and was attended by twenty new entrants to the hospital service. The course was addressed by many distinguished Portuguese hospital engineers, including the Federation President, Dr. Eduardo Caetano.

Its objective was to give a basic introduction to the subject, especially on plant and equipment aspects. The course was held at the National School of Public Health in Lisbon.

Library News

In 1979 a limited number of cassettes were introduced into our Library service. These covered such subjects as *The Health and Safety at Work Act 1974, The Employment Protection Act, Coping with Tribunals* and *How to Handle Dismissals.*

Due to a continuing demand from members for the loan of these cassettes, Council have recently accepted the Honorary Librarian's recommendation that more cassettes should be introduced. Five additional *Holdsworth* cassettes, each with a running time of approximately 45 minutes, are now available:

The Management Process. The skills of planning, organising, motivating and reviewing. John, a project manager, explores difficulties with a feasibility study. He later applies these management principles to the setting-up of a service unit.

Managing Time. Diary analysis, time planning, network analysis and other aids to time management. Martin, an export section head, explores why he never seems to have enough time, and discusses how his working hours can be improved.

Rational Management. The skills of problem-solving and decision-making. Paul, a technical services manager, has a problem with the call-rate of his engineers. A colleague talks him through the stages of Describe, Diagnose, Diverge and Decide, and discusses the main barriers to effective problem-solving.

Managing People. How to understand and influence the behaviour of subordinates. David, an accounts manager, has problems with a keen but under-utilised accountant, and a poorly motivated supervisor. Conversations with them and a colleague help him to cope better with these situations.

Managing a Team. Understanding the structure and dynamics of groups and how to get individuals to work with each other. Brand Manager James explores these principles as applied to a number of meetings and interviews with members of his product group.

The cassettes are now available to members for loan. Applications should be made to the Honorary Librarian in the normal way.

As the cassettes are ideal for Branch Meetings and Seminars, Branch Secretaries may wish to make use of a number of these cassettes as a package.

Council Elections — 1980

Members are advised that the following are the sole-nominees in their respective categories for election to Council in 1980:

	Category
Dr K. I. MURRAY BSc(Eng), PhD, CEng MIMechE, FIHospE *Assistant Chief Engineer, DHSS*	General Member
J. B. PACKER CEng, FIMechE, FCIBS, FIHospE *Consulting Engineer*	Nominated Member
P. C. VEDAST TEng(CEI), CIHospE	Area Member London
K. B. WORSELL TEng(CEI), MIHospE, LIPlantE *District Engineer, Peterborough Health District*	Area Member North East and Yorkshire

In that they are the sole nominees in their respective categories each will be elected unopposed to Council and will assume office at the conclusion of the Annual General Meeting of the Institute to be held at the Holiday Inn, Seaton Burn, Newcastle upon Tyne at 9.30 am on Thursday, May 8, 1980.

BY ORDER OF COUNCIL

J. E. FURNESS
Secretary.

Admissions

Fellows

CONNOR, William, Manchester AHA.
EGLEY, Austin, Barnsley AHA.
EVANS, Gareth John Morgan, Clwyd Health Authority.
PAYNE, Rolf.
SEOW, Hong Chiow, Ang Thian Soo and Partners.

Members

BEATTIE, Kenneth Howard, Varming Mulcahy Reilly Associates.
BENNETT, John Alexander, J. Roger Preston and Partners.
BRADLEY, John Gerard, Tameside General Hospital.
CARRAHER, David Patrick, West Sussex AHA.
CASE, Raymond Richard, E. G. Phillips Son and Partners.
CROFT, Trevor Crosby, Great Yarmouth and Waveney Health District.
DAVIES, Anthony Frederick Badham, Welsh Health Technical Services Organisation.
DOHERTY, Daniel Joseph, Glasgow Royal Maternity Hospital.
FENTON, Paul Francis, Liverpool AHA(T).
HODGKISS, Harond Leonard, Hellesdon Hospital.
HUGHSTON, Roy Harry, Gwynedd Health Authority.
JOHNSON, Roy, East Birmingham Hospital.
LEE, John Richard, P. F. Leivers.
MACKENZIE, Peter Howard, Building Services Copartnership.
MADDOCKS, David James, Dorset AHA.

MILLAR, William Stewart Henry, Watford General Hospital.
MITCHELL, James Robertson, John Laing Services Ltd.
MORGAN, Thomas, Northumberland AHA.
McLEISH, Bruce, Royal Scottish National Hospital.
McNAMARA, John Patrick, T. A. Thompson & Associates.
PHILLIPS, Gordon Peter, Hants AHA.
POTTINGER, Robert David, Pembury Hospital.
ROBINSON, Barry H., Brown Crozier and Wyatt.
SHAND, Martin Jamieson, Craig Phadrig Hospital.
SLATTERY, Terence, St Ebbas Hospital.
STOKOE, Robert Hylton, Castle Hill Hospital.
STURDY, Geoffrey Francis, Leeds AHA.
THOMPSON, Roger, Sefton General Hospital.
TUNNICLIFFE, Graham John, Staffordshire AHA.
THORNTON, Alexander Murray, Royal Beatson Memorial Hospital.
WILLIAMS, Adrian George, Great Yarmouth and Waveney Health District.
WOOD, Robert, E. G. Phillips Son and Partners.

Graduates

ASHDOWN, Brian Leslie, Queen Victoria Hospital.
McKIE, Stephen, Ayrshire and Arran HB.
WARD, Robert Gordon, Lothian Health Board.

Associates

KHAN, M. Idris Ahmad, Armed Forces Medical Services, Saudi Arabia.
PAYNE, Anthony John, Static Systems Group.
RAZZELL, John Charles, BOC Medishield Pipelines.

Engineer at the Bar

It is not, perhaps, usual for members of the Institute to stray outside their own profession, but not so Keith Hanlon, who was called to the Bar in the Michaelmas Term at Gray's Inn. Mr Hanlon, MSc(Arch), BSc(Econ), LLB, CEng, FIHospE is Principal of Keith Hanlon Associates, Pangbourne, Berks, and a non-executive Director of the Astra Group of Companies.

Mr Hanlon remains a pupil in chambers for the next six months,

Mr K. G. Hanlon

after which he intends continuing to practise with his legal work, arbitration and expert evidence within the building industry in general, and Building Services in particular.

New Member in Abu Dhabi

It is pleasant to hear from Institute member, Mr W. C. Jeffries of the ceremony to mark the admission of a new member — Mr Wenceslaus Pais. He received his Certificate of Membership at a presentation by the Indian Ambassador, Mr M. H. Ansari, attended by representatives from the British, Indian and Pakistani communities.

Southern Branch

John Walker is giving up the Honorary Secretaryship of the Southern Branch after holding this office for the last three years. We are all indebted to him for his considerable efforts over this period. He is to be succeeded by Mr R. P. Boyce of Chichester who offered his services. As ever the services of one volunteer is worth those of ten pressed men.

Midlands Branch

Future activities planned by the branch include: March 13, 1980 — AGM at West Midlands Gas, Solihull; May 3, 1980 — Five Branch Meeting at The John Radcliffe Hospital, Oxford.

The following programme is in hand for 1980/81: September 1980 — Visit — Reliant Cars; November 1980 — Visit — BOC Wolverhampton; January 1981 — Paper — Building Topic; February 1981 — Paper — Medical Topic; March 1981 — AGM; May 1981 — Five Branch Meeting.

November 6, 1979

On Tuesday, November 6, 1979, members and guests of the Midlands Branch attended a technical meeting held in the Board Room of the General Hospital, Steelhouse Lane, Birmingham.

Mr A. Round, Vice Chairman, welcomed all members and guests present and introduced the speaker.

The subject was drainage, maintenance and design, and was most ably and enjoyably presented by Mr Rolf Payne, TEng(CEI), LIOB, FIOP, MIHospE. Thirty-three members and guests attended.

Mr Payne, with the aid of photographic slides, demonstrated the pitfalls that can ensue from poor design and maintenance standards. Mr Payne spoke of both soil and surface drainage, including some graphic descriptions of problems encountered due to poorly maintained drains and roof gutters.

We were all given much food for thought and the need for regular maintenance inspections of all kinds of drainage was very well impressed upon us.

Mr Payne also discussed aspects of drainage design and the use of correct materials. Again, samples were given of various 'horror' installations. How often do we maintenance engineers find that rodding points, etc, have been installed in the most inaccessible places. Mr Payne stressed the need to know as accurately as possible the liquids that are put into the drainage system and their approximate temperatures.

Many questions were put to Mr Payne and an interesting discussion followed the talk.

December 6, 1979

On the evening of Thursday, December 6, 1979, the Midlands Branch held a dinner dance at Penns Hall Hotel, Sutton Coldfield.

The evening was fully subscribed with a total of 113 members and guests attending. A most enjoyable evening was had by all with many requests being made to various Committee members for a repeat next year.

The Branch was proud to have Mr Laurence Turner, the Institute's President (and a member of the Midlands Branch) and his wife attend the evening's festivities.

Letters to the Editor

The First International Seminar for Senior Hospital Engineers

. . . From Denmark

Dear Sir,
The first International Seminar for Hospital Engineers held in Falfield, England was very successful.

The topic 'Focus on appropriate Technology' was well chosen, considering the complexity characteristic of hospital technology today. The topics discussed were extremely relevant, and although the participants came from different parts of the world, the seminar reflected that hospital engineers face, more or less, the same problems — whether they come from Europe or other parts of the world.

Regretfully, participation was low and I hope that more engineers, especially from Europe, will take part in the next international seminar.

Many of the papers given at the seminar taught us a great deal about British intentions with regard to appropriate technology. We had ample opportunity to learn about the excellent tools developed by the DHSS. It is my impression that elements can be adapted to different national standards, with only a few changes necessary.

I am principally working on developing projects in the Danish Hospital Institute, and I feel that I have now received valuable information on efforts made in England regarding the maintenance function; not least the evaluation of the setting of the seminar, The Hospital Engineering Centre, which seemed to function extremely well both with regard to courses offered, facilities and lecturers. At the annual meeting of the Organisation of Hospital Engineers in Denmark — the SMS — I had the opportunity to give a presentation on the centre.

The Danish Hospital Institute would like to congratulate you on the successful arrangements, and hope that a second International Seminar for Hospital Engineers will become a reality.

Yours sincerely,
NIELS TINGLEV CHRISTENSEN,
Hospital Engineer,
Danish Hospital Institute.

. . . From Pakistan

Dear Sir,
I have already submitted a detailed report to the WHO and to my Government on this International Seminar, held in Falfield, England.

Most of the advanced countries know that the subject of Hospital Engineering is little known in the under-developed countries. Therefore, to keep the wheel of modern technology in Hospital Engineering moving, it is very essential that developed nations share their knowledge with the under developed countries. This seminar on Hospital Engineering was a resounding success as far as the under developed countries are concerned. Most of the under developed nations have little know-how about this technology and would like to utilise their strained finances economically so that proper utilisation can be made of their limited resources.

It is necessary to attend seminars especially for countries which cannot afford to organise them. The International Seminar on Hospital Engineering conveyed useful information to all members of under developed countries who have embarked on ambitious plans in the Health Development sector. These countries can derive much from the lectures and papers given at the International Seminar at Falfield. In this seminar, it was established that no Health Development scheme should be started unless proper master planning had been done, and all the factors governing the master planning have been decided by the parties concerned. Areas were identified where available resources could best be utilised. Other areas were identified where economies could be effected. Other areas of conflict were discussed in detail.

Workshops, and projects given to groups of delegates gave us ample opportunity to deal with every subject — from initiation to the point of completion — including functional/operational difficulties. Since this seminar was attended by delegations from all regions, it was very interesting that problems which were diagonal to each other were brought to the centre.

I am personally engaged in the execution of some Health Projects which are of great magnitude, and the seminar has been a great help to me. I have identified my problems and received guidance from renowned engineers and architects. It has been very educational and informative. As this was the first International Seminar, the small attendance should not matter, or disappoint the organisers. I would like to congratulate all those who made arrangements for this seminar. They made tremendous efforts, but I should like to suggest the following for consideration:

The seminar schedule and dates should be conveyed to delegates in good time.
Time for workshops should be increased.
Project time should be increased.
The seminar should be held for a minimum of six weeks to enable these parts to be adequately covered.
The rest of the arrangements were excellent, and have my full appreciation.

Yours sincerely,
SHER MOHAMMAD,
Engineering Advisor (Health),
Pakistan.

. . . From Denmark

Dear Sir,
The Hospital Engineering Centre was an ideal setting for the seminar, both with regard to facilities and staff. The planning and timing were impressive.

The topic 'Appropriate Technology' was very relevant, and from the excellent lecturers I learned a great deal about conditions in England.

Although I found that the seminar was both inspiring for my work at the Danish Hospital Institute, and instructive for me personally, I should like to make some suggestions which in my opinion would have made the seminar even more profitable.

1. The number attending should have been 12-16. In particular the participation from the European continent and North America was low.

2. A little less weight should have been attached to the planning and building of hospitals and more on the rational running of existing hospitals.

3. Medical technology should have been dealt with more critically, not only from an economical point of view but also from the needs of the community, the patients and the employees. The term Technology Assessment was for instance never mentioned, although the theme of the seminar was Appropriate Technology.

In spite of these comments I should, however, like to stress that I think the seminar was a success, on which I should like to congratulate you.

Finally, I should like to take the opportunity to send my sincere thanks to the planners, lecturers and staff behind this first seminar. I hope that the next seminar will be as successful.

Yours sincerely,
TORBEN JØRGENSEN,
Medical Engineer,
Danish Hospital Institute.

. . . From Africa

Dear Sir,

I was very pleased to have participated in the seminar and I have been able to achieve magnificent knowledge and gain highly valued experience through the seminar. Thank you for offering me a place in the seminar the first of its kind in the world.

I will summarise my impression of the seminar by saying that the seminar programmes were interesting, challenging, comprehensive and detailed. I commend it to all Hospital Engineers worldwide, especially those in the continent of Africa. The study materials were well planned and easy to assimilate. In analysing the four notes I will borrow a statement made by one of the lecturers who presented papers at the seminar — Mr C. Davies — who said during one of his sessions that, "Unless one moves out of his domain, he will not be able to assess how much he does not know." The seminar afforded me the opportunity to understand two vital issues:

Hospital Engineering covers a wide range of professions, bordering on planning and designing of hospital buildings, building fixtures, and medical equipment.

A Hospital Engineer must possess an appreciable knowledge of what other professionals do within the rank and file of the Hospital Services, so that all hands ensure appropriate execution of Health Care policy.

My suggestions for the improvement of future seminars are:

The time limit for the seminar is too short and should be extended.

More time to workshop practices and projects should be given.

Visits to industries where medical equipment is manufactured should be included.

An observers gallery should be introduced into the seminar, whereby it would be possible for any Hospital Engineer to attend such a seminar as an observer and pay their way if they have failed to pass through his/her employers screening exercise for nomination.

Give adequate publicity and sufficient time allowance to closing date for submission of nomination papers etc and give liberal terms on payment as this will attract more overseas participants.

I wish to express my sincere gratitude to the organisers, planners, directors and lecturers who contributed from their wealth of experience to the success of the seminar.

Yours faithfully,
S. ADE. MUSA,
Principal Maintenance Supt.,
Vaccine Production Laboratory,
Yaba — Lagos,
Nigeria.

A misleading article

Dear Sir,

In fairness to readers, I think I must point out that the article *Training Biomedical Engineers and Technicians in Developing Countries* which appeared in the December 1979 issue of *Hospital Engineering* by Oleka and von der Mosel contains misleading information.

The authors imply that a course for Biomedical Engineers and Technicians has been operating at the College of Medicine in Lagos for some years. However, no such course has ever existed. A curriculum was planned, but has not been implemented.

Yours faithfully,
MALCOLM BROWN
Bioengineering & Medical Physics Unit
Liverpool Area Health Authority.

Patients First

Dear Sir,

The Health Service is in danger of being reduced to the level of a game of 'Snap'! Small is beautiful? — yes, but in what way? as an object of outstanding historical interest?

One of the most significant advances achieved by the Health Service post 1974 reorganisation is the 'bureaucratic' requirement to plan at local level. To plan — that is to think about, to talk about and to consult with the potential users of the service being provided and to be provided —

THE PATIENT —.

Pre-1974, the only 'planning' authority at 'local' level was with the Regional Hospital Boards. Areas, as Authorities in their own right, with their districts were established to bring the Health Service nearer to the user and to enable local opinion and needs to be more clearly identified and thus be given the opportunity to shape the provision of services.

Understandably those health service staff given the responsibility for this planning activity, found some difficulty in acquiring skills completely new to most of them. Through training programmes organised by the DHSS this skill is now rapidly being acquired, and benefits being reaped not only in an improving environment (in spite of an ever growing backlog of necessary maintenance) but through many service improvements, greater efficiency achieved through the elimination of wasteful practices, and the saving of substantial sums through energy saving programmes.

This is now in danger of receiving a set back from which the Service may not recover for many years. To plan effectively, it is necessary to have something to plan with. In a game of 'Snap' there are no choices — if the new District Health Authority is too small there will be no choices. There will be choices and options, but only at the Regional level — not at the local level.

For the planning activity to be a viable local function and for the user to be able to influence the quality of the service to be delivered, the District Health Authority must be large enough to have sufficient resourses through which change may be achieved.

Resources in this context are not just money, although that plays an important part and allocations will

vary with the size of an Authority. Resources are also and perhaps more importantly — people and buildings, engineering services, equipment, grounds and gardens. In other words, the Estate that they use. That is the real wealth of a Health Authority — manpower and their skills, the size and quality of the Estate, and the money these attract.

It is clear that these will vary proportionally to the size of an 'Authority' and its catchment population.

If you want to keep the Health Service 'local' in the future, make sure the future Authority is large enough to have a range of choices open to it.

Through 'Patients First' — Mr Patrick Jenkins, the Secretary of State for Health and Social Services has given you a choice — maybe it is the last one you will have this decade — make it.

Yours faithfully
W. NICHOLAS
DipArch RIBA AIArB AIHospE
Area Works Officer
Suffolk AHA

When is an 'engineer' not an Engineer?

Dear Sir.

I am aware as I write, that by the time this is read, the report of the Finniston Committee — the Government's Inquiry into the engineering profession — will have been published.

Unfortunately, as a very pessimistic individual, I very much doubt if either re-inforcement of old concepts or the promulgation of new ones within this report will alter the views and prejudices of the general public and non engineering professions towards engineers.

For example, at present there are absolutely no legal constraints to prevent a person who has virtually no practical training, and certainly no relevant academic qualifications, from setting themself up, following the purchase of a van (suitably sign-written) and a few tools, as a 'Heating Engineer'. However, an attempt to practise as an architect without being suitably qualified, would rapidly find you in 'deep water'. Clearly, it is illegal to call oneself an architect if you are not suitably qualified, so why is it not so with engineers?

It occurs to me, that by now you may be wondering where all this is leading to. Well, the point I am trying to make, is that I, with many other members of the Yorkshire Branch of the Institute, are becoming tired of every time there is a dispute at a hospital involving engineering craftsmen or electricians, the media report the facts as:

"A dispute at such and such a hospital involving engineers has reduced all admissions to emergencies only."

This is in spite of the fact that as defined in the Royal Charter of the CEI, the engineering profession is made up of:

Chartered Engineers, Technician Engineers and Engineering Technicians.

Bearing in mind the above, it occurs to me that if the general public are ever to accept engineers as professionals, that the media when reporting incidents involving craftsmen or egineers, (be they Chartered or Technician) must be made to use the right nomenclature. After all they would be most indignant if they found their professions being brought into disrepute.

Consequently, in my opinion, a concentrated effort must be made by those working in the engineering profession in general, and this Institute in particular, to ensure that everything possible is done to persuade and educate non-engineers into the correct use of engineering titles, and that all engineers are registered with the ERB and make use of any 'letters' so acquired.

Yours faithfully
K. B. WORSELL,
TEng(CEI), MIHospE,
Area Member of Council —
North East & Yorkshire.

A letter from America

IFHE — Tenth Anniversary

The American Society for Hospital Engineering would like to congratulate the International Federation of Hospital Engineering on its tenth anniversary. We are proud to be a part of the contributions the Federation makes to world wide health care through hospital engineering.

The rapid growth of the International Federation is a strong indicator of the need for high quality information to be made available to members. The International Federation can look forward to many years of growth, and an immeasurable contribution to the health care environment.

The American Society is also proud to be the host for the International Congress on its tenth anniversary. Our goal has been to develop the highest quality Congress and make it available to hospital engineering throughout the world at the least possible cost. We anticipate registrants from every continent and this could only be possible through the strong and reputable International Federation of Hospital Engineering.

We are affiliated with and guided by the American Hospital Association, and are located in Chicago, Illinois. Membership of the society is available to those individuals who are active in the field of hospital engineering and related engineering disciplines. Hospital engineering embraces multiple engineering disciplines that include planning, managing, operating and maintaining the physical plant facilities, communication, and biomedical equipment and systems in health care facilities.

The American Society for Hospital Engineers is directed by engineers, for engineers, so that hospital engineering may advance. It is a personal membership society, that offers an outlet for knowledge, experience, and ingenuity. The members contribute to the effectiveness and impact of the Society by participating at both chapter and national levels. There are over forty affiliated chapters throughout the United States.

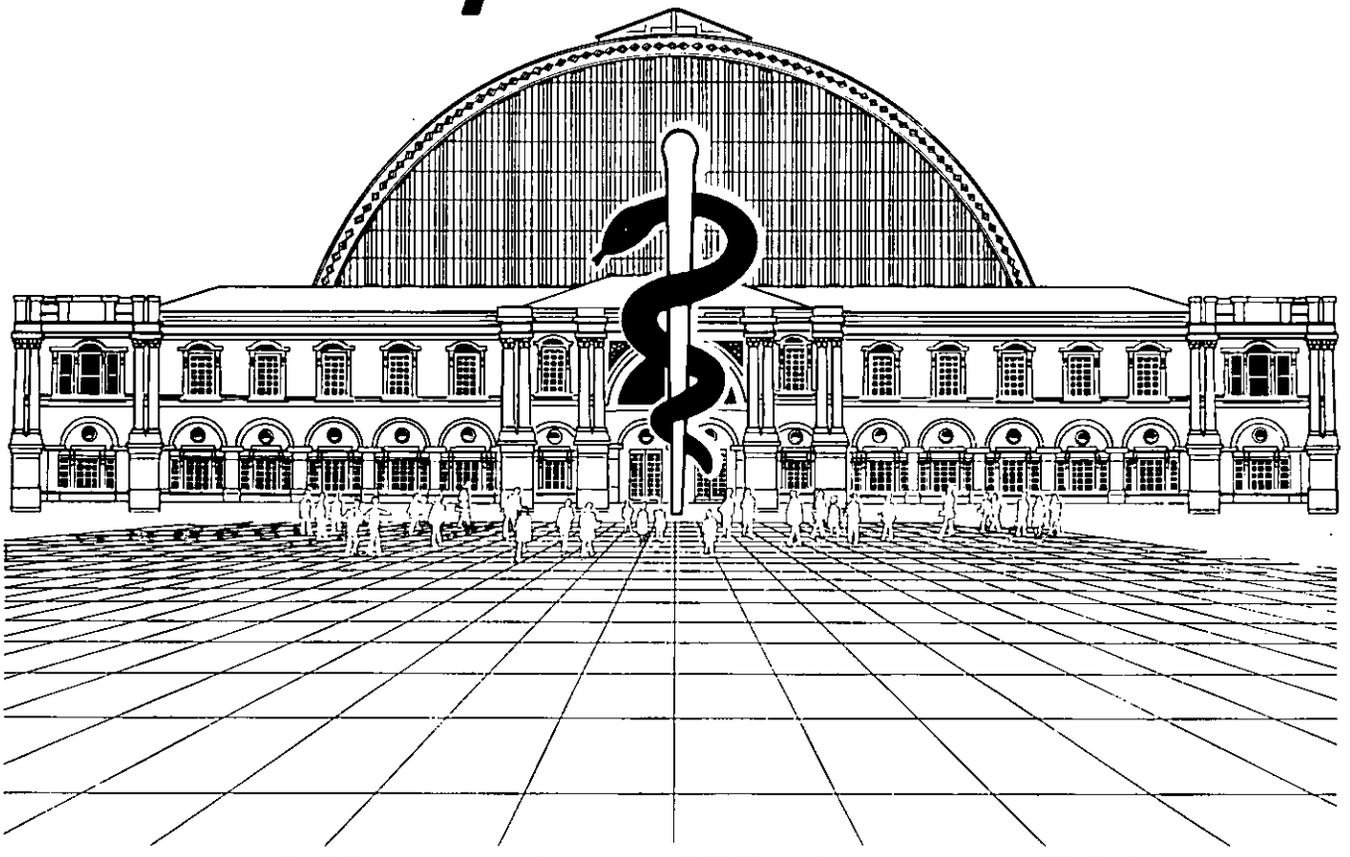
The objective of the American Society for Hospital Engineering is to advance the development of effective hospital engineering in the health care institution by:

Encouraging and assisting members to develop their knowledge, and increase their competence, in the field of hospital engineering.

Encouraging and assisting in conducting regular meetings, conferences, and educational programmes.

Providing a medium for the interchange of ideas among members and dissemination of information to members.

A major International Hospital & Medical Exhibition that you must visit



British Hospitals and Medical Exhibition, Olympia, London, 2-6 June 1980 9.30 am to 6.00 pm Monday to Friday

World health comes into focus at Olympia between 2nd and 6th June, 1980.

Plan your visit now to one of the most comprehensive international exhibitions ever staged in Britain for all professions and skills involved in hospital and health care.

See what's new for the 1980's in hospital and medical equipment, services, materials and supplies – at one time, under one roof. Compare features... prices... value for money to help you buy efficiently, more economically in the decade ahead.

Over 200 companies will be taking part in the exhibition including individual company and group exhibits from Australia, Germany, Denmark, Sweden, Brazil, France, Italy and the USA. Specially designated areas of the exhibition will be devoted to first-time displays of an advanced modular operating theatre, fully fitted with the very latest equipment and instruments, a new type of mobile dental theatre; the latest developments in patient diagnosis and a unique presentation devoted to current developments in handling major disasters and incidents. As part of the exhibition, there will also be the first British conference on laser surgery, a technique hitherto little known in general terms. The equipment of this technique will be exhibited by many manufacturers from the UK and overseas.

INTO THE 80's

For pre-registration tickets plus information on the eleven major conferences and meetings being organised for your profession during the show, write immediately to: British Hospitals and Medical Exhibition, 21 Park Square East, London NW1 4LH. Telephone: 01-935 8200.

Sponsored by the Institute of Health Service Administrators

Organised by Fairs and Exhibitions Limited, a Member of the Kern Organisation Limited.

6E CONGRÈS INTERNATIONAL DE L'INGÉNIERIE HOSPITALIÈRE

Washington, DC, July 6–11, 1980

The International Federation of Hospital Engineering (IFHE) and the American Society for Hospital Engineering (ASHE) of the American Hospital Association are offering to foreign and American hospital engineers, and guests an opportunity to discover and to discuss new developments, and new technology, in hospital engineering facilities, equipment, and operations through the presentation of papers, programmes and tours, at the Sixth International Congress of Hospital Engineering. The congress will be based at the Washington Sheraton Hotel.

Outline of Events

Sunday, July 6
12.00–18.00 Registration
18.00–20.00 Welcoming Reception

Monday, July 7
09.00–17.00 Late Registration
09.00–10.00 Official Opening
10.00–10.30 Welcome Coffee
10.30–12.00 Congress sessions
12.00–13.30 Luncheon
13.30–17.00 Congress sessions
19.00–22.00 Evening sessions

Tuesday, July 8
09.00–12.00 Congress sessions
12.00–13.30 Luncheon
13.30–17.00 Congress sessions
19.00–21.00 ASHE Regional meetings

Wednesday, July 9
09.00–12.00 Hospital Tours
12.00–14.30 ASHE Annual Meeting and Awards Presentation
15.00–21.00 Annual Outing

Thursday, July 10
09.00–12.00 Congress sessions
12.00–13.30 Luncheon
13.30–15.30 Congress sessions
16.00–17.30 IFHE General Assembly Meeting
19.00–24.00 IFHE Reception and Banquet

Friday, July 11
09.00–12.00 Congress sessions
12.00–13.30 Luncheon
13.30–15.30 Congress sessions
15.30–16.00 Farewell Coffee
16.00–17.00 Closing Session

Congress Sessions
The congress programme has been designed to provide an international perspective in areas that concern hospital engineers throughout the world. Supplementing the premier presentations of technical papers, concurrent sessions will be held throughout the week. The premier presentations of technical papers will be simultaneously translated into English, French, Spanish and Italian. Adequate time has been allowed for discussion of papers during the sessions. In addition, copies of the papers will be available in English or French to registrants at the time of registration. The following topics and papers will be offered in the premier session:

Planning and Construction, Monday, July 7
"Health and Social Security Centre" — M. Ferrando & E. Milone (Italy)
"Portuguese Hospitals. Planning, Evolution & Construction" — E. Hilario (Portugal)
"Practical Experience in Integration and Coordination of Engineering Services as Applied to Systems Buildings for Health Care Projects" — L. G. Hadley, S. Ratcliffe, R. H. Rooley (United Kingdom)
"Hospital Planning & Construction" — G. M. Hollander (USA)
"Hospitals: Modular Design & Structure — an integrated approach" — B. Shapiro & G. A. duToit (Republic of South Africa)
"Current Development in the Design & Construction of the Burns' Unit" — R. D. Buckley (United Kingdom)
"Health Facilities Planning, Design & Construction" — G. Oudens (USA)

Codes and Standards, Tuesday, July 8
"Challenges and Conflicts with Involvement in Writing Standards" — G. Webb (USA)
"Using Statistical Analysis to Write Standards, Codes, and Preventive Maintenance Programs" — H. Bershad & S. Szeglin (USA)

Managing the Engineering Function, Tuesday, July 8
"The Management of Change" — J. W. Winning (United Kingdom)
"New Role for the Hospital Engineer (as a Manager) — The Technical Administrator" — M. J. Fischer (USA)
"Hospital Engineer as a Professional Manager" — R. L. Beliveaux (USA)
"Control and Communications Center" — E. Rahat (Israel)
"A Case for In-House Service in Small Hospitals" — O. Hartford (Canada)

Hospital Medical Instrumentation Management (Clinical Engineering), Tuesday, July 8
"Developing an Efficient Medical Equipment Management Program" — M. Brinkman & M. Ridgway (USA)
"Development of responsibility principles in Swedish hospitals" — N. Tjernald (Sweden)
"Clinical Engineering in the Veterans Administration" — A. Bierenbaum (USA)
"The Biomedical Engineering Department" — L. Wullaert (Belgium)

Telecommunications in Health Care, Thursday, July 10
"International Telecommunications: Technological & Regulatory Perspective" — (USA)
"Telecommunications in Health Care" — M. Dillon (USA)
"Radio Frequency Paging Systems" — A. D. Blackler (New Zealand)

Energy Systems & Conservation, Thursday, July 10
"Conservation Opportunities in Hospitals: Research, Development, & Demonstration" — R. Pollack & B. E. Thurston (USA)
"Energy Conservation" — (United Kingdom)
"Energy Conservation in the Veterans Administration" — N. Feldman (USA)
"Maximising Energy Conservation Return on Investment" — E. T. Liston (USA)
"Air-conditioning installations in the surgical block" — D. J. Gallostra & J. Vinals (Spain)

"Geothermal energy utilisation for Merle West Medical Center" — R. L. Howard (USA)

Plant Equipment & Maintenance, Friday, July 11
"Development of a Management Information System and a PM System for Hospital Engineering Services" — C. Tanverdi (USA)
"Where Did All the Maintenance Man-Hours Go?" — W. L. Clemons (USA)
"Plant Maintenance" — (United Kingdom)
"Basic Elements for X-Ray Equipment Installations" — J. A. Silva (Brazil)

Safety, Environment & Infection Control, Friday, July 11
"Legionaire's Disease" — G. Mallison (USA)
"Isolation Facilities for Persons Infected with Communicable Diseases" — (United Kingdom)
"Hospital Services & Technical Installations" — A. Lena (Italy)
"Infective Waste in Hospitals — Safe and Economic" — C. Hartung (F.R. Germany)

Running concurrently with these sessions, the following special technical and issue-oriented programmes will be presented in English only.

Alternate programming for plant engineering includes sessions on the hospital engineer's role in safety and infection control, energy policy, energy building performance standards, energy contingency planning, emergency preparedness, construction in the USA, risk management, hazardous waste disposal, electrical safety testing, management skills, preventive maintenance, the Life Safety Code, National Electrical Code and an update on interpretation of JCAH standards on functional safety and sanitation, and building and grounds safety.

Alternate programming for telecommunications will focus on those technological and management issues that are of interest to international participants as well as US participants at the congress. Telecommunication sessions will include presentations on efficiency in the design of the telecommunications department, guidelines for purchasing a hospital telephone system, the role and responsibilities of hospital telecommunications directors, back-up and ancillary support systems to facilitate hospital communications, and computerised telephone management systems.

Alternate programming for clinical engineering will include a series of displays, sessions and workshops on the following topics: clinical equipment planning including ICU design, evaluating service contracts and bid proposals for medical equipment, productivity of clinical engineering departments, AHA Technology Evaluation and Acquisition Method (TEAM), electrical safety testing consistent with the up-coming NFPA 76B, risk management concepts for engineers, update on electrical codes and standards, JCAH interpretation, clinical labs and x-ray system maintenance, AHA/ASHE Technology Assessment Programme including mass spectroscopy systems, infusion devices, multiphasic screening, arrythmic systems, ethylene oxide control, and waste anaesthetics systems.

In addition, two special sessions have been planned: "Curbside Clinics" (on Monday evening, July 7), which are informal discussion sessions led by individual moderators on various topics, and a special session designed to assist hospitals from a wide range of countries to evaluate existing medical technologies for possible equipment acquisition, installation and maintenance (on Wednesday morning, July 9).

Tape recordings of the first session presentations will be available for purchase in French, English, Spanish, and Italian. Recordings of the alternate technical programme will be available in the language of presentation only (predominately English). Tapes may be ordered at the Congress and will be shipped at a later date.

Hospital Tours. Tours of the physical facilities of several hospitals in the area have been arranged for a limited number of delegates and guests on Wednesday morning, July 9. Each tour will highlight some aspects of unusual architectural layout, mechanical design concepts, a special treatment center, physical plant or patient care area. Tour information will be mailed with materials upon receipt of advance registration.

Poster Sessions. Space will also be available for hospitals, engineering society chapters, or individuals to present subject matter that would best be displayed through the use of photographs, graphs, or charts. Poster presentations will be open all week, and schedules will be posted with times when authors will be available to answer questions about their displays.

Literature and material illustrating various states-of-the art in equipment, design, and technology will be available for purchase in the display area.

Other Activities

Banquet. On Thursday, July 10, the IFHE Banquet will be held in the hotel, beginning at 7.00 pm with cocktails, and followed by dinner and musical entertainment.

Afternoon Outing. A traditional ASHE event, the annual outing will be held on Wednesday, July 9 from 3.00 pm–9.00 pm at Smokey Glen Farm. Buses will transport you to the rolling hills and farmlands of Maryland to enjoy an informal old-fashioned Americana feast of barbecued chicken and ribs, baked beans, home made bread and pies, and beverages including unlimited beer and wine. Entertainment includes a barber shop quartet, hayrides, craftsmen at work, and a stirring presentation by musicians and performers dressed in Revolutionary War uniforms.

For Spouses and Guests. A hospitality suite for spouses and guests will be hosted by the Chesapeake Area Society of Hospital Engineers in the hotel during the Congress. Information will also be available on tours, sites, and services in the Washington area. In addition to the numerous museums, monuments, and shops in Washington, DC, there will be optional day tours available on a limited basis through Cartan Travel Bureau.

Full details and application forms are available from: International Conference Service, Group Travel, Thomas Cook Ltd, PO Box 36, Thorpe Wood, Peterborough PE3 6SB Tel: 0733-502594005.

6o CONGRESO INTERNACIONAL DE INGENIERÍA HOSPITALARIA

Patients First

The Institute held a one-day seminar in London in February, jointly with the Institute of Building. It was a forum for discussion on the NHS consultative document Patients First. *The discussion was lively, and the papers were illuminating.*

Two of the papers are reprinted below, and the remainder, together with a full report of the day's proceedings, will appear in our April issue.

What Should be the Regional Role?

G. BROOKE MSc(Eng) CEng FICE MBIM
Regional Works Officer Mersey RHA

Any sound enterprise requires a policy which sets out its intent; access to resources to meet that policy; and the Managerial Systems needed to achieve the policy..

Sir Keith Joseph describes the Estate in the '74 re-organisation as, "The biggest slum in Europe". This is a manifest demonstration that, as an enterprise the NHS is a failure in managing the Estate and physical environment in which care is provided. This paper examines the way Regions and District Health Authorities must collectively arrange their joint interests. The examination moves on from the guidance in *Patients First* which concentrates on the operational problems of providing health care. The Regional role must concentrate on the strategic problems of the mid '80s. The problems the Estate will be facing are:

The Bills from the peak investment in the '60s
Current design standards and their consequences
The effect of current cuts
The effects of Legislation
The 'new broom' attitude
The faster pace of change.

Looking at these in more depth, first, we had a surge in capital building works in the late '60s and early '70s. The percentage of resources needed was doubled from about 6% to 12% and the building industry offered materials and systems which were quick and cheap at the time. The 10 to 15-year life cycle of key elements is over and the debts are coming in. Flat roofs, plastic coated windowframes, softwood timbers, air conditioning systems that have not been properly looked after are all evident.

The public housing sector is now facing these bills in its flats, and housing corporation estates.

Second we have seen a continuing erosion of design standards when quality has been lost due to cost limits — save on capital and spend on maintenance. But of course the money was not spent on maintenance. The politicians were happy as they were delivering more beds per £, but those politicians have now moved on . . .

Third the financial crisis hit the Health Service from '78 onwards. Traditionally, and unimaginatively, the cost of estate maintenance was the finance officer's first target. Works staff may now have better information and more professional management, but we still see cuts in spending. The debts that were deferred, will accrue in the mid '80s.

Fourth uncosted Legislation and the effects of Howie, Health & Safety at Work, Fire Precautions and Building Legislation are now sapping the capital programme and working their way through the system. They were pushed forward as a political priority but, as with all instant political decisions, the costs were not worked out till afterwards.

Fifth the 'New Broom' mentality of the new DHAS questions the plans and priorities which were imposed on them by former Areas and Regions. New members are working to make their impact with new management teams as they learn new roles and responsibilities. The fashionable words to describe the current reorganisation are: 'Minimum Turbulance'. But, that cannot mean no turbulance.

Sixth nationally, big shifts in the economy will be seen, and the effects of high fuel and labour costs will be felt. The first sector to be hit will be the Long Stay Institutions. Society will be less tolerant of the existence of 'People Bins' in the non acute sector and with the aged population increasing more strain will be put on this sector.

I therefore predict an accumulation of problems in the mid '80s. This is the environment in which we must examine the key problem areas which are:

Policy
Resources
Management Arrangements

Problems on Policy

There is no clear policy which defines the Secretary of State's duty, or how public investment in Health Estates, should be used to provide health care.

RWOs met the previous Secretary of State, David Ennals, in April 1977 and told him he didn't know where he was going and his Department didn't know either. We demonstrated to him that for the past thirty years the Service had been living off the fat of the Victorian era and the Estate's assets had been wasted during that time. Was that to be policy for the next thirty years? We proposed that a study be set up to review Health Capital Estate under an independent Chairman. We were fobbed off with a Departmental Review which eventually came up with the Review of Health Capital in October 1979.

This was a ragbag of old techniques but even this could not avoid the obvious. On policy it said:

"further thought needs to be given to identify the essential features of broad national guidelines".

It took them two years to confirm what we had originally told them.

Politicians like policy. The trouble is that they are never around long enough to develop one. As long as they can produce a glib title, it doesn't bother them too much. You remember, *People before Buildings, The Way Forward,* and now *Patients First.* Perhaps, the next one should be *Wither the Estate.*

Resources

Now let us look at the problem of resources. Here I mean money but the economists in the Treasury always talk about 'Resources'. Talk amongst Works Officers on status and professionalism, means nothing unless we get the resources right.

The allocation at Departmental

level, on the Health Service vote into revenue and capital accounts, is nonsense because:

There is no policy on which an allocation can be determined and capital funds (which are not capitalised) are set by chance, as the uncommitted cash flow left over in the Health Service vote after the revenue commitment has been met.

There is a failure to recognise that so called capital and current estate maintenance spend are inseperable cash flows of current resources into the estate. The definition of capital is a cost clerk's contrivance.

'Free' Capital in the financial system — our money and their money — must set Region and District at each other's throat and give local management a soft opinion either to blame 'others', who will not give capital or exacerbate public opinion until the capital is provided.

There is an uneven demand on resources in the form of past investment (that is in the present Estate) and future resource (that is capital and revenue spend in the current Health Service vote). This is due to population change and change in clincal practices. The response time of the administrative system creates artificial restraint on the provision of health care and the effective use of public money. Peaks in capital demand are uneven. Even the smallest nucleus first phase with its related support schemes can be double the average demand by a DHA for capital. For example, 10% of a Region's population may need 20% of capital for three or four years to manage a modest building programme. They will get 5% for the next three or four years whilst another District takes its turn. The former Areas could smoothe out between Districts and Region could smoothe out between Areas. That flexibility will be lost.

Direct capital allocation may suit a few big DHAs and Teaching Areas but the average and small DHA would never have enough capital cash flow to enable it to make any significant changes.

It would be soft to imagine we can mount an argument to this Government for more resources. And the next Government, be it Socialist or Conservative, will be in no better position.

To the eternal optimist, who hopes that some golden dawn will arrive with capital poured in from on high, we must pose this question. How quickly can the Service respond? We are now suffering, as I showed earlier, for the precipitate injection of capital in the '60s which produced the 'Monster' DGH which is now the subject of criticism from the politicians, who didn't want it good — they wanted it quick.

Management

In addition to the omission of policy above, and the illogicalities of resource definition at the top office, there is further confusion caused by ambiguous and conflicting responsibilities vested in the Agencies which we used — that is between the Department, Region, and District Health Authorities.

The Secretary of State has the burden laid on him by Parliament to provide health care for the public and patients. He wants the minimum superstructure, and would like to deal directly with the patients and the public.

Patients First sets out the Secretary of State's intent at 'coal face' level and in it he outlines what he wants regarding the DHAs and its Units. But between him and the DHAs there is ambiguity and uncertainty.

Firstly, on the interface between Regions and the DHAs and secondly, on the relationship between the Regions and the Department.

There are those who say on grounds of simplicity — Do away with Regions. But that leaves the Department to the DHA interface, and who controls the Department? This great dinosaur has Sir Patrick Nairn and Patrick Jenkin up in the skull pulling all the levers but Region and DHAs have to deal with the rear end of the beast. What sort of service are 200 DHAs going to get and furthermore how big will the beast then be?

We must recognise the control and influence of lay members. Their presence holds the two organisations at Region and DHA together. The Department has no such control.

To those who complain of the Regional yoke, we must ask: "But would you prefer the Departmental yoke?"

I believe that a Region and its component Districts must be allowed adequate freedom by the Secretary of State to join together to agree their preferred local solutions from the mid '80s onwards. It is worth stressing here that there is a *wide disparity in Regions. How geography influences relationships now the local membership grapevine works whether the Region faces growing or diminishing populations. The character of DHAs will vary far more widely than their former Areas varied.*

The flexibility in the Regional role and its relationship with its Districts must take into account these wide variations. The message I propose is "No Departmental Dogma".

Without policy, with conflict and confusion on resources, there can be no numerate criteria to measure management performance. Without measurement of performance there can be no management success.

So what are the proposals that I put forward?

Proposals

Policy

There must be a policy. As the politicians and the Department have failed over the past thirty years this should be left to Regions and their District Health Authorities to agree. Morally it should be: to hand over to future generations a Health Estate in no worse a condition than the one we have inherited. Reality stifles the ambition to hand over a better Estate.

At worst it could be: to ensure that no District Health Authority selfishly consumes its inheritance to the detriment of its sister Authorities.

In practice it may be: to ensure that all Authorities consume their Estate resources to an equal rate, and let future generations fend for themselves.

The central point must be:

It is in the common interest of DHA to share the burden and agree the policy within a Region.

The agreement should be local and not come from centralist imposition.

That a short term expedient must not prejudice long term need.

Whatever policy is chosen introduces a need for Trustees of the Estate. The Trustees must protect the inheritance of a vast Estate for the benefit and needs of future generations from the depredations and short term interests of this generation. The 1977 Act specifically gives power to the Secretary of State to maintain the Estate. The Secretary of State should vest the function of Trusteeship in the Regional Health

Authority. In turn the regional Health Authority would require a District Health Authority to undertake the twin responsibilities of trusteeship for future generations, as well as the provision of health care for this generation.

To use another analogy, this Government frequently commends the managerial virtues of Marks & Spencer: There we have common policy and the local management striving for maximum service in their environment. No local manager is allowed to sell off his store's carpets and fittings to enhance this year's profits, on the basis that Head Office will give him more capital to buy new carpets next year. This concept of capital preservation is now being recognised by the more forward thinking Treasurers in the Service.

I turn now to my proposals on resources where I will develop this concept of Capital Preservation.

Proposals on Resources

Capital and revenue spent on the Estate must be recognised as cash flow. They must be recognised and recorded as resource investment into the Estate, to compensate for decay and facilitate change. It is a fundamental weakness in any managerial system to separate control and accountability. The statutory accounts produced by Treasurers show capital spent in one account and revenue spent in another. But simply as an audit of expenditure not as a management account.

Capital is now a 'free good' and in any managerial or economic system a 'free good' destroys economic and managerial logic.

The Government pays interest to borrow capital and so should the users.

Regions should have a capital fund to finance the policy they can afford.

A Region and its DHAs should not depend on some Departmental whim for their level of capital provision.

The District Health Authorities should repay what they consume to generate a self financing Regional Capital Fund.

Capital is the seed of change.

At present we consume that seed corn each year and no effort is made to replenish our Capital Fund, hence the fund must be self-financing.

The Region would become a banker operating this account on behalf of District Health Authorities. This fund would comprise of the present capital subvention by the Department plus loan repayments from borrowing Authorities. The size of the capital fund, interest rates and repayment policy would be decided by the Trustees within a Region by costing the chosen policy. As a broad judgement to match a 'no decay' policy the fund should be set up to allow annual capital spends at double the current levels. This could be achieved in about five to ten years time at an acceptable pace of change.

Internal borrowing and lending in a Region should not suffer the Treasury's objection to external borrowing by the NHS. The arrangement proposed has political credibility: in an era of moneterism it gives genuine choice to DHAs and the grass roots decision makers to bring in some real honesty into decision making.

There will be a natural squawk that DHAs can't afford the cost of capital: *if they can afford the operational costs of a new development which may be about 50% of capital costs they can afford the costs of capital which may be 15% or so. If they had spent revenue on maintenance they would not need to borrow capital for repairs.*

Whatever develops, I believe this Regional fund is a necessary first step. The idea was mooted in the RAWP Capital Report but, as then proposed, it suffered the over-complications of charging differential interest rates to reflect health care priorities.

I don't think that could work but it may be a longer term development.

Revenue

Estate Maintenance Expenditure on Building Engineering and Grounds, would be agreed at a standard rate per square metre by all District Health Authorities within a Region. This rate would be weighted to reflect Estate mix and would be agreed by all District Health Authorities, in consultation with Regional Trustees. In the first account period the rate would reflect recent expenditure but allow time to adapt, future increments of expenditure would be agreed.

Such agreement is to the common interest to prevent renegade Authorities underspending on their estate, and forcing high priority on to capital schemes to remedy any cumulative decay. In effect this steals capital from other District Health Authorities. Expensive capital borrowing would encourage a proper revenue spend by District Health Authorities.

To accelerate the growth of working capital in the Regional Fund, Authorities might agree to remit to the Regional Capital Fund a common charge per square metre representing a notional charge on existing Estates. This arrangement has merit over the alternative of a common levy on revenue allocation, which may not reflect the volume and effective use of fixed assets inherited by District Health Authorities. Current flexibility between capital and revenue is a welcome move but cannot work properly without a 'banking' arrangement. A prudent DHA, moving revenue to capital cannot build up sufficient funds to change significantly their own capital programme. This situation will be harder for the increasing number of small Authorities evisaged in *Patients First.*

The prudent are further deterred by knowing that any reduction they make on the demand for 'free capital' is mopped up by the profligate Authorities' 'shroud waving'.

Resource Measurement

This requires an Estate Asset Register for each District Health Authority, which will record depreciation and unites capital and revenue cash flow of resource investment, over a three-year operational period. This is shown in simple terms in *Figure 1.*

Figure 1. Asset Depreciation Register

Opening Asset at Start of Account	—	Less Annual Depreciation on Life Cycle set by Trustees	+	*Controlled by Region* Annual Capital Expenditure	+	*Controlled by District* Revenue Expenditure on Building Engineering and Grounds	=	Closing Asset at end of Period Less Disposals

The technique and data to operate this resource measurement, which did not exist at the '74 reorganisation, are now available. However, there would be a sensible cut-off agreed to include land, building and building services and major fixed equipment. This formula is the essence of control. It is to Estate Management what $E = mc^2$ was to Physics.

Management performance would be measured by the change in the above components, enabling comparison to be made between Health Sectors, District Health Authorities and Regions. The Department has resisted this technique since Guillebaud in 1956, and in their recent 'Review of Health Capital' could only argue that 'the analogy with private or nationalised industry is not really applicable'.

To date there has been no audit on performance and no management measure. How are 200 DHAs to demonstrate they are not burning up the floorboards to keep the patients warm? How is the Secretary of State to satisfy Parliament that he has not pawned the Estate this year?

He could direct Regions, and Regions could direct the DHAs. He has the power, but he wants to leave it to grass roots decision-makers. As *Patients First* indicates, he should require Districts and Regions to work out their own solutions to the problem of Trusteeship.

Management Arrangements

Estate Trusteeship should be vested by the Secretary of State in Region, perhaps using an Advisory Committee to the RHA. This Committee could comprise selected RHA members plus one member with big business experience from each DHA.

The Trustee Advisory Committee would agree:

Estate Policy
the level of the Regional Capital Fund
loan period and interest repayments
standard levels of Estate Maintenance Revenue expenditure for all DHAs

The allocation of capital loans would be vested in the Regional Health Authority recognising its obligations for strategic planning, resource allocation and accountability to the Secretary of State for the conditions of its Estate.

The Region will allocate revenue resources and capital from the Capital Fund to ensure strategic plans are implemented. It will prepare for the Trustees and for local DHAs control an asset register showing the net change in assets over an account period.

To manage this process for the Regional Health Authority, a capital planning, design and estate management service would be controlled by the Regional Works Officer to support the DHA Works Office.

The Regional role is as follows:

Regional performance *would be measured by its ability to manage Asset Changes in the Region as a whole. In turn it would measure the performance of DHAs by their success in managing the change in the condition of the Estate.*

Project Appraisal *is a prime responsibility of Regions for any scheme making a call on capital funds. The brief fixes 80% of capital costs. The designer and contractor can only influence 20% of the costs. There are sufficient medical and nurse planners to staff the existing Region and Area service. Two hundred DHAs could not hold or utilise these key people. Applications for capital invariably underestimate costs just to get a scheme admitted to the capital programme. So the people issuing capital must make the estimate of capital cost, otherwise the capital programme is a compilation of pious hopes.*

Allocation of Loan Capital. *New capital is the vehicle of change. Allocation must rest with lay members to follow the priorities that they choose as guardians of the local public interest.*

Design and Project Service. *Design process must be integrated with project appraisal and the feasibility study.*

Initial Cost Plan

The initial cost plan is the first and most important discipline to impose on the designers and the project team. The selection of designers to meet that discipline, is a professional responsibility. It is not a matter for lay judgement by members, or administrators on the basis of 'Golf Club' contracts or "my brother-in-law had a garage built. He knows a good architect".

The volume of experience and knowledge in the Regional Works Service in numbers alone, must be greater than that which will be defused amongst Works staff in 200 DHAs.

I believe the Health Service must use its purchasing muscle in buying professional services. It should develop the experience in selected practices who are prepared to respond to our needs. To do this a tightly controlled panel of approved practices is needed.

I understand the frustration on capital works, and the belief that local appointment will remove this frustration. This is not so. The frustration arises from the process of capital control on public money. I would like to comment on that in a moment.

Support to Small DHAs on Revenue and Capital

The principal responsibilities of current Area staff are:

managing delegated capital schemes
formulating Area Plans and Budgets

There is a risk that this service to DHAs will collapse in the turmoil, as multi-District Areas are dismantled. In the period of change I believe Regions should provide that service.

We know the District to District service doesn't work. If Region does not manage, who will?

Scheme Approval

All those who argue that the Regional tier should be dismantled must answer the question "Who is to give the approval to various stages in Capital Schemes?"

If the Regional responsibility is reduced to a service as in Scotland, do you seriously believe that the Department should be the vetting body? It may work in Scotland with a population of five million and the Secretary of State on the doorstep.

All the above components can be managed by local agreement between Region and DHAs using the Trustee Committee. But again remember the wide variation between Regions and further between the new DHAs.

The solutions I use in Mersey may not work in the South West and vice versa.

The imposition of Departmental dogma trying to fit all Regions and DHAs into the same mould will pro-

duce unnecessary stress. Let me return to the problem of capital controls which cause Area such frustration.

Capital Controls

The process of controlling capital spend is, in my view, over-disciplined but it is public money. Parliament and the Public Accounts Committee and the Secretary of State require controls. One of the key components is the outside body checking and vetting the proposals of the spenders.

The major components are:

Priority decisions between Sectors and Districts
Allocating a relevant sum to the scheme
Control expenditure to meet allocation
Accounting for where the money went
Standards of investment, seeing they are neither too luxurious nor too spartan.

Reduce the Region to a service agency and you put yourselves in the hands of the Department.

Having described what I believe is the need for a strong Regional role how does this relationship develop with the DHAs?

The DHA Role

To strengthen and develop the Works service into the DHA role, I take as my premise that the performance of DHAs is to be measured by the Asset Depreciation Register. We now get proper management accounting through the Trustee Advisory Committee. The DHAs are working to common levels of annual spend. Where this spend is allocated is a matter for local decision.

This standard Estate Charge is £/sq metre is converted to an annual budget and allocated by the Works Officer into:

Building
Engineering
Grounds and Garden components.

This spend is then allocated by the DHA to the component Units. The capital expenditure on the operational units is aggregated at this stage to give to the *Total Cash Flow on the Estate.*

The planning and programmes of this spend are then a matter for agreement and consultation by the District Works Officer with the Unit Management Team.

Good management requires clear accountability and the essential element is that the budget holder is defined as the DWO as the only man technically qualified to manage that budget.

I would briefly like to develop my view on the Works Officer role at DHA level.

First we should recognise the significant difference between existing AWOs. Second recognise the wider spread of responsibility we are likely to face from say, large Areas currently serving perhaps 500,000 people to the small DHA which may have 150,000 to 200,000 people.

The choices seem to be either to have a general post and refill all DWO and AWO first and second line posts. This produces maximum turbulance and, more important a maximum increase in costs. Or to try and preserve the status quo, and replace by natural turnover. This has minimum turbulance and minimum costs.

But it leaves DWOs exposed to capital works and budget responsibilities they were not appointed for, and which were formerly carried out by multi-District Area staff. I believe the most efficient way to support the existing DWOs in multi-District Areas, is to provide these supra district needs by carrying former Area staff on the Regional payroll. If geography is the problem, outposting is the answer.

There has in the past been duplication between Regional liaison staff and Area staff and that could be eliminated.

We should look to full chartered status of all DHA Works Officers but of the 250 DWOs only about one-third are currently chartered and it would be a waste to the Service to remove them from post.

The District Works organisation is primarily an operational service responsible even at the mundane level of, warmth, light, and water, delivered 24 hours per day, 365 days per year by increasing expensive and complex technologies. The staff needed to carry this burden, are not the staff needed for strategic planning and design.

Having defined this prime operational responsibility, and recognising budget accountability, it is clear that the new District Works Officer should be accountable directly to the District Health Authority. That is at the top of the tree. Down at grass roots, it would make good sense to designate one Works Officer at Unit level to respond to the needs of the Unit Management Team. Here again this is a matter for local decision, be it Engineer or Building Officer.

Criticism of these proposals will come from those managers who have traditionally used estate maintenance and minor capital allocations as a soft way of balancing budgets in the short term. There are also those who will argue that current resources do not allow sufficient revenue to repay capital. In reality they are ducking the responsibility of genuine opportunity cost evaluation which is the price of grass roots autonomy. The Department and Treasury civil servants who see self financing capital funds as depriving them and their masters of their major gift and influence, will also object.

There may even be the managerial 'flat earthers' who have only known the existing system of capital and revenue allocation from the inception of the Service. Their answer is, for all to see, in the present condition of the Estate. The benefits will be:

a realistic volume of capital made available by local agreement to meet the needs that District Health Authorities can afford;
a means in the long term to reverse the continuing slide into decay of the Health Estate and the environment in which patient care is provided;
a vehicle to eliminate the inherent conflicts and nonsense arising out of 'free capital';
measured accountability and responsibility down the line from the Secretary to the Patient's bedside.

Summary of Recommendations

The recommendations are as follows:

Introduce loan repayment and interest charges on borrowed capital by operating a Regional Capital Fund.
Set minimum levels of expenditure on the Estate by agreement with all Health Districts.
Consolidate the above two methods of investment into one account which records the assets and their depreciation over the account period.
Have the concept of Trusteeship measured by the above Asset Register, vested by the Secretary of State in Regional Health Authorities.
Let Regional Health Authorities devolve their Trusteeship to District Health Authorities, and in turn measure their performance.

£500 ENERGY SAVING COMPETITION

Hospital Energy Conservation Year 1980

Wanted	Your ideas for Energy Saving Schemes
Reward	You can win a cash prize, and have your idea published in Hospital Engineering Magazine
Who?	Anyone who works in or with hospitals (or uses hospitals) e.g. Administrators, Doctors, Nurses, Ancillary Staff, Engineers, Patients and Visitors
When?	Submit your entry anytime until October 1980
Subject	Enter in any of the classes below

1. Modifications to Plant (Heat Recovery etc) which have been implemented and proved
2. New Ideas for Plant Modifications, etc, which have still to be evaluated
3. Non-Engineering Suggestions for Conservation Measures
4. "In-House" Publicity Schemes, eg Regular Hospital Energy News Sheet for all Staff
5. Poster Design for Encouraging Energy Savings in Health Care

Prize - £100 per class (prizes may be shared or not awarded at all, at the judges' discretion. See full rules for further details.)

The Institute of Hospital Engineering, 20 Landport Terrace, Southsea, Portsmouth, PO1 2RG

Hospital Energy Conservation Year 1980

Patrick Jenkin

Foreword by Secretary of State

As Secretary of State I am happy to give my support to the Institute of Hospital Engineering proposal to make the fothcoming year 'Hospital Energy Conservation Year'. I know you aim not only to save energy but also to reduce the cost to the Health Service. Thus there is the double motivation. All cost savings which can be made can be ploughed back into the direct patient care which is our primary purpose; but additionally all economies in energy, whether they conserve our indigenous fuel supplies or whether they reduce our national demand for imported energy, are a great help to the nation.

The Health Service estate is not only much larger but also much older than is generally realised, having an average age of 65 years. Thus a high proportion of the buildings and services reflect the design attitudes of an age when fuel was readily available and cheap. Clearly this stock of buildings in its various parts must offer potential savings but a wide range of techniques of both management and technology must be used if they are to be realised.

The energy bill for the NHS is already in excess of £150 million per annum and the energy conservation efforts to date, in which your Institute has played its part, have halted what was previously a steadily rising annual consumption curve. But the real costs of energy are also rising and are predicted to double by the year 2000. The importance of conservation increases with every upward change. To appreciate that even at today's prices every one per cent of improvement in the thermal efficiency of our buildings will save the Health Service over £1 million per annum is to realise what a substantial

Competition Rules

1. There will be a cash prize of £100 in respect of the entry from each Class which, in the opinion of Adjudicators, is considered to contribute most, within its Class, to energy conservation within Health Care Premises.

2. All entries must be received by the Secretary of the Institute by September 15, 1980.

3. All Classes are open to any person, of any discipline, and joint authorship is allowed.

4. The Paper may have been given at an Institute Branch meeting or meeting of any other Institute or Organisation. Authors, wishing to submit a Paper presented to a meeting of another body, must obtain written permission from that body and forward it with the entry form. A paper which has been published previously, may be entered for the Competition but in this event it should be accompanied by the written permission of the publication concerned with authority for republication if the Institute so wishes.

5. The Paper which should normally be of not less than 1,500 words (3 x A4 sheets), may include illustrations, charts, etc. It should be original, and clear acknowledgement must be made of any use of published material and references.

6. Papers should be typewritten, preferably double-spaced, and on one side of the paper only. The Paper must be accompanied by a completed entry form together with details of the date and occasion on which it was originally presented, if applicable.

7. Entries for Class 4 must be accompanied by the "In-House" publicity journals which the Institute will have the rights to reproduce in whole or part in the journal *Hospital Engineering*. The publicity schemes entered in this class must have been running for at least six months.

8. Entries for Class 5 must be original and of the authors/Authorities' own design. Posters submitted should be forwarded to the Secretary of the Institute in a suitably sized envelope/cardboard tube, unfolded. On receipt, the Institute will have the rights to reproduce in the journal *Hospital Engineering*.

9. All entries will become the property of the Institute. The copyright of any original paper published in *Hospital Engineering* shall belong to the Institute, but publication elsewhere may be allowed at the discretion of the Institute.

10. Neither the Institute nor the Publishers will be held responsible for any loss of or damage to material submitted.

11. Adjudication will be completed by October 15, 1980. The Adjudicators shall be appointed by the Institute of Hospital Engineering and their decision shall be final.

12. In the event of it being decided that a Paper shall be published, the Editor reserves the right to edit this Paper prior to publication.

13: Non Institute members, whose Papers are published will receive a complimentary copy of the appropriate issue of *Hospital Engineering*.

14. The right is reserved to withhold an award should none of the Papers submitted/published be considered to be of sufficient merit.

15. The awards will be presented in London onNovember 12, 1980.

contribution can be made by further efforts in this field.

Future improvement in energy conservation will clearly require greater efforts by management and increased user co-operation and I am pleased to see that you propose to discuss these subjects. But it will also be necessary to look to technology, and perhaps the new technologies, to produce the larger economy which we must try to achieve. In so doing there must be hard economic appraisals of costs and benefits for it is not enough simply to aim for the maximum possible energy economy. In today's economic climate all proposals have to be evaluated and weighed against each other so that the service as a whole obtains the greatest benefit. I hope that from the deliberations and activities of the Institute and its members throughout the forthcoming year there will be many more detailed and rigorous examinations of schemes for energy conservation, and that they will receive their due consideration in competition with other demands on Health Service capital and achieve economies that benefit the service as a whole.

Patrick Jenkin, MP

Hospital Energy Year £500 Competition

As announced in our December 1979 issue, with the agreement and approval of the Department of Health and Social Security, the Institute of Hospital Engineering has declared 1980 *Hospital Energy Conservation Year*. The Institute is extremely grateful to the Secretary of State for Social Services, Mr Patrick Jenkin who has written the foreword which appears in this issue, and who has kindly agreed to open the first of the four Symposia which the Institute is holding on Energy Conservation.

Hospital Energy Year, which is designed to involve people from all disciplines within the National Health Service, including patients and visitors, are mounting a competition with prizes worth £500.

The competition is divided into five classes: two for technical papers on Energy Conservation Schemes; one on 'Housekeeping and Non-engineering topics'; a review of Authorities and Hospitals 'in-house' publicity schemes to encourage energy saving; and an Energy Saving Poster Design competition.

Judging will take place in September/October 1980, and the Secretary of State for Energy will present the prizes at the final Symposium which will be held in London on November 12, 1980

The purpose of Hospital Energy Conservation Year is to combine the efforts and talents of the energy suppliers (works discipline) and the users (all disciplines). Homer wrote in the Iliad, *to aid our cause, although we be but two, great is the strength of our feeble arms combined.* The Institute believes that, with even greater efficiency of generation and distribution, and thrifty and sensible use of energy in its various forms, the Health Service's energy costs of £120 million per annum can be greatly reduced.

Posters and copies of the Competition Rules and Entry Forms will be sent to all Health Authorities and Districts in March. The Rules and an Entry Form will be included in the April issue of *Hospital Engineering*. All enquiries should be sent to the Institute office in Southsea.

Members are asked to do all they can to generate interest in the Symposia, and participation in the competition, which are important parts of Hospital Energy Conservation Year.

HOSPITAL ENERGY CONSERVATION YEAR 1980

COMPETITION ENTRY FORM

Name: (Mr/Mrs/Miss) ..... Occupation.....

Hospital/Health Building .....

Name of Employing Area, District, RHA, etc .....

Home Address: .....

.....

Entry for Class:

	Subject	
No. 1.	Modifications to Plant, (Heat Recovery etc) which have been implemented and proved	.....
No. 2.	New Ideas for Plant Modifications etc, which have still to be evaluated	.....
No. 3.	Non-Engineering Suggestions for Conservation Measures	.....
No. 4.	"In-House" Publicity Schemes, eg Regular Hospital Energy News Sheet for all Staff	.....
No. 5.	Poster Design for Encouraging Energy Savings in Health Care Premises	.....

(Please tick appropriate class no.)

Brief summary of paper submitted. (Maximum 50 words).
(This should be filled in for entries in classes 1-3. Examples of the submission should be included in classes 4 and 5).

I agree to abide by the rules of the competition and that my entry (in class 1-5) becomes the property of the Institute of Hospital Engineering.

Signed .....

The Institute reserves the right to publish entries in the Institute's Journal or any other publication of its choice.

Entries to be submitted *only* to: The Secretary, The Institute of Hospital Engineering, 20 Landport Terrace, Southsea, Hants PO1 2RG.

N.B. The Institute would expect that any prize awarded might be shared amongst any joint participants/contributors to the successful scheme/entry.

Patients First

Another paper given at the Institute's February Seminar.

The District and Unit Functions

FRANK D. BLACKBURN AIEE FIHospE

District Works Officer, Norwich Health District

Introduction

In the light of current discussion of *Patients First*, it is hoped this paper will present a District and Unit Works viewpoint on the problems arising from the proposed re-organisation, and offer tentative guidelines as to how such change should be achieved. Former re-organisations and past progress will be reviewed, whilst also looking forward to the future envisaged in the consultative document. The structure and size of existing Districts and Units will be analysed in relation to the implications of *Patients First*, in addition to an examination of the workload of the modern 'Works' department. The problem of accommodating this workload within future arrangements will be discussed, as will possible management structures. Finally, certain guidelines to re-organisation will be identified, the most fundamental being re-organisation 'from the grass roots up' and, not surprisingly in the view of the consultative document, 'patients needs first'.

Re-organisation — Past and Present

Patients First envisages re-organisation as fundamental to achieving an effective Health Service, but such views were also expressed prior to 1974. Re-organisation is usually seen as the universal panacea before the event, and as scapegoat afterwards. Such naïvety ignores the fact that much progress was achieved consequent on the re-organisations of 1947 and 1974. Many of the problems currently faced in the National Health Service are a reflection not of difficulties arising from re-organisation but of such factors as persistent underfunding and worsening industrial relations. In part, the alleged 'failings' of 1974 also represent not so much inadequacies within the system as unrealistic expectations of the likely benefits from organisational change. Yet, the current mood is again towards re-organisation, with some hoping for a return to the situation prior to 1947. Whilst undoubtedly there is virtue in organisational simplicity, a return to the former system would be disastrous for the Service.

The idealistic view of the pre-war hospitals emphasises their virtues of small size, local autonomy, strong and direct management by a Chief Executive, but neglects the inequality in care, variation in standards, duplication of provision neglect of priorities such as maintenance. The Clerk of Works was solely concerned with basic maintenance, often of a 'make do and mend' type. There was a gross lack of expertise in other areas of estate management. The nationalisation of hospital in 1947 had important implications for the role and status of Works Officers — the Group Engineer became directly accountable to the Hospital Management Committee for both maintenance and minor new works — but the fundamental problems remained. Duplication of services, poor co-ordination and planning, autonomy of organisations within the Service, maintenance as planned neglect, still plagued the Health Service, and it was at some of these problems that re-organisation in 1974 was aimed.

Clearly, bearing in mind the current state of the service, re-organisation did not provide a complete solution to existing problems, nor would it have been realistic to have expected it to do so. However, a certain amount of progress has been achieved and it is important that this should not be lost during future change:

First, the 1974 re-organisation achieved the unification of all the Works disciplines, creating a co-ordinated team.

Secondly, all levels gained a comprehensive view of Estate Management and a realisation that capital provision and the life cycle concept of terotechnology cannot be divorced.

Thirdly, a recognition of the importance of planning.

Fourthly, a closer involvement of other disciplines within the Works function and vice versa.

Fifth, information systems have been improved to provide a sounder basis for managerial decisions.

Finally, the new management structure facilitated the provision of more professional solutions to increasingly sophisticated demands upon the Works function.

Despite such progress, it is clear that there is still a high level of dissatisfaction with the Service at political levels, hence the publication of *Patients First*. The Government proposals are summarised in Paragraph 7 of this document, namely:

First, the strengthening of management arrangements at the local level, achieving maximum delegation.

Secondly, simplification of the organisational structure.

Thirdly, simplification of existing advisory machinery.

Lastly, simplification of the planning system.

The manner in which delegation is to be attained is outlined in Paragraph 12:

First, each major hospital or group will require an Administrator, Nurse and Doctor on the management team.

Secondly, there will be no administrative tier between Units and Districts.

Thirdly, wherever possible, non-clinical staff will be accountable to the Unit Administrator. It is envisaged there will be no functional line management above.

These proposals raise a number of immediate questions:

Firstly, is it feasible to delegate all Estate Management work to the 'grass roots' level?

Secondly, are Sectors really necessary?

Thirdly, can Estate Management be run without line management arrangements?

Fourthly, what will be the undesirable consequences, if any, of maximum delegation?

Finally, is it either realistic or desirable for generalist administrators to manage technically qualified staff?

The second proposal, the simplification of the existing organisational

structure, follows closely on from the strengthening of local management arrangements. The new structure, according to Paragraph 5 must:

First, enable the Service to be planned and managed effectively and efficiently.

Secondly, allow decisions to be taken quickly and at the lowest managerial level.

Thirdly, ensure that staff with responsibility for patient care remain unimpeded by administrative considerations.

Paragraph 17 to 19 give further detail as to the precise manner in which these objectives are to be obtained. The Area tier is to be abolished, and the administration of the Health Care system is to be focused upon Health Districts. The Districts envisaged should be large enough to support the district general hospital, but not so large as to be too remote from the local population. Existing single District Areas will be retained; all multi-District Areas are to be restructured. In considering these proposals, attention should be given in particular to the following problems:

First, what constitutes an ideal District?

Secondly, what is a 'Unit'?

Thirdly, what will be the consequences of a large number of small authorities?

Last, but not least, what does the patient want?

Since the consultative document puts 'Patients First', it would appear appropriate to do likewise and discuss what the patient might expect from Works Departments.

Definition of Structural Base

District

An ideal district health authority would be responsible for a locality which is 'natural' in terms of social geography and health care, large enough to justify the range of specialities normally found in a district general hospital, but not so large as to make members of the authority remote from the services for which they are responsible and from the staff who provide them. It would be co-terminous with the boundaries of social services, housing and education authorities. Some existing areas and districts come near to the 'ideal'.

The existing authorities vary substantially in size, serving populations of 60,000 to over 500,000. The largest of the multi-District Areas has a population of 1.4 million. The Government has suggested that Districts should serve between 200,000 and 420,000 people, with extreme parameters of 150,000 and 500,000. As can be seen from *Figures 1 and 2*, of the 32 existing single District Areas, 80% fall within the preferred limit, and only 5% below the threshold. But of the 172 health Districts within multi-District Areas, only 51% are within the limits, with 22% below the threshold. Clearly in a number of cases, substantial boundary adjustments may prove necessary. Specifically in Works terms, the existing distribution gives rise to considerable problems due to variation in the provision of buildings between Districts *(see Figure 3)*.

What patients want:	**What patients do NOT want:**
Adequate facilities.	*Poor facilities liable to breakdown.*
Local quick decisions.	*Inadequate maintenance.*
Revenue savings.	*Slow response to maintenance needs,*
Safety of plant and premises.	*and suggested improvements.*
Value for money.	*High revenue costs.*
Effective use of capital and property.	*Delay.*
Effective use of existing space	*Lack of information.*
and plant.	*Poor communications.*
Effective planning.	*Lack of co-ordination.*
Reliability of plant and	*Cumbersome monitoring process.*
equipment.	
Effective maintenance and repair.	

Given these demands upon the Works function, it is important that,

First, maintenance is given proper status and treated as an integral part of Estate Management.

Secondly, an appropriate level of expenditure is allocated.

Thirdly, there should be flexibility in the use of the total Estate Management budget.

Lastly, a more logical financial system should be instituted, capable of a more efficient use of increasingly limited resource.

Unit

Little guidance is given in *Patients First* as to the nature of a 'Unit'. in the absence of contrary information, it will be assumed that a 'Unit' is a natural group of health care facilities functioning as an integrated section of the new Health District. These groups may comprise a single hospital, a group of hospitals, a selection of community services, or a combination thereof. The precise composition will be determined by the new District authorities.

Re-organisation and Works — Workload

It is clear that the Works department will not be unaffected by reorganisation, and it is important that some consideration must be paid to the existing workload in determining proposed structural change. There are four basic elements in the function of a Works Department:

PLANNING
DEVELOPMENTS
MAINTENANCE
LAND AND PROPERTY MANAGEMENT

Ultimately, local solutions to structural problems will depend on how these tasks are undertaken.

Planning

Patients First acknowledges the value of a logical and comprehensive planning system, but urges simplicity in its organisation. Whatever form planning should take in the reorganised Service, it must be comprehensive, multi-disciplinary, recognise client care groups, and be 'need-oriented'. Since needs are identified at the grass roots level, it should be a 'bottom up' system, and the input from Works Officers should start there and continue upwards. In addition to simplicity and a 'local' approach to planning, the time scales involved should be substantially reduced — in essence, planning is at present too involved and takes too long.

Works department involvement in planning must include the planning and resource use, and this will only be possible within the context of an integrated Works service capable of assuming a comprehensive view.

Formerly, there has been a discrepancy between the planning process and estate management Works input. The estate is a fundamental resource

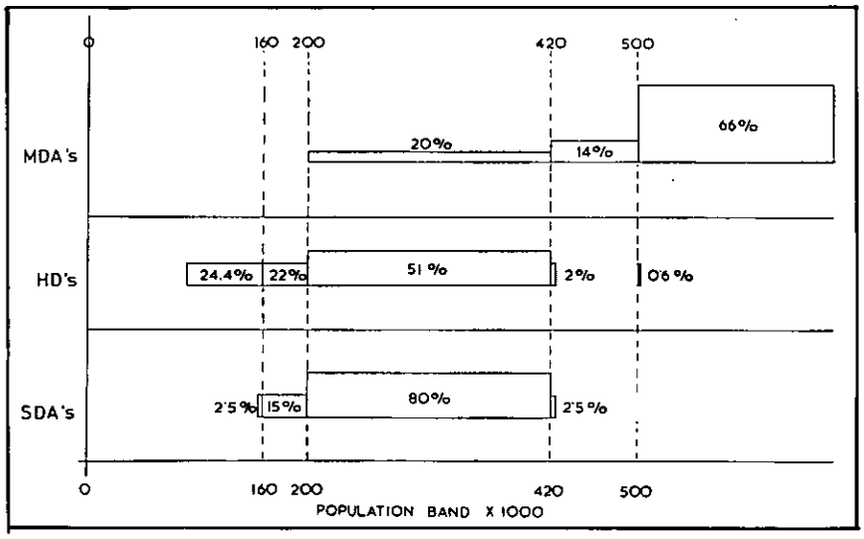


Figure 1. Distribution by Population of Multi-District Areas, Health Districts and Single District Areas.

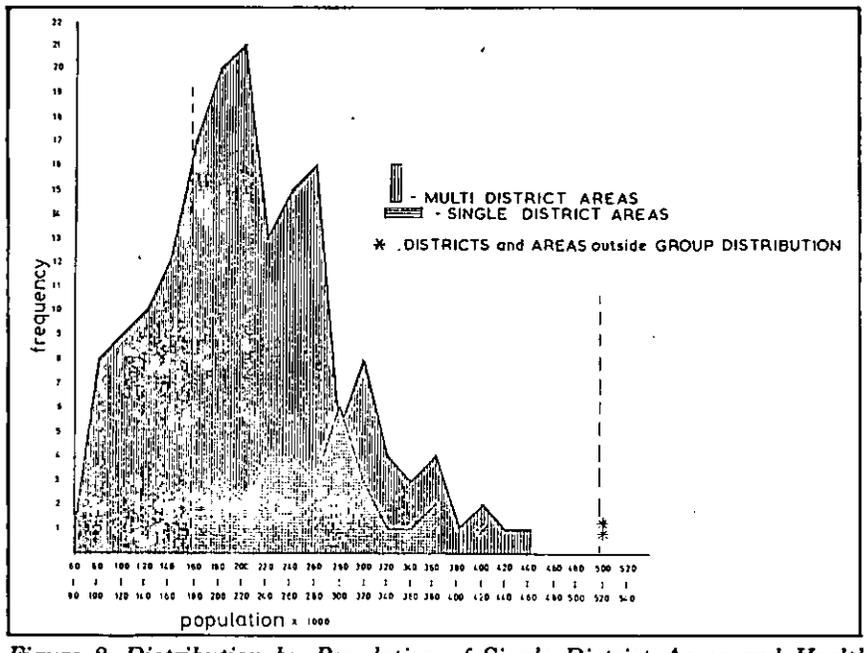


Figure 2. Distribution by Population of Single District Areas and Health Districts within Multi-District Areas (England only).

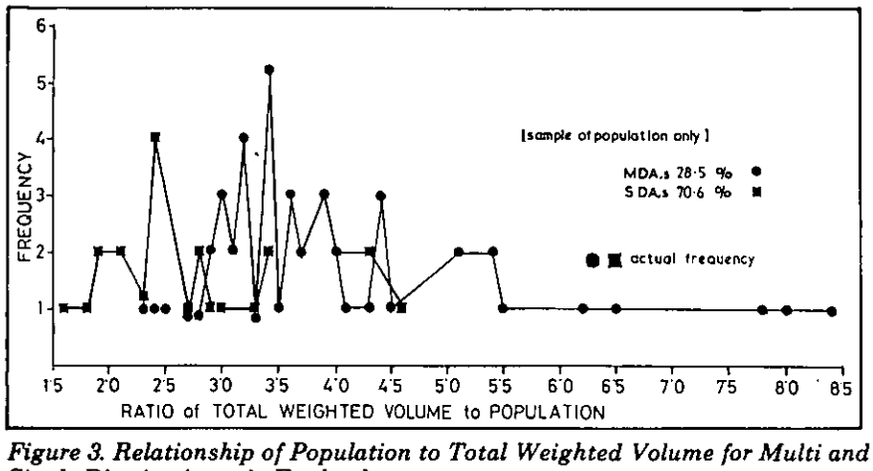


Figure 3. Relationship of Population to Total Weighted Volume for Multi and Single District Areas in England.

and must be considered in any coherent future system. One of the fundamental reasons for the failure of Health Service planning has been the lack of Works involvement in resource identification. In order to effect the envisaged Works involvement in planning, a considerable workload is involved, in determining resource assumptions, costing proposals and identifying their implications, establishing priorities, justifying proposals, and consultation. Implications of the provision of this input are:

First, collection of appropriate information relating to the Estate.

Secondly, preparation of estate control plans.

Thirdly, possession of information relating to the rationalisation of land and property holding.

Fourthly, collection of data on the backlog of maintenance.

Fifthly, collection of data on energy use.

Sixth, rationalisation of Estate Management planning and control systems using Estmancode.

Lastly, developing efficient manpower planning and accounting techniques for Works personnel.

When such steps have been undertaken, and the appropriate information obtained, planning may proceed on a realistic basis and Estate Management develop beyond former negative policies of planned neglect. Since Districts and Units, in the light of *Patients First*, will be largely responsible for their own futures, it seems appropriate that the work involved in planning should be undertaken at this level.

Developments

The provision and design of capital and resource works is one of the main functions of the Works organisation. It has five main components — preparation, design, construction, commissioning and evaluation. These elements can be undertaken either by external consultants or Regional experts, or delegated to the District Works level. In general, 'in house' work provides better quality and is more sensitive to operational problems. If an 'in house' solution is accepted, there must be a segregation of tasks between the Regional and District tiers. Whilst it is accepted that major capital programmes should be undertaken by the Region, nevertheless there is a general inability at Regional level to meet

local needs in both the capacity and timing of minor capital and non-recurring works programmes. It is therefore suggested that the remainder of the capital programme be undertaken at District, with advice as necessary from the Regional team.

Land and Property Management

National capital assets of land and property are currently valued at 8.5 billion pounds and the Estate Management input to the control of this asset is minimal, the task is largely undertaken by generalist administrators. Re-organisation could provide the opportunity for placing property management within a professional Works context. It should be a Works Department responsibility to:

identify the suitability of property
take possession and make available for occupation
preparation of lease and calculation of rent
identification of appropriate special funding (if any)
negotiation with freeholder when alterations are required
determine when a property is no longer suitable and advise as to its disposal
dispose of property.

The District Valuer should be consulted to provide an impartial valuation service.

Maintenance and Operation Work

It is exceptionally difficult to estimate the potential workload at the operational level. The engineering officer and building officer at the Units are the main source of information on patient needs. To identify the work one can take the basis of the formula for appointing staff in PTB 9/78, or more realistically, attempt a 'bottom up' analysis based on expressed needs. To this end, a survey was made of all technical officers in the Norwich Health District up to and including third-in-line personnel, in relation to their precise workload. The results of this analysis are shown in *Figures 4, 5 and 6. Figure 4* shows the workload allocated according to job descriptions; *Figure 5*, the proportionate amount of worktime in percentages within divisions; *Figure 6*, worktimes apportioned ideally by the officers involved. The information collected

EXAMPLES OF ELEMENTAL BREAKDOWN OF MAINTENANCE AND OPERATIONS FUNCTION AT UNIT LEVEL

MANAGERIAL (DECISIONS)	Personnel -	Recruitment, welfare, training, industrial relations, discipline, grievance, general
	Communications -	Job information, meetings, other desciplines programmes.
	Finance -	Budget, DEL, contract, records, data costings coding
	Deputise -	For other Works Officers
	Organise -	Workload, DEL, contractor, emergencies
	IBS -	Control, programme, check, authorise
	Supervision -	DEL, contract, T.Os.
RESOURCE MANAGEMENT	Operations & Planning aspects of -	Maintenance, stores, energy, contingency and emergency, hazards, condemning, reports, standards, job costing, PPM, transport, insurance, requistions, replacements, adaptions, upgradings, developments, security, estimates, surveys, assessments, design, specification, equipment, labour, technical investigations, material appraisal, tendering, programming, organising, implementing.
BUDGETORY CONTROL		Labour cost effectiveness, economic purchasing, control overheads, feedback for job costing, standing instructions, VAT assessment, Fuel, Light and power costs, contract.
ESTATE RECORDS INFORMATION AND STATISTICS		Estmancode, vehicle register, MOT, plating, Hazards, permit to work. personal files, call-outs, overtime, training, accidents, leave, financial, energy, water, PPM, drawings, tech. data, population cube, collect, collate, record, history, inspection manuals.
STATUTORY REQUIREMENTS POLICIES AND REGULATIONS		Compliance, technical, legal, standards, safety, standing instructions, training, hazards, protective clothing, permit to work, building regs., HASWA, Factory Act, Town and Country Planning, Fire, Medicines Inspectorate, Environmental Health, Polution, Asbestos.
LIAISON, COMMUNICATION AND TECH. ADVICE.		Workscolleagues, Department Heads, Personnel in other disciplines, Fire Officers, Contractors, Police, Local Authority, Insurance, Management Services, Consultant Architects, Engineers, Region, Area, DHSS, PSA. CHC, Unions, Health and Safety Executive.

Figure 4. Examples of Elemental Breakdown of Maintenance and Operations Function at Unit Level.

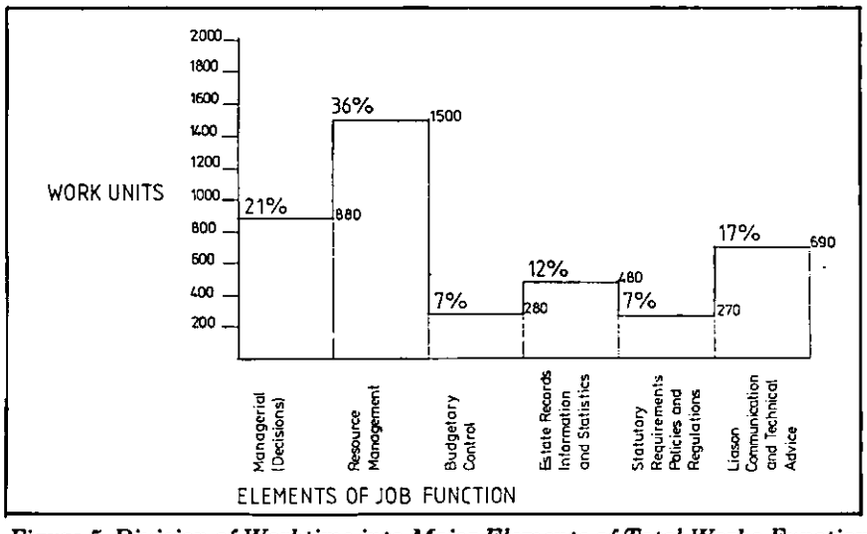


Figure 5. Division of Worktime into Major Elements of Total Works Function (Existing).

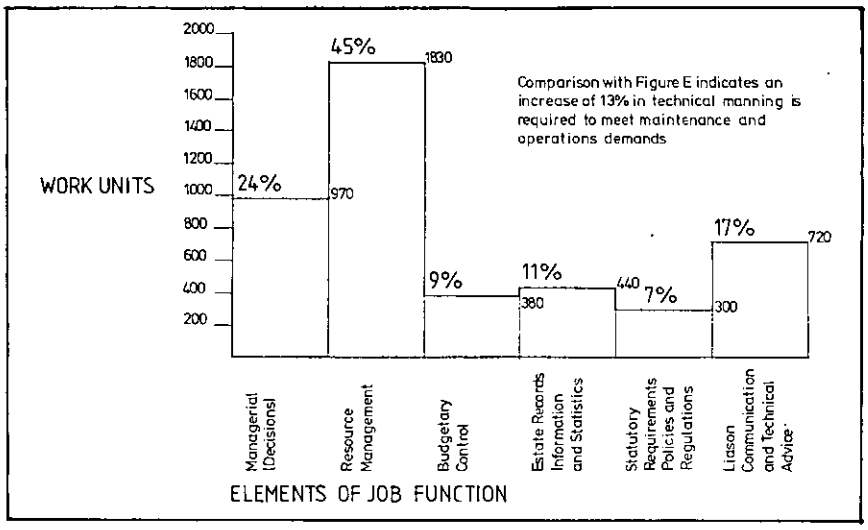


Figure 6. Division of Worktime into Major Elements of Total Works Function (Suggested).

represents a useful management tool, invaluable in attempting to restructure management arrangements. The following factors are known:

First, the total work units required.

Secondly, how these units are apportioned.

Thirdly, where shortfalls and surpluses exist.

This information provides a grass roots analysis that will enable restructuring to be carried out efficiently, adjusting the balance of the various elements. For example, *Figure 7* depicts the type of solution that might be reached in applying the technique to the Norwich Health District. By extracting design, energy, records and statistics and concentrating these at District, a readjustment of balance can be made at Unit level which will allow a more efficient service to be given. Any combination may be arrived at to suit local requirements. This technique provides a simple tool which could be applied to any Unit Works Department to use existing manpower far more effectively. The opportunity offered by reorganisation should be seized to improve the efficiency of the Works organisation.

Management Arrangements

It is clear from *Patients First* that management at Unit level is to be strengthened. However, it is also abundantly clear that the existing hospital personnel cannot undertake the required workload. In addition, it must be recognised that Unit personnel cannot provide the full range of necessary services, nor would they possess the appropriate expertise. They would have to rely on support from higher management, in a direct line management relationship to the Chief Works Officer of the new authority. Three main options exist in structuring management relationships:

First, two Senior Works Officers (third-in-line), one building, one engineering, should manage the Unit Works function as an integrated team. One being designated as the co-ordinator between the Chief Works Officer and the Unit Management team.

Secondly, a single Unit Works Officer might be appointed and regarded as the Head of the Unit Department.

Lastly, the existing line relationship and grades of staff might be retained, but the relationships of the present District Engineer and Building Officer should be amended to establish a closer working relationship with Unit administration. A District line management relationship to the Chief Works Officer would remain essential.

Regardless of which option might prove appropriate, the importance of a direct line management relationship from Unit to District remains paramount. The Unit concept is incompatible with existing services — Area laundries, CSSD, ambulance, renal dialysis. It is perhaps doubtful whether the concept of a single Unit Works Officer is feasible.

The new District will provide a complete range of Estate Management services and it is clear that many of these — particularly the design and planning function — will be most appropriately provided at the District not Unit level.

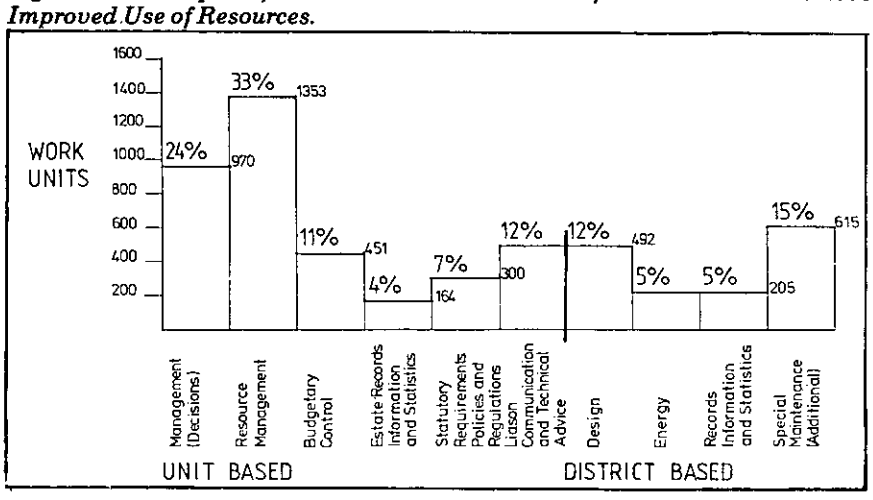
Re-organisation provides a perfect opportunity to gain recognition of Works role as an input to total patient care by placing Works Officers on the District Management Team.

The Management arrangements at District and Unit can only be framed with Regional roles and responsibilities in mind.

It will be essential to develop and strengthen the relationship between the Regional Works Officer and new Chief Works Officer. In addition, the Regional Health Authority should bear the responsibility for all major capital works.

The new Chief Works Officer must be the budget holder for all maintenance and operational activities, as well as devolved capital. Capital and revenue funding should not be separated, since doing so would reduce

Figure 7. Example of Possible Re-distribution of Workload to Achieve Improved Use of Resources.



the ability to transfer revenue to capital. The Chief Works Officer may well delegate the A, C and D elements of maintenance to Unit staff, whilst retaining the B plant replacements and non-recurring maintenance.

The Estate Manager will need to be an individual of considerable personal and managerial ability. His primary function will be to deal with the organisation, implementation and execution of a maintenance and operational programme, together with the administration of numerous small and medium projects. To undertake this work will require professional and technical knowledge but also general management skills and practical experience covering such areas as the theory and practice of: **Delegation. Leadership. Decision-making. Information systems. 'Management by objectives'. Motivation. Communication. Industrial relations. Priority assessment. Job analysis. Training.**

All these qualities are necessary for competent management. Such qualifications should match those for present Area Works Officers.

Conclusions

It is difficult to envisage any situation relating to patient care where there is not some form of Works involvement. The potential workload is vast and the manner in which it is to be undertaken in the light of *Patients First* raises a number of fundamental questions:

Structure

Should Districts conform to the majority banding? Is it necessary for Districts to be twice this size to be viable? Can large Districts closely reflect patient needs? Should such Districts provide total health care provision? What would be the affect on the Service of creating uniformity of District size?

Workload

Planning: *Patients First* aims at simplification of the planning system. It would appear logical to have a system that: *Simplifies the administrative burden of planning. Integrates planning into the management function. Embodies change in a revised strategy, reviewed every four years. Embodies a systematic annual review of services. Provides a realistic assessment of needs in the light of available resources. Combines Regional and District strategies in a single plan.*

Developments

Should all capital and revenue funds be delegated to Districts?

Should there be a District Design team, or should Regions undertake all design work?

Maintenance

Workload analysis may be used to make more effective use of existing staff, even within single District Areas.

The status of maintenance should be raised, and a realistic allocation of funds made.

Property Management

In order that an Estate of 8.5 billion pounds be managed effectively, the Works department should take full responsibility for property management.

None of the existing vast workload will disappear in re-organisation, the problem is essentially to determine the appropriate level of delegation. A professional superstructure will still be required, with probable functional management links to Region. Within these parameters, important questions still remain: *The nature of the post of Chief Works Officer? The strength and form of functional management arrangements, and their size and composition. The detailed manner in which the various functions are to be delegated, and the extent of delegation.*

Solutions to such questions can only be found by discussion at the local level, following the guidelines of re-organisation 'from the bottom up' and 'patients needs first'.

A Paper read at The Royal College of Surgeons' Symposium on Future Design of Operating Theatres *November, 1979. Mr Howorth is a Past President of the Institute.*

Air Flow Patterns in the Operating Theatre

F. H. HOWORTH OBE PPIHospE
The Howorth Air Engineering Research Laboratory, Ollerton, Chorley, Lancashire

Summary

Bacteria-carrying particles and exhaled anaesthetic gases are the two contaminants found in the air flow patterns of operating rooms. Their origin, direction and speed were illustrated by a motion picture using schlieren photography and smoke tracers.

Compared with a conventionally well air-conditioned operating theatre, it was shown that a downward flow of clean air reduced the number of bacteria-carrying particles at the wound site by sixty times. The EXFLOW method of achieving this without the restriction of any side panels or floor obstruction was described. The total body exhaust worn by the surgical team was shown to reduce the bacteria count by a further 11 times. Clinical results show that when both these systems are used together, patient infection was reduced from 9% to between 0.3% and 0.5%, even when no preoperative antibiotics were used.

Anaesthetic gas pollution was measured and shown to be generally 1,000 ppm at the head of the patient, in induction, operating and recovery rooms, also in dental and labour rooms. A high volume low pressure active scavenging system was described together with its various attachments including one specially for paediatric scavenging. Results showed a reduction of N_2O pollution to between zero and 3 ppm. The economy and cost effectiveness of both these pollution control systems was shown to be good due to the removal of health hazards from patients and theatre staff, in addition to the energy conserved by the re-use of clean air.

Introduction

It was Florence Nightingale who wrote "the first requirement in a hospital is that it should do the sick no harm". She might well have added that it should also do no harm to those who care for the sick.

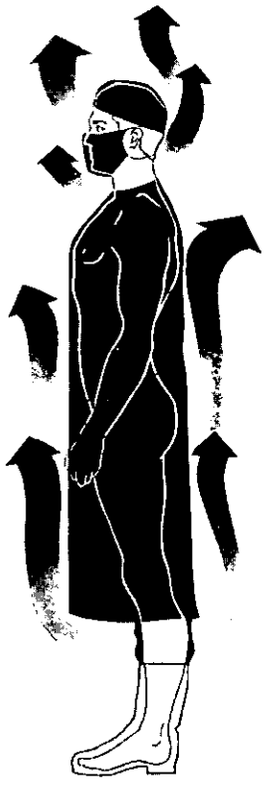
Contaminants which are transported by the airborne route, do harm — both to the sick and to those who help them — when there is no effective control of their dissemination and movement.

Two groups of airborne contaminants are generated in operating suites:

Bacteria-carrying particles;
Anaesthetic gases.

Both are disseminated into the ambient air from identifiable sources,

Figure 1. Operating theatre up-currents.



and then, even in a well air-conditioned theatre, move about at the whim of turbulence and convection currents.

Behaviour of Bacteria-Carrying Particles

Let us first consider the particles which are transported on these currents.

Those which are emitted directly from sterilised items such as gowns, drapes, glove powder etc carry no bacteria and, therefore, do no harm. They do however render meaningless any particle counter tests as an indication of possible airborne infection during surgery. Consequently, testing for absence of bacteria must be carried out by bacterial means.

Warm objects create up-currents, hot objects create rapid up-currents. These always start from the floor which, even in the operating theatre is bacterially dirty. *(Figure 1).*

A person emits approximately 1,000 epithelial scales per minute, and on them ride all the bacteria, which are to be found on the body. The footwear of operating room personnel scuff the floor and put contaminants into the air. These are induced by convection to rise up and combine with the bacteria carrying particles being emitted by the operating team. These, in turn are transported on their own warm body convection up-currents. Movements of hands, arms and bodies create considerable turbulence and deflect these contaminated air currents in all directions, infecting the wound directly, and indirectly by contaminating the gloves, instruments etc which go into the wound.

The heavily contaminated and turbulent air currents gain velocity as they pass the hot operating lamp.

Finally they reach the ceiling, where they are entrained by the clean air coming in from conventional air conditioning diffusers, which unfortunately recycles them downwards again. The total inability of a conventional air-conditioning system to control air behaviour patterns, and so prevent the dissemination of airborne contamination, is even more evident when actual air speeds are considered.

Convection up-currents from the body of a surgeon when working on a patient have a speed of 25–30 ft/min (0.12–0.15 metres/sec). Those created by the operating lamp, vary between 30–50 ft/min depending on the type of lamp, and whether it has its own heat exhaust system. To oppose and, therefore, control these up-currents, a downflow speed of at least 60 ft/min (0.30 metres/sec) at the wound is necessary. In our current clean zone system, there is a downflow speed of 70 ft/min (0.35 metres/sec) at the wound.

An MRC sponsored study carried out by Whyte[1] using volumetric sampling, showed that in a well air-conditioned operating room, there were between 450 and 500 bacteria particles per cubic metre at the wound site during surgery.

This was reduced by sixty times with downward flow, but it was reduced by only 12 times with horizontal flow. This finally established that downflow is five times more effective in the operating room than horizontal flow.

A type of downflow is also preferable to horizontal flow because, it has been found in bacteriological and pharmaceutical applications, where horizontal flow is often used, that the work-piece must be immediately in front of the air source, with nothing in between which could emit or cause uncontrolled turbulence with consequent contamination.

In surgery, the patient is the work-piece so he has to be located immediately adjacent to the air source. With the anaesthetist at the head, the clean air source would have to be at one side, making access to the patient, and movement of the surgical team very restricted. Furthermore, a horizontal flow unit occupies or excludes the use of valuable floor space.

To prevent body emissions from the surgical team, they wear special masks and all-enveloping impermeable gowns down to 15 in. from the floor. This is worn together with a total body exhaust system which maintains the wearer at a negative pressure, and at the same time, cools him. This makes him comfortable and refreshed by the air flow which passes over the whole of his body, on its way to the exhaust apertures at the mask *(front cover)*.

This total body exhaust, which is only worn by members of the surgical team who are in the clean zone, was found to reduce the bacteria particle count by a further 12 times, making a total reduction of over 650 times, or only 0.63 of a bacterium particle per cubic metre. More recently work done by Dr Clark at the Medical Research Council, Department of Aerobiology, has supported this — see his film *Surgeons' Clothing*.

In order to establish a clean zone for surgery, without any floor or hanging obstructions such as drapes or panels, the sterile air, after moving downwards over the wound and the surgical team, must then move radially outwards away from them. This air flow pattern is rather like the mouth of a trumpet. *(Figure 2)*.

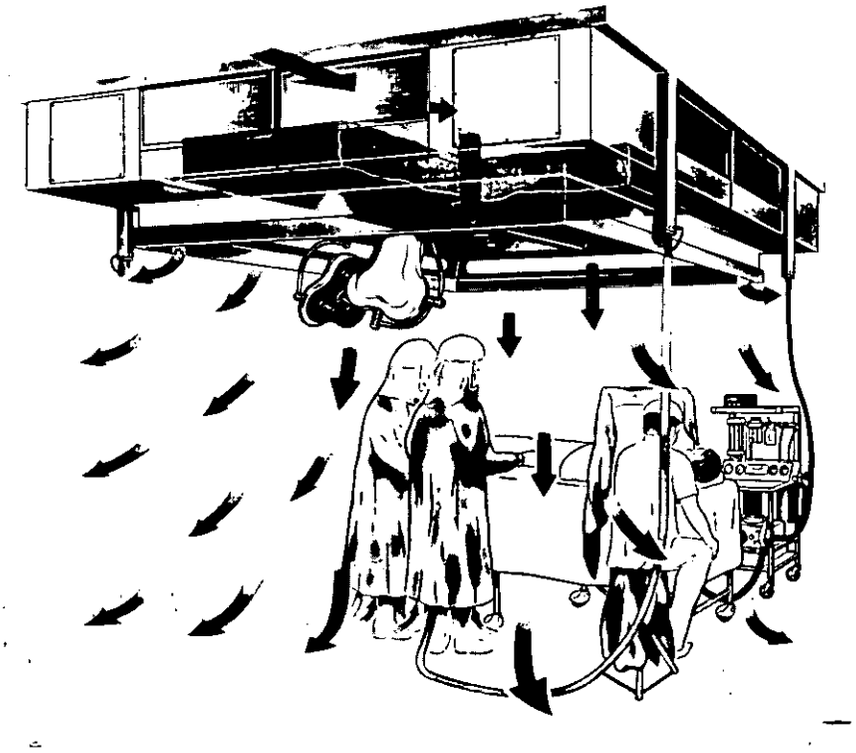
As that shape is an exponential horn, I have called this air pattern 'Exponential Flow' which may conveniently be abbreviated to 'EXFLOW'. A motion picture has been shown in which actual air flow patterns can be seen by means of smoke tracers and by schlieren photography.

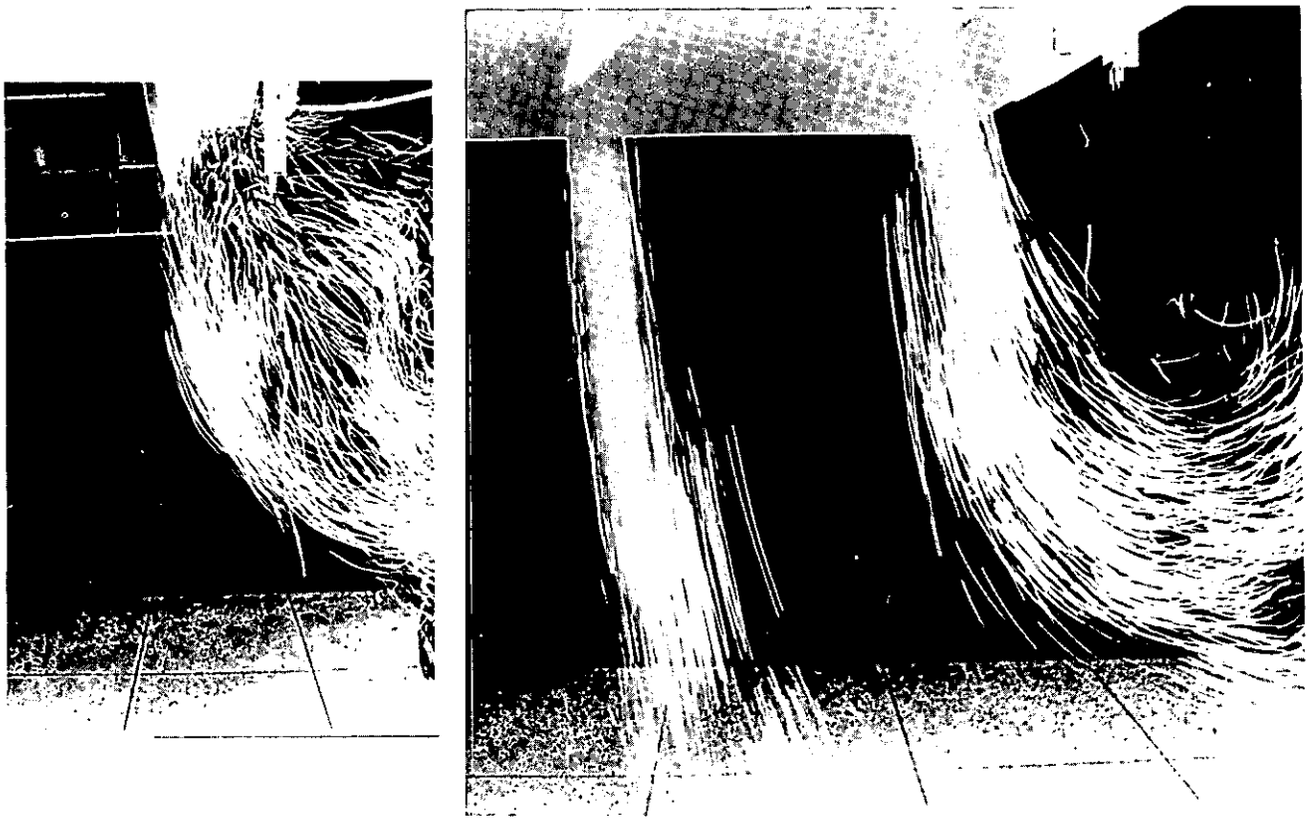
The effectiveness of the EXFLOW of clean air can best be seen statically by means of the illuminated bubble streams used by W. Whyte[2]. In *Figure 3* they are discharged just outside the EXFLOW clean zone canopy. This clearly shows that no contamination can possibly enter and that anyone approaching must move against the clean air flow which is always moving downwards and outwards, away from the wound.

Figure 4 shows the discharge of two bubble streams inside the EXFLOW clean zone canopy. One is near the centre, and one near the right-hand inner edge of the canopy, moving downwards and outwards. It will be realised that in the event of sepsis, only the drapes, the gowns and the floor are contaminated, so there is no delay between patients.

Clinical statistics from Wrightington Hospital show a reduction in patient infection from the original 9% to between 0.3% and 0.5%. This level has been held constant without the pre-operative use of antibiotics for over 14,670 total hip operations which were carried out there up to

Figure 2. The EXFLOW clean-zone canopy.





Figures 3 and 4. Air streams from an EXFLOW canopy.

June 1979. Similarly consistent results are to be found elsewhere.

It can now be seen that the air in the EXFLOW clean zone is clean by elimination. The air in the remainder of the room is cleaned by the dilution caused by this high air flow passing outwards from the clean zone on its way to the evenly distributed recirculation inlets. The air recycle rate is 97 times per hour for the whole theatre.

A working party, chaired by Dr Lidwell[3], stated that there must be positive pressure in the operating room at all times, so that when doors are opened there is a steady outflow of clean air across the whole area of the doorways.

To satisfy this requirement, and to provide adequate control of climate, twenty air changes per hour of fresh conditioned air are the minimum which must be introduced into the operating room, preferably via the EXFLOW unit. This gives 77 air changes, recirculation, plus twenty fresh air changes. Automatic pressure control dampers allow this excess of clean, conditioned air to continue to flow into the adjacent rooms and corridors when the operating room doors are shut. It, therefore, remains in the building so that an extra air conditioning function is continuously performed, and as none of this valuable air is being exhausted to outside, there is a considerable saving in energy, in winter and summer.

With the air in the operating theatre bacterially and climatically correct, it can do the patient no harm.

Behaviour of Anaesthetic Gases

To find out the behaviour and concentration of anaesthetic gases in the various places where they are used, a Miran portable gas analyser has been used to measure the N_2O content. Since other gases present are a known and considerably smaller percentage than N_2O it was evidently more indicative to study the larger volume.

In conventionally ventilated operating theatres the air behaviour pattern is dominated by convection-up-currents.

Although anaesthetic gases are heavier than air, this is no longer true when they have been warmed by inhalation and are then allowed to escape into the relatively cooler room air, when they are about the same weight as that air. They therefore remain in a cloud along the top of the patient and around the anaesthetist, supported additionally by the convection up-currents. It is in this cloud that the heads of the surgical team and the anaesthetist are situated during an operation. *(Figure 5).*

Conventional air conditioning does not exert much influence on this gas cloud, although with a diagonal air pattern, from side wall diffusers, it has been found that the gas cloud moved over to the wall containing the air outlets, and remained there at about head height, being removed from beneath by an exhaust air system and continually replenished by emission from the expiratory valve in the patient circuit, or the expiratory port on the patient ventilator. *(Figure 6).*

Gas pollution is not only seriously high in operating rooms, but also in anaesthetic and recovery rooms. It is similarly high in labour rooms where entonox is used and in dental units where general anaesthetics are given.

Data from well informed sources in Britain, Russia and NIOSH in the USA indicate that 30 ppm of N_2O is the maximum safe level of gas pollution in which people may work safely.

A survey was carried out covering over a hundred operating suites. The

information collected revealed such consistent figures that they came to be regarded as normal.[4]

Within a one metre radius of the head of the patient, and with no leaks from the anaesthetic machine, the N_2O concentration was around 1,000 ppm. This reduced towards the feet of the patient to between 200 and 400 ppm when measured up to one metre either side of him. The objective was to scavenge and remove this pollution effectively, safely, and economically with a system which was easy to install and requires minimum maintenance.

It was evident that the system would need to have a high volume of air at a negative pressure low enough so that no influence could possibly be exerted on the expiratory valve or the anaesthetic circuit.

After studying various anesthetic machines and ventilators, it was found that an exhaust volume of 150 litres/min was required at the expiratory valve. At this time, that was greater than the volume asked for in the draft BSS. Although the draft BSS stated at the time that the negative pressure at the expiratory valve should not exceed 0.5 cm H_2O, it was found that the required volume could be handled at less than half that figure by an exhauster of specific performance characteristics, combined with a cuffed breakpoint connector.

For the scavenging in recovery, paediatrics, dentistry and labour rooms where there is no direct connection between the anaesthetic circuit and the scavenging system, there is no need for a breakpoint, so the full exhaust volume can be applied to the various special attachments which have been designed for these applications.

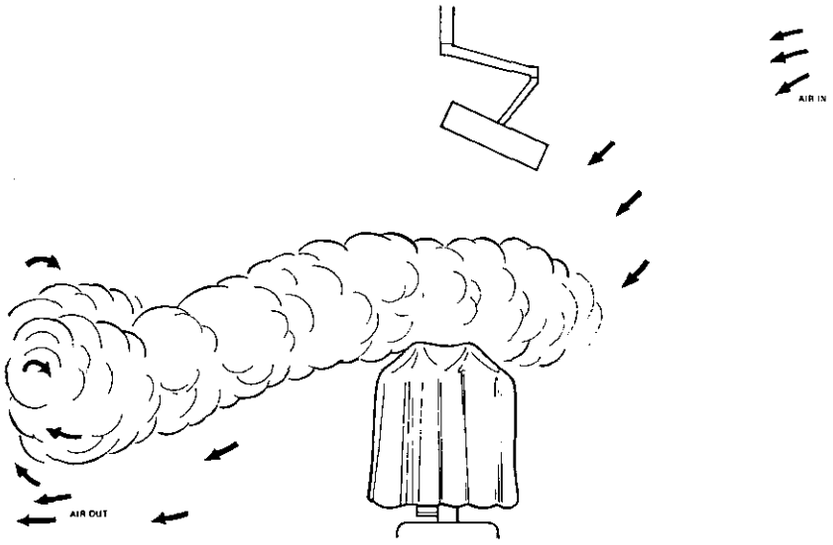


Figure 6. Gas behaviour with conventional air-conditioning.

Safety

The draft BSS recommends 150 litres/min with a negative pressure of 0.5 cm H_2O. With the system described, it is possible to have up to 300 litres/min without exceeding 0.5 cm H_2O.

At 150 litres/min the negative pressure is no more than 0.2 cm/H_2O. The breakpoint cuff has air entries both above and below so that accidental occlusion of one annular orifice does not affect performance. With this, it is not possible to occlude both annular apertures accidentlv. The breakpoint offers no resistance to the escape of exhalation, if there should be a system failure.

There should be a relief valve immediately downstream from the expiratory valve so that if the flexible exhaust tube is occluded and exhalation can escape without resistance. The flexible exhaust tube should preferably be transparent, so that any condensation within can be seen before occlusion takes place.

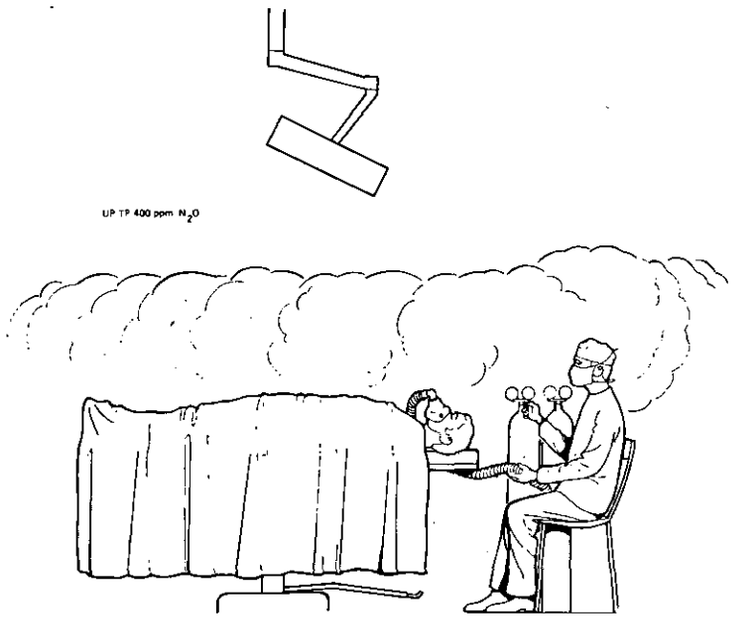
The performance characteristics of the exhauster must be such that it can never exceed the safe negative pressure stated in the draft British Standard Specification, when measured at the expiratory valve, yet it can overcome wind pressure at the outside discharge.

The exhauster should have a spark-proof impellor and the drive motor must be outside the polluted air flow.

An air flow sensor must be in the system, so that if the air flow fails, warning lights show in all rooms which have exhaust points.

By having groups of three or four exhaust points to one exhauster, only one group of exhaust points is affected in the event of electric motor failure. Because of the large amount of room air drawn in at all the exhaust points, this dilution is sufficient to prevent deterioration

Figure 5. Anaesthetic gas cloud around the surgical team.



within the system. This may otherwise occur, due to high concentrations of gas or moisture in the ducts. *(Figure 7).*

Economy

A power consumption of only 75 watts is required for an exhauster having the performance suitable for the system described.

If several groups are required, the hospital needs only one small and inexpensive spare impellor motor sub-assembly, which can be fitted in ten minutes by the hospital engineering department.

The High Volume, Low Pressure system has particular benefits in power saving, as the pipes are larger than in high pressure systems, and do not offer such a high resistance to air flow.

In the unlikely event of leaks occurring in the ducting, they are of little or no significance in a high volume low pressure system, but they are very serious in a high-pressure low-volume system.

With a system comprising a number of groups (as described), only the group required would be switched on during a night emergency operation, so no energy is wasted.

Results

The results from well over 100 surveys of anaesthetic gas pollution in operating suites, taken before and after installation, show consistent figures which can be regarded as typical:

In Recovery Rooms, Paediatric Operating Rooms, Maternity Units and Dental Units	
No Scavenging	Up to 1,000 ppm at head of patient
Passive Scavenging	Not possible because 750 litres/min are required
Howorth High Volume, Low Pressure Scavenging	0-5 ppm depending on proximity of exhaust point to face
In Induction and Operating Rooms	
No Scavenging	600-1,000 ppm N_2O foot to head of patient
Passive Scavenging	230-300 ppm foot to head of patient
Howorth High Volume, Low Pressure Scavenging	0-3 ppm at head of patient. In all other positions in theatre: zero

Discussion

These systems are applicable to existing or new theatres, and by their effective control of air-flow patterns and emissions, the air in the operating suite can do no harm, and can be economically conserved.

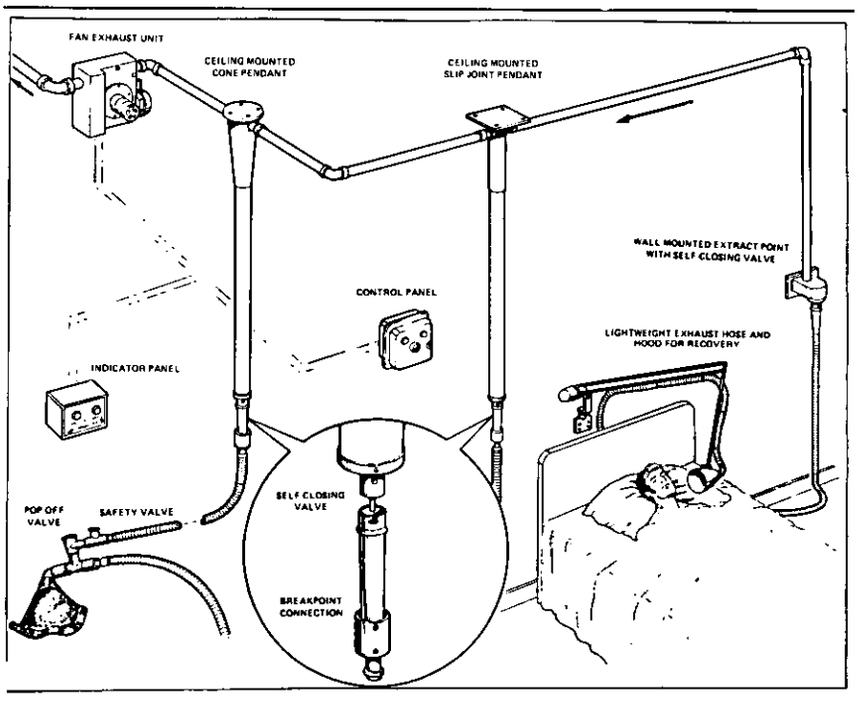


Figure 7. Suggested layout of exhauster system.

The cost effectiveness of the EXFLOW clean zone is evident when it is realised that, for instance, in the orthopaedic application capital cost is recovered when the deep infection of just two total hip replacements has been prevented.

From current clinical trials, it now appears that where surgery is carried out in this truly clean zone either with or without pre-operative antibiotics, the patient infection rate is approximately halved, compared with surgery done in conventionally well air-conditioned operating theatres using all possible antibiotic treatment.

The principles of Joseph Lister are still valid today; "prevention of infection is better than cure", and it is certainly reasonable that measures to prevent morbidity to both the patient and the operating team, should be adopted.

Acknowledgements

Our thanks are due to Professor Sir John Charnley and the surgeons and staff at Wrightington Hospital for their support and their records of infection rates. W. Whyte for bacteriological testing and data. Dr R. P. Clark at the Medical Research Council for his work on surgeons' clothing. Brian Mullen for his splendid schlieren photography showing convection currents. Dr Hale Enderby, who identified the problems of anaesthetic gas pollution for us and the many anaesthetists, who have subsequently co-operated with us. And to the members of the Department of Health and Social Security, Engineering and Scientific departments, who were always ready to help and advise.

References

[1]Whyte W. et al. Controversial Opinion in Surgery. Presented at the 9th European Surgical Congress, Amsterdam. June 1975.

[2]Whyte W. Proceedings of the 4th International Symposium on "Contamination Control", Washington DC, USA September, 1978. Pages 46-51.

[3]The Report of a Joint Working Party on "Ventilation in Operating Suites", chaired by Dr O. M. Lidwell. June 1972.

[4]Howorth F. H. "Anaesthetic Gas Pollution", *Hospital Engineering*. October 1976 and March 1977.

For further reading reference should be made to the book by Professor Sir John Charnley entitled "Low Friction Arthroplasty of Hip".

LFR for Hospitals

A new Economy Heating Concept

Low Frequency Radiation is the total answer to substantial fuel savings of some 35–45% for 10 ft high ceilings.

Unlike others, this system does not rely on heated air (natural or fanned convection) nor high temperature radiation to impart comfort. This new concept relies on low frequency radiation and re-radiation from walls, ceilings and equipments, plus contact comfort. This means total absence of wasteful temperature gradient.

The **FloRad** responsive wet underfloor system runs on low-low temperature hot water up to 55–60°C (130–140°F). Simple and quick to design and cost by floor areas.

FloRad is quicker to install using only basic or trainee pipefitting skills and minimal tools.

Here are a few advantages:

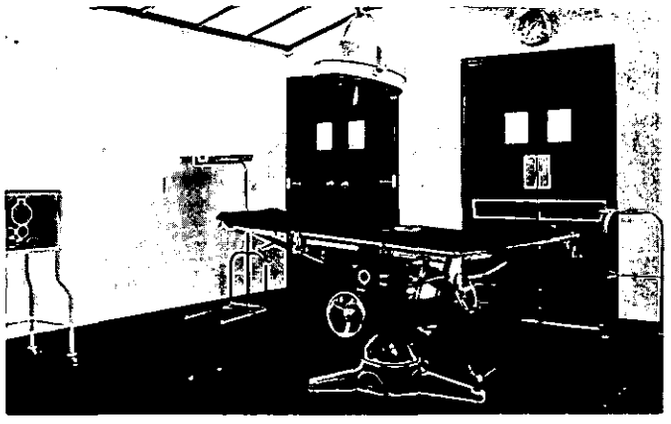
Unobtrusive comfort.
No hygiene cleaning for radiators.
No convection, thus no streaking and decor cleaning.
Contact comfort — end discomfort in foot extremities by poor circulation.
LFR eases Rheumatic and Arthritic pain.
***FloRad** residual low temperature heating leads to Stable RH and thus eases breathing for bronchitics and asthmatics. This also reduces condensation.*

Uncluttered walls for optimum arrangement of beds/lockers and for resuscitation, communication, monitoring, and entertainment services.

Beau Design Services Ltd.,
Pipeline House, Borehamwood, Herts WD6 4SG
Send for your copy of "the case for wet underfloor Central Heating".

Theatres closed.. Surgery as usual?

Answer: P.H.I. THEATRE UNITS

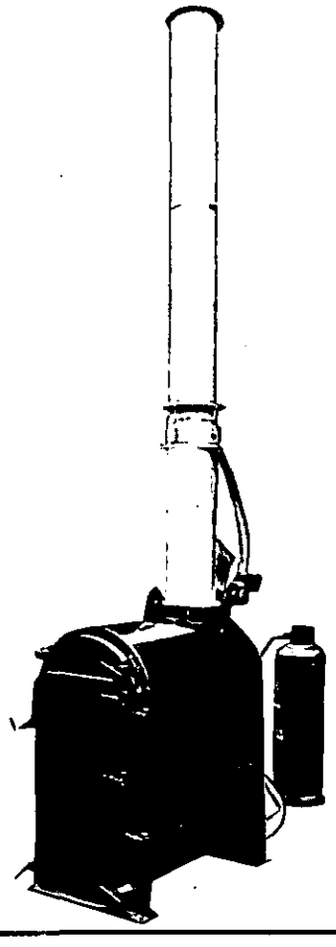


SAVE CAPITAL AND MAINTENANCE COST

Complete Theatre Suites installed in a ward or exterior building with the minimum disruption of services in as little as 7 days. Rental or Purchase from :–

P.H.I.

PAUL HANFORD INSTALLATIONS LTD
Unit 2, Industrial Estate, Boston Road, Horncastle, Lincs. Tel. Horncastle (06582) 7383/4



The Redpath way to SMOKELESS Incineration

1 **Low Cost Disposal of Solid Waste**
2 **Efficiency in Operation**
3 **Skilfully Constructed**
4 **Competitively Priced**
5 **For Rent or Purchase**
6 **Simple Operation**

Redpath Engineering Limited produce a range of Sealed Flame Incinerators working on the "Starved Air Principle". These Incinerators will operate with virtually any mixture of combustable waste materials, including rubber, plastics, wet garbage, meat wastes, cloth, sawdust and hospital wastes.

Full details may be obtained from: Mr A. Taylor

Redpath Engineering Limited
Mechanical Engineering & Foundries Group
Incinerator Sales Dept.,
P.O. Box 15, Middlesbrough,
Cleveland. Tel: (0642) 245501

Product News

Floor Cleaning Machine

Truvox Floorcraft Ltd are introducing a new model into their range of automatic scrubber/wet pick-up vacs. It is the Truvox/Taski Combimat 55.

High grade starter or traction batteries provide between four and five hours working time running at full power. With a working width of 22 inches and a top speed of 2½ mph, the Combimat 55 is capable of both scrubbing and wet vacuuming an area of approximately 23,500 sq ft per hour employing one operator.

The 30 inch pick-up squeegee can be wrung out to the side so that baseboards, corners and floor space under supermarket shelves (for example) can be wet vacuumed. The flexible rubber blades adapt to uneven flooring and it is possible to wet vacuum both forwards and backwards. The cleaned floors can be walked on immediately. Suction power is up to 35 litres per second.

The machine carries its own water supply and wet recovery tank. Unproductive working time is minimised by the design of the recovery tank which is on rollers. When full, the tank can be rolled down runner guides on the machine, wheeled to the nearest waste outlet, and tilted on its stand for emptying. Alternatively, there is a tap on the side of the tank which can be used to empty the water directly into a floor drain or gulley.

The machine has conveniently arranged levers for controlling height of squeegee, solution flow and speed. It is also highly manoeuvrable, and has a very tight turning circle enabling the smallest areas to be cleaned.

It can cope with all kinds of hard flooring and is suitable for a variety of medium-sized commercial and industrial cleaning situations, eg supermarkets, stores, nursing homes, hospitals and gymnasiums.

Further particulars can be obtained, or a demonstration can be arranged, by contacting Truvox Floorcraft Ltd, Third Avenue, Millbrook, Southampton SO1 0LE. Tel: Southampton (0703) 784123.

Flue Gas Analyser

Analysis Automation Ltd, manufacturer and supplier of gas analysers for on-line process control, industrial safety and emission monitoring, have announced the availability of a new Flue Gas Analyser — the Teledyne 9300.

Full technical information is available on request from Analysis Automation Ltd, Cherwell Boathouse, Bardwell Road, Oxford OX12 6SR. Tel: 0865-511186/53713.

Surgical Instruments Cleanser

The Mark XI conveyorised five-stage washing, disinfecting and drying machine for soiled surgical instruments is fully automatic and ensures complete protection from infection for staff handling instruments after the cleaning process. The instruments are fully disinfected when emerging from the machine and therefore there is no danger to staff and the chances of cross infection are minimised. There is no handling of instruments during the five stages of cleansing and drying.

Designed for use in the hospital's TSSU and CSSD, the machine can handle soiled instruments from up to ten theatres. Only one operator is needed to process 146 sets of instruments of 565kg weight, in a normal eight-hour shift. The operator only has to load the machine, which is fully automatic, and can therefore undertake additional duties. The total time through the five stages is 24 minutes, with a potential throughput of one basket every three minutes from the machine.

The Mark XI is believed to be the only machine designed to carry out, automatically, cold water pre-wash, combined detergent wash and ultrasonic cleansing, second cold water wash, hot water rinse and disinfection, and hot air drying.

The instrument trays are accepted direct from the operating theatre and the instruments (which stay in sets) are loaded into baskets. Each basket of instruments is subjected to a 3-5 minute treatment in each stage, according to the setting of the timer.

The instruments leave the machine completely dry, clean and bright, ready for checking and re-laying in the theatre trays (prior to final sterilization).

The Dent & Hellyer Mark XI, which measures 12 ft long × 2 ft 10 ins. wide × 4 ft 6 ins. high (3.7 × 0.9 × 1.4 m), occupies only 3.2m^2 of floor space and can be supplied complete with loading and unloading conveyors. The standard voltage is 400-440 V three-phase and neutral supply. Other voltage supplies can be accommodated, if required.

Further information from: Dent & Hellyer Ltd, Grosvenor Works, Walworth Road, Andover, Hants SP10 5AA, England. Tel: 0264 62111.

Bedside Call Unit

Bedside nurse call and radio hand units probably suffer more breakages than most items of hospital equipment.

To help reduce this problem, Cass Electronics are making swivel arm units available to all hospitals as a separate item of equipment.

The units are supplied with all the Cass hospital communication systems and have proved to be both reliable in performance and virtually unbreakable. Depending on whether or not the hospital has a speech programme in its communication systems, the swivel arm unit consists of on/off and programme selection buttons for the radio, a nurse call button, an earphone socket, a 'dim' light that enables the controls to be located easily in the dark, and a microphone loudspeaker. It is simple to use and all cables are encased in the tubular arm; this swivels out of the way if doctors or nurses need access to the patient so nothing can suffer breakage or damage.

Another advantage of swivel arms over bed-head units is the ease with which they can be adjusted to the correct height for the patient.

Full information from Cass Electronics Limited, Crabtree Road, Thorpe, Surrey. Tel:Egham 6266.

Change of face for Medishield Suction Controllers

In accordance with the International Organisation for Standardisation (ISO) recommendations, Medishield high and low suction controllers for hospital pipelines are now fitted with new gauges calibrated in kiloascals (kPa) instead of

millimetres of mercury (mmHg).

Whereas the old-style gauges were black, with white lettering, the new gauges are primrose yellow, with black lettering.

To enable personnel who operate suction control equipment to become fully conservant with the new method of information presentation and relevant conversion factors, an A4 size wall chart, in laminated plastic, has been produced by the Medishield Corporation. It has full colour photographs of the new and old-style suction controllers, brief notes on their operation and conversion tables from kPa to mmHg.

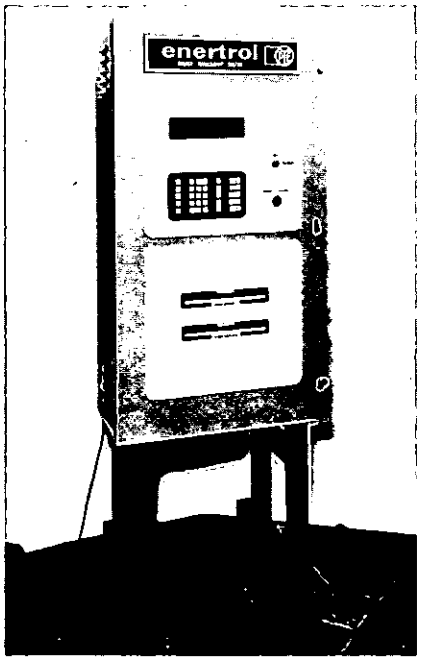
Copies of the chart are available, free of charge from: (UK customers) Sales Department, BOC Medishield, Priestley House, Priestley Way, London NW2 7AG. (Tel: 01452 8955); Overseas customers) Marketing Department, Medishield Harlow, Elizabeth Way, Harlow, Essex, England (Tel: 0279 29692

For further information contact: Bob Pirie, Medishield, Tel: 01-748 2020.

Enertrol Energy Management Systems

A new marketing and projects team has been formed by Pye Business Communications to market the Enertrol energy management system in the UK. A relatively new concept to Britain. Enertrol energy management is claimed to be able to reduce an organisation's electricity consumption by between 15-25%. It is already being used by a number of well-known organisations.

Further details are available from: Mr Clive Robbins, Pye Business Communications, Energy Management Systems, Cromwell Road, Cambridge CB1 3HE. Tel. 0223 45191.



Enertrol Energy Management System

Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

Humberside Area Health Authority
Beverley Health District
CASTLE HILL HOSPITAL

Engineer

Applications are invited from young enthusiastic persons wishing to embark on a career in the Health Service.

The officer appointed to this post will be responsible to and assist the Senior Engineer in managing the operation and maintenance of all engineering services and plant in the above unit, which is currently the centre of the main development within the District.

Current developments include the construction of a twin cardio-thoracic operating unit, North Humberside CSSD and manufacturing pharmacy. Future developments include new wards.

Applicants should have completed a recognised apprenticeship and possess a sound knowledge of either mechanical or electrical engineering.

The requisite qualifications appertaining to this post are an ONC in either mechanical or electrical engineering or an approved equivalent qualification.

Salary scale: £5,178 rising by annual increments to £5,784 pa (increase pending) plus PTB bonus officers' payment, currently payable at 13%.

Informal enquiries may be made to Mr N. Hudson, District Engineer, Tel: 0482-861234, ext 358.

Application forms and job description are available from the District Personnel Department, Westwood Hospital, Beverley, ext 245, quoting ref no 308.

Closing date for receipt of applications is March 21, 1980.

MID-SURREY DISTRICT
OF THE SURREY
AREA HEALTH AUTHORITY

ENGINEER

Required to assist the Senior Engineer, in managing the operation and maintenance of all Engineering Services in the District Properties division including the Central Boiler House, Horton Lane, Epsom.

Applicants (male or female) should hold an Ordinary National Certificate in Engineering or an equivalent qualification, have completed an apprenticeship in mechanical or electrical engineering and have five years' relevant experience. Experience on a steam-raising plant would be an advantage.

Salary scale £5,576–£6,182 pa inclusive plus up to 15% bonus. Pay award pending.

Enquiries are welcomed to Mr D. Chilcott, District Works Officer (Tel: Epsom 26100 ext 485).

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

Closing date: March 31, 1980.

NORTHERN DISTRICT
HIGHLAND HEALTH BOARD

ENGINEER

Salary Scale: £5,178 to £5,784 per annum (further award pending).

Applications are invited for the above new post based in Wick.

The successful candidate will assist the District Engineering Officer with the engineering maintenance operations programme and minor alteration work throughout the District.

Candidates must hold an ONC in Engineering, a higher qualification or an alternative qualification acceptable to the Secretary of State. They must have completed an apprenticeship in mechanical and electrical engineering, having acquired a thorough practical training as appropriate to the duties and responsibilities of the post, and have five years' relevant experience. A valid current driving licence should be held.

Further information may be obtained from the District Engineering Officer – Telephone Number – Wick (0955) 2061 or 3659.

Applications stating age, educational and professional qualifications, details of posts held with duties and responsibilities to the District Administrator, 32 Northcote Street, Wick KW1 5QP. Tel. No. (0955) 2061 or 3659.

York Health District
District Works Headquarters

Engineering Works Officer

(Sector Engineer)

Due to retirement, the above post will become vacant on March 22, 1980 and applications are invited from suitably qualified candidates.

The post will be located at District Works Headquarters in York and the responsibilities will cover all engineering aspects in the general field of maintenance operations and minor new works at a management level, between that of District Engineer and Senior Engineer.

Experience in the Health Service is desirable but not essential, but applicants must have a good working knowledge of the techniques and standards of the installation, operation and maintenance of engineering plant and services in current use in Hospitals.

Applicants must have Higher National Certificate in Mechanical or Electrical Engineering, plus appropriate endorsements — equivalent qualifications would be considered.

Salary: £6,075 rising to £7,191. An additional payment up to 10% is made for duties relating to the management of an Incentive Bonus Scheme. New entrants to the National Health Service normally commence at the minimum point of the scale.

Application forms and job descriptions or further enquiries can be obtained from the District Works Officer, York Health District, Groves Chapel, Union Terrace, York (Telephone No. 0904 54664).

HARROW HOSPITAL

Chief Engineer

c. £7,000

Attractive position in small private hospital of 99 beds. The successful applicant will be expected to manage all activities in relation to the maintenance of both building and engineering services, including plant within the hospital and its annexes.

You will be responsible for managing the Maintenance Department, recruitment of staff, supervision of service contracts where appropriate, and preparation of specifications.

Free installation and rental of telephone and free health care after six months service. Company pension scheme, subsidised canteen, permanent disablement scheme, and life insurance cover.

Apply to Bryan Elphicke, Professional Recruitment Consultants Limited, 109 Kingsway, London WC2P 6QP. Telephone: 01-405 1205/6789

ESSEX AREA HEALTH AUTHORITY

HARLOW DISTRICT

ENERGY CONSERVATION OFFICER, £6,216–£7,332 plus bonus

(third stage increase pending)

Reporting to the District Engineer, the appointment will initially be devoted entirely to policy initiation development and implementation of matters relating to energy conservation throughout the District.

Acting as Chairman of the District Energy Committee, the man or woman appointed will be responsible for raising awareness of the need for conservation, by training schemes and publicity. He/she will also advise on energy saving schemes and designs and the deployment of revenue and capital.

After approximately two years we see the post holder retaining a time commitment to energy management, but becoming increasingly concerned with broader projects as an Engineering Works Officer. This will involve the design and execution of minor capital works and participating in operational maintenance and operation of plant.

This is a senior management post (third in line manager) requiring HNC Engineering or C & G Tech plus an endorsement in Industrial Administration or Management. Specific knowledge and experience in energy conservation in respect of steam raising boiler plants, distribution systems and electricity tariffs is also required. An essential car user allowance is payable.

For a detailed job description and application form please write or telephone Tony Weight, Personnel Officer, Harlow District, Essex Area Health Authority, Hamstel Road, Harlow, Essex CM20 1RB. Tel: Harlow 26791 ext 552.

Closing date: March 24, 1980.

ROCHDALE AREA HEALTH AUTHORITY
BIRCH HILL HOSPITAL

QUALIFIED ENGINEER

(ONC or equivalent) required at Birch Hill Hospital to be responsible for Electrical/Mechanical engineering maintenance work and minor improvements. Applicants should have completed an apprenticeship.

For further information contact Mr D. Cunliffe, Area Engineer—Telephone Rochdale 77777 (extension 308/9).

Salary: £5,178 rising to £5,784 per annum (increase pending) plus allowance of 15% for supervising bonus scheme.

Job description and application form available from the Area Personnel Officer, Birch Hill Hospital, Rochdale OL12 9QB. Tel: Rochdale 77777 ext 237. Please quote reference number.

Ref: RS.12/80.

West Midlands Regional Health Authority
Regional Sterile Supply Unity

ENGINEERS!

ASSISTANT AREA ENGINEER

The managerial role you've been waiting for.
An opportunity that combines the two sides of you.

Firstly, put your Mechanical/Electrical Engineering experience to good use working alongside Pharmacists/Managers in the factory environment of the Sterile Supply Unit, based in Wolverhampton.

As Assistant Area Engineer you'll be responsible for the smooth running of a wide range of modern plant and equipment, including technologically advanced pharmaceutical/sterilisation machinery, air conditioning and boiler plant as well as the engineering building services.

Secondly, exercise your managerial qualities leading a six-strong works team.

Duties include the recruitment of suitable tradesmen/women and maintaining good staff relations. Also, as a member of the Unit Management Team you'll be expected to liaise with other senior works and management personnel on various projects and developments. You will be professionally responsible to the Area Engineer.

Applicants should have an HNC or HND in Electrical or Mechanical Engineering, together with endorsements in electro-technology or applied Heat/Electrical Engineering and a certificate in industrial administration.

Salary is currently in the range £6,624–£7,845 per annum. On top of this, earnings are considerably boosted by a successful well-established bonus scheme. New entrants to the NHS usually commence on the minimum of the salary scale.

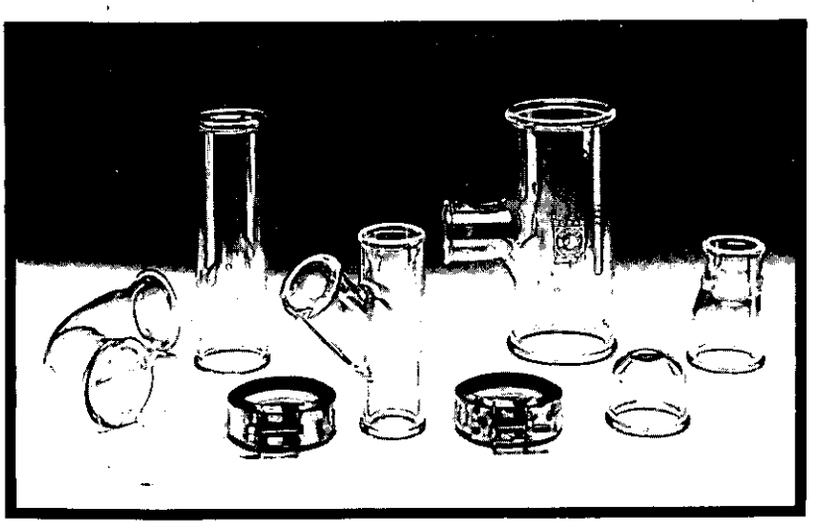
For full description and application form, contact Mr J. Kennerley, Personnel Officer, Wolverhampton Area Health Authority, Administrative Offices, New Cross Hospital, Wolverhampton. Tel. Wolverhampton 737221 ext 35, to whom completed application forms have to be returned by April 25, 1980.

ARE YOU WORKING IN THE DARK

. . . With Drainage Problems?

A borosilicate glass pipework system, such as Boresist, is the answer to many hospital and laboratory drainage problems.
For the transportation of corrosive effluent, the Boresist system is ideal, for these reasons:-

* Unaffected by the most corrosive of chemicals
* Its transparency ensures a debris-free installation and permits the immediate location of any subsequent build-up or blockage
* The simple, quick-release couplings allow the clearance of obstructions and reconnection of the system with the minimum of delay and without the need for replacement parts
* The smooth bore, well-radiussed fittings and engineered joints minimise the formation of deposits
* Negligible thermal expansion
* Resistant to thermal shock



For the Boresist technical brochure write, telephone or telex

Schott-Kem Ltd.
Drummond Road
Stafford ST16 3EL
Telephone: 0785 44231;
Telex 36685 SUKG

SCHOTT MAINZ JENAER GLAS

A Member of the Schott Group