The Journal of the Institute of Hospital Engineering May 1982

HOSPITAL ENGINEERING

Hospitals don't burn — or do they?

Whether your telephone system needs 1 more line or 999...

Norton treats every case as an emergency.

We've recently been fully approved by British Telecom to engineer, supply and install PABX 3 and 4 equipment, for connection to it's national network.

Until now, Strowger users wishing to update or enhance their systems have been deterred by — high costs — long delivery — poor service. Norton has changed all that.

In case you don't already know us, we've installed a million PAX and PABX lines over the past decade.

Many of those installations were for hospitals...so we understand your special requirements.

With offices in Luton, Bristol, Hinckley and Stockport we offer a national service too. With all the expertise you'd expect from the company that some of the world's largest organisations consult.

So if you desperately need to make your telephone system better, call Norton. We'll come to your aid immediately.

Totally Telecoms

NORTON

Norton Telecommunications Limited
Norton House, Bilton Way, Luton, Bedfordshire LU1 1UU
Tel: Luton (0582) 416444 Telex: 826955

Hospital Engineering is published ten times a year, by Mallard Publications. In January and July the *Hospital Engineering Newsletter* is circulated to Institute Members only.

Individual copies cost
£3.25 UK postage paid

The annual subscription is UK: £27.00
Overseas: £33.00 Americas: $70

Average circulation per issue
(January-December 1981): 2827

ABC

Editor
Christopher Tanous TD

Advertisement Manager
Kate Oriel

All correspondence relating to the Journal should be addressed to:

Hospital Engineering
Mallard Publications
48 Southwark Street
London SE1 1UN, England
Telephone: 01-403 6166

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 (STD 0705) 823186

Secretary
J. E. Furness MBE VRD*

Hon Librarian
D. L. Hall Esq., FIHospE MIPlantE
MRSH MBIM LHA
49 Fitzroy Avenue
Harborne
Birmingham B17 8RL
Tel: 021-554 3801, ext. 4838 (Office hours)

HOSPITAL ENGINEERING

The Journal of the Institute of Hospital Engineering

Contents

Volume 36 No. 4 **May 1982**

Front Cover:
Our front cover shows a door after a fire at a hospital in the United Kingdom see our article *Hospitals don't burn — or do they?* (page 10).

Opinion

The Sorcerer's Apprentice or The Magic of Training

I am a fairly recent recruit to the ranks of The Institute, although I have been a licenciate of The Institution of Plant Engineers for some time. I was dismayed to realise that one of my personal criticisms of the latter Institute is to be found again in this one. I write to you with this criticism only because, at last, we have a solution in our hands.

It is worth considering who, of the membership, has most to gain from the Institute's reservoir of knowledge, and I am of the opinion that it is the younger element, the lower echelon, that stands to gain most from sitting at the feet of their elders and betters.

Those who have gained knowledge and experience over the years have much to impart to the novice, who having much of his trade still to learn, can never hope to originate innovative and original thinking, having still to fully learn the 'State of the Art'.

It has been in the historical nature of things that wise men have always taken apprentices, who since they have been almost universally poor, have been educated for nothing. Not so with the Institutes of today.

The boss once told me "never argue by example" — I won't! Here is a story.

Picture, then, our Modern Apprentice. He is, in the main, a Hospital Engineer or Senior Engineer, both of whom still have much to learn despite their positions of responsibility.

Picture our Modern Sorcerer, The Institute, wielding an increasing degree of power over our apprentice to practise his art.

We join our apprentice to our sorcerer, who with largesse, and for a modest stipend undertakes to provide a 'tie of office', a certificate of indenture and involvement in a correspondence course enabling a periodic receipt of a precis *Journal of Spells*.

Time passes and the sorcerer one day writes to say that there are new spells to learn, but they're in Birmingham. If our apprentice can nip out of work early, get a train from Tiddley Under Wychwood (change at Crewe) and get to Brum for 4.30 pm, all will be revealed for only £27.50p.

The day of learning comes, and at 2 pm our apprentice (complete with tie of office and A4 ring binder) is arrested in his departure by his bleep. One of his patients (Psychiatric) has just eaten 9 ins. of lagging and bitten through a 6 ins. steam main. The Regional Works Officer has arrived on a surprise visit and sustained a double puncture on hot ash outside the boiler house, and the bank rings to say that his account is £28 beneath the minimum balance necessary not to incur charges for a quarter.

Under the circumstances the apprentice decides not to go.

His next two chances of learning new spells are at the International Seminar for Senior Engineers and the 38th Annual Conference at the Hilton International, Stratford-upon-Avon.

The Regional Engineer, still smarting from putting the jack through the side of his 2CV, fails to see what the Authority will gain from their apprentice passing a £1,200 holiday in Gloucestershire, and the apprentice would rather visit his mum in Carlisle for three weeks than spend the cash on a week-end in Stratford-upon-Avon.

As time and opportunity passes, the Precis *Journal of Spells* is all the apprentice ever sees, and he becomes one of the many who finds his beard growing longer and whiter without ever becoming close to his sorcerer.

A sad tale and grossly exaggerated of course — or is it?! Most younger members whilst fully affording their betters the respect and prestige they deserve, just cannot attend lectures and conferences because of the all too familiar constraints of time and finance.

But our sorcerer turns out to be a wise man after all and learns a modern thing or two from his apprentice, who it seems has spent his time between journals and watching TV and playing Space Invaders.

Perceiving that all his apprentices have TV, or access to one, the sorcerer decides to put all his knowledge onto video cassette.

Amazingly he finds that the apprentices in Tiddley Under Wychwood and Haverfordwest rent his cassette at £5 a time and put on shows locally for their fellow apprentices.

More amazingly he finds that this previous loyal band still come to sit at his feet and enjoy the pleasure of his live performance, together with the opportunity of debate with him.

Now he gets lots of letters from ones such as the Tiddley apprentice, whom he had begun to suspect were disinterested dunces, concerned only with having the certificate of joining and tie of office.

So, how about it Sorcerer? The capital outlay or rental wouldn't break the bank. The revenue would come in handy, and there must be lots of Tiddley apprentice groups who would hire a video for local meetings. Me for instance!

Martyn Loveday

Institute News

Report of the Council for 1981

Council, and Council Committees, met on a total of 31 occasions during 1981.

The membership of the Institute increased with 170 new members being elected, whilst 41 members had their category of membership upgraded.

The Institute continued to enjoy its contribution as an Affiliate of the Council of Engineering Institutions and as a member of the separate sections of the Engineers' Registration Board.

Council is pleased, particularly, during the year, to have completed the arrangements for the establishment of the Lucas Scholarship Fund which will be used, initially, to sponsor young members to attend Conferences and other activities from which they might benefit.

The 1981 Annual Conference was held in Sheffield when, once again, the technical programme was well received as, indeed, was the Ladies programme. Council acknowledges its indebtedness to officers and members of the East Midland Branch for the tremendous support given.

Four one-day Symposia were arranged. One of these, held at the Royal Festival Hall, and formally opened by H.R.H. the Duke of Gloucester, represented the Institute's contribution to the "International Year of the Disabled" and for which it won compliments. Another of the Symposia sought to convey to Chairmen and Members of the new District Health Authorities, and others, the wide range of responsibilities involved in the "Management of the NHS Estate". This was so well attended that to meet requests, the event was repeated. These one-day Symposia continue, regularly, to attract good attendances and Council is pleased that the Institute is meeting an obvious need in this respect.

The Institute continues to be a member, and have representation on Council, of the International Federation of Hospital Engineering. As is known, the quarterly issues of the Institute Journal, "Hospital Engineering" are, also, the official organ of the International Federation. IFHE continues to grow, to the extent that some 31 countries are in membership. Because of this rapid growth, over only 10 years, it is recognised that the "infant" born of the efforts of just 6 countries has quickly grown to adulthood, and that, as a consequence it is necessary to look at its organisation. Currently then, study is being undertaken over the possible revision of its Statute and Standing Orders, Administrative and Membership structures and modus operandi.

Meanwhile Council is delighted to have been invited by IFHE, again, to arrange and hold an International Seminar for Senior Hospital Managers/Works Officers/Engineers and this will be held at The Hospital Estate Management and Engineering Centre, Falfield from 18th April–7th May 1982.

The Northcroft Silver Medal Award for 1981 is awarded to Mr. M Woodroofe for his Paper entitled "Installation of a Honeywell Delta 1000 Building Services Management System" which appeared in the October Issue of "Hospital Engineering".

The Institute Library continued to function, although the year saw the installation of a new Honorary Librarian, D L Hall succeeding R G Smith who retired from the office and the NHS, to graze pastures anew.

During the year, Council determined to try to produce comprehensive "Careers literature" as there is ever-growing evidence of the need for this in the enquiries received from young people and educational establishments.

In peripheral activities, the Institute's opinion continued to be sought from numerous quarters and at various levels. Representation on certain CEI and BSI Committees continued, as it did on the Watt Committee on Energy, this last named organisation now having invited the Institute to be represented on its Board.

Council hopes, therefore, that members will share the view that the year was one of progress.

Lucas Scholarship Fund Awards

Two Awards have been agreed for 1982 under the new Lucas Scholarship Fund, established by Dr B G B Lucas, a Past President of the Institute (see the *Hospital Engineering NEWSLETTER*, January 1982).

The Award winners are:

J. Morton Engineer Southampton General Hospital.

R J Clark Engineer Royal West Sussex Hospital.

and they will attend the Annual Conference of the Institute to be held at the Hilton International, Stratford-upon-Avon from the 19th–21st May, all expenses paid.

The Award scheme is restricted to members under the age of 28. The response in this first year was most satisfactory and encouraging as approximately one-sixth of all members eligible applied. It is hoped that this pattern will be repeated in future years.

Successful Institute Sponsorship

We are very pleased to announce that our sponsorship of Mr D. E. Wellstead as Chartered Engineer has been successful.

Mr Wellstead obtained his BA at the Open University, and in addition, in order to satisfy the requirements of the Engineers Registration Board, he successfully sat certain subjects in the CEI Part 2 examination.

Scottish Branches Conference

The 12th Conference of the Joint Scottish Branches is to be held in Glasgow from the 28th to 30th October, 1982.

The Executive Group of the South Western District of the Greater Glasgow Health Board is making accommodation available at the Walton Conference Centre, which is situated in the grounds of the Southern General Hospital.

At the time of going to press, details of the content of the programme have yet to be finalised, however it is hoped to structure this on the theme of the current Information Technology Year 1982.

Further information and forms of registration may be obtained from: T M Sinclair, Hon Branch Secretary, West of Scotland Branch, 3 Morven Way, Kirkintilloch G66 3QL, Scotland.

Appointment of District Works Officers

West Midlands RHA

North Staffordshire	B. J. Dunn
South Warwickshire	D. A. Brant
Central Birmingham	T. A. Workman, CEng MIMech FIHospE
West Birmingham	W. Howarth, MIMarE FIPlantE FIHospE
Solihull	R. J. Sear, BSc CEng MCIBS FIHospE
East Birmingham	A. Round, MIPlantE FIHospE
Bromsgrove/Redditch	M. J. Kirby, BSc CEng MIMechE MCIBS
Herefordshire	B. J. Williams, DipArch ARIBA
Rugby	R. J. Chatwin, CEng MIMech MCIBS MIHospE
SE Staffordshire	C. Lamb, CEng MIEE MCIBS
Wolverhampton	C. F. Rea, ARICS MCIOB
Worcester	J. P. Addison, BSc CEng MIMechE MCIBS MIHospE

In the following cases, the boundaries have not changed, and the former Area Works Officers have been appointed as District Works Officers to the new Authorities — in NHS jargon they have been 'slotted in'.

Shropshire	E. F. Austin, CEng MIMechE MIHVE FIHospE
Coventry	F. J. Williams, CEng MIMechE FInstF FIPlant FIHospE
Dudley	A. L. Towle, CEng MIMechE FIHospE
Sandwell	H. R. Martin, CEng MIMechE MCIBS FIPlant FIHospE
Walsall	C. F. Robson, CEng MIEE MIMechE

Trent RHA

Barnsley	M. Smith, CEng MIERE MCIBS
Sheffield	H. Smith, ARICF
Leicester	No Appointment
S. Derbyshire	C. Marshall, BSc(Eng) CEng MIMechE MIHospE
N. Derbyshire	B. McAlavey, CEng MIMechE
Central Notts.	M. R. Morris, BSc MCIBS MBIM
Nottingham	H. C. Knight, DipArch
N. Lincs.	J. K. Orr, ARICS
Rotherham	R. Ashton, CEng FIHospE
Bassetlaw	D. Lea, CEng MIMechE MBIM MIPlantE
Doncaster	H. Batey, CEng MIMechE FIHospE FIPlantE MBIM
South Lincs.	A. D. Mason, HNC(Mech)

New Branch Officers for 1982/83

Midlands Branch

Chairman, K W Ashton
Vice-Chairman, G Pike
Secretary, W Turnbull, 3 Rowallen Road, Four Oaks, Sutton Coldfield, West Midlands.

West of Scotland Branch

Chairman, D E Moss
Vice-Chairman, B D Edgar
Honorary Secretary, T M Sinclair, 3 Morven Way, Rosebank, Kirkintilloch, Glasgow G66 3QL.

J W Campbell retires

Mr J W Campbell, CEng FIMechE FIHospE retired from the Health Service on the 31 March 1982. Mr Campbell joined the former Birkenhead Hospital Management Committee on the 1 March 1946 as Chief Engineer after serving on the Queen Mary and Queen Elizabeth during the War, thence to the Grimsby HMC as Group Engineer to the South Liverpool from 1951-1972, when the South Liverpool HMC was absorbed into the Liverpool Teaching Group. After the 1972 re-organisation, Mr Campbell was appointed as Area Engineer to the Cheshire Area Health Authority, which appointment he held on retirement.

We wish him and his wife, Nora, a long and happy retirement.

Forthcoming Branch Meetings

Southern Branch **Hon Sec: R P Boyce 0243 781411**

11th May, 5.15pm	Branch Meeting and Film	Winchester Royal County Hospital.
13th July, 5.15pm	Branch Meeting	Southampton General Hospital.

East Anglian Branch **Hon Sec: M Brooke 0493 50411**

17th July	Visit to new District General Hospital, Gt. Yarmouth	

Yorkshire Branch **Hon Sec: J Bate Wakefield 890111 Ext 293 (Home Leeds 863743)**

14th June at 2.00pm	Total Energy Stations Presented by Mr S Whitehead Station Superintendant Leeds General Infirmary	Donald Kaberry Lecture Theatre Leeds General Infirmary Great George Street Leeds LS2

North Western Branch **Hon Sec: J Sunderland 061-235 9456 Ext 588**

12th May	Talk by IMI Bailey Valves Ltd	Hope Hospital Post Graduate Centre, Salford

Scottish Branches Conference **T M Sinclair 041 332 9696**

28th, 29th and 30th October	Information Technology Year 1982	Walton Conference Centre Southern General Hospital,Glasgow

6 Branch Meeting

12th June 10.00am	See programme in this issue	John Radcliffe Hospital,Oxford

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

The Institute of Hospital Engineering
Annual 6 Branch Meeting

The John Radcliffe Hospital
Headington, Oxford

Saturday 12th June, 1982

PROGRAMME

10.00 Coffee

10.15 OFFICIAL OPENING by
K. W. ASHTON Esq CEng MIMechE AMSE FIHospE
Chairman, Midlands Branch.

CHAIRMAN FOR THE DAY
COLIN ASTLEY Esq CEng MIMechE MCIBS FIHospE
Regional Engineer, Oxford.

10.25 MICRO BIOLOGY AND THE WORKS DEPARTMENT
Speaker: Dr. M. EMMERSON
Consultant Medical Micro Biologist and Infection Control Officer, Islington District Health Authority.
Senior Lecturer in Micro-Biology
Univeristy of London at University College.

11.30 ENERGY CONTROL AND MONITORING SYSTEMS
Speaker: BRIAN AMEY Esq
Johnson Controls Ltd.

12.30 Discussion

12.45 Lunch. This is available at the John Radcliffe Hospital at £2 per head including wine.

14.00 TOWARDS THE LOW ENERGY HOSPITAL
Speaker: M. CORCORAN Esq MSc MCIBS AMASHRAE
Associate, Building Design Partnership, Manchester.

15.00 DISCUSSION

15.45 CLOSING ADDRESS BY CHAIRMAN

16.00 Tea and Disperse

Will members wishing to attend please contact their Local Branch Secretary.

Ken Eatwell retires

K. J. Eatwell, CIHospE, long a senior Council member, retired from his post as Regional Engineer to the South West Thames Regional Health Authority in February.

Our photograph shows Ken with his wife Betty at a farewell party attended by 150 friends and colleagues, looking at their farewell card.

Another feature of the occasion was a cake bearing the Institute's insignia.

We are delighted that Ken will still be seen at Institute events from time to time, including the Annual Conference this year.

Obituaries

Mr T Withers

It is with great regret that we record the death on the 28th January last of Mr. Thomas Withers, for many years a member of the London Branch. Born in Crewe in 1914, Mr. Withers served his apprenticeship from 1929-1935 at the famous LMS Workshops in that town.

He worked in a number of hospitals in the London area, retiring from St. John's Hospital, Lisle Street in 1979.

His short retirement was dogged by almost continuous illness. He died at St. Christopher's Hospice, Beckenham, Kent.

He is survived by his wife Doris, to whom we offer our deepest sympathy.

Mr C R Morley

It is with deep regret that we report the death of Mr C R Morley, Area Works Officer of the City & East London Area Health Authority (T).

Dick Morley joined the Health Service as Chief Engineer to the Board of Governors of the London Hospital in 1967 after a career in Works Management in Industry.

In taking-up his appointment as Area Works Officer with the City & East London Area Health Authority (T), he undertook a most demanding job with two major teaching hospitals in a deprived area, with reducing revenue allocations. He became intimately involved in the radical planning which this situation demanded. He inherited an estate of 30 mainly old hospitals, many in a most decrepit state. The rationalisation plans demanded that many of these old hospitals had to close, so that the savings could be reinvested in improving those retained. At the same time he was involved in the planning of three new hospitals, the two Nucleus Hospitals at Newham and Homerton at Hackney, and a major extension to the London Hospital. It was through this involvement that he perceived the need for Works Officers to be trained in the planning process. It was through Dick Morley's initiative that several hundred Works Officers have now attended the DHSS Estate Management Planning course held at Falfield.

Dick had a natural gift for leadership and served as the first Chairman of the National Association of Area Works Officers from 1975 to 1977. These were difficult days to establish new working arrangements for such bodies but, under his wise counsel, he quickly established trusting relationships with the DHSS and other professional bodies. His whole-hearted commitment and enthusiasm made him a ready target for enlistment onto many Committees and Working Parties, the most notable of which has been his invaluable contribution to the work of the DHSS Advisory Group on Estate Management.

Mr S Argyrou, the Area Administrator of the City & East London Area Health Authority (T), said that Dick Morley was held in very high regard by the Authority and colleagues, and what was most impressive was his ability to inspire enthusiasm and personal commitment from all the Works staff in the Area.

Dick would have been justifiably proud of his achievements, and the Area Health Authority will certainly be handing over to the new District Health Authorities an estate which has been greatly enhanced by Dick Morley's dedicated work.

Fellowship of Engineering

Study of modern materials in British Industry

The Fellowship of Engineering has received a grant from the Department of Industry for a study on the engineering use of modern materials. By making a number of case studies, the Fellowship will review the factors which have inhibited the introduction of modern materials (including new materials processing techniques and materials treatments) into British manufactured products, and will isolate the main factors which have inhibited innovation. It is also intended to highlight those material processes and treatments which have already been introduced into other industrialised countries and which have not yet apparently made any significant contribution to British engineering design. This will lead to a review of likely future trends in new materials, new products and new methods of materials processing, and suggestions will be made on how these might be used to commercial advantage by British firms.

The study will be carried out by a group of Fellows under the chairmanship of Dr. A. Kelly FEng, FRS, Vice-Chancellor of the University of Surrey. The other members are Mr. John Collyear, Managing Director of Associated Engineering plc, Mr. R J Dain of Ford and Dain Partners, Sir St. John Elstub formerly Chairman of IMI, Professor Cyril Hilsum of the Royal Signals and Radar Establishment, Dr. R. Nicholson formerly Managing Director of INCO Europe Ltd. now Chief Scientist at the Cabinet Office and Dr. D. S. Oliver, Research Director of Pilkington Brothers Limited. The Fellowship has asked Michael Neale and Associates of Farnham, Surrey, to assist them with the study.

Wolfson Industrial Research Fellowships

The Wolfson Foundation has decided to devote up to £750,000 a year for the next few years to establish an Industrial Research Fellowships Scheme, to be administered by the Fellowship of Engineering.

In the present recession, a number of industrial firms have been forced to reduce their research and development budgets, and in some cases their R & D staff as well. As a result, a number of industrially-oriented engineers and scientists trained at great expense are seeking employment in which they can use their technological skills and practical experience. It also means that some young people who had completed their professional training have had their hopes of a career in the innovative process frustrated for the time being.

Between twenty and thirty Fellowships will be awarded for periods of one, two or three years, and will be tenable in suitable laboratories, such as one or other of the many Wolfson Units associated with university departments, where industrially-oriented development work is carried out. The Scheme will provide each Fellow with a stipend appropriate to his age and experience and to the laboratory in which he will work, together with money to provide for laboratory overheads and working expenses at a level depending on the individual project. Preference will be given to applicants in the age range 25 to 35 years, although exceptionally those outside this age range will be considered : all applicants must have experience in industrial research and development.

Applicants must themselves propose a project on which they will work during tenure of the Fellowship. There is no restriction on the projects which will be considered, except that each should show a reasonable expectation of commercial or industrial benefit in the medium term, say three years. Evidence that the project has aroused industrial interest in a particular firm would be an advantage.

It is the intention of the Foundation that the Scheme should support individual workers in the practical application of science and technology to the creation of wealth. It is not intended to subsidise existing industrial research programmes in individual firms, or to support general research not related to practical applications.

The Fellowship of Engineering will form a Panel of Assessors, to select suitable candidates, arrange for their attachment to appropriate laboratories and to monitor their progress.

Applications should be made by individuals, and should include the following:—

a. Curriculum vitae of the applicant;
b. Names of two referees (at least one from industry);
C. An outline of the proposed project, setting out clearly the expected benefits, the timescale, and the level of industrial interest;
d. The proposed duration of the Fellowship;
e. An estimate of the costs of the project;
f. Suggestions of suitable places where the work might be done. (This will be subject to the charity laws).

The application, headed 'Wolfson Industrial Research Fellowship Scheme' should be sent to The Fellowship of Engineering, 2 Little Smith Street, London SW1P 3DL. Contact: Mr. W B H Lord, 01-222 3912, Ext: 9; or Dr. Fiona Steele 01-222 3912 Ext. 5.

CEI News

New Chairman and Vice-Chairman at the CEI

The Board of the Council of Engineering Institutions has elected Mr. Gerald James Mortimer CBE FEng as Chairman, and Dr. Wilfred Eastwood FoEng as Vice-Chairman, for 1982–83. Both appointments took effect from 25 March, following the Council's Annual General Meeting.

Mr G J Mortimer, is a consultant mining engineer.

Dr. Eastwood, is a consultant structural engineer.

CEI Board Election 1982

The names of the four successful candidates in the 1982 election of Individual Members to the Board of the Council of Engineering Institutions (CEI) were announced at the Council's Annual General Meeting on Thursday 25th March 1982. The new members of the Board are, in alphabetical order:-

* Dr. H P Jost, Hon FIProdE, FIMechE, Hon MIPlantE
Mr A G Read, RAeS, IMechE
* Mr J D Sampson, FIMechE, FIMarE
Mr W Wright, FIEE, FIMechE, FInstE (asterisk indicates previous members of the Board).

Extraordinary General Meeting

Notice is hereby given that an Extraordinary General Meeting of the Council of Engineering Institutions will be held at 1730 hours on Thursday 16 September 1982 at The Institution of Civil Engineers, 1-7 Great George Street, London SW1 for the purpose of considering and if though fit passing the following Special Resolution.

'That Article 2 of the supplemental Charter of 27 July 1978 and By-Law 84 shall be amended in the manner set out in Column 2 of the Schedule below and in such other manner as the Lords of Her Majesty's Privy Council may require, and the Board of the Council of Engineering Institutions may agree.'

By order of the Board D B Wood Secretary.
25th March 1982

Note:
All Chartered Engineers are entitled to attend and vote at this meeting.

Schedule

Existing Text	Amended Text

(1) Amendment to the Supplement Charter

Existing Text	Amended Text
"Special Resolution" means a resolution passed by not less than two-thirds of the members of the Board present and voting at a Meeting of the oard and confirmed by not less than two-thirds of the Individual Members and representatives of Corporation Members present and voting at a General Meeting of the Council held not less than six weeks nor more than six months after the said meeting of the Board.	"Special Resolution" means a resolution passed by not less than two-thirds of the members of the Board present and voting a Meeting of the Board and confirmed by not less than two-thirds of the Individual Members and representatives of Corporation Members:- **(a) present and voting at a General Meeting of the Council held not less than six weeks nor more than six months after the said meeting of the Board; or (b) if the Board so determines, voting by means of a poll taken in such manner as shall be prescribed by Regulations made by the Board.**

(2) Amendment to By-Law 84

Existing Text	Amended Text
84. These By-Laws may be amended, added to or revoked only by a Resolution passed by not less than two-thirds of the members of the Board present and voting at a meeting of the Board and confirmed by a Resolution passed by not less than two-thirds of the Individual Members and representatives of Corporation Members present and voting at a General Meeting held not less than six weeks nor more than six months after the said meeting of the Board:	84. These By-Laws may be amended, added to or revoked only by a Resolution passed by not less than two-thirds of the members of the Board present and voting at a meeting of the Board and confirmed by a Resolution passed by not less than two-thirds of the Individual Members and representatives of Corporation Members **(a) present and voting at a General Meeting of the Council held not less than six weeks nor more than six months after the said meeting of the Board; or (b) if the Board so determines, voting by means of a poll taken in such a manner as shall be prescribed by Regulations made by the Board.**

Explanation

The purpose of these amendments is to extend the method of confirming Board resolutions relating to proposals to alter the Supplemental Charter or By-Laws by introducing the option of a poll at the discretion of the Board.

The current Regulations on the conduct of a poll specify that all Individual Members of CEI shall have a vote which shall be recorded by post.

Nominations for the CEI Board

Nominations are now required from Chartered Engineers to fill the six places on the CEI Board which will become vacant at the conclusion of the 1983 Annual General Meeting.

Nomination forms are available from CEI, 2 Little Smith Street, London SW1P 3DL and will give details of the nomination procedure. Nominations must be supported by fifteen chartered engineers and forms must be received at CEI by 1200 hours on 30th September 1982 at the latest.

The following elected Board Members will be retiring and those not eligible to stand for re-election are marked*

Mr R D Anthony RAeS IMechE
* Mr K W A Guy IChemE
Mr A M Jackson IGasE
Mr K B Smale-Adams IMM
Mr A D W Smith ICE, IMunE, IHE
* Mr E H Wakefield ICE, IHE

The By-laws require that not more than two elected members of the Board shall be identified with any one Corporation Member or the group of Affiliates. In consequence nominations from members who are corporate members of IEE only, IMechE only or IEE and IMechE only cannot be accepted as the elected members not retiring including two members identified with each of these two Institutions.

New CEI Secretary

Mr M W Leonard BSc (Eng), CEng, FICE, MIMechE, Secretary of the Council of Engineering Institutions since 1969 retired on 31 March. When the Fellowship of Engineering was set up in 1976, Mr Leonard became its first secretary and will still continue to perform this duty at 2 Little Smith Street, Westminster.

Mr D B Wood CB, MA, CEng, FIMechE, took over as Secretary from 1 April. Mr Wood joined the Council in 1978 as Executive Secretary following a career in the Regular Army. The title of Executive Secretary will now lapse.

CEI Branches Conference

The 1982 Branches Conference of the CEI is to take place on the 8th-9th July, and will be held at Churchill College, Cambridge.

Amongst the subjects for consideration are the effect that the establishment of the Engineering Council will have on the engineering profession, and the ways in which organisations as the CEI can use public relations.

The attendance fee for the Conference is £35, further details and registration forms are available from Mr S P Collins, 32 Sedley Taylor Road, Cambridge, CB2 2PN, Telephone (0223) 247027. Closing date for applications is Friday 25th June.

Accreditation is Good News

CEI has the obligation "to establish", uphold and advance the standards of qualification of professional engineers" and sets its own examination at degree level as the minimum academic standard for Chartered Engineers. The great majority of registrants however are given exemption from the CEI examination on the strength of an engineering degree acceptable to CEI awarded by a UK university, or indeed a degree in a related subject acceptable to CEI. The process of deciding which degrees are acceptable as giving exemption from the CEI Examination is called *accreditation* and is carried out by the profession for the profession.

There is a similar process, known as *validation*, carried out by the academic community which determines whether a particular course of study qualifies for the award of a degree. Validation is carried out by each university for its own courses, and by the Council of National Academic Awards (CNAA) for Polytechnics and other Colleges. Superficially it may appear that these two processes are so nearly identical that they could be combined, but an example will illustrate the fallacy of this idea. A university course consisting partly of engineering and partly of other subjects, as many university courses do, may have all the necessary qualities needed for validation for the award of a degree, but the engineering content may be inadequate as an academic base for a professional engineer and accreditation may be denied.

Done properly, accreditation is an expensive and time-consuming process, involving the careful scrutiny of the course content, entry standards, teaching methods, nature of practical work, and method of assessment. A visit to the teaching establishment is often needed. It is not simply a go / no-go test. Sometimes a course can be modified by the teaching establishment to make it acceptable to the accrediting authority. Some engineering Institutions have been engaged in accrediting degree courses for several years and all are now involved. However there are upwards of 500 seperate courses in the UK which lead to the award of engineering degrees and it will be several years before all these can be properly accredited; by which time, like painting the Forth Bridge, it will be necessary to start again at the beginning. It is recognised that the content and standards of these courses vary a good deal and until all have been accredited there must be some concern about the basic academic standards of the engineering profession. To meet this concern, one Institution has decided to impose a threshold of a second-class honours degree on applicants for corporate membership. It is generally acknowledged that this is a somewhat blunt instrument since it cannot deal with the problem of differing standards between one second-class honours degree and another. It seem possible that this requirement may be modified when accreditation of all relevant degree courses has been carried out.

The Engineers Registration Board of the CEI is also involved in the accreditation process in partnership with the member Institutions. The purposes of ERB involvement are:

a. to ensure that one Institution or another accepts responsibility for accrediting every relevant course;
b. to make special arrangements for accrediting general engineering science courses that do not fall naturally into any one discipline;
c. to ensure that common standards are applied;
d. to satisfy the CEI Charter requirement that exemptions from the CEI examination must be approved by the CEI Board.

ERB representatives are now working with the accreditation boards of all institutions or groups of institutions. Their expenses are met from ERB funds.

Accreditation is a major undertaking but, if you are a Chartered Engineer who is concerned about the standards of those who follow you, or a student seeking to join a well-run profession, systematic accreditation of engineering degree courses is good news.

Letters to the Editor

Article: Gas Scavenging at Queen Alexandra Hospital, Portsmouth

Hospital Engineering — February 1982

I refer to the above article and feel that it is appropriate to comment on certain aspects.

The paper described the work carried out to measure the concentrations of waste anaesthetic gases in the operating theatres and recovery room, and showed that:

a. Abnormally high concentrations of nitrous oxide were present in the operating theatre;

b. Concentrations were considerably reduced when the air vents on the receiving system of the scavenging system were sealed; and

c. High levels of nitrous oxide were present in the recovery room.

I would suggest that this paper could seriously mislead your readers because it implies that scavenging systems incorporating air break vents can be ineffective unless the air vents are sealed. The purpose of the air vents is to protect the patient from excessive positive or negative pressures. **UNDER NO CIRCUMSTANCES SHOULD THESE AIR VENTS BE SEALED OR BLOCKED IN ANY WAY.**

It was stated in the conclusion of the paper that sealing the air break vents was a temporary measure but even so patients could have been put at risk. If the performance of the scavenging system is not satisfactory, the most likely cause is that the extract flow rate from the receiving system is too low, and this should be checked initially. An extract flow rate of 100-150 litres/min would typically be required, depending on the design of the system. Incidently, when the levels of nitrous oxide were measured by my staff in the recovery room, the average was less than 25ppm.

The article also states that the DHSS has laid down pollution limits. It is not possible to be that specific. The removal at source of expired anaesthetic gases by means of a scavenging system is recommended as stated in HC(76)38. The provision of a good standard of theatre ventilation however is also important in the control of pollution from sources other than expired gases and during procedures in which the use of scavenging is precluded for clinical reasons. These general objectives are supported by the Health and Safety Executive. The DHSS and the RHAs have studied the theory and practice of anaesthetic gas scavenging and readers are advised to seek assistance from their Regional Engineers or the DHSS on any problems that they encounter on this subject.

T A Nicholls, Chief Engineer, DHSS, London.

Chartership — another opinion

Having read the article, NHS Reorganisation-A Qualified Success, in the April issue of Hospital Engineering, I feel I must reply, being a mechanical graduate and having recently applied for corporate membership of the Mechanical Engineering Institute.

The new Service, existing from the 1st April 1982, will, I hope, be a streamlined one if this is accomplished, the reduction in manpower must surely mean that those remaining will have to be of the highest potential. As is quite correctly stated, the service requires two things (i) to be maintained and (ii) to be developed, and the very fact that there is a current reorganisation points to at least some degree of failure in the past. In 1974 many engineers found themselves in relatively senior posts of which they were not capable, and such could happen again if this reorganisation is merely a shuffle. I feel that for the future the type of engineer required is one of graduate status, with the prospect of becoming chartered.

I would not deny for one minute that the older, perhaps less qualified engineer has a wealth of experience and knowledge, but I believe that for the Service to move forward quickly with the technological developments of this present age we have a greater need not for experienced engineers, but those with potential and enthusiasm; experience will be gained on the way. I believe that this type of engineer will, where he exists, grasp the promotional opportunities that will be created, and those who want these positions must move towards becoming chartered.

I feel that it is unfortunate that those truly capable, older, non-qualified engineers, may be "pensioned off" early, because they could be invaluable in helping the younger chartered engineer gain time and experience, while developing their full potential. Hence I would advocate more than five years, protection for these persons. I also accept the possibility of a limited number of eligible engineers existing to fill senior posts in the newly reorganised Health Service, and this strengthens my feeling for longer protection for the above mentioned. However, we must get rid of the dead wood.

The challenge exists for younger, enthusiastic graduate engineers to become chartered and assume control of the new Service. The present state of the management of engineering functions, the lack of zeal for advance, the sluggish performance of those in control at present, are all a poor advertisement for the NHS. The only prospect is to proceed using chartered graduate engineers who will undoubtedly because of their training advance at a much increased rate from 1982 onwards, than the older part-time educated engineer did from 1948 to the present day.

W J Doran, Senior Engineer Craigavon, Co Armagh.

Institute of Building Seminar

This month's articles were first presented as papers at a seminar organised by The Institute of Building some time ago, but their content is still as significant.

Mr. Hinkley joined the DoE's Fire Research Station in 1951. He has been concerned with such diverse research projects as the use of fire fighting foams, the ignition of materials by radiated heat, protective clothing against flame and heat, the spread of fire beneath ceilings and methods of controlling the spread of smoke in buildings.

He now heads the Materials, Components and Structures Section which is concerned with the behaviour of building materials, elements of building construction and complete building structures in fire.

We are grateful to the Fire Research Station for the photographs in this article, and on the front cover.

Hospitals don't burn — or do they?

P HINKLEY FIFireE

Introduction

Years ago hospitals were built with large wards having high ceilings and were ventilated by tall windows. Services were minimal, heating was by hot water radiators, there was electric lighting, piped water and drainage but generally no piped oxygen. Finishes were hard, generally painted plaster. The beds with mattresses of traditional materials were arranged along the side walls and, apart from bedside lockers, there was not much other furniture.

Such wards would now be regarded as "institutional" in appearance but they were good from the point of view of restricting fire spread. Today there is a greater emphasis on patients' comfort and on saving energy. This has led to the lowering of ceilings, the sub-division of wards, new types of furniture, new finishes and more "services" being introduced. At the same time staffing levels are tending to be reduced. For these and other reasons considerable emphasis is being placed on fire precautions in the design of new hospitals and in the "upgrading" of old ones and this can cause considerable difficulty to the staff concerned with alterations or maintenance.

The first part of this paper discusses some fundamental principles in the ignition growth and spread of fire and the spread of smoke. This is followed by an examination of some aspects of fire precautions which should give some understanding of the requirements in regulations and elsewhere (Ref. 1 & 2) and some assistance in complying with them.

The selection of topics has been somewhat arbitary but is intended to include those which seem to cause particular difficulty.

This is not intended to be an authoritative guide to the upgrading of existing buildings which the DHSS are currently giving consideration. A draft hospital technical memorandum on Fire Safety in Health Buildings which is applicable to new buildings with certain exceptions is available *(see reference 3)*. It is important that the local fire authorities are consulted before any work which might affect the fire precautions in the hospital is carried out.

Fundamental considerations in fire and smoke spread

For a fire to start and spread three things are necessary — fuel, oxygen (in the air) and an igniting source (heat). Thus the most fundamental fire precaution is to keep sources of heat and potential fuel well separated. This covers the whole spectrum from the provision of adequate ash trays (or better still the prohibition of smoking where possible) to the design of a hospital so that kitchens (where a fire is likely to start) are kept apart from stores (where there is a lot of fuel) and wards (where people are at risk).

There are many causes of fire but in areas of hospitals where there are people the commonest sources of ignition are smoking materials and matches; "malicious ignition" is not uncommon particularly where there are psychiatric patients. In kitchens the commonest cause of fire is ignition of food being cooked — particularly the deep frying range. *(See reference 4)*.

Only rarely is the structure of a building ingnited directly — ignition generally involved the contents. Materials which are easily ignited includes paper (particularly packing materials), textiles (such as cotton sheets or blankets and curtains unless they have been specially treated to make ignition difficult) and foam plastics such as are used in mattresses and upholstery.

The most likely first effect of ignition by a cigarette end is smouldering or glowing combustion. This can occur in fibrous materials including cotton wadding (in some types of furniture) and bundles of sheets and in some types of plastic foam. It can persist for some time with little visable effect since it can be hidden within the material but eventually it may become transformed to flaming — possibly by a slight draught.

Once ignited a fire is likely to spread. Materials over which fire can spread rapidly include thin materials such as vertically hanging textiles, crumpled sheets of paper, fibreboard packing cases and plastics foams.

Fire generally spreads more readily upwards than sideways although downward spread may be caused by falling burning material (eg dripping molten plastics or curtains supported by plastic hangers which melt when heated). It spreads more rapidly in corners than over flat surfaces and it spreads more rapidly over combustible insulators than over heavy materials such as solid timber. An insulator in this context is a lightweight material which does not absorb much heat — such materials feel warm when touched as opposed to say concrete which feels cold.

Fire can spread rapidly over some types of plastic foam mattresses and upholstered furniture and a lot of work is being done on the design of hospital mattresses and other furniture so as to slow down fire spread. *(see reference 5).*

The hot gases and smoke produced by the fire rise upwards until they reach the ceiling where they spread laterally and fill the room from the ceiling downwards. In a couple of minutes the smoke from a burning mattress in a ward can be thick enough to hinder escape. Any fire produces toxic combustion products (the most important being carbon monoxide) which if people are unable to escape will lead to disorientation (reducing the likelihood of escape still further) and eventually death.

In the early stages the spread of fire may not be affected by the presence of the walls and ceiling. If all doors and windows are closed the fire will eventually be affected by lack of oxygen and the burning rate will be reduced; in a small room it might even extinguish itself. However at this stage anybody in the room would be dead.

If the fire is not affected by lack of oxygen eg. because doors are open or a window breaks it will continue to grow and will heat up the walls and

The cigarette end smouldering on the bed in the above photograph caused the fire shown below.

ceiling so that they radiate heat on to materials not involved in fire. When the fire has grown to the extent that flames reach the ceiling they will "mushroom" out beneath it and this greatly increases the effect of such radiation. Hence fire will spread more rapidly in a room with a low ceiling than in one with a high ceiling. Also walls and ceilings with exposed insulation which heats up rapidly accelerate the spread of fire.

If wall and ceiling linings are combustible they will play an important part in spreading fire since they constitute large areas of continuous surface over which flames can readily spread.

Eventually a stage is reached at which the fire appears to "flash over" to involve all exposed combustible materials within the room. At this stage all people in the room would be dead and the fire poses a substantial threat to the remainder of the building.

A fire can be divided into four phases, an induction period following ignition — this may be long (as with smouldering) or short (as with the burning of some types of upholstered furniture), a period of more rapid growth leading to flash over (in which linings are important), a period of relatively steady burning following flashover and a decay period when the fuel is burning out.

The first effect of the fire outside the room in which it originates will be the arrival of smoke and other combustion products. Hot smoke can move along corridors at a walking pace, even against normal ventilation air flows, initially it forms a layer beneath the ceiling but this layer deepens until people escaping are in the smoke. After it has travelled a good distance the smoke may cool and then it moves with normal ventilation air flows. The most important barriers to smoke and toxic gases are closed doors.

Wall and ceiling lines and finishes

The importance of the walls and ceiling in the growth of fire has already been stressed. Performance requirements generally refer to the Spread of Flame Test of BS476, Part 7. In this test a 900mm long by 230mm high vertical sample is subjected to radiant heat similar to that expected in a fire; this decreases in intensity along its length. The hot end is ignited by a pilot flame and according to the horizontal distance of flame spread at 1½ and 10 times materials are classified 1, 2, 3 or 4 in order of increasing hazard.

This test takes little account of the heat output of the material when it is burning and another test is therefore required for materials to be used for lining critical areas, such as escape routes. This is the Fire Propogation Test of BS476, Part 6, the results of which are expressed as indices being an indication of the heat output of the material in the early part of the test and 1 an indication of the heat output throughout the test. A 'Class O' material is defined in the Building Regulations; it is a Class 1 material which additionally has 1 less than 12 and 1 less than 6.

Although these tests are often regarded as tests for surfaces a considerable depth of the specimen is involved and if the surface material is a paint film or sheet of limited thickness, the performance will be greatly dependent on the substrate and often on the methods of attachment.

The performance of many types of material and of many types of proprietary coatings on various substrates has been catalogued (see Ref's 6, 7, 8) most untreated woods and hardboards are Class 3; low density woods and fibre insulation board are Class 4, but all these materials may be brought up to Class 1 by suitable impregnation processes or by fire retardent coatings. Clear paints are available which will bring timber up to Class 1 without hiding the grain.

Plasterboard is generally Class O but it is close to the limit because of the paper face and care has to be exercised in the choice of coatings if the system is to be this class. The choice is wider if the plasterboard has been given a skim coat of plaster.

The draft Technical Memorandum for new hospitals *(see reference 3)* specified Class O for walls and ceilings of escape routes; in living accommodation or areas for treatment, care or maintenance of patients walls must be Class O but ceilings may be Class 1. These ratings should be achieved without the use of flame retardant coatings.

In existing buildings however, it may not be possible to achieve these standards and in addition recourse may have to be made to flame retardant coatings.

When overpainting areas which have been treated with flame retardant paints or other processes, it is necessary to ensure that fibre retardant paints which are compatible with the original treatment are used. The advice of the manufacturers should be sought in such cases.

Care has to be exercised in the choice of paints to use on lightweight insulating material such as a sealer for sprayed asbestos. A number of suitable coatings are now available for this task.

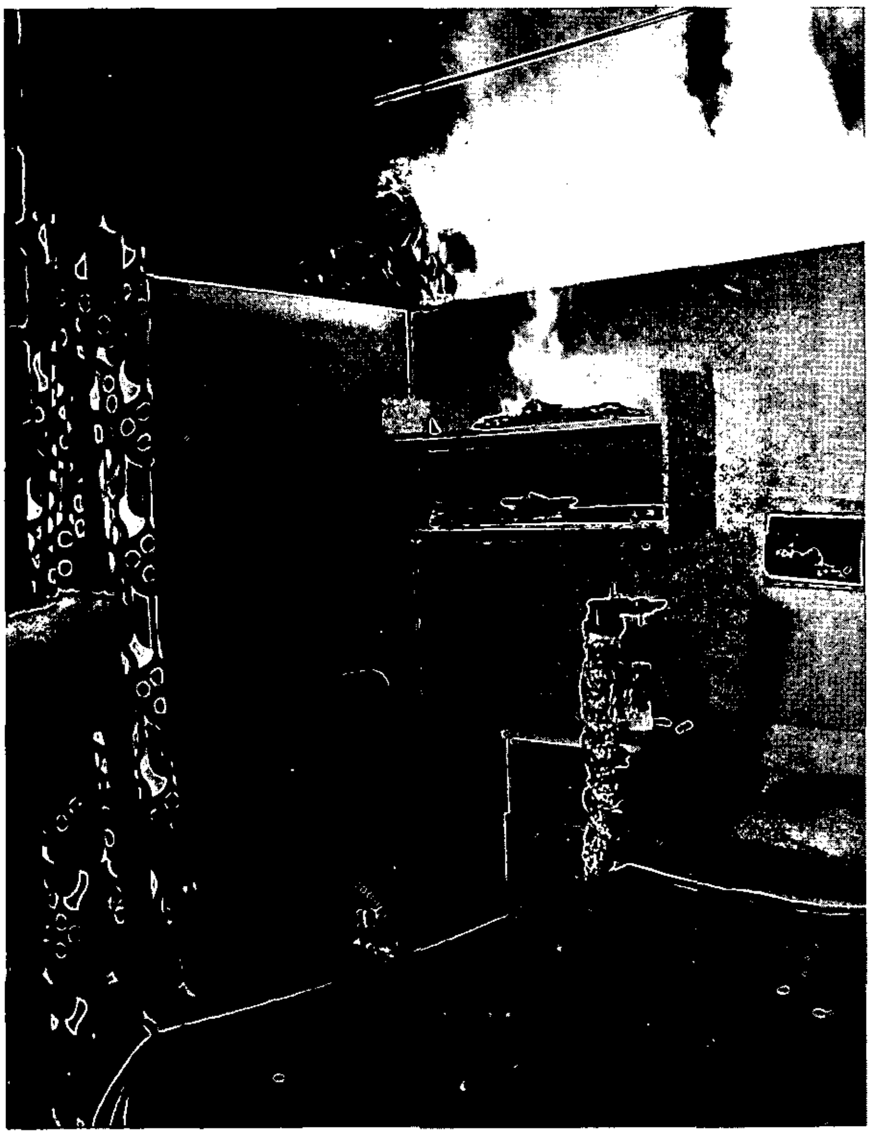
Frequently one encounters a thick film of paint of uncertain composition which has been built up over the years and it is difficult to predict the likely fire performance. Generally, there is a tendency for the flamespread characteristics of oil based and similar paints to improve with age but difficulties may occur if adhesion between coats is poor or if one of the layers is of a paint (possible an emulsion paint) which softens to release the outer layers prematurely in a fire. A falling, burning film of paint (or any other coating) can be a hazard. It may be possible to reduce the tendency of the paint film to burn by covering with a paint containing a flame retardant.

Most ordinary types of wallpaper less than 1mm thick if attached to unplastered plasterboard); they may also be Class O. This applies to embossed and duplex papers and to most vinyls and also generally after a paint finish has been applied. A thin foamed polyethylene film may also be satisfactory. Old wallpaper should be stripped away before applying new, otherwise one can end with effectively an untreated cellulosic board.

Some care has to be exercised with the selection of 'speciality' papers such as those made from fabrics or fibres laminated to a paper base. Only those which have achieved the required classification on BS476, Parts 6 and 7 as appropriate, should be used in critical areas. Useful information on acceptable surface finishes for walls and ceilings is given in the Appendices to the Guides to the Fire Precautions Act 1971 *(see reference 2).*

Fire resistance

Fire resistance implies the ability of a compartment to contain a fire without structural collapse which might endanger other compartments. It is a property of an element of structure (eg a wall or a floor) or of the whole structure, not of a single material (eg Fire resistance is determined by sub-



A hospital style cubicle being tested to show its resistance to fire.

mitting representative samples, as far as possible full size, to the test given in BS476, Part 8 (an older version of the test was given in BS476, Part 1). The sample is heated as it would be in a fire (eg floors are heated from underneath) in a furnace following a standard temperature regime and the periods for which it satisfies criteria are determined. The criteria are:

Stability: resistance to collapse

Integrity: resistance to formation of gaps through which flames could pass.

Insulation: the temperature rise of the unexposed face must not be sufficient to ignite materials.

Schedule 8 of the Building Regulations lists constructions which satisfy these criteria for specified periods and a catalogue of results of fire resistance tests on proprietary constructions is available (*see Ref's 9, 10*).

Fire resistance is generally attained with steel structures by applying suitable insulation to the steelwork. This insulation may take the form of various encasements or spray-on coatings and it must be maintained in good condition. If it is necessary to remove part of it, eg to attach services to the steelwork, it must be replaced and this may entail the services of a specialist contractor.

The fire resistance of concrete structures depends on the dimensions of the concrete and on having adequate cover to the steel reinforcement. In some instances a plaster or other covering may be included; this covering must be maintained in good condition.

The fire resistance of a timber construction depends on the fact that, in the test, timber burns away at a fairly constant rate (40mm in 60 minutes for most types) while the remaining timber retains most of its strength. The rate of destruction of timber is generally not greatly affected by impregnation treatments.

Often it is necessary to increase the fire resistance of an existing floor to, for example, one hour's stability, insulation and integrity. A BRE Digest (*see Ref. 11*), is available suggesting methods by which this may be done. Briefly, the usual method is to apply protection such as plasterboard with a lightweight plaster finish to the underside of the ceiling taking great care to ensure adequate fixing of the protection.

Suspended ceilings

Suspended ceilings may serve various functions and suitable ones can form an essential part of a fire resisting floor construction. Their function is often to provide protection to steel beams instead of insulating each beam individually. Some types may be used for the more onerous duty of protecting a timber floor. The ceiling itself may not be fire resistant and, unless it has been shown by test to comply with the integrity and insulation requirements, it cannot be assumed that inflammable materials within the cavity will not ignite. Since the suspension system is seldom designed to withstand a serious fire within the cavity, the amount of combustibles (eg plastic services or combustible insulations) must be severely limited.

These ceilings are carefully designed and erected by specialists and generally depend on careful detailing. When tiles are missing the floor will not have the necessary fire resistance, thus they must not be removed unnecessarily and must be carefully replaced as soon as possible together with any holding-down clips. If mineral fibre or other insulation has been used to provide extra protection, this must be carefully replaced if disturbed. If tiles are damaged (some types may be damaged by water from, for example, a leaking pipe) they must be renewed.

Nothing should be attached to a suspended ceiling protecting a floor structure and partitions should not be installed beneath it without obtaining specialist advice since thermal movement of a partition may result in premature failure of the ceiling in a fire.

All light fittings, etc, in a suspended ceiling should be of types tested and found satisfactory with the particular type of ceiling used. When in doubt, consult the manufacturers.

Suspended ceilings which do not contribute to the fire protection of the structural floor or its supporting members must not add to the fire hazard; in particular the ceiling must not collapse prematurely before all the occupants of the room have been evacuated. The combustible content of the void should be a minimum and all surfaces in the cavity should be at least Class 1.

Cavity barriers and fire stops

Undivided cavities, eg within walls consisting of two separate leaves, above suspended ceilings and within roof spaces, may provide passages for the spread of smoke or fire. If the cavity contains or is lined with combustible material, this may become involved in fire. A fire in a cavity is difficult to extinguish and often produces much smoke and toxic gas. For these reasons cavities in buildings being designed today are subdivided at intervals by 'cavity barriers'. Cavity barriers were at one time referred to as 'fire stops' but this term is now reserved for a seal to close imperfections of fit between components or elements of construction so as to resist penetration of smoke or flame.

Two BRE Digests are available which provide a guide to the design of cavity barriers and fire stops *(see reference 12)*.

Installation of cavity barriers in existing buildings is a difficult and costly procedure but it may be considered necessary where a cavity fire could create a serious life hazard. Any cavities resulting from new work such as installing a suspended ceiling must have cavity barriers at the intervals required by the regulations.

Any holes in walls or floors round pipes or other services or at junctions between elements of structure due to imperfection of fit must be adequately fire stopped; this is particularly important with compartment walls or floors. Since fire stopping (or the lack of it) is often concealed within a floor cavity or above a suspended ceiling, careful supervision is necessary to ensure it is properly carried out. Should works connected with maintenance or new installations reveal holes that have not been 'fire stopped' the opportunity should be taken to rectify the omission.

Doors

The function of fire doors is to restrict the spread of smoke or the spread of fire in a building. The construction and use of timber fire doors is described in BRE Digest *(see reference 13)*, and only a few points will be considered here.

There is at present no accepted test for the resistance of a door in its frame to the penetration of smoke and performance specification of doors is based on the fire resistance test method of BS476, Part 8. Many authorities, however, also accept doors tested to the slightly less stringent BS476, Part 1. Since the gaps around the edge of a door and the design of the frame can critically affect performance, the combination of door and frame must generally be tested.

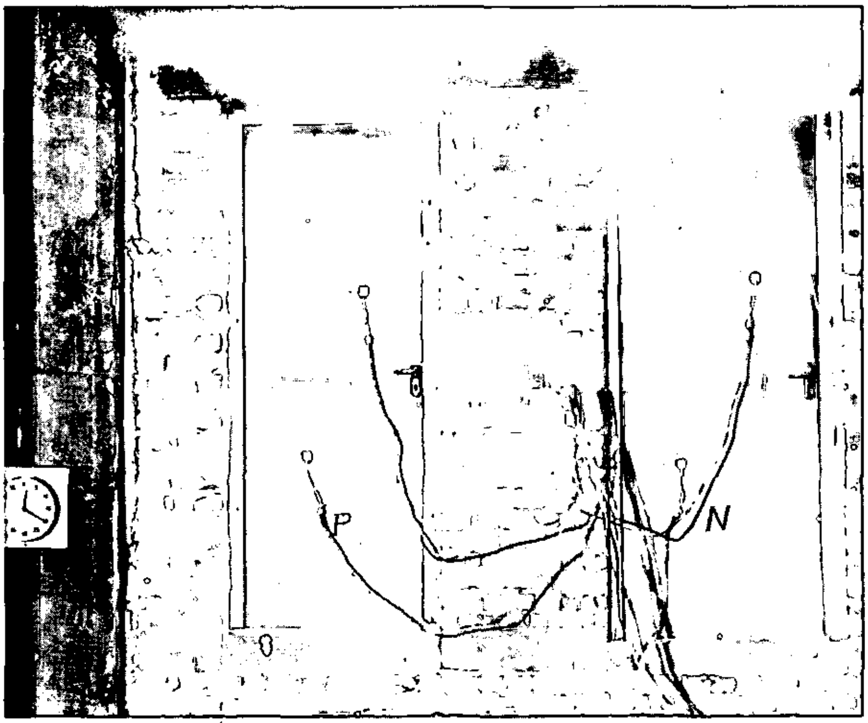
The lowest requirement for a door is usually 20 minutes integrity and 30 minutes stability (sometimes called a 30/20 door). Other requirements are for doors with 30 minutes or longer stability and integrity. Generally, there is no requirement for insulation on the grounds that materials are unlikely to be placed against doors. A timber door may have some insulation but not that part which is glazed.

One way of improving the integrity of a door is by the use of intumescent strips generally set in grooves either in the edge of the door or in the frame. These strips swell or intumesce at fire temperatures so sealing the door gaps. Unfortunately, they are often planed away to make the door fit either on installation or should the door subsequently swell. Vandals sometimes pick the strips out. If the strip is missing the door should be re-grooved if necessary and more intumescent compound (now available as a mastic) inserted.

Normal draught excluders are useful in reducing penetration of cool smoke round doors although they may not be satisfactory with a large fire and should be supplemented by intumescent strips.

Hinges and latches have an important role in ensuring the integrity of the door. Hinges of steel or brass are satisfactory for a half hour door but for longer periods steel hinges are necessary and these should have broad butts. Hinges must be adequately screwed so that they hold, even if the wood in the vicinity becomes charred. Latches must be of a design found to be satisfactory on the type of door.

There is a constructional specification (BS459, Part 3: 1951), for two flush doors which are termed half hour and one hour fire check doors. They are generally considered satis-



Fire doors undergoing tests at the DOE's Fire Research Centre.

factory in situations requiring 30/20 and 60/45 standards of fire resistance respectively and with the addition of intumescent strips would satisfy those criteria under BS476 Part 8.

Sometimes it is necessary to improve the performance of an existing door to 30/20 or half hour standard. Only some types of door are suitable for upgrading. Panelled doors having stiles and rails not less than 37mm thick are suitable but flush doors are only suitable if it is known that they have a substantial sub-frame. There are various methods of upgrading available but fixing is of paramount importance. Additional materials such as mineral insulation boards must be so fixed that thermal movement will not pull out the screws or nails.

Doors are of no use if they are open in a fire and therefore fire doors must be fitted with self-closing devices. In some circumstances rising butt-hinges may be acceptable but generally more positive devices are required. If the door is not fitted with a latch, surface mounted devices are required. If the door is fitted with a latch, surface mounted devices (which may become inoperative during a fire) will be adequate but otherwise recessed self-closing devices (preferably within the sill) are necessary. Whichever type is fitted, it must be maintained in good condition.

Self closing doors which are installed only as a fire precaution are obstructions to the normal passage and movement of people within the building and with children, disabled and geriatric patients may be positive barriers *(see reference 14)*. This can be improved by careful adjustment of the closing force but a much greater improvement is obtained by using an automatic door closure system in conjunction with a magnetic holding open device. Some devices allow the door to be "free swinging" except when a fire has been detected. Even these are not perfect solutions and careful thought must be given to the siting of doors to obviate their disadvantages as far as possible.

References

1. *The Building Regulations 1976.* Statutory Instrument 1976 No. 1676. Building and Buildings. London, 1976, HMSO.
2. Guides to the *Fire Precautions Act 1971.*
a. Hotels and Boarding Houses
b. Factories
c. Offices, Shops and Railway Premises HMSO.
3. *Fire Safety in Health Buildings.* Draft Hospital Technical Memorandum 1 September 1978. Department of Health and Social Security.
4. Chandler S. E. *Some Trends in Hospital Fire Statistics.* Building Research Establishment Current Paper CP67/78.
5. *Fire Risks associated with Furniture and Furnishing and Textiles.* DHSS Supply Division circular HN(76)80.
6. Fisher R. W. and Rogowski B. F. W. *Results of Surface Spread of Flame Tests on Building Products.* Building Research Establishment Report, London, 1976, HMSO.
7. Fisher R. W. *Fire Tests on Building Products — Surface Spread of Flame,* London 1978. Fire Protection Association.
8. Fisher R. W. and Rogowski B. F. W. *Results of Fire Propagation Tests on Building Products.* Building Research Establishment Report, London, 1976, HMSO.
9. Fisher R. W. and Smart P. M. T. *Results of Fire Resistance Tests on Elements of Building Construction.* Building Research Establishment Report, London, 1975, HMSO.
10. Fisher R. W. and Smart P. M. T. *Results of Fire Resistance Tests on Elements of Building Construction. Part 2.* Building Research Establishment Report, London 1977, HMSO.
11. *Increasing the Fire Resistance of existing Timber Floors.* Building Research Establishment Digest No. 208, December 1977, HMSO.
12. *Cavity Barriers and Fire Stops. Parts 1 and 2.* Building Research Establishment Digests N: 214 and 215, 1978, HMSO.
13. *Timber Fire Doors.* Building Research Establishment Digest No. 220, 1978, HMSO.
14. Read R. E. H. and Shipp M. P. *An Investigation of Fire Door Closer Forces,* Building Research Establishment Report, Department of the Environment, London 1979, HMSO.

Bibliography

Langdon Thomas, G. J. *Fire and Safety in Buildings — Principles and Practice.* London 1972, A & C Black.
Merchant, E. W. *A Complete Guide to Fire and Buildings.* Lancaster 1972. Medical & Technical Publishing Co. Ltd.
Butcher E. G. and Parnall A. C. *Smoke Control in Fire Safety Design.* London 1979. E & F Spon Ltd.
Cooke G. M. E. *Fire — the Unseen Problems. Architects Journal,* 1979. 170 (35) 425-468.

The Fire Protection Association produces a number of publications, information sheets, etc., many of which may be of value.

Institute of Building Seminar

Dr Hall graduated with an honours degree in Forestry in 1960 and subsequently undertook a post-graduate study in wood technology in Canada and the United States which led to a Master's degree from the University of British Columbia and a Doctorate from Yale University. He returned to the UK in 1965 to join TRADA's Biology and Chemistry Department, becoming its manager in 1966 and Head of Technology in 1977.

Timber Treatment

G S HALL BSc(Hons), MF, DFor, FIWSc

Introduction

Maintenance of timber components may be categorised conveniently as follows:

(a) The reinstatement or remedial treatment of the timber itself.
(b) The renewal of surface treatments.
(c) The reinstatement or protection of ancillary components such as door hardware, fasteners and timber connectors.

It is not intended to provide a comprehensive survey but rather to consider the more important aspects of the subject and new developments.

Re-instatement or remedial treatment of timber

In an ideal world reinstatement or remedial treatment should not be necessary since the timbers, treatments, ancilliary materials and design expertise are available to give timber a more or less indefinite life. However problems arise in practice, sometimes through incorrect selection or specification of materials, but more frequently due to design, detailing and workmanship faults.

Remedial measures are limited and are specific to individual circumstances. There are really no new developments. There is no new brush-on maintenance treatment to overcome basic design and constructional deficiences (with timber or any other form of construction).

There are two developments in the wood preservation field which can retrieve a situation where timber decay is occurring should this be identified in time. (This is itself not easy and requires detailed knowledge of each building's design and potential weaknesses).

Firstly, mayonnaise emulsion type wood preservations, which are suitable for in-situ application, and which can be used to reinforce (or rectify omission of) conventional wood preservatives.

Secondly, Injection techniques by in-situ application of wood preservatives appropriate particularly for localised use, especially where joints are involved — windows, curtain walling, exterior joinery.

These treatments are not alternatives to other aspects of rectification such as eliminating the source of moisture, providing adequate drainage and ventilation of cavities, etc.

Any timber used to replace or reinforce deteriorated timber should be naturally durable or adequately treated with wood preservatives. There have been no major developments in products or techniques in this field in recent years (more a question of refinement) but the specification situation has been improved by the publication of BS Codes of practice 5268: Part 5 and 5589.

Insect attack of in-situ timber (almost exclusively the common furniture beetle) can be a hazard to structural softwood timber but is rarely serious in structural terms. Eradication of an outbreak is probably best left to specialist treatment firms in view of the hazards involved in applying treatments. Gamma HCH smokes or dichlorovos strips may have relevance in specialised situations.

Epoxy resin systems for reinforcement of partially degraded timber are available on the market as relatively recent developments. Penetration of sound timber is virtually non-existent but areas degraded by fungal attack can be impregnated by low viscosity resin systems and as long as these materials do not shrink during the curing, they will form a plastic plug filling the degraded area. It is doubtful if the structural properties will be reinstated but they may avoid the need to replace or splice new sections into components showing only localised deterioration.

Renewal of surface treatments

Surface treatments are applied to timber for decoration, protection or as is more usual, both.

A maintenance-free timber finish does not exist although if aesthetically acceptable, naturally durable or effectively preservative treated, timber can be left to weather naturally and will come to no harm as long as the component is correctly designed and fixed.

Interior finishes present fewer problems than exterior but two categories need mention.

Flame retardant surface coatings.
These are specially formulated paints and varnishes which have active flame-spread supressing action when applied to timber, plywood, etc. Most are moisture sensitive to some degree, although the extent to which they will withstand repeated washing without loss of active properties is not well established. Their performance will also be impaired by unsuitable or excessive application of conventional finishes. Where surface coating flame retardants are used to achieve the flame spread performance required by building codes, it is important that these specialised finishes are identified and that redecoration is carried out in accordance with manufacturers' instructions, particularly with regard to compatibility and surface preparation.

There have been significant advances in this field in recent years and in the allied use of impregnation treatments to limit flame spread. Further information is contained in the Wood Information Sheet.

Floor sealants
These are, in effect, a sacrificial wearing surface and even if protected by even more sacrificial floor polishes, will eventually need renewal. No new breakthroughs are evident in this area. Compatibility and surface preparation are the main points requiring attention, particularly with the non-oleoresinous seals.

Exterior finishes provide a much wider range of characteristics and specialised uses.

Textured finishes
These come in a wide variety of types not all of which are suitable for, or perform satisfactorily on, timber or plywood substrates. The effective life of such finishes is very much dependent on the substrate as well as on their inherent durability and properties. Soiling is a problem and an essentially cosmetic maintenance treatment can be applied with conventional oil-based or emulsion paints. Some products have claimed lives of 15 years and more. Adequate adhesion is essential if such a performance is to be achieved in practice. Plywood is the usual substrate and because of the characteristics of this board material, design detailing is vital if the finish (and the plywood) are to perform satisfactorily. Merely recoating degraded panels with textured finishes under conditions where adhesion is likely to be deficient is not a suitable maintenance procedure.

Before retreatment, panels must be dry, prepared back to bare timber, primed as recommended by the manufacturers (preferably on the backs also), and edge sealants checked and reinstated as necessary.

Exterior wood stains
These can hardly be said to be a recent development but have, in recent years, made a big impact on the exterior finishing of timber. They are not a cheaper version of a paint or varnish.

Their main merits lie in ease of application, relative insensitivity to surface and application conditions, their permeability to moisture vapour (allowing trapped moisture to dissipate) and the ease with which they can be maintained compared to paint. Their disadvantages lie in the requirement for frequent maintenance and the greater timber movement resulting from their permeability.

A fuller discussion of these products is given in the Wood Information Sheet on exterior finishes.

The question of their compatability with and performance in conjunction glazing sealants or systems is not adequately resolved at present, but the state of the art will be discussed.

Re-instatement or protection of ancilliary components

Timber does not itself corrode, except in very aggressive chemical environments. Mild steel components in contact with timber are not so resistant and are often an integral part of timber structures. Good practice dictates that protective plating and even additional resin coating should be used to protect steel in such situations. Some wood preservatives and inorganic salt type flame retardant treatments aggravate the corrosion problem, necessitating protection beyond the normal galvanising process. In any case, maintenance inspections should include this aspect where, as with timber decay, superficial appearances can often be deceptive.

Conclusions

Developments in timber treatments in recent years, when correctly specified and applied, should improve the lot of the maintenance engineer but they are no substitute for good design and its implementation. In particular, poor detailing can negate any benefits. Recognition of situations where water penetration can occur, but drainage and/or ventilation are restricted, is essential even where natural durability or preservative treatment reduces the decay risk. At the very least, damage to protective finishes is likely and worse problems possible. Such design features should not exist, but in practice they do and merit a wary eye.

Institute of Building Seminar

The author joined the Department of Health in 1968 when he took over the supervision of the Department's drainage problems and advised Regional Hospital Boards on drainage designs for new work and the rectification of faults in existing systems.

In 1970 he formed with others the Partnership Hospital Hygienics *specialising in all aspects of public health engineering for the Health Services and was one of the multidiscipline team that produced the* Harness Hospital *package. He resigned from this office in 1976 to write a book* Sanitary Pipework and Drainage Systems for Health Buildings *and now specialises in 'trouble shooting' and planned maintenance problems for all building types.*

Drainage Problems

R. PAYNE HNDip TEng(CEI)LIOB FIOP MIHospE

Introduction

Until recently it was assumed that all 'old' hospitals in the United Kingdom would be replaced; to speed up the process the Department of Health and Social Security developed the 'Harness' hospital programme with standard departments each capable of being linked together to form a whole.

Part of each departmental package was a sanitary system developed alongside the remaining building elements such as structure and cladding and capable of operating with a minimum of trouble and of being maintained easily and quickly. It was also capable of taking the various effluents likely to be discharged; from pathology — chemicals, to kitchens — high temperature, to wards — macerated bedpans.

The design of hospital sanitary systems — both above and below ground — is historically linked to simple domestic systems developed for mass housing estates. The materials and installation techniques are — or were — those developed and practised successfully by generations of plumbing craftsmen and because of the system of craft training carried out in our technical colleges is slow and difficult to change as each apprentice is trained by the craftsmen of the preceding generation.

Sanitary systems were generally external to the building so that if or when a blockage occurred it did not directly affect the occupants of the building and maintenance could be undertaken externally. This type of system was applied to many hospitals built prior to 1939 and an attempt was made after the Second World War to repreat the approach, but, in addition, to bring everything inside the building envelope.

It was soon realised that like departments were not always stacked one over another and that vertical stacks had to offset at each level and in some cases offset to miss the structure. It was usual practice to design the floor layouts and structure without considering the services; these then threaded through wherever possible, sometimes with disastrous results.

The Problem

The Building Research Station was investigating the problems of draining multi-storey flats and simplifying the domestic systems then in vogue; they were constantly being asked to advise on drainage problems in hospitals — both old and new — so a survey was undertaken in 1966 to discover the extent of the problem. The results were published as Digest No. 81 in April 1967, *Hospital Sanitary Services: Some Design and Maintenance Problems.*

To summarise the reasons why some hospital drainage systems became blocked is not easy but certain facts kept being repeated throughout the survey.

Blockages occurred at, or because of, the following:

Knuckle bends
Right angle junctions
Crudely made joints
Rough bore materials
Builders rubbish in the system
Misuse by the the users.

Laboratory tests were undertaken to discover the effect of gradient and it was soon realised that if other conditions were right, the gradient played little part in the creation of blockages.

It was also realised during the survey that however well the systems were designed and installed, blockages still occurred due to misuse by the users who treated the appliances like ever-open dustbins where everything could be readily and easily pushed out of sight.

There is another factor which influences the number of blockages, that it is not always possible to follow *the basic rules of good design.* Blockages may develop because of influences outside the control of the designer. The type and position within the development plan of an appliance is dictated by medical necessity and consequently there may be lack of flow or very long run where build-up can occur and planned maintenance will be required.

Design Solutions

Since the BRE survey, having been commissioned by DHSS to consider problems of maintenance, two other main factors have emerged as major causes of blockages:

Manholes where the pipework is *joined and passes through as open* channels.

Multi-branch cast iron inspection chambers.

If a performance standard for pipework materials and jointing systems as set out below is accepted, the majority of blockages resulting from those items set out in the BRE Digest will be eliminated.

The pipework and fittings must be of smooth material without rough edges and protrusions.

Only large radius bends and junctions truly oblique to the direction of flow should be used.

All joints between components in the system must be to engineering tolerances.

There are a number of first class materials that meet this specification completely and others which are acceptable; they are given in order of technical acceptance.

uPVC
Glass
Copper
Clayware
Spun Iron.

There are other plastics that are also acceptable but in most cases they are inflammable.

It is interesting to note that some hospitals experience no blockage problems — or at least few, whilst others are inundated. Usually the reason falls within the performance specification for the material; for *example:*

In one particular case the drainage within the few manholes constructed passed straight through the access caps on the pipework.

Tests and practice have shown that multi-branch cast iron junctions cause blockages. These have been used where the branches are directly opposite each other and the inverts *are all the same, allowing the flow to* proceed in any direction, depositing solids on the way. They are also usually crudely cast and of rough bore.

Solutions for Existing Works

There is no point in maintaining a system that repeatedly fails, ie blocking.

Firstly, the cause of the failure must be correctly diagnosed. Here the Building Maintenance and Cost Information Service may be able to help as it has published numerous information sheets on hospital *drainage failures.*

If the blockage occurs at a particular point in the system consideration should be given to carrying out remedial works.

A typical example is that of a manhole that continuously blocks; by rebuilding it to an improved design no further trouble would be experienced.

However, it is not always possible to carry out such remedial work and three other courses of action are suggested:

The installation of automatic warning devices which will give the alarm when a blockage develops — they can usually be fitted in a manhole and wired either to the switch-board or a bell or light. *By providing a warning,* sewage — possibly pathogenic or corrosive — may be prevented from spilling into clinical areas.

The replacement of paper towels — a major cause of blockages — by hot air hand driers and an increase in the water consumption of bedpan disposal units — another main cause of blockages.

Planned maintenance and the provision of additional inspection points and appropriate equipment to maintain the systems.

Planned Maintenance (PM)

Firstly, PM will not prevent blockages which are due to isolated events blocking the systems.

To carry out PM successfully in accordance with the guidance set out in Estmancode is expensive. This has long term implications which are related to improving the efficiency of the systems, lowering the risk to health due to the release of pathogens when clearing a blockage, preventing the general decline of building stock and should produce a gradual reduction in cost as the PM system takes effect.

Possibly the most expensive — and essential part of a PM system — is the site survey of the estate. This usually has to be done on the ground, as drawings — particularly of old buildings — are notoriously inaccurate as many of the alterations will not have been recorded.

This survey must be transferred into an easily understood and workable system which can consist of a 1:200 A4 drawing of every building on the site and a related Work Schedule as in the Estmancode Tradesman's Master Manual.

There will, however, still be parts of the estate not covered, usually isolated gullies, ditches, land drains, etc; these must be identified on another drawing with its associated Work Schedule.

The time intervals set out in the Tradesman's Master Manual are not mandatory and should be assessed and adjusted as required. They should certainly be reviewed after twelve months and adjusted in accordance with the reports of the maintenance staff.

There is no point in maintaining, say, a manhole in a High Risk Area every eight weeks if nothing is done each time. It is expensive and pointless.

One of the main expenses in such a PM system — and one of the main benefits — is that it identifies those parts of the system that are in decline. Once identified, repair work should be put in hand. Such work could be broken manhole covers, the benching to channels that has become defective, or road surfaces that have settled causing drainage gullies to become proud so that ponding occurs.

Equipment

There are two choices open to works staff regarding the carrying out of planned maintenance:

PM can be contracted out.

Works departments can establish the organisation to undertake the work itself.

In all cases, the latter course is recommended but it may be expedient to combine the two in some part.

Some local authorities will provide a road gully clearing service — or even a main drain jetting service — at a very reasonable cost.

Drain cleaning contractors are expensive and are only as good as the local franchise operator — not the national advertisers — some are good; others not so good.

To set up an 'in house' service, the estate systems need to be assessed carefully to discover the type of equipment best suited for the task.

The only piece of equipment not needed are cane rods. They only punch a hole in the blockage — rarely will they remove the source.

There is a great variety of equipment available but basically it can be divided into three main types:

Kinetic Guns: Very useful in clearing soft blockages quickly from small diameter wastes and drains. Should be included in every kit or parts.

Mechanical Spiral Wires: Various sizes and makes, either electrical or petrol motor driven. Small hand held machines are essential for PM.

Jetting Devices: Should only be used externally, but under certain circumstances can be used within the building. Should not be used in glass systems or when the fixings are not adequate. Excellent for clearing out sedimentary deposit from all types of drains, foul, surface water, combined, land.

Bibliography

1. A report into the efficiency of the Marley uPVC Rodding Point Drainage System at two hospital units after six years. (Marley Plumbing Technical Paper No. 5).
2. *Investigations of Drainage Blockages and their Implications on Design.* M. Lilleywhite and C. Webster. The Building Research Establishment.
3. The Building Maintenance and Cost Information Service Ltd. 85 Clarence Street, Kingston-upon-Thames, Surrey, KT1 1RB.

Institute of Building Seminar

Mr. Jones studied Architecture at the University of Sheffield, graduating in 1962. After a short period of research work he joined Yorke Rosenberg Mardall to work on the development of St. Thomas' Hospital in London and the new John Radcliffe Teaching Hospital in Oxford. In 1965 he went to Cambridge to work on the design of the University buildings with Professor Sir Leslie Martin.

Returning to the challenge of hospital design in 1970 he joined the Research and Development Group of the Oxford Regional Hospital Board. He was appointed Deputy Regional Architect in 1972 and Regional Architect of the new Oxford Regional Health Authority in 1974. At Oxford he pioneered the development of Computer Aided Design in health buildings and more recently turned his attention towards the introduction of similar developments in estate management.

The Rehabilitation of Existing Premises

E M JONES DipArch RIBA

This is really a subject which is concerned with what has become known in the NHS as Estate Management — or at least part of the problem of Estate Management.

Most people are familiar with what is known as the Estate. But what is less certain and perhaps surprisingly so, is a familiarity with the fundamental concepts of management.

There are a number of definitions of management — one of which refers to 'Trickery — deceitful contrivance'. It may well involve these skills but my definition is — 'The making of decisions based on *information*'.

Most people involved in the management of Health Services collect information — lots of it! The DHSS Advisory Group on Estate Management have produced a bibliography of regional activities in this area and from the ambitious claims made in it by each region it would appear that everyone has more than enough information.

Most regions, areas and districts have systems of estate records; regions have working parties on design feedback; works department forward budgeting systems based on historical data and future requirements; working parties on record drawings and micro-filming have been set up and backlog maintenance surveys abound. Energy conservation programmes are being programmed and much energy is being expended on 'monitoring'.

Despite all this effort there is an air of despondency. It is said that various difficulties are to blame. The reorganisation scape goat has tended to recede after five years although perhaps with a new government another may be on the horizon. Problems with structures and salaries have prevented works staff from getting to grips with the problem (it is claimed). Some dream of a promised land where flat roofs are pitched and steam mains are made of platinum, unions do not exist and district administrators manicure your nails.

Such a land, however, does not exist.

The solution to the problem involves a multi-disciplinary activity in which works staff have a major contribution to make along with medical nursing and administrative staff. Each discipline contributes information to enable a judgement to be made and the proposals culminate in a strategic plan.

The strategic plan contains an assessment of desirable levels of services to the patient. It should state the levels of provision currently existing and should propose the way of getting from where we are now to where we want to be, say, in ten years time. It will obviously contain information about existing resources and future resource assumptions; about manpower availability and manpower planning; provision of beds per thousand population and lengths of stay; the costs per patient day and cross boundary flows.

The final item of the plan will be a selected strategy. The strategic plan will involve hours of measurement and calculation, great skills of judgement and balance and of political awareness. But it is a useless document if it does not take an appropriate account of the age and condition of the building resource. Many such plans simply assume that most buildings which now exist will continue to exist.

Manpower, buildings and equipment are intricately inter-related and cannot effectively be managed and balanced as a whole to provide health care in the way that is suggested in the NHS Planning System Document unless accurate and pertinent information on each of the resources is available in a comprehensible form.

To date, information on the buildings and estate of the regions in the form that is necessary has not been available — a situation which must not only greatly weaken the validity of any regional strategic plan which may be produced but which may also reduce confidence in any consequent capital programme.

It is suggested that to overcome this problem an estate planning information system is necessary. The purpose of the system would be to provide a pertinent distillation of, and means of analysing information about aspects of buildings and land which are fundamental to the management of the NHS Estate with the objective of ensuring that strategic plans so far as they rely on building and estate resources are soundly based.

Work has *begun* on the development of such a system in the Oxford Region. The word 'begun' is italicised because it means just that and there is a long way to go. The purpose and direction of the system, however, are becoming clearly defined.

One of the basic principles of the system is not a new one but was referred to nearly 90 years ago and is a well understood and fundamental concept of management science.

It was Lord William Kelvin who said:

> 'When you can measure what you are speaking about and express it in numbers you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of meagre and unsatisfactory kind: It may be the beginning of knowledge; but you have scarcely, in your thoughts, advanced to the stage of Science'.

This must be so with any successful management information system — which is what we are talking about.

So, having established this point, what is it necessary to know about, say, a hospital in order to assess its potential?

The answer to this question depends on who you are — a strategic planner at region or a maintenance man at district. There is obviously no point in the district man maintaining a building which the strategic planner has disgarded. Similarly, it will lead to problems if the strategic planner assumes a long life for a building which, unknown to him, is in an advanced state of decay.

It is unfortunate, but the rate at which the capital assets of the NHS buildings, services, plant and equipment — wear out is greater than the rate at which financial resources can be provided to replace them. Therefore, unless the estate is used, maintained, continually adjusted and managed with *precision*, the ability to provide health care will diminish and the opportunity for the development of new or improved services will not be available.

The objective of an estate management information system must, therefore, be to provide accurate and detailed information on the capacity, condition and potential of the existing estate so that Management, with the application of financial resources can decide how to use the estate most effectively for the provision of health care services.
effectively for the provision of health care services.

To do this we need to know the following:

1. Functional Factors	— Capacity	
	— Utilisation	
	— Space standards	
	— Facilities standards	
	— Usability	
	— Convertability	
2. Building Factors	— Remaining life of elements	
	— Fire Precaution standards	
	— Energy conservation standards	
3. Dependencies	Geographical	
	— Constructional	
4. Alternative Value	— Development/Sale potential	

This information is needed in terms of numbers if it is not to be in Lord Kelvin's words 'of meagre and unsatisfactory kind', which means:

Capacity	— How many functional units the department is *capable* of providing
Utilisation	— What percentage of this capability is utilised
Space standards	— How many square metres per functional unit
Facilities standards	— Ratio of crucial facilities — eg wards — how many beds per bath, WC, Sluice room etc.
Usability	— How convenient is the department to

	use? Score out of 10 against defined criteria — different criteria for each kind of department
Convertability	Driving Licence principle currently used for Class B function but also suitable for functions C, E, and G
Remaining life of elements eg	— External wall — roof — heating — electrical (subdivide if necessary) — structure — engineering mains — plant and other significant elements

Accuracy on sliding scale ie. more accurate as remaining life reduces

Fire Precaution standards	A = OK B = Could be made OK — Reasonably economically C = Not OK and difficult to make so or scale of 1-10 against defined criteria
Energy Conservation standards	What is possible compared with what has been done — again a *quantified* assessment against a list of criteria
Dependencies	Geographical — on what other buildings does the function of the buildings under consideration depend and what other buildings are dependent on it? eg. laundries, kitchens, CSSD etc.
Constructional	A building element may have a long or short life depending on the function of another element being fulfilled eg. a pre-cast concrete frame containing high alumina cement or calcium chloride depends for its potential life on high efficiency of a vapour barrier or waterproof membrane. These linkages can be recorded so that whenever a roof covering is reviewed the importance of the roof covering to the life of the structure will automatically be highlighted.
Alternative Value	This consideration is almost too obvious to need explanation but when one is spending money, struggling to maintain a decaying fabric, housing an unsuitable facility in the wrong place, it is not always apparent that its site value may be the means of providing a newer, more suitable facility, in a more appropriate location.

A great deal of information is needed, the collection of which will consume significant resources over a considerable period of time. To be useful, however, completeness is important but one cannot wait five years whilst someone collects detailed information from the top left hand to the bottom right hand corner of the region. Therefore, several passes may be necessary, involving increasing degrees of refinement, providing the status of each pass is also recorded. Having collected it, how do we store it and how do we use it?

At this point consider the earlier definition of management and refer to an aspect which some may well prefer to describe as 'trickery and deceitful contrivance'. Since by the time all the described information has been collected, it will probably be 1984, would it be too unreasonable to propose that we face up to the reality of computers?

A detailed description of the computer system involved would need to be a subject of a separate paper. However, the information which is needed has been described and now consider in what way, by this means of 'trickery and deceitful contrivance', albeit electronic, the information collected can be manipulated into the information needed in order to answer the question about the potential of existing buildings and their capacity to meet changing needs.

Let us look at the crisis issues first. What is going to fail or fall down in the next five years? The computer can provide a plan of each hospital in a region and, with different kinds of hatching, graphically illustrate how black the picture really is, eg. areas of roof with a remaining life of, say, less that five years are hatched vertically, heating horizontally, electrical diagonally and so on until you have a build up of superimposed hatching literally illustrating how extensive the problem is in each hospital. This can be additionally superimposed with below-the-norm space standards, fire precaution standards etc.

If the picture is too depressing you may wish to ask for a site plan illustrating alternative use zoning and a calculation of likely sale value'.

You may wish to examine one element — say heating in more detail. You would set up parameters of what you consider to be below average life, average life and above average life — say, below 5, 5-15 and above 15 years respectively and then have the machine map this information on to the plans of each hospital under consideration. Do not forget this could be, for, say, each hospital in your district, or for each hospital in the region having fewer than 20 maternity beds or for all hospitals in your area having a boiler life of less than, say, 5 years. In fact — any way you choose to slice the cake.

You are able to manipulate and analyse information in any way you wish — provided that you have collected it using Lord Kelvin's numbers and have not shied away from computers.

From this foundation, one may go on to analyse many characteristics of the building stock — eg. decay rate of the national stock, the regional stock or the decay rate of an individual hospital — invaluable information when one is calculating the future level and nature of health care facilities which can be provided in the long term.

To embark on such a system for the whole of the NHS would be a daunting task but it is worth considering that the NHS building stock, if it did not already exist, would cost £11¼ billion to provide new, for just England alone.

It is reasonable to propose therefore, that the intellectual effort involved in the scientific developments in medicine should be matched by a corresponding intellectual endeavour directed at effectively managing the environment in which nursing and medical care can properly be delivered. If it is not, then estate management in the NHS will remain, like the information on which it is based — "of meagre and unsatisfactory kind".

Product News

New Osram Security Light

A new security light manufactured by Osram-GEC, the Nightwatch 18, costs less than 0.1p per hour to operate, and yet produces 43% more light than a 100W tungsten lamp.

Conforming to BS 4533 2.5, the Nightwatch 18 has been designed for both interior and exterior applications. Illumination is provided by a Super Sox low pressure sodium lamp, rated at 18 watts but providing 1600 lumens.

Supplied with full installation instructions, the Nightwatch 18 includes a selection of screws, washers, etc., and a cable gland for wall or ceiling mounting. The body is manufactured from precision moulded, brown polycarbonate, with the cover produced in impact resistant opal polycarbonate. Socket head stainless steel screws provide a vandal resistant cover fixing, and accessories include a cast aluminium multi-purpose fixing bracket; clamps for allowing fixing to horizontal or vertical poles, and a photoelectric cell for automatic switching.

Complete details of the Nightwatch 18 may be obtained from Osram (GEC) Limited, PO Box 17, East Lane, Wembley HA9 7PG. Tel: 01-904 4321.

Digital Millivolt Calibrator

The Labfacility Digital Millivolt Calibrator is designed to measure input millivolts and to generate output millivolts, primarily for use in Temperature Measurement. The range covered is 0-199.99 millivolts with a discrimination of 10 microvolts, approximately equivalent to 0.25°C.

The Portable battery operated 4½ digit calibrator has an LCD display, indicating in the measure and output modes. In addition, the reference junction temperature at the measuring terminals can be selected and indicated to 0.1°C, facilitating calculations for any thermocouple type. The unit will measure the output from thermocouples as well as calibrate thermocouple instrumentation.

For further details, contact Labfacility Ltd., 26 Tudor Road, Hampton, Middlesex. TW12 2NQ. Tel: 01 941 4849.

Hoval Boilers for Olympic Village

The new Olympic Village at Stoke Mandeville, Bucks, completed late last year, provides a high standard of sleeping accommodation for disabled participants in sporting events such as the recently held Paraplegic Games.

The one level dormitories with 412 beds, ablutions and launderette were built entirely from donations from private and business sources worldwide for an estimated £1¼ million. They are purpose-built for the disabled sportsman and sportswoman, and special showers and bath units are installed.

A major problem created by the building of the new village was the extra hot water and heating required from the boilers which were installed when the sports complex was first built 12 years ago. As replacements three Hoval ST boilers were selected and installed, with a collective output of 8.4 million Btu/hr, and these provide the low water temperature system for the swimming pool, gymnasium, kitchens and dining rooms, as well as the new buildings.

The village which runs alongside the sports area is heated by radiators in the corridors and ancillary areas, but the dormitories have overhead ducted heating which was designed and installed by M K Heating Company Limited of Leighton Buzzard, Beds, who also installed the boiler plant.

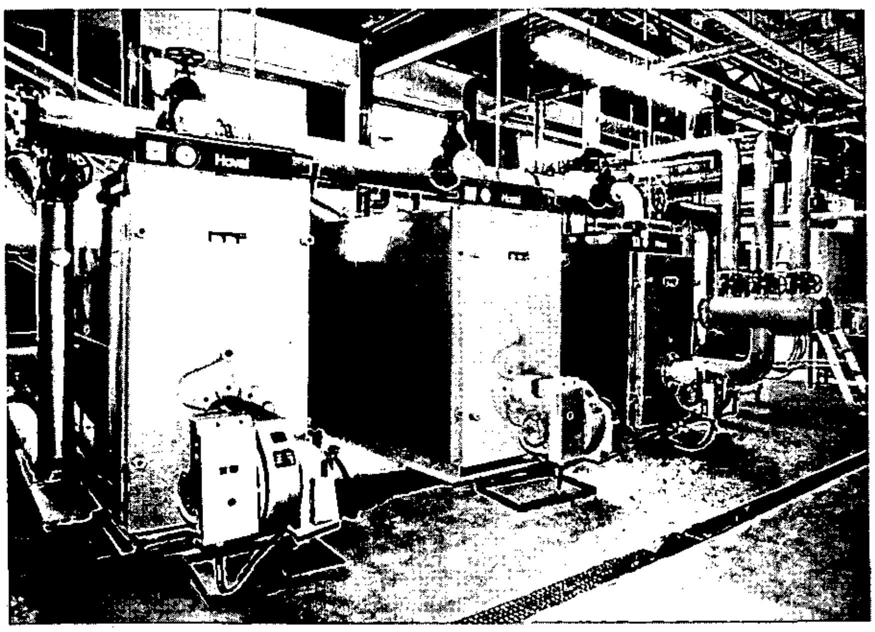
Eight Hoval calorifiers were also installed to provide an efficient hot water system, seven type 125 models for hot water with a primary output of 10 gallons per minute each at 82°C and one type 300 for the launderette with a primary output of 20 gallons per minute at 82°C. The calorifiers which draw the water from the central boiler plant are dispersed throughout the village in easy access cubicles off the corridors.

To recoup some of the running costs for the complex as a whole, it is intended to hire out the facilities for sporting events or overnight or weekend meetings.

Architects for the project were James H Cox Partnership of Aylesbury.

For further information contact Hoval Farrar Limited, Northgate, Newark, Notts. Tel: 0636 72711.

The installation of the three Hoval ST boilers at the Stoke Mandeville Sports Complex for disabled people.



Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

Maintenance Supervisor
Engineering and Building Services

Location: Regional Hospital, Galway.
Salary: £8561–£10,012 per annum.
The latest date for receipt of completed application forms is on **20th May, 1982.**
Application forms and further particulars for the above post may be obtained from the personnel officer, Merlin Park, Regional Hospital, Galway.

Brunei

Hospital Commissioning Engineer

The Crown Agents are looking for a Commissioning Engineer to form part of a team advising the Project Director in the remaining phases of planning and administration of the 550 bed new Brunei hospital at Bandar Seri Begawan.

Candidates should be practical senior engineers with hospital experience specifically in acceptance testing large central air conditioning units, steam installations, piped medical gases and laundry.

Further duties of the post include contributing to the design consultants brief, advising on programming of commissioning, monitoring tender documents and training a locally appointed hospital engineer designate.

The salary applicable to this post is £20,500 p.a. tax free.

A gratuity of 25% of basic salary is payable on completion of the eighteen months tour.

Benefits will include free accommodation, official car plus loan for second car, generous paid leave, education allowances and children's holiday visit passages.

For full details and application form telephone Glenys Derwent George 01-222 7730 Ext. 3535 or write quoting HS/0104/HE.

Crown Agents

The Crown Agents for Oversea Governments & Administrations, Health Services Division (Staffing), 4 Millbank, London SW1P 3JD.

Southern District of the

Highland Health Board

ENGINEER

The above post will be based at the Royal Northern Infirmary, Inverness and the holder will be responsible to the Senior Engineer at that hospital for the operation and maintenance of all mechanical and electrical plant and equipment on the hospital site and other properties as detailed in the job description.

Applicants must hold an ONC in Mechanical or Electrical Engineering or Engineering, a higher qualification or an alternative qualification acceptable to the Secretary of State, have completed an apprenticeship in mechanical or electrical engineering, have acquired a thorough practical training as appropriate to the duties and responsibilities of the post, and have 5 years practical experience.

A current driving licence is essential.

Salary scale £6583 rising by five annual increments to £7425 maximum. An incentive bonus scheme is in operation and a bonus allowance of up to 15% is applicable to the holder of the post.

Further information may be obtained from the District Engineering Officer, 28 Queensgate, Inverness. Tel. No. (0463) 221771.

Application form and job description from the District Personnel Officer, Southern District — Highland Health Board, 14 Ardross Street, Inverness, 1V3 5NT. Tel: No. (0463) 32401 Ext. 44.

Closing date for receipt of completed application forms is 31 May 1982.

SULTANATE OF OMAN

MINISTRY OF HEALTH

The Health Services of the Sultanate of Oman invite applications from suitable candidates for the post of:

HOSPITAL ENGINEER

Requirements:
Degree in Electrical/Electronic/Mechanical Engineering and experience of not less than ten year in the installation, maintenance and supervision of Medical Equipment (X-Ray/ECG/Autoclaves/Anaesthetic Equipment etc.) and non-medical equipment (Laundry/Water Treatment/Central Air-conditioning/Refrigeration/Boiler etc.) as well as other Electrical/Mechanical installations which are common in the Health Services.

Candidates should be in the age group 40 to 50 years and possess experience in administration and control of Technical Staff.

Salary:
Rials Omani 605/- per month (approximately £11,500 per annum, tax free, according to present rate of exchange). Gratuity of one months's salary for each year of service after completion of minimum of two years.

Benefits:
One year contract renewable for further period of mutual agreement. House facilities as per regulations of the Sultanate of Oman. 48 days paid leave per annum with FIRST CLASS air passage from Muscat to hometown and return for self, wife and up to three children under 21 years. Other terms and conditions of service in accordance with the Civil Service Regulations of the Sultanate of Oman.

Suitable candidates desirous of taking up this position should forward their applications giving full particulars, a recent passport-size photograph and the names of two referees to:

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

not later than 5 June, 1982.