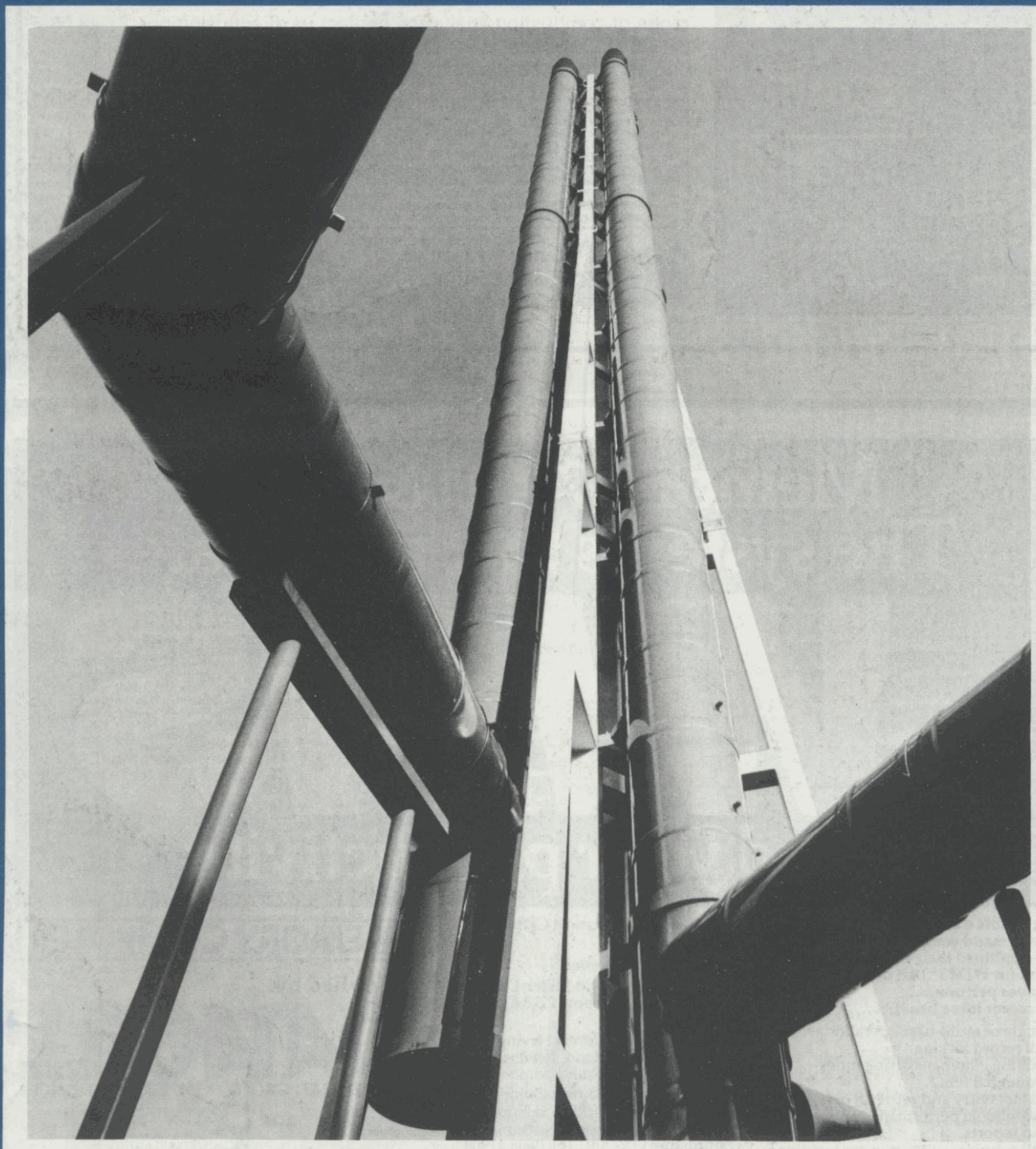
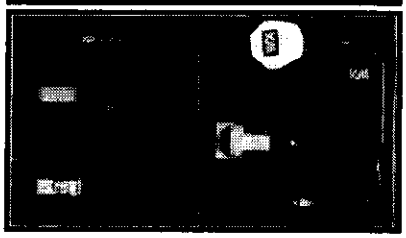
The Journal of The Institute of Hospital Engineering August 1984

HOSPITAL ENGINEERING



- Chimney design and prevention of failure
- Effective use of executive time
- The efficient use of NHS Estate – functional stability
- Training in the NHS



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HOSPITAL ENGINEERING

The Journal of The Institute of Hospital Engineering

Volume 38 No 8 **August 1984**

Front cover: Insulated chimneys at Swansea's Morriston Hospital make an impressive sight as they rise 55m above the hospital.

Institute News

BRANCH NEWS
Branch Officers 1984/85

Welsh Branch
Chairman: D. Griffiths
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Hon Sec: M.J. Back, 10 Nant-y-felin, Efail Isaf, Nr Pontypridd, CF38 1YY
TN Cardiff (0222) 755 944 ext 2562

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TN Glasgow (041) 204 2755 ext 2710

East Anglian Branch
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Hon Secretary/Treasurer: J.A. Parker, Norwich Health Authority, 102/104 Prince of Wales Road, Norwich
TN Norwich (0603) 611 233

North East Branch
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Publicity Officer: J. Sherry
Hon Secretary: G. Baxter, 25 Augusta Close, Darlington, Co Durham DL1 3HT
TN Darlington (0325) 460 100

East Midlands Branch
Chairman: J.M. Hemes
Hon Secretary/Treasurer: E.A. Hall, E.G. Phillips Son & Partners, 26 Annesley Grove, Nottingham NG1 4GW
TN Nottingham (0602) 475783

Presidency for South Western branch chairman

The present Chairman of the South Western branch of The Institute, Mr C. E. Watkins was installed as President of the Institution of Plant Engineers.

New member for Council

Warmly welcomed to the Publications Committee is James (Jim) Parker, CEng FIMarE FIHospE. He is Area Member of Council for East Anglia and East Midlands, and is also active at Branch level, having held at different times the vice-chairmanship and the chairmanship of the East Anglian Branch. At present, he is Secretary and Treasurer.

After his apprenticeship, he served in the Merchant Navy as an engineer, but left in 1957 to join the National Health Service. He became Senior Engineer to the North West Durham Hospital Management Committee, and a few years later was promoted to Group Engineer.

Jim Parker spent an interesting four years abroad as Technical Superintendent (Hospital Installations) to the Public Works Department of the Hong Kong Government. In this capacity he was involved by the overseeing and commissioning of the 1400-bed acute Queen Elizabeth Hospital, and also the setting up of a works organisation for the operation and maintenance of all Government hospitals in the Colony.

Returning to the UK in 1966 he became Group Engineer to the Peterborough and Stamford HMC, and in 1969 was appointed Group Engineer to the Norwich, Lowestoft and Great Yarmouth HMC. On the reorganisations of the NHS he became Area Works Officer to the Norfolk Area Health Authority, until in 1982 when he was appointed as District Works Officer to the Norwich Health Authority. Jim Parker is also Tutor to the Developing Management Effectiveness Courses at Falfield.

FORTHCOMING BRANCH MEETINGS

North East Branch: *Hon. Sec. G. Baxter Darlington (0325) 460100*
October 9th — Visit to R.V.I., Newcastle
November 13th — 'Energy Conservation' South Cleveland Hospital
December 14th — Visit to Cameron's Brewery, Hartlepool

East Anglian Branch: *Hon Sec. J.A. Parker Norwich (0603) 611 233*
September 15th — Visit to RAF Station, Lakenheath Military Hospital
November 24th — 'Incineration/Heat Recovery' West Norwich Hospital

Highland Branch: *Hon Sec. M.J. Shand Inverness (0463) 234 151*
September 20th — Visit to MacDermotts, Ardesier Inverness Oil Rig Construction Yard
November — Visit to Headquarters, Northern Constabulary, Inverness

Mid Scotland Branch: *Hon. Sec. S. Roberts Aberdeen (0224) 29901*
September 22nd — Visit to the new Raigmore Hospital

Southern Branch: *Hon Sec. R.P. Boyce Chichester (0243) 781411*
September 12th — Visit to County Police HQ, Winchester
November 15th — Visit to Cathedral Stonemasons and tour to see cathedral restoration works, Chichester

East Midlands Branch: *Hon Sec. E.A. Hall Nottingham (0602) 475783*
September 27th — 'Applications of electricity in the Health Service' East Midlands Electricity Offices Rawdykes Road Leicester

Please contact the local Honorary Branch Secretary with regard to any of the above meetings.

Obituary

It is with the deepest regret that we record the sudden death of Mr. S. Gillard.

Born in 1912, Stanley Gillard served an apprenticeship with the old LMS Railway. Subsequently, he worked in the Heating and Ventilating Industry.

He moved to the Ministry of Works in 1940 where he was employed on the Atomic Energy side. He transferred to the Ministry of Health and Local Government in November, 1954, as an Engineering Inspector. He was promoted Superintending Engineer in 1960 and became Assistant Chief Engineer in 1973.

Throughout his career he always displayed great interest in Education, Training and Career development.

His contribution to 'hospital engineering' and to the Institute of Hospital Engineering was very substantial. He joined Council of the Institute on Incorporation, at 1st January 1967. His bare record of service reads:

Member of Council, 1967 - 1974
Chairman, Membership Committee 1967/8
Chairman, Education Committee 1968/74
Member, Finance and General Purposes Committee 1967-74
Institute representative on Council of International Federation of Hospital Engineering 1970-74
Chairman, International Congress Committee 1972
Chairman, Joint DHSS/IHospE 'Keele Courses' Committee 1966-74

This mere list of his involvement in so many spheres of the Institute's activities can, in no way, do proper credit to the size of his contribution.

In addition to all this, Stanley Gillard served for some time on the Council of the Institution of Heating and Ventilating (now CIBS) and was Chairman of that Institution's 'Hospital Engineering Services Group'.

Stanley was deeply involved, too, in Masonry and yet found time for his favourite hobbies of gardening and supporting Watford Town Football Club.

He will be greatly missed by his innumerable friends in, and outside, the National Health Service.

NEXT MONTH
September
International
Issue

- ☐ Electrical safety in operating theatres – Australian approach
- ☐ Disposal of hospital waste
- ☐ The engineer as a top management leader
- ☐ Austin Hospital, Victoria

THE INSTITUTE OF HOSPITAL ENGINEERING

ONE DAY SYMPOSIUM 'ORGANISATION OF NHS TRANSPORT'

at The Institute of Marine Engineers, 76 Mark Lane, London EC

Wednesday 3rd October 1984

The Rayner Study on the Use of Non-Ambulance Transport has focused attention on the need to examine the way in which transport in the NHS is procured, maintained and used with a view to obtaining the best value for money. It affords an opportunity to consider a study made of the management of transport and of the reliability of ambulances in particular. It will be of interest to all those involved in the procurement, maintenance and control of all transport used by the NHS.

PROGRAMME

10.00 Coffee

10.30 OFFICIAL OPENING by L.G.HADLEY ESQ CEng, FIMechE, FInstE, FCIBS, MConsE, FIHospE
President, The Institute of Hospital Engineering
CHAIRMAN for the day: TERRY GOLDRICK ESQ CEng, MIMechE, FCIT, MIRTE
Director of Professional and Engineering Services
Freight Transport Association

10.35 THE RAYNER SCRUTINY ON THE USE OF NON-AMBULANCE TRANSPORT
Speaker: N. WHALLEY ESQ
Assistant Treasurer
Halton Health Authority
Member of the Rayner Scrutiny Team examining NHS Transport

11.15 NHS ARRANGEMENTS FOR VEHICLE MAINTENANCE REPORT OF THE CENTRAL MANAGEMENT SERVICES STUDY
Speaker: G.W. WRIGHT ESQ
Staff Inspector
Management Services Branch
Department of Health and Social Security, Newcastle-upon-Tyne Central Office.

12.00 ENGINEERING MANAGEMENT OF A LARGE TRANSPORT FLEET
Speaker: D.ROBINSON ESQ
Engineering Projects Officer Engineering Department
Ribble Motor Services

12.45 Lunch

14.15 MAINTENANCE OF DATA ANALYSIS FOR AMBULANCES
Speaker: S.T. PEACOCK ESQ BTech, MSC, MSaRS
Reliability Engineer
Bradford University Research

15.00 FACTORS IN THE DETERMINATION OF VEHICLE REPLACEMENT POLICIES
Speaker: EDWIN HODSON ESQ. BSc, CEng, MIMechE, MIRTE
Automobile Engineer
Northern Regional Health Authority

15.45 Open Forum

16.30 Close.

TALKING POINT
A District Works Department Structure

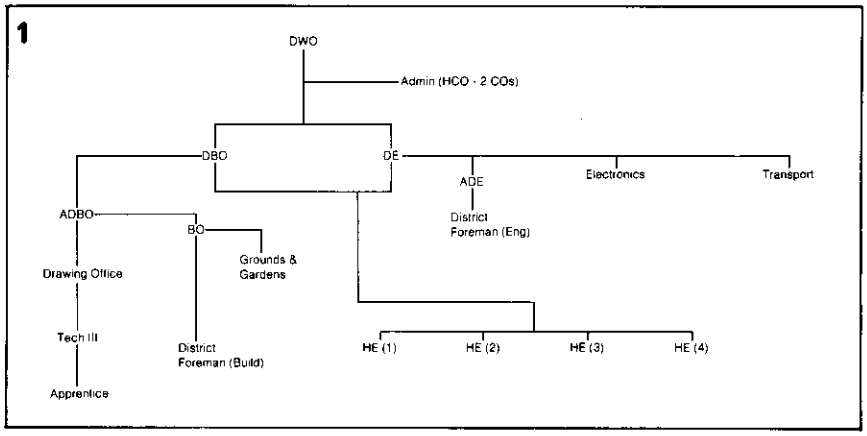
L R F HOUSE CEng MIMechE FIHospE MBIM

With something like 200 Districts there must be several ways of setting up a District Works Department, I give here one method of doing just that!

My district is a D2 and covers some 670 square miles of rural country with 17 hospitals, 10 health centres/clinics and 6 ambulance stations.

Historically this district was made up of three hospital management committees and no building officers were carried by any of them.

In 1974/5 the new District Works Department structure was (see Fig. 1):



This worked reasonably well with a good cross over relationship between building and engineering, it was still felt that building officers presence at hospital level was not required for maintenance purposes. Although there was an Area Works Department, which consisted of three staff, very little use was made of them by this district. The Area Works Department tended to use consultants for larger projects and we did not have many large projects on the go at that time.

With this structure and the value of work undertaken, making use of provisional sums and using small works contracts one officer was put in charge of a project and he undertook both building and engineering work. The only exception to this was if the engineering works were of a complicated nature in which case the

continued on page 16

TICKET APPLICATIONS

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

Please send me_____ ticket(s) for the ONE DAY SYPOSIUM to be held on Wednesday 3rd October 1984. I enclose £_____ to cover the cost.

Ticket to include morning coffee and lunch and VAT

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ADDRESS_____

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Position_____

Non member (please tick)_____

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

Calenge-Watkins, manufacturers of calorifier equipment, organised a competition at IHEX '84. Entrants had to forecast the number of copper discs in a 'dimple' bottle. Mr Watkins, Director of the company, is seen here presenting the winner, Mr Ian Crichton, Principal Commercial Engineer with SWEB with his prize of 12 year old Dimple whisky. The actual number of copper discs in the bottle was 16,692.

This paper was presented by the author at The Institute's Updating Seminar held at Kensington Town Hall in March '84

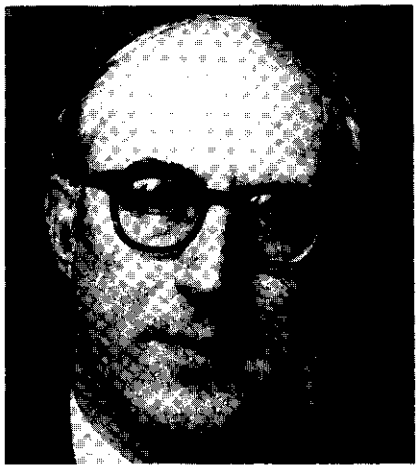
Training in the NHS

SIR JOHN DONNE Chairman of the NHS Training Authority

The National Health Service Training Authority

Let us start with an explanation of the authority itself, its task and how it intends to fulfill this and then to expand the perception of the contribution which the authority can and should make in the areas of most interest to the works professions. The NHSTA has not come to its task with preconceived solutions – nor indeed with fixed preconceptions about the problems – and it is very much part of its philosophy that it should seek views from and share its thinking with health authorities and other organisations concerned with training and the development of cost-effective services for the NHS.

The NHSTA was set up following acceptance by ministers of the very strong recommendations by Mr Christopher Bland's Review Group that the NHS itself should take over from departments the central responsibility for NHS training. The authority was constituted in shadow form in April 1983 and took over its responsibilities formally in October. While much of the practical work will be done through the medium of expert groups, including the national staff committees, the authority itself has quite deliberately been established as a strategic, management and co-ordinating body. Its membership accordingly comprises 23 people – 16 as management members representing the 14 English regions, Wales and family practitioner service interest. Five representing the national staff committees and two representatives from our staff side. The wealth of talent and experience possessed by the members put forward shows very clearly the high importance the service itself attached to the task and its successful fulfillment. In this it will be accountable not simply to ministers, like other



Sir John Donne, Chairman on the NHS Training Authority

health authorities, but also both informally and formally through annual accountability reviews and discussions on the budget, to the service itself.

To date most of the work has been dealing with issues concerned with the setting up of the authority – recruiting a Chief Officer, finding a temporary base and sorting out the takeover of financial and other responsibilities from the department. These have been time-consuming and tedious tasks, but the importance of establishing a sound foundation and the fact that there is not usually very much to show while this essential work is going on will surely be appreciated. However the NHSTA is now beginning to emerge above ground level. It moved into premises of its own at the Royal Eye Hospital in February 1984 and Mr Bob Dearden, presently District Administrator at Hereford, will shortly take up his post as Chief Officer. Mr Dearden's own words in accepting the appointment epitomise the authority's own approach to its task, 'I am delighted to have this tremendous opportunity of helping the National Health Service to make the fullest use of the talents of its staff.'

With foundations well and truly laid, the NHSTA will be able to move much more quickly into interpreting and developing its role and fulfilling the functions of:

- identifying training needs;
- formulating, coordinating and developing national policies and standards;
- providing or making arrangements for the provision of training programmes, courses and research;
- stimulating, monitoring and reviewing training activities, and most important of all
- imposing a sensible strategic and corporate sense of purpose on all such activities.

To fulfill these functions effectively quite clearly it is necessary to know rather more than is already available centrally about the regional & district level. To ascertain this information a questionnaire will shortly be issued to the service. It is hoped that the service will however recognise the significant difference in this questionnaire from the many which in the past they have been used to. The NHSTA want to know centrally what is going on locally, but the emphasis chosen in the questionnaire is to preface a request for information by a succinct description of what is currently going on centrally and an invitation for views on this. The questionnaire will hopefully evoke a good response and will help to provide sensible answers to many of the questions which the NHSTA have yet to tackle. Some which spring to mind are:

what provision should be made for central training services?

how can we organise the NHSTA and operate to be really responsive to the needs of the service?

what is the right balance to strike between the range of authority's activities?

how might the NHSTA develop an approach to budgeting which is more 'zero based' than a form of 'creeping incrementalism'?

what are the best ways of providing advice and support to the Service?

how should the NHSTA set about developing its strategies and plans?

So much for the general. Now to turn to matters of particular interest; to the hospital and estate management training centre at Falfield, which is held in very high regard by the works professions. The NHSTA is well aware of the importance of the need to maintain and make better use of the NHS estate and the input that works staff make to this function. It is also well aware that the 25,000 or so works staff make a valuable input to the maintenance and operation and upgrading of buildings and equipment whether the work is done by direct labour or by contract work. Courses prepared by the Department of Health's works group and mounted at Falfield, many of which are now run routinely by Falfield and other courses prepared by the continuing educational unit for NHS Architectural Studies at York, have made an important contribution to the way works staff have been able to carry out their work. NHSTA has, as a policy, to build on the existing arrangements and works group have been asked to continue to direct operations on behalf of the NHSTA for the coming 12 months at least.

NHSTA makes no promises that changes will not be made. Finance is always a problem and close financial control will be necessary to ensure that the needs of the NHS at large can be met. Fees for course attendance may have to be put up so that other important groups of NHS staff can receive their share of the training funds. Advice is given by the NSC for works staff and in turn NSC(W) is grateful to the input made by individual professional groups such as regional engineers, regional architects, regional surveyors and district works officers. The thoughts of these groups of staff on training needs are clearly of great benefit in a formal identification of training needs for groups of NHS works staff and to the determination of the individual course contents. Safety of patients and staff are paramount. Cost savings through energy control and better use of estate are ploughed back into health care for the benefit of patients.

Courses on strategic planning which were first run at Falfield for works staff have now been developed into completely multi-disciplinary courses which can be put on in centres around the country possibly including Falfield. The Davies Report emphasises the role of works staff in better use and management of the estate.

One important change in the future is that where possible, more training events will be taken to regions and districts as an alternative to bringing district and regional staff to Falfield. This clearly presents problems with those courses which require very large practical content using the sort of equipment that course members will find in hospitals. Indeed, all the courses at Falfield have a very high practical content even though the practical content may be by virtue of project work rather than by 'hands on' design or maintenance experimental work. Practical work of this sort helps those attending training events not only to retain what has been taught but also helps them to identify the sort of problems they could meet in practice at their place of employment and also gives them confidence to employ the techniques learnt at Falfield. Most distance learning packages prepared by Falfield will require practical work of this nature to be incorporated. As an example of this a number of training events were put on in regions around the country to explain the difference between the 15th edition of the Handbook of the Institution of Electrical Engineers and the previous issue.

Education and career development problems

Training is not by any means the only responsibility of the NHS Training Authority. The education of staff to enable authorities to recruit and develop suitable staff is equally important. The National Staff Committee is very anxious to have introduced a formal appraisal system by which managers can identify the responsibilities of individual jobs and plan training to meet these responsibilities. This can only be of benefit to all members of the staff. It is not just to consider training needs but also educational needs perhaps by day release or short courses avialable at local education centres; possibly training in management skills run by the district or region. It would help managers at all levels identify the high fliers so that they can be trained and given additional responsibilities to match their abilities. This of course is not always easy with the rigid structures at the region and district and the NSC is very keen to promote through the Whitley Council a common structure between region and district in order to make temporary assignments and secondments easier. The National Staff Committee has also put forward proposals for a training grade at district to enable districts to recruit school leavers or young graduates and give them a training which will be acceptable to the Whitley Council for appointment in the engineering or building officer grades. The National Staff Committee is also making a response to the Engineering Council on their consultative document 'Standards and routes to registration' which deals with the registration of chartered engineers, technician engineers and engineering technicians. They are well aware of the problems which exist for school leavers starting on a route which, because they are late developers, inhibits their potential development. While not encouraging people to believe that the Field Marshal's baton is in every haversack – the NSC is anxious to see that there is a route for a limited number of people who merit advancement being able to take educational courses which will meet the requirements for registration as a chartered engineer. There is an equal difficulty for building officers if they wish to take architecture although for surveyors it is often possible to take a part-time day course which can be approved.

The National Staff Committee is also anxious to see more use made of the Youth Training Scheme particularly when structured as part of the PTB Training Grade when it is approved or the Craft Apprenticeship Scheme. There is great concern that

very few apprentices are being trained by the National Health Service particularly since this is symptomatic of industry at large. Of course the way health authorities choose to spend their money is their own responsibility and apart from ensuring that authorities are informed of the problems the Staff Committee has no intention of trying to persuade them to spend more money where they do not wish to spend it.

The role of The Institute of Hospital Engineering in putting up adequate qualified members for registration as chartered engineers despite the fact that some of the other professional institutions like the IEE and Institution of Civil Engineers might demand an honours degree, is applauded by the National Staff Committee and it is hoped that this can continue. The recent consultative document published by the Engineering Council however seems to be starting on the basis that a chartered engineer will need an honours degree and this is not always available by part-time study. The National Staff Committee will certainly encourage the Engineering Council to accept standards required by the Health Service.

1984 is the Year of Women in Science and Engineering. It is to be hoped that health authorities will play their part in encouraging women as well as men to join the engineering profession.

The author is the Chief Engineer to the Welsh Health Technical Services Organisation. This paper was given by special invitation at the 'Developing Management Effectiveness' Senior Course at Falfield

Effective use of executive time

R G KENSETT BA CEng MIMechE MInstE MCIBS MBIM FIHospE

The major resource any manager, particularly a senior manager, has to offer any organisation is his or her time. It is appreciated that some may consider experience should be included but this evolves over the years and largely results from time other people have given to you.

The effective use of time also means that the organisation will obtain from this expensive resource, and of course the higher your position in the hierarchy the more expensive this becomes, the maximum benefit.

In the present time of financial restraint, staff shortages and in some instances, even staff reductions, I would suggest that the effective use of our time is something we all need to consider very carefully.

Even with the maximum of 'unloading' or, if you prefer to call it by its proper name, delegation, managers are constantly up against the problem of limited time. Have you ever considered that whilst many of us seem to be in the office at all hours and frequently take home full brief cases to be looked at over the weekend or during the evening, many more seem to be able to cope with things so much more easily and indeed are able to find time to carry out that extra task or prepare that special report that no one else can find time for. This I would suggest is indicative of the person who is organised, has arranged the day properly and in consequence makes effective use of time.

One of the major tasks of management is the solving of problems and when one considers matters carefully, the major problem is finding sufficient time for all the other tasks.

Consider any executive's day. He is under constant pressure from a number of constraints. Firstly he must be aware of what is going on both inside and outside of his organisation. He must also ensure his staff are performing their own tasks effectively and if they are not he must find time to deal with their problems and shortcomings. This kind of help must of course be carefully watched otherwise there will be a tendency to rely too heavily on the boss, waste the time of both the chief and himself and, of course, in the long term, lose initiative and confidence. I am sure we all realise how finely the line is drawn between being supportive and taking over the job oneself.

A manager is also usually conditioned by past, present and future meetings and committees of all descriptions. Before each meeting there is a need to ensure you have read the papers and done those things which you ought to have done (and probably haven't). After the meeting there is the need to action decisions which in turn bring their own problems which also require solutions. In this connection I believe in dealing with these quickly because they never go away and like so many things only become worse if they are allowed to fester untouched.

Many of you I am sure, find as I frequently do, that you look back on the week and have the feeling of just living from meeting to meeting with all the every day mundane matters building up behind them.

Another factor of major importance that all managers and aspiring managers need to remember is the importance of communication. You must always be approachable for help, both internally and externally, workwise and on a personal level. We all need to appreciate how important is your availability to the essential personal relationships with your staff and how essential it is to make time available for this to take place. No matter how hectic the day or how rushed you may be, it is vital that you at least give the appearance of having all the time in the world to listen and advise. The other side of the coin is of course that you in your turn will make similar demands on the time of other people. As we all know, no man is an island, particularly in these difficult times.

There are many facets to the effective use of time and I would suggest that the first step is to analyse how *you* spend *your* time In this connection the following aspects of time spending are worth special consideration.

Meetings & interviews

These include discussions of all descriptions at meetings, conferences, interviews of staff and outside organisations, social contacts (an essential part of

continued on page 22

Figure 1 The cost of time

The following analysis is based on a working year of 238 days with each working day equivalent to 7 hours.

It highlights the cost to any organisation of wasted or mis-spent working time.

	Time Cost					
Salary per annum	**1 min**	**5 min**	**10 min**	**30 min**	**1 hour**	**1 day**
£ 5000	5p	25p	50p	£ 1.5	£ 3	£ 21
£ 10000	10p	50p	£ 1	£ 3	£ 6	£ 42
£ 15000	15p	75p	£ 1.5	£ 4.5	£ 9	£ 63
£ 20000	20p	£ 1	£ 2	£ 6	£ 12	£ 84

The author, who is Regional Works Officer for the South Western Regional Health Authority, gave this paper at the Institute's symposium on The Efficient Use of NHS Estate in October '83

The efficient use of NHS Estate – functional suitability

DAVID HANSON B Arch ARIBA FCIOB Assoc IHospE

Functional suitability

In preparing this paper I have been conscious of the danger of considering this subject too much in isolation, but yet I acknowledge other contributors are dealing with some of the important related issues today. Therefore I will avoid the temptation of wandering too far outside my topic, but for the sake of establishing the correct context for functional suitability studies I am bound to indicate where the links are with other relevant aspects.

Straight away, a cautionary note must be sounded. Functional Suitability studies are an important part of the whole strategic and services planning activity. This is a cyclical process which can be summarised as 'establish the present situation, determine future service objectives, establish policies for change, then implement these changes'. Functional suitability studies of existing properties in this case appears to be an initial activity.

However, certain service objectives have been clearly stated by government. As a result mental handicap, mental illness, and geriatric patients have been identified as priority care groups, and these aims have been backed up by policy documents like 'Care in the Community'.

The main reason for mentioning this is to stress the need to use common sense in deciding where to 'break into the circle'. In implementing these government policies many districts may decide in effect to close all their large hospitals for the elderly and so on, thereby moving patients into the community in their own or adjoining districts.

As a consequence many large old properties and the land surrounding them could become available for disposal, and indeed one or two cases have already attracted media attention. There is a district in my Region where such a strategy has been adopted and this is expected to achieve a reduction in total estate volume of something like 50% before the end of the decade. Now in circumstances like this it might not be justifiable to carry out anything more than cursory inspections of such properties but perhaps the case examples I shall use later will persuade you otherwise! The point I am perhaps labouring is that in contemplating any of this work, common sense must be applied.

The subject of functional suitability assessment seems to have been neglected very largely by the NHS in much the same way that evaluation of new buildings has. These are both multi-disciplinary activities subject to the co-ordinating role of the administrator. In contemplating the need for these surveys the service seems almost to be paralysed, waiting for 'tablets of stone' guidance to be sent down from the DHSS. This is not criticism of the DHSS but a recognition of the trap we all may have fallen into. So much guidance comes from that source and so many initiatives appear to be under the control of the DHSS – that it has somehow the effect of 'freezing' the subject as far as the NHS is concerned. We are all familiar with the phrase 'we are working on that already'. I am deliberately exaggerating but have long felt that if there were a more vigorous spirit of partnership and multi-disciplinary working, the enthusiasm and experience in the NHS could be harnessed more widely, rather than stifled, as it seems to be now on occasion.

So what has the NHS done and how do we 'unblock' the present situation? What I am about to propose is not an attempt to cut the administrator out. It simply recognises that senior, experienced administrators in the service (contrary to popular conceptions) are inundated with central initiatives requiring their immediate attention to the point that, almost inevitably, desirable activities like functional suitability studies, are pushed down their list of priority tasks. It is recognised that doctors and nurses are in a similar situation and have very little time to spare for apparently non-immediate and detailed work.

It is a fact that in order to manage the estate at all, the works officer needs to collect or prepare location plans, site plans, block plans, floor plans for all buildings, and information about their condition. With only a small amount of additional work the works officer, with colleagues in his discipline, can break the back of the work required in functional suitability studies.

The district team will need to make judgements about acceptable standards of provision, and in time will need to concern themselves with the small number of judgements which the works officer will refer to them for decision.

Let us see whether a couple of examples bear out that claim, and in doing so it should become clear that the fundamentals of functional suitability assessment have been established for some time, and the concept is by no means new.

In 1973 the South Western Regional Hospital Board carried out a survey of its existing Poor Law Institutions. It set up a multi-disciplinary team of doctor, nurse, architect, engineer and administrator and this team visited thirty eight properties up and down the region grading each building as a result of personal inspection. The broad gradings were given letter references as follows:

A – Hospitals which should be replaced upon their own or another site within a decade.

B – Hospitals which should be replaced as soon as possible or be substantially upgraded, often including major demolitions.

C – Hospitals which could continue for many years before ultimate replacement but will require appropriate upgrading from time to time.

To ensure as far as possible a uniform approach to each hospital, a check list was also used and this was under ten main headings:

1. Environment
2. Wards
3. Day hospitals
4. Accommodation for supporting services:
   Remedial
   Other patient services
   Catering
   Gardens
   Staff accommodation
   Storage facilities
   Pharmacy
5. Communications
6. General services
7. Fire risks
8. Appraisal and structure
9. Maternity
10. General comments

Most of these headings had several subheadings; for instance in the case of No. 2, Wards, the following were considered:

Size and disposition of dormitories and day rooms;

Access between dormitories and day rooms and other patient facilities;

Overcrowding	Floor levels
Outlook	Sanitary facilities
Windows	Ventilation – smells.

Figure 1 Poor Law Institution Report December 1973 – recommendations by individual officers of the team

	Doctor	Engineer	Architect	Nurse	Administrator
1	A	A	A	A	A-C
2	A	B	A	A	B
3	A	A	A	A	A
4	A	A	A	A	A
5	A	A	A	A	A
6	A	C	A	A	A
7	A	B	A	A	A
8	A	C	A	A	A
9	B	A	A	A	A
10	B	B	A-B	B	B
11	B	C	A	A	B
13	B	C	C	A	B
14	B	A	B	A	B
15	B	B	B	A	B
16	B	B	B	B	B
17	B	C	C	B	B
18	B	C	B	B	B
19	B	C	C	B	B
20	B	C	C	B	B

A double classification (eg No. 10 A-B) indicates a separate assessment of different parts of the hospital buildings.

The category recorded by the engineer relates to the engineering services only.

Figure 2 Poor Law Institution Report December 1973 – recommendations by individual officers of the team

	Doctor	Engineer	Architect	Nurse	Administrator
21	C	C	C	B	B
22	C	A	C	C	C
23	C	C	C	B	C
24	C	C	A-B	B	B-C
25	C	C	C	C	C
26	C	C	C	C	B-C
27	C	C	C	C	C
28	C	B	C	C	B-C
29	C	C	C	B	B-C
30	C	C	C	C	C
31	C	C	C	B	C
32	C	C	C	B	C
33	C	C	C	C	C
34	C	C	C	C	C
35	C	C	C	C	C
36	C	C	C	C	C
37	C	C	C	C	C
38	C	C	C	C	C

A double classification (eg No. 10 A-B) indicates a separate assessment of different parts of the hospital buildings.

The category recorded by the engineer relates to the engineering services only.

The results were very useful in the strategic planning context and by taking action on Category A properties, many have been released for disposal. As an aside I would add that this final stage is not all plain sailing. For a number of years we have been prevented from proceeding with disposal in one interesting case because of the sinister presence of a graveyard for cholera victims in the corner of the site, and it might just as well be a dump of waste nuclear fuel!

The results of this survey are useful in a quite different way, as Figures 1 & 2 show. Taking the gradings awarded by members of the various disciplines (and acknowledging that the engineer consciously assessed the state of the engineering services only), it can be seen, taking the assessments of the doctor and nurse as a standard, that Works colleagues were remarkably consistent in reaching the same conclusions. Therefore I would go so far as to say that given the DMT has agreed baseline standards, local works officers could complete the functional suitability survey themselves, highlighting for reference to DMT, the exceptional cases where the issues were not clear.

There is another NHS study which it would be helpful to look at briefly and this was one carried out by Dr Ron Pollock of Oxford Region, assisted by a secretary. This is a brief acknowledgement that such a study was carried out, for my information is that the Oxford RHA is currently reviewing both the method used and the baseline standards prior to carrying out a more comprehensive survey throughout that Region. Since preparing material for this paper, I have been informed that Dr Pollock has accepted an invitation to assist a team led by DHSS, whose task is to examine the subject of appropriate standards – welcome news indeed.

The approach Oxford Region used was to establish a few key measures which could be regarded as reasonably representative of the whole of the hospital. In addition, an assessment was made of the quality of provision and an informed guess made of the likely costs of effecting improvements. Without going into detail here, the range of measures used for wards were:

1. Floor area per bed
2. Ratio of baths and wc's to patients
3. Availability of a dayroom
4. Availability of utility rooms
5. Availability of office accommodation
6. The size of store rooms;

and for theatres:

1. Floor area of the operating room
2. Availability of an anaesthetic room
3. Size of staff changing rooms
4. Rate of flow of the ventilating system.

It would be fruitless today to spend time on the details of the standards adopted as these are currently under reivew, but it is obvious Building Notes represent a starting point and these can be modified according to local circumstances. As a matter of interest, North Western Region has carried out studies based on the adoption of Building Note Standards unaltered, and have developed a cost-based formula for assessing future maintenance needs.

A number of academic centres have been engaged in functional assessment studies, often for a wide range of building types, not simply health buildings. Typical of these is the work done by Dr David Canter of Strathclyde University in 1971, which used the technique of asking occupants to complete questionnaires in an effort to assess subjective reactions to environmental conditions. Dr Canter was involved in a further study for DHSS at Surrey University when evaluation techniques for new health buildings were examined. Mention should be made of work currently being completed by the Medical Architecture Research Unit, for DHSS, of health building functions and suitability. Although not published yet, this work is bound to be of practical value to anyone contemplating functional assessment studies, and hopefully will be useful in training NHS staff engaged in such work. My personal plea to those completing this work is 'please keep the processes as simple as possible!'

As many officers in the Health Service are aware from attending the Mereworth courses arranged by DHSS Works Group at

Falfield and elsewhere, Mr Cyril Battye of Leicester Polytechnic, with assistance from NHS officers in all the interested disciplines, has been developing many of the subjects we are considering at this Symposium, and Functional Suitability is amongst his studies. Hopefully a microcomputer program will be available shortly from the DHSS as a module in the Works Information Management System (WIMS). The current work Cyril Battye is doing, with others, relates to another model situation codenamed 'Heathbridge' and this work is the subject of courses developed for multi-disciplinary teaching purposes. Hopefully this material will be diseminated very quickly to the service and published, so that the NHS can end the waiting and get on with the job. No format will ever be entirely suitable so let us learn from the experience of people who have done a lot of work on the subject, such as Common Services Agency in Scotland, agree an approach, publish it widely and carry out these surveys.

Borrowing from the Heathbridge work it is possible to review the essential elements of a functional suitability survey, the backbone of which is to agree the aspects to be studied, set some osrt of standard for each, and agree qualitative grading. For the purposes of this paper, arguments about whether numbers or letters are best for gradings have been set aside although personally I have some misgivings about mixing them up.

The aspects to be considered in the survey and the appropriate grading for each are:

1. Functional suitability

There is no widely agreed methodology for this, which is surprising, but the following is proposed:

A Indicates a high degree of user satisfaction.

B Acceptable without requiring any structural change.

C Tolerable only with minor changes or by a reduction of the service provided.

D Tolerable only with major and very costly structural changes including an extension of present facilities.

E Impossible to improve, with replacement the only option.

Beneath this 'upper level' of judgements is a secondary level of assessment which includes:

1.1 Facilities: Provision of essential basic departmental accommodation and of items like wc's and back-up rooms, are considered.

1.2 Space standards and critical dimensions: Space provided, including dimensions, is considered in the context of the use of that space, eg operating theatre.

1.3 Layout: Relationship of individual spaces is considered against the need for closeness, good observation, walking distances and so so.

1.4 Environment: Comfort conditions are examined against desirable standards for temperature, noise, ventilation and so on.

1.5 Amenity: Aspects such as whether the need for privacy has been met, are examined.

As well as forming judgements, the cost of taking corrective action is taken into account. The standards set have to be stated, and these will no doubt be based on available guidance, such as Building Notes, Hospital Technical Memoranda, locally agreed or Regional Standards, and experienced user judgement. Care is needed here, for many Regions at present are designing 10% or more, below current Building Note Standards for new accommodation.

2. Utilisation and the assessment of spare capacity

Again no system exists to help make these judgements but the pressure is on Authorities to make best use of all space and dispose of the unwanted or underused. The following scale is suggested:

1. – Indicates empty or grossly underused at all times.

2. – Generally underused, utilisation could be significantly increased.

3. – Adequate, at satisfactory level of utilisation.

4. – Overcrowded.

This is a case where Mr Battye has proposed numbers since the record is a situation record, not a qualitative measure. In this case, it is just as bad that conditions are overcrowded as that accommodation is grossly underused. No. 3, the state of 'adequacy', is clearly the optimum situation to aim for.

3. Energy performance

This subject is well covered in another paper, so I will not elaborate on the grades proposed. The measures are:

A – Energy input is less than 60 GJ/100m^3 and represents a standard which complies with current regulations and the best management practice.

B – Energy input is within the range 60 - 80 GJ/m^3 which indicates a well managed situation.

C – Energy input is within the range 80 - 100 GJ/m^3 and indicates a low level of energy maintenance and management.

D – Energy input greater than 100 GJ/m^3 which suggests a very poor standard of fabric (like an untreated EMS building might be) and no management.

3

MEREWORTH HEALTH AUTHORITY : COURTLANDS HOSPITAL

CONDITION SURVEY

		BUILDING	MAIN BLOCK	NURSES HOME
		STOREY AGE	F2 /1906-27	3 /1922
		AREA (GROSS) m²	3231	380

		1	2	3	4		1	2	3	4		1	2	3		3	4
		CONDN	COST TO REPAIR	REMAIN LIFE	COST TO UPGRADE		CONDN	COST TO REPAIR	REMAIN LIFE	COST TO UPGRADE		CONDN	COST TO REPAIR	REMAIN LIFE		REMAIN LIFE	COST TO UPGRADE
BUILDING	STRUCTURE	C	10	3	100		A										
	EXTERNAL FACADE	B					B										
	ROOF	B					B										
	INTERNAL SURFACES	A					A										
	SANITARY FITTINGS	C	1	2	10		C	1	2	10							
	FIXED EQUIPMENT	B					B										
	FIRE + H & S.W. STANDARDS	D	5	2	50		B										
	THERMAL PERFORMAINCE	C					C										
ENGINEERING	ELECTRIC POWER	B					B										
	LIGHTING	B					B										
	HEATING DISTRIBUTION	B					B										
	STEAM DISTRIBUTION																
	VENTILATION																
	DOM. WATER + INT. DRAINAGE	C			10		C			8							
	COMMUNICATION SERVICES	B					B										
	FIRE + H & S.W. STANDARDS	C			20		C			5							
	FIXED PLANT + EQUIPMENT	C			10		C			3							
	FUEL + WATER STORAGE	B					B										
	PIPED MEDICAL GASES																
	GAS (FUEL / PROCESS)	C			10		C			1							
	LIFTS	C	10	2	80												
	BOILER/CALORIFIER/REFRIGERATION	B					B										
	EXTERNAL DRAINAGE	C			8		C			2							
	ENERGY CONSERVATION	C			2		C			1							
	TOTALS				310					33							

NOTES:

1. WARD AREAS CURRENTLY BEING UPGRADED.
2. THEATRE & KITCHEN IN VERY POOR COND'N
3. SURGICAL WARDS - MEANS OF ESCAPE UNACCEPTABLE
4. SOME UNDERPINNING TO MAIN BLOCK REQUIRED

CONDITION CATEGORY		REMAINING LIFE BLDG	ENG
A = AS NEW		60+	20
B = MINOR DETERIORATION		20-60	6-
C = MAJOR IMPROVEMENT REQD		3-20	1-
D = UNUSABLE / UNSAFE		0-3	0-1
1. CONDITION DEFINED ABOVE			
2. COST TO REPAIR & COST IN £000's FOR URGENT WORK TO ENSURE REMAINING LIFE (COL. 3)			
3. REMAINING LIFE (AFTER REPAIR) IN YEARS BEFORE UPGRADING (COL.)			
4. COST OF UPGRADE / RENEWAL			

SIGN / DATE: CD · TN : FEB '80

X – This identification is added in cases where improvements are either impractical or beyond reasonable cost to carry out.

4. Fire safety and other statutory standards

To effect improvements to fire and other standards in an existing building can be very costly and it is an essential consideration in any review of existing property. The 'score' relates mainly to fire security standards and other aspects may be referred to by reference to the proposed draft format, which hopefully will be available to the NHS soon. The gradings proposed are:

A – The building fully meets current HTM Standards;

B – The building meets the standard set in the Home Office Draft Guide for Existing Health Buildings;

C – A standard less than B but better than D;

D – The building would be regarded as a 'black spot' if included in the joint Home Office/DHSS Survey carried out recently on a sampling basis.

5. Physical condition

Those who have attended the Mereworth Training Courses will recognise the approach to this section. The following paper will go into greater detail on this subject. Essentially degrees of acceptable condition are established and again condition 'B' is regarded as an acceptable 'norm'. Figure 3 is an example of a typical data collection which includes an estimate of the cost to bring the condition of all elements up to condition 'B'. The grades of condition are:

A – As good as new;

B – Adequate, minor deterioration only; probably the building will be good for the next 20 years or longer;

C – Operational, but major repairs required;

D – Inoperable or dangerous, replacement necessary.

Some estimate of the remaining life of a property is essential planning information, especially if the estimate is below a 10 year life.

A typical functional suitability survey summary form is shown at Figure 4. The desirable state to achieve is when all grading assessments are B or better, with one exception, Utilisation, where 3 is the optimum measure.

No functional suitability survey is complete until some view is taken of:

1. The location of the Health facility in relation to its catchment population, not forgetting the travelling that relatives might have to do;

2. Accessability by public transport;

3. The staffing position for both professionally qualified and other staff;

4. The way the land on which the facility stands is utilised.

4 Name of Property _____ Date of Survey _____

BLOCK REF NO.	DEPARTMENT OR FACILITY * = Ground floor dept.	Functional Unit	Area m²	Suitability	Utilisation	Energy	Fire/ Safety	Condition	GENERAL COMMENTS	Remaining Life (in years)	Total Cost to achieve Condition 'B'
	WARD Nº 2	26	870	C	3	C	B	C		20	£15,000
5	WARD Nº 3	24	870	C	2	C	B	C	2 more beds could be added		
	ACCIDENT DEPT. *		870	B	2	C	B	C	Access poor (see note)		
2	KITCHEN *	500	400	D	4	D	C	B			£200,000
	GENERAL STORE (part)	–	90	B	2	–	–	–	Remainder of store located in Block 3		

KEY

OPTIMUM SCORE: "B" OVERALL

FUNCTIONAL SUITABILITY	A	B	C	D	E
	User well satisfied	Acceptable no change	Tolerable with minor changes	Tolerable with major changes	Replace
UTILIZATION & SPARE CAPACITY	1	2	3	4	
	Grossly underused	Generally underused	Adequate	Overcrowded	
ENERGY INPUT (GJ/100m²)	A	B	C	D	
	< 60	60–80	80–100	> 100	
	X (added to any letter) indicates improvements impossible or too costly				
FIRE/SAFETY & OTHER STANDARDS	A	B	C	D	
	Meets standards fully	Meets H.O. standards for E.H.B.	Standards < B but > D	Black Spot	
PHYSICAL CONDITION	A	B	C	D	
	Like new	Minor deterioration	Major repairs required	Replacement necessary	

5. The value of the site including its enhanced value. Urban locations particularly should be subject to very careful study.

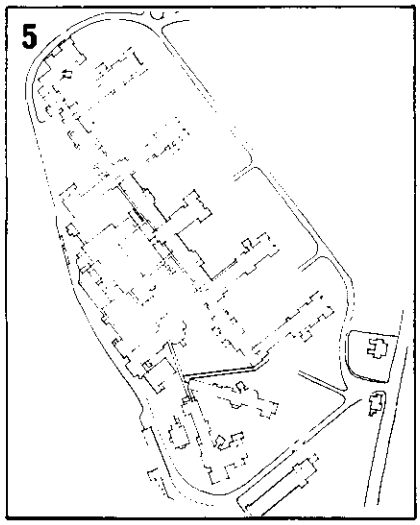
It is my belief that there are sufficient staff in the NHS with Town Planning and other relevant qualifications for most of these questions to be answered by Works staff. Those which cannot, can be referred to Works specialists in the District or Regional Authority, or can be the subject of investigation by the District Valuer or private practitioner.

Some NHS experience has been referred to already and before closing, I would like to refer to other studies which can result from Functional suitability studies, especially where underuse is revealed.

These examples are the work of Viren Sahai, Regional Architect to the South Western Regional Health Authority and were completed over a year ago. Both studies contributed to Option Appraisal Studies and were prepared to see whether existing buildings could be used more efficiently, to determine whether benefits would result from short-term and long-term management changes. Needless to say, both are Victorian buildings used for long-stay patients in the priority care groups.

Case study No. 1

The objective here was to assess the effect of reducing the number of beds on site, as well as rectifying the present position where existing spaces were not used in the best way. Figure 5 shows the existing site layout and is typical of the period. Wards at the extreme ends were served through wards nearer the centre where the service departments are located. This made nursing in the wards used as thoroughfares very difficult. Figure 6 shows how, by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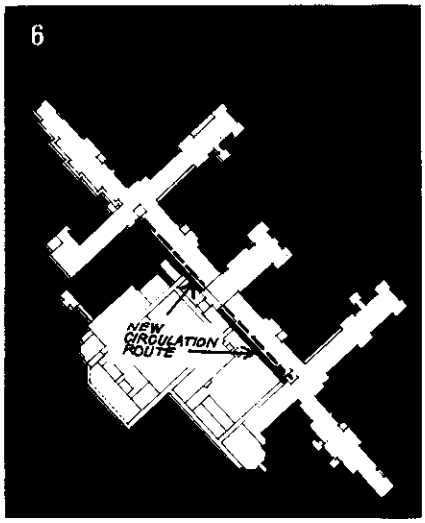

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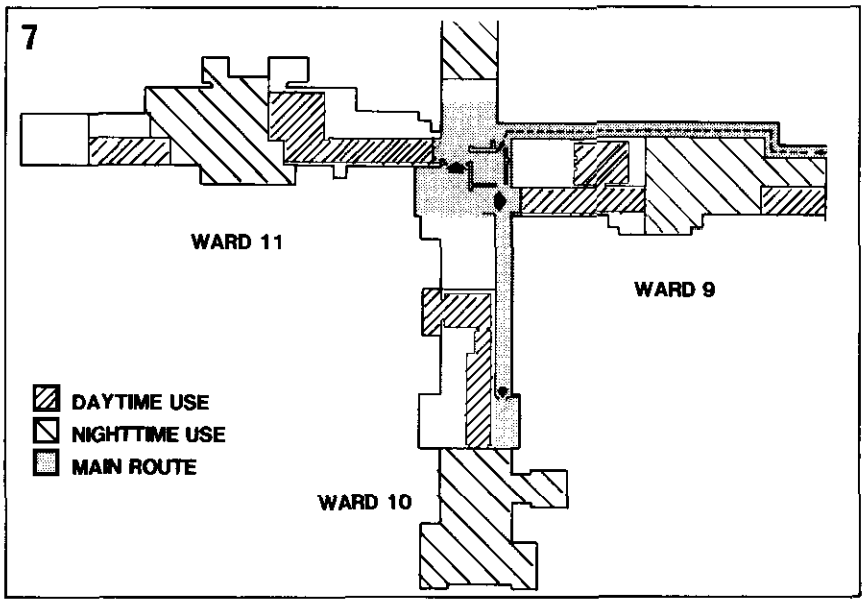
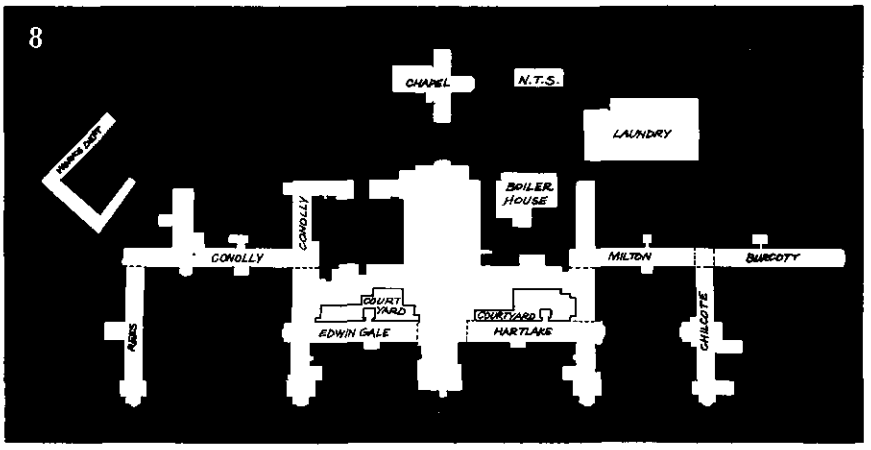
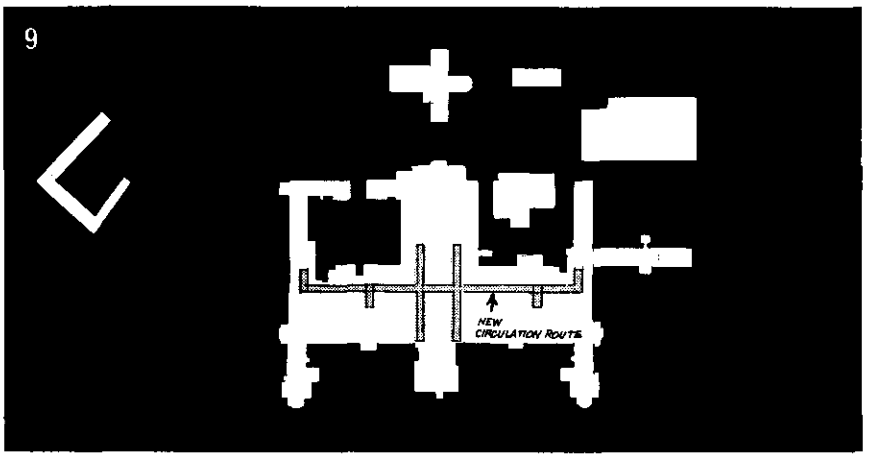






reorganising the circulation so that it is external of the centrally located wards, it is possible to serve two sub-centres from which wards radiate on either side of the centrally located service departments.

Figure 7 is an enlargement of one side to show how, by clearly defining dormitory areas away from access routes, the organisation of ward areas becomes more logical and patient comfort is increased. Note particularly how approximately one third of the accommodation at present used as wards, is released for other uses or even demolition.

Case study No. 2

This is a similar case but the present situation is a lot worse because there is a large backlog maintenance bill to pay if it is decided to retain the existing buildings.

Figure 8 is the plan of the central accommodation on this site. Not shown are outlying villas which were the subject of a different study in the same Option Appraisal. The same fundamental problem of circulation is seen in this case with the same effect of underused and unsatisfactory 'thoroughfare' wards. Figure 9 shows how by the creation of a hospital street external to the wards better organisation of nursing units becomes possible, with resultant reduction in the building volume required, which would bring large savings in running costs.

In both these cases the option of reprovision in the community giving an opportunity to close down the old hospitals is a real alternative, but time must elapse while the new facilities are constructed. In the interim, say for three or four years, the cost of reorganising these old hospitals would be repaid many times by the resultant savings in running costs.

Having produced functional suitability surveys, incorporating condition information, it is possible to produce Estate Control Plans by adding in the Services Planning Strategy decisions.

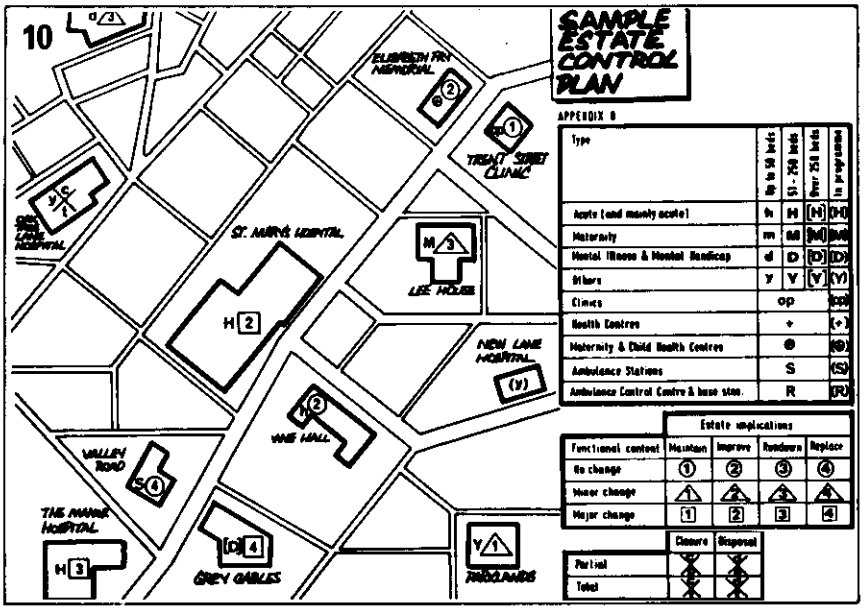
Viren Sahai, when Chairman of AGEM working Group 1, devised a way of displaying both functional suitability and services planning information, graphically, and I show this as Figure 10. By using a simple range of symbols and references it is possible to appreciate the present state and future planning intentions for each group of buildings in a district. It is worth recalling that in DS 85/75, it was stated that districts should produce overall service planning objectives and define the present and future role of their existing stock. Eight years later, this has happened in very few districts in England. It is also sad to reflect that the Report of this Working Group was in final draft four years ago, but not published by DHSS because changes in the planning system were imminent.

Another way of expressing the same point is to say that with condition and function information available, service planning can become a dynamic rather than an academic activity.

Figure 11 illustrates the sort of situation which ought to be commonplace in future. The example shows how authorities can make service planning decisions:

in Hospitals 1 & 2	To ensure further useful life by adequate maintenance;
in Hospital 6	To upgrade it for the same reason;
in Hospitals 3 & 4	To upgrade and extend in order to decant patients from Hospital 5 (with some exchange of patients between Hospital 3 and Hospital 1);
and Hospital 5	Can be sold, and if the sums are right the proceeds should pay for the work in the other hospitals. This is a more likely outcome in

10



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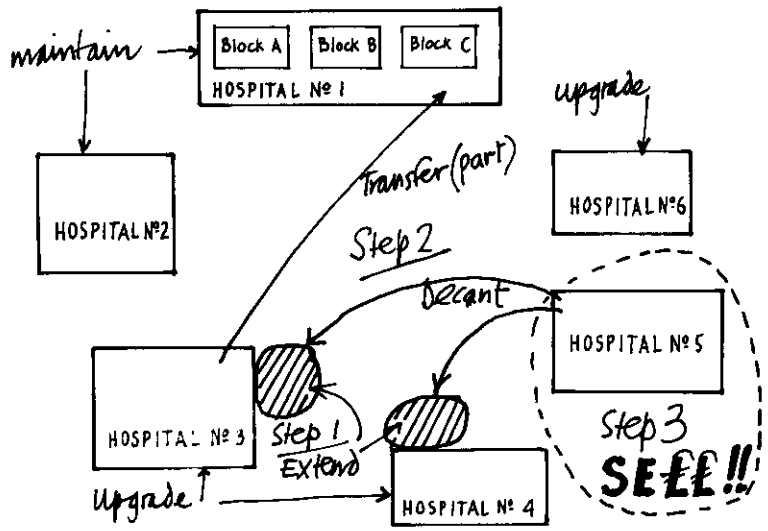


DECISIONS POSSIBLE FROM DISTRICT SURVEYS

an urban rather than a rural situation.

NET RESULT: A smaller more efficiently used group of hospitals with a saving in running costs and big improvements in conditions for staff and patients.

Finally, I would like to emphasise that works officers have, or can develop, the skills to carry out the examinations described in this paper; it is now up to authorities to make arrangements to use the potential of works officers to the full, thereby breaking the present deadlock many authorities seem to be in. Chairmen and members and perhaps especially colleagues in other disciplines, should acknowledge that members of the works discipline are well qualified colleagues in the NHS with the training and skills to make a full contribution to this activity. Those authorities who have trusted works staff to be fully involved have been able to show the benefits of this arrangement, and their fellows are failing in their duty if they do not make similar arrangements.

Functional suitability studies

HC(83)22 (November 1983) states: Health authorities are to complete functional suitability studies within one year of DHSS issuing guidance.

The NHS *still* has not received the guidance but it is important that the studies should be done.

The paper was produced against a brief to show how works officers, with their estate information and general understanding of the buildings for which they are responsible, are well placed to take a lead in carrying out functional suitability surveys even though many aspects should involve colleagues in other disciplines.

CROSS REFERENCE

Starting this month, we pick out from the journals of professional colleagues, articles and news items of interest to hospital engineers.

BUILDING SERVICES
Sound intelligence – an article by David Perks describing an award-winning energy management system based on occupancy sensing by sound. *July, p 49*

ELECTRONICS & POWER
Engineering and morality – an article by the Rev. Canon George Tolley argues that divorcing moral responsibility from the practicalities of engineering in this modern age endangers both society and the professional status of engineers. *June, page 477*

CHARTERED MECHANICAL ENGINEER
CAE update – a review of some of the latest computer aided engineering design systems. *June, page 16*

NEW CIVIL ENGINEER
PSA design assessment criticised – news item on a new report on government design work calling for a more accurate assessment of outside consultants. *June 28, page 7*
Clients push on with new contracts scheme – news item on British Property Federation's publication of its new contract from. *June 21, page 9*

THE ARCHITECTS' JOURNAL
Building with information technology – article by Mike Nightingale covers the advances in information technology as yet new to this country that have a direct effect on hospital design. *June, page 81*

40th Annual Conference – all shipshape and Bristol fashion

The Institute's 40th Annual Conference was held with great success this May in Bristol. The city proved to be a pleasant and hospitable venue and several delegates and their partners added a day to their trip and made the most of the beautiful West Country. Who better than to open the proceedings than Mr W V S Seccombe, Chairman of the South Western Regional Health Authority.

In his speech, Mr Seccombe made three main points. First he reminded delegates that patients and public, whatever else they worry about, absolutely take for granted that hospitals are safe and reliable buildings. Secondly he commented on the speed of change and increase of complexity and variety of engineering installations. He emphasised as his final point the continuing importance of energy conservation, the need to reduce energy bills and to generate additional revenue for patient care and other service developments.

With those thoughts to the fore, the delegates settled down to a programme of papers, many of which dealt with subjects of particular relevance to the South Western area.

In the evening business and pleasure combined on a trip to Falfield, the Hospital Estate Management and Engineering Centre. Delegates and their partners packed into two coaches (one of which got lost, but turned up just in time). After being split into several small groups, Falfield lecturers gave conducted tours of the centre. Those with no previous experience of the place were both interested and impressed by what they saw. After the tour, delegates were treated to a barbecue party which unfortunately the heavy rain drove indoors, though the cooks battled gamely over the chicken legs under a polythene canopy. In spite of the weather the party went with a swing and gave friends and colleagues an enjoyable opportunity to get together.

Opening introduction of the 40th Annual Conference by the Institute's President, Mr L G Hadley.

The second day ended with a Civic Reception and dinner dance. Speeches were made by Mr Seccombe, Mr L G Hadley the Institute's President and the Lord Mayor of Bristol. The Northcroft Award was presented to Mr R Buckley for his paper published in the Journal.

The Conference was closed at noon the following day by the President, Mr Hadley. It had proved a lively, informative, thought-provoking and enjoyable occasion. It is hoped that all those who attended and many more who did not will be at Harrogate next year.

Ken Eatwell OBE Chairman of the Institute's F & G P Committee seen in discussion with Lucas Scholarship Award winner, Brian Ashdown – Tunbridge Wells Health Authority, during the tour of the Falfield Centre.

NEWS

Enhanced version of WIMS System

ICL has recently completed the second version of its implementation of the DHSS' Works Information Management System, WIMS. The work has been done by ICL's Health Branch and staff from the Northern Regional Health Authority, who will be taking responsibility for supporting the system throughout the NHS.

Further details from: International Computers Limited, Bridge House, Putney Bridge, Fulham, London SW6 3JX. Telephone 01-788 7272. Telex 22971

US acquisition for the BOC Group

The BOC Group, through its Ohmeda health care division, has acquired Precision Vacuum Systems, Inc. (PVS) of Denver, Colorado, who develop and manufacture vacuum and compressed air systems used in dental laboratories and operating theatres.

More experience available

Heat Transfer Limited, already in the forefront of calorifier design and manufacture, have extended their interests by the purchase of the calorifier section of Hartley & Sugden Limited with all their drawings and records.

These, together with those from already acquired from Royles Limited and Pressurisation Limited combined with the specialist manufacturing facilities of Heat Transfer, will allow any request for calorifier spares to be dealt with from one central works in Cheltenham.

Further details from: Heat Transfer Limited, 3 Bath Street, Cheltenham, GL50 1YE. Tel: (0242) 582777 Telex: 43458.

Building Research Establishment Research Programme 1984-85

The Building Research Establishment Research Programme 1984-85, recently

IHEX '84 great success - prospects good for IHEX '85

First thing in the morning saw the opening of IHEX '84, the first-ever hospital engineering exhibition to be held in association with the Conference. All the 30 stands had been booked well in advance and the whole venture proved a considerable success.

Tom Jarvis, the organiser of the exhibition, expressed his delight at the success of IHEX '84 held in Bristol during May in association with the 40th Annual Conference of The Institute of Hospital Engineering.

There has been positive, constructive and encouraging response from exhibitors shown by the reservation of stands for IHEX '85 – next year's exhibition in Harrogate, even while the first event was still in progress.

Visitors were quick to recognise the specialised nature of the exhibition and Keith Noble of Surgical Equipment Supplies Limited commented – *'a superbly attended exhibition which gave the opportunity to meet senior engineers – altogether fantastic!'.*

Norrie Welsh, Senior Sales Engineer of Scott Western Limited, another company who have reserved space for next year, echoed the general consensus of opinion – *'Very satisfied with the exhibition and several useful contacts were made'.*

The organisers were encouraged by the interest and constructive ideas suggested by the exhibitors for next year's exhibition, which they are confident will be even more widely supported and attended.

Chairman of the South Western Regional Health Authority, Mr Seccombe (pictured above with Mr Hadley, the Institute's President touring the exhibition), also expressed the hope that the exhibition would be a continuing feature of the future conferences.

IHEX '85 Hotel Majestic, Harrogate, Yorkshire 22 – 23 May 1985

published, contains a new General Research Programme. The main objective is to maintain the Establishment's capability to meet its objectives and to respond to future customer requirements. Currently, the General Programme consists of eight programmes of work representing 2.5 per cent of BRE's research effort. It is expected to increase to five per cent by the beginning of 1985-86.

The BRE Research Programme 1984-85, which covers the current year and forward commitments entailed over the next two years, is available, free of charge, from the Publications Sales Office, Building Research Establishment, Garston, Watford WD2 7JR.

British Standards Institution

Sizes of drawing sheets

The ISO-A series of paper sizes has been recommended for engineering drawings for many years and BSI has just published a revision of the relevant standard, BS 3429 Specification for sizes of drawing sheets, *which supersedes the 1975 edition (now withdrawn).*

Copies of BS 3429 may be obtained from the Sales Department, British Standards Institution, Linford Wood, Milton Keynes MK14 6LE. Price: £4.90 (BSI subscribing members receive a 50% discount).

ENGINEERING COUNCIL

United approach to engineering careers

A united approach to providing engineering careers advice and guidance to young people is recommended in a discussion document published recently by The Engineering Council.

This is published in the form of a report *'Schools, pupils and the engineering profession'* following a comprehensive survey by the Occupational Research Centre at Hatfield Polytechnic. It reveals widespread confusion among pupils about opportunities in engineering profession, and recommends wide-ranging action by the newly-established Engineering Council to solve the problem.

The 98-page report, price £10, including p & p, is available from Julia Watson, Education and Training Directorate, The Engineering Council, Canberra House, Maltravers Street, London WC2R 3ER.

COMPETITION

The Institution of Mechanical Engineers/Esso Petroleum Co Ltd

Tribology Award 1984 £500

For an essay on industrial aspects of lubrication, friction or wear.

Open to anyone under 35 in UK industry or on a sandwich course.

The entry, describing original work, should be an informal essay of 2000-5000 words, with illustrations as necessary. Merit will be assessed on content and application to industry, not on length.

This award recognizes individual contributions in tribology by young engineeers in early or mid career in UK industry.

Closing date 31 October 1984

Further information and entry form from Miss C H Nicholson, Divisional Officer, Engineering Sciences Division, Institute of Mechanical Engineers, 1 Birdcage Walk, London SW1H 9JJ

CONFERENCE

Heat pumps for building 2

A major conference on the application of heat pumps for the efficient cost effective heating and cooling of buildings.

24th – 25th October 1984.

Royal Institute of British Architects, London W1.

Further details from Conference Secretary, Construction Industry Conference Centre Limited, PO Box 2, West PDO, Nottingham NG8 2TZ. Telephone Nottingham (0602) 282 257.

TALKING POINT
continued from page 4

building and engineering officers would work together. All drawing work was done in the drawing office.

Then in 1982 another reorganisation took place which disbanded the Area Works Department and increased the work load on districts as a whole. The Regional plan indicated that a lot more delegated work would be given to districts. The three senior works officers considered that this reorganisation gave the opportunity to set the works department up differently to take into account this extra work load. After consultation with the administrator it was agreed that the works department could not follow the administrative units as it would have meant such an upheaval and movement of staff and workshops that it was not justified. With this point cleared up it was requested by the administration that one point of contact was required, so that the senior administrators would know who to contact and who should relate to the unit management teams.

The District Works Department structure was set up as (Fig. 2):

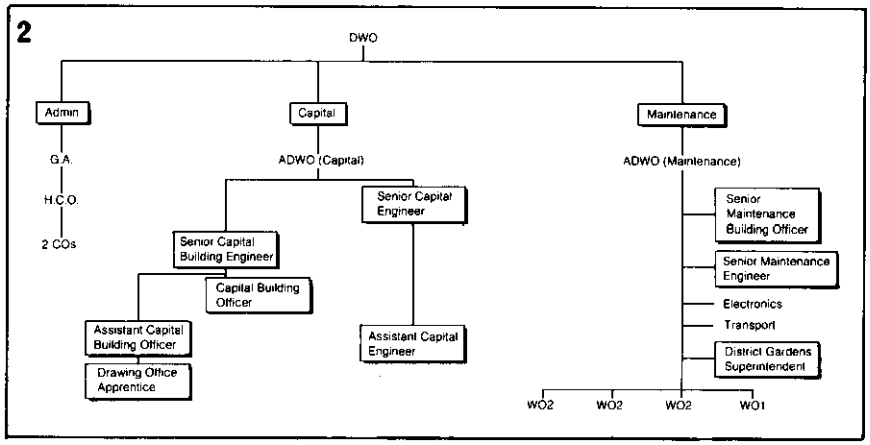
With the now larger capital sums being delegated to the district, the advent of JCT 80, the use of nominated/domestic contractors and more involved tendering procedures, it was felt that a single officer doing both building and engineering work could not continue under Figure 2.

Although an officer is still put in charge of a project, depending whether the main part is building or engineering the respective officer is chosen to be the lead person, the building and engineering staff then work together.

Under Figure 1 structure there was a bottle neck in the drawing office, because of this it was agreed that each officer should do their own drawing work. Under Figure 2 this has led to a better flow of work and my staff get more satisfaction from being able to control the whole operation.

Regular monthly meetings are held with the ADWO (Capital) and the capital section and the DWO is given a progress report which he then uses for his budget meetings with the Administrator. The ADWO (Maintenance) has regular meetings with his works officers, he also attends all

2



UMT meetings as and when required, receives all agendas and minutes and has the right to attend when works matters are discussed. The ADWO (Capital) attends as and when required and also receives agendas and minutes.

The DWO attends all DHA meetings, attends DMT as and when required, receives all agendas and minutes and has the right to attend when works matters are being discussed. He also receives all UMT agendas and minutes. The four hospital works officers attend heads of department meetings. This system works very well and we feel that we are part of the team.

With the advent of the 1982 reorganisation the opportunity was taken to alter the administration section as well and a general administrative assistant was proposed to head this section. Tighter control was needed because of the extra work involved with JCT 80. Certain clerical duties that the technical officers undertook were now given to the GAA allowing more time to be spent on technical work. Throughout the year more work will be devolved thus allowing us to become more efficient.

Work undertaken by the maintenance section

1) Production of the yearly works programme – which is a comprehensive document for each hospital set up as per Estmancode definitions with the exception of category 'D' work.

2) Planned preventive maintenance.

3) National incentive bonus scheme.

4) Transport purchases and maintenance.

5) Grounds and gardens.

6) Electronics.

7) Minor improvements (administrators budget) which is capable of being undertaken by the hospital works department and not requiring a specification etc.

Works undertaken by the capital section

1) Delegated major capital work either by inhouse staff and/or consultants.

2) Minor capital work.

3) Non-recurring revenue budget work – this money will decrease over the years as it is 'Bank' money for our new DGH.

4) Category 'D' work from the budget held by administration which requires specifications/drawings for work to be undertaken by contractors.

5) Updating drawings/estate terriers etc.

An explanation of the budget for category 'D' work would be useful here. This always used to come from the works budget and there is no doubt that maintenance work suffered because of this. It was decided some five years ago to try and get over this problem. A budget was set aside and given to the administration to control so that they could get the category 'D' work done from this budget. This eased the pressure from the works budget and meant that only maintenance work would be undertaken from this money. So if the administration wanted shelves put up, a door moved etc. etc. he paid for it from 'his' budget. This really brought home to them the high cost of some of the work they wanted to do, quite a few

jobs asked for were not done when the cost was relayed to them – must prove a point.

Something new that we are contemplating for April 1985 is charging fees for all work undertaken by the capital section. To this end the capital section are now completing timesheets so that an assessment can be made as to the 'fee element' that could be charged to the headings 1-5 of the work undertaken by the capital section.

Each project is given a job number and no work can be undertaken by the capital section without a number. As some work has to be carried out at risk a district works number is given and re-charged at a later date if the project starts.

In the past abortive work was lost in the district works budget and I know that this can be expensive for some projects, I will now be able to find out the exact cost so that it can be reported to the appropriate committee.

One of the reasons behind this new venture is to make the UMTs more aware that they are buying services and *all* work for them has to be paid for. This should make better use of the capital/revenue monies given to this district, we are all enthusiastic that this will work as well as the category 'D' budget above.

The structure described here may not suit other districts but appears to work for us. No doubt it would be interesting to hear from other DWO's on their structures and reasons for same, I know I would.

This paper was presented at the 40th Annual Conference of the Institute this year at Bristol. The author is Senior Partner of Armand Safier and Partners, Consulting, Structural and Civil Engineers

Chimney design and prevention of failure

ARMAND SAFIER DIPCE BSc(Eng) CEngFICE FIStructE FCIARB MConstE MSOCIS(France)

General

It is said by psychiatrists that people mostly talk about matters that are a problem to them. The title of this paper seems to indicate that chimneys in hospitals constitute a problem – something I have found to be true and not only with regard to hospital chimneys, but chimneys in general.

Let me sketch out the scene – how chimneys are designed, or for that matter more commonly not adequately designed, contracted and constructed, the failures that arise and what might be done to avoid these.

First we have to define what is the purpose of a chimney? Openings in roofs of prehistoric dwellings to let the smoke from the open fire escape, without inconvenience to the inhabitants, and to create the draught necessary for combustion, were provided long before windows were introduced to give light. The purpose of our modern chimney is precisely the same – to lead combustion gases efficiently away without inconvenience or harm, nowadays no longer only to the immediate users of the fuel burning device but also to the public at large, excepting some export to make acid rains in Scandinavia, and create a draught.

This is where one of our chimney problems starts – since the advent of the Clean Air Act – chimneys have to be much taller than ever before, thus causing problems of scale. The origin of another of our chimney problems is the switch over in the '50s and '60s to oil burning, as a cheap convenience fuel, from coal burning, and then in the 1970s, after becoming accustomed to oil burning, having to make our boilers more and more efficient so as to offset the continually increasing fuel price. Incinerator flues are a special case and I will refer to these later on separately.

To conserve fuel, multi-boiler installations, each boiler with its own flue, came into fashion with ever more sophisticated automatic thermal controls switching the boilers off and on at ever increasing frequencies and rapidity of flue gas temperature rises – quite a different situation from that one had been accustomed to with coal burning equipment.

Boiler and burner manufacturers researched into the efficiency of their appliances and provide the Mechanical Engineer with whatever data he requires as to the calorific output and efficiency of their equipment – including flue diameters related to the discharge height of the chimney, based on the premises that at full load the efficiency of their equipment will not be impaired. They have, however, not researched, or do not consider, the effect of that design on the durability and therefore the cost of the chimney. They contend that their responsibility ends at the combustion gas exit opening of the boiler. Maintenance contractors do likewise.

That boilers are very rarely called on to work full blast for long periods and that this maximum output efficiency design philosophy should not be the main criterion of chimney sizing is either not realised or is not a boiler selling point. At lower outputs flue gases cool rapidly, inversion and condensation accompanied by the production of aggressive acids occurs – leading to chemical deterioration of the flue linings. Exaggerating only a little bit it is as if aircraft designers were to design their craft for a cruising speed of say 600mph without thinking of the need to accelerate through the nought to 600mph range

and consequently stalling on the way. It is not only in this respect that this analogy applies, there are similar attitudes in the structural design.

A further paradox arises in that boilers and associated equipment are assumed to have a 20 year life or thereabouts, but chimneys built in or free standing are often assumed to have a near indefinite life and practical replacement facilities are rarely provided.

Not infrequently so called spare flues or flues for future additional boilers are provided within a multi-flue installation integral with the working flues and are either never or for many years not used. Thus creating cold spots and differential stress problems.

What actually happens in an oil firing installation chimney with a flue gas exit temperature at the boiler of about 300°C? As soon as the hot gases come in contact with the inner face of the flue lining – regardless of its material type – that face heats up to the gas temperature and by internal conduction transfers heat to the layers of material behind it within the lining. It is well known that, for practical purposes, all materials expand on being heated – this temperature expansion occurs in all directions and conforms to the formula $\Delta L = \gamma(T_1 - T_2) \times L$ where

ΔL = linear length increase
γ = material expansion factor
T_1 = starting temperature
T_2 = final temperature
L = original length

Although correct, this formula is one of the main causes of misunderstandings in the design of chimneys because it omits to caution, as it is assumed obvious, that the expansion is instantaneous and omni-directional. That is as soon as the temperature of the lining's inner face has been heated to a higher temperature, and before the deeper layers can ssume the same temperature by conduction, which takes time, the inner face expands to take up the volume appropriate to the temperature it is at any one instant of time. There is thus a temperature and associated dimensional difference between each material layer, of molecular thickness, and those adjoining it. As these layers are rigidly interconnected differential mechanical stresses are set up in the

Victorian hospital chimney badly leaning and hooped, just prior to demolition.

material which will sooner or later lead to material fatigue and failure. These mechanical stresses will recur every time the chimney is heated or cooled.

In high temperature engineering one has to consider not only the macro-environment but also the micro effects within the material. For instance the use of an aggregate with a high temperature expansion factor in chimney concrete will obviously lead to higher internal disruptive stresses than construction with a carefully selected aggregate would. Insufficient research has so far taken place in this field.

The problems of scale mentioned earlier arise from the proportionality of the factor 'L' in the above formula. The larger the dimensions the larger the movement, for instance the internal lining of a 50m high steel chimney will grow by about 180mm every time the flue is heated from 15°C to 315°C and vice versa.

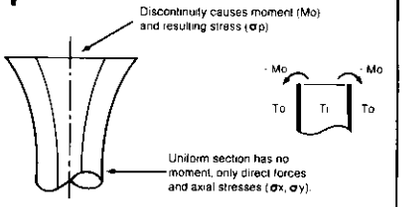
The magnitude of the stresses occuring and their effect are very difficult to assess. These are proportional to the rapidity of heat gain – slower heating permits the heat conduction to proceed more in conformity with the rise in temperature.

There is nothing new in this – we all know what happens if hot water is poured too rapidly into a glass, but heat shock, slow or rapid and often repeated, is rarely mentioned or thought of in connection with chimney design. This aspect is, of course, much more serious in incinerator chimneys.

The ideal lining material should therefore have (1) a high insulating value, (2) a low modulus of elasticity that is not to be brittle, (3) be acid resistant i.e. dense and (4) be of sufficient strength to carry its own weight within the working temperature range of the flue.

Only (1) and (2) are compatible whilst (3) and (4) require quite different material qualities. I will return to materials later but first would like to illustrate two common forms of chimney deformation the first colloqually called the celery effect, results from an increased radial expansion of the upper annulae of all flues and is due to the geometrical discontinuity of the flue exit orifice (Fig. 1).

1 Celery Effect



1 UNIFORM SECTION

$\sigma_x = \sigma_y = \pm \frac{E\gamma\,(Ti - To)}{2\,(1 - v)}$ the outer face will be in tension if Ti > To

2 DISCONTINUITY

Moment caused by discontinuity,

$Mo = \frac{E\gamma\,(Ti - To)\,D^2}{12\,(1 - v)}$

and resulting stress,

$\sigma p\,(max) = \frac{E\gamma\,(Ti - To)}{12\,(1 - v)} \times \left(1 - v + \frac{\sqrt{1 - v^2}}{\sqrt{3}}\right)$

Where: Ti,
To = Temperature inside and outside shell
σ = Stress E = Modulus of elasticity
v = Poisson's ratio
γ = Coefficient of thermal expansion. d = Shell thickness

σp is (For v = 0·3) typically 25% greater than σ_y

Because of the symmetrical nature of the construction of a cylindrical chimney under uniform temperatures at some distance from either end there will be no bending stresses in the flue shell, only direct stresses conforming to the formula:

(1) $\sigma x = \sigma y = \pm \frac{E_\gamma(T_1 - T_2)}{2\,(1 - \gamma)}$

The upper sign refers to the outer

surface indicating a tensile stress if $T_1 > T_2$.

Near the ends, that is mainly at the top of the chimney, and at joints not fully restrained, there will be some bending stresses due to a free moment:

$$(2)\quad M_0 = -\frac{E_\gamma(T_1-T_2)d^2}{12\,(1-\gamma)}$$

and the stresses caused thereby, everything else being equal, would be

$$(3)\quad (\sigma_\psi) = \frac{E_\gamma(T_1-T_2)}{2\,(1-\gamma)}\left(1-\gamma+\frac{\sqrt{1-\gamma^2}}{\sqrt{3}}\right)$$

for a Poissons ratio of $\gamma = 0{\cdot}3$ this stress is about 25% greater than that at the middle height of a chimney.

We can therefore conclude that if cracking will occur due to a temperature difference $T_1 - T_2$, it will start at the top edge and proceed downwards in an axial direction. It is for this reason that we see many chimneys with hoops strapped around at upper levels.

It is of course by far better to counteract this stress increase by providing a stronger shell for a distance downward from the upper exit orifice.

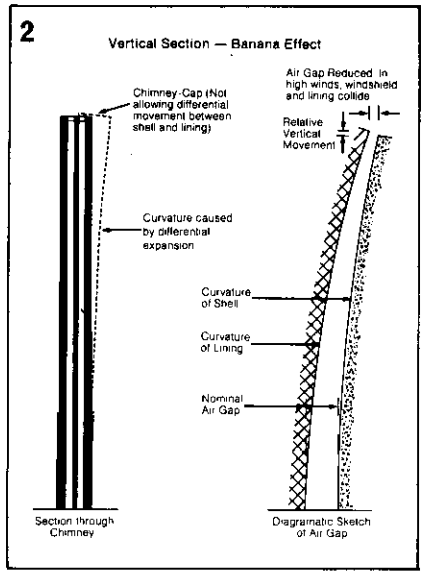
Similar considerations apply to stresses at flanged joints, which are always increased.

The second type of deformation is the so called banana effect, commonly occurring in integral or structurally interconnected multiflue systems as exemplified by the illustration in Figure 2.

The characteristics and properties of some materials relevant to chimney linings are given in Table 2 of BS 5854:1980. There is one reservation as regards the properties shown therein. High Alumina Cement converts in a warm and moist environment, becomes molecularly porous and deteriorates. These characteristics need to be borne in mind when specifying its use.

So far I have only mentioned the functional aspects of the material relevant to chimney construction. Once the materials of construction have been decided on these must be put together to form the flues.

To this end the materials must first



be reasonably economically manufacturable, handled and assembled to form leak proof flues that can either freely move with temperature variations or resist these and either have an integral windshield or be contained within a protective windshield. As the windshield is more of a true structural element and therefore of somewhat secondary interest to Hospital Engineers I will only refer thereto when showing examples – suffice it to say here that obviously it must be sufficiently stable to resist the windstresses, not oscillate under windloads and not exhibit deflections that could damage the lining.

Design of chimneys

Problems and failures occur not infrequently because of a misunderstanding of the design process and the interface between the various disciplines involved. In the case of hospitals, the architect acting as design team leader will normally leave the design of the boiler house installation and layout to the mechnical engineer whose discipline demands the assembly of an installation from individual items of equipment, available from a multitude of manufacturers, into one compatible working system. The flue is often considered either outside the system or left in the hands of a 'specialist manufacturer' or because of its size to the structural engineer whose discipline requires primary design – that is to devise the construction of basic raw materials into the required forms and because of its prominence to a shape as required by the architect and/or planners.

Generally there is an interruption of the flow of basic requirements as to flue design between mechanical engineer and structural engineer and a blurring of responsibilities. The situation can only be improved by a greater understanding by all parties of the chimney's function and the whole combustion process. I have already commented on the need not to oversize flue diameters. It is for this reason that I shall not mention applicable standards and codes. The requirements of the standards should be taken into account and the data given therein allowed for. Standards can however not compensate for a lack of thorough understanding of material physics and temperature expansion effects, as well as practical details. Such details should include the provision of venturi pipes at the exit orifice to achieve a gas ejection velocity that will ensure dispersion, rather than immediate condensation and smudging. In masonry lined flues a length of about two to three diameters from the top should be in engineering brick or glazed earthenware linings and condensate or other fluid syphoning off drains be provided at the bottom of the chimney. Masonry linings should preferably be fully supported all round by the wind shield.

There are many ways in which flues can be insulated to avoid heat loss over their length. Generally a 35 to 75mm thickness of mineral wool insulation held in place by galvanized chicken wire mesh will suffice in steel flues. The masonry linings, such as moler concrete or refractory brick, do provide their own insulation.

Chimneys are working spaces; access facilities for external inspection should be provided and internal ladders, rest platforms, lighting and ventilation should be provided within steel windshields and concrete windshields with steel or independent brick flues as well as in very tall chimneys.

Construction of chimneys is highly labour intensive and therefore costly. Material costs are a small proportion of the cost and material sizes should not be skimped.

Chimney construction

In day to day building construction one comes only across a very small number of elements that are actually working elements within the structure of a building, one such example are self finished concrete storage and other floors which suffer continuing wear and tear, another are chimneys, most other elements provide enclosures to the function within the building but do not participate in the process itself.

It is for this reason that a particularly high standard of workmanship and supervision is required in the construction of chimneys. In over three decades in the building industry I have yet to see a Clerk of Works inspecting regularly the progress of chimney construction or for that matter descend on a bosun's chair within a completed chimney for the final inspection. Such inspections, if ever done, are left to general steeplejack who although experienced in their skills are not normally competent to judge for themselves good or bad workmanship.

If neither the engineer's representative nor clerk of works are able to undertake such inspections themselves they should at least be present, instruct the steeplejack before ascending the chimney and question him immediately he comes out of the chimney.

Whatever material a chimney is built of it must be built leak proof, have a reasonably smooth face on the gas side, that is joints in masonry units must be properly full and flushed.

In steel linings welds must be complete and bolted joints be tight and contain a suitable packing.

In flanged joints bolts should be so positioned as to exert a central pull on the flange forcing it to close flat rather than asymetric, and not remain slightly open either on the inside or outside and a good leak proof and thin packing provided.

All chimneys should at first be dried out slowly, to avoid the sudden movements associated with moisture evaporation from masonry chimneys and rapid shrinkage, and should be smoke bomb tested before first firing.

If a construction fault is discovered after firing, this will be almost impossible to rectify because of access difficulties.

Inspecting chimney by bosun's chair – simple and effective.

Incinerator flues

Incinerator flues are a particular case.

It is reasonably simple to design and construct an incinerator provided the quantity and type of material to be burned therein are known. Unfortunately, this is rarely the case and especially so in hospitals. There is a constant change in the type of materials handled in hospitals and the load too can change from day to day. The materials incinerated are consumed at different temperatures and speeds. Sometimes, despite all precautions, pressurized spray cans or other aerosols find their way into the incinerator, explode therein and cause pressure shock waves throughout the system including the flue. As a fair amount of plastic, including PVC, is found in hospital wastes, the chlorides from the PVC combine with moisture to form hydrochloric acid within the flue gases. These condense on shut down and cause chemical corrosion.

The combustion gas exit temperature in incinerators can be of the order of 900°C to 1200°C. These are extremely high temperatures and require refractory linings within the incinerator and the flues. The temperature rise and fall are also very rapid. It is extremely difficult to construct a tall lining of say again 50m height that will stand up for a long time to frequent intermittent firing at such temperatures. By far the better solution is to take the gases through a heat exchanger and reduce their temperatures to a reasonable 250°C/300°C. Preferably top dampers should be provided to reduce the continual heat shock and the reduced temperatures kept above the relevant acid dew point temperature.

Even so the operation of any equipment at the high temperatures required for incinerators is a skilled job, it needs a full understanding of the complete incinerating process and the effects temperatures and their rapid variation can have on all the equipment used.

The life of an incinerator flue depends very much on the operation of the equipment as well as maintenance and it is certainly substantially less than that of boiler flues. If it forms part of a multi-flue installation deterioration will normally start in incinerator flues first.

All flues should be regularly cleaned and in particular incinerator flues so as to avoid soot deposits and the risk of reignition, explosions or fire in the flue, especially on purging following firing.

In all chimneys, the designer should aim to avoid combinations of materials with substantially different thermal expansion characteristics, the higher the flue gas temperatures the more important is this requirement.

The forms of failure likely in incinerator flues are vertical cracking of the lining of refractory lined-flues and collapse or crinkling of steel flues at high temperatures, starting at bends at the bottom and/or where material has been reduced in thickness by corrosion. Flaking and erosion of refractory linings due to acid action may also occur.

Chimney failures

Most chimney failures start in a small way, if the damage is repaired whilst it is small not much will happen, but if unobserved, or unobservable, and thus undetected and left for some time the whole chimney will fail beyond economic repair.

Steel chimneys normally wear out, like car exhausts only on a larger scale, and need replacing. Damage can also occur because of inadequate external maintenance due to corrosion, bad welds, etc. as well as excessive temperature caused stress and consequent material fatigue at bends, joints and other more highly stressed positions.

Brick and other masonry chimneys fail usually due to weathering, inadequately formed joints or lack of regular maintenance as well as acid attack, primarily on the joint material.

Concrete chimneys, whilst the most

attractive long term performers given good design and construction, fail simply because of lack of attention to these two prerequisites.

I will only mention two well known examples, one the Kinnear-Moodie type pre-cast multi flue chimney, and the segmented type concrete block chimneys, of both of which there are many examples of failure in existence.

The second one first, it is mainly constructed of concrete blocks with vertical and horizontal reinforcement placed in the joints between the blocks within a poured HAC grout.

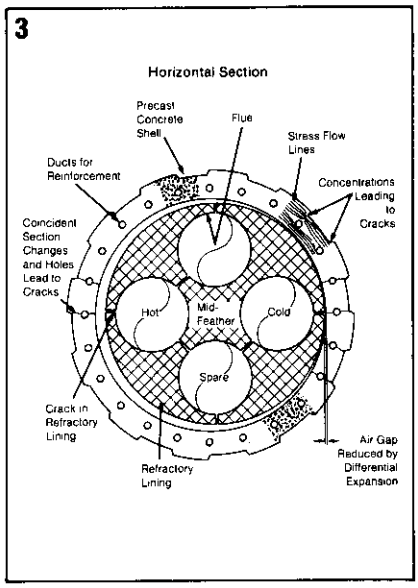
The chimneys were of medium height. The joints were often badly filled, the design did not allow for the obvious difficulty of ensuring that this can be done easily and the use of HAC in conjunction with OPC blocks in a warm and often wet environment due to rain was most conducive in encouraging HAC conversion, concrete porosity in the joints became inevitable and was followed by reinforcement corrosion. Such damage is unrepairable and these chimneys need replacing.

The Kinnear Moodie type precast chimneys exhibit many design and construction faults. These were aired in open court in the Pirelli case.

One of the most elementary of these faults was the construction of the refractory lining in one single large diameter disc of 300mm thickness. Typically there were 3 to 7 flue openings within the discs (Figure 3). The discs were placed one on top of the other – within the windshield to heights of 50m or more, with only mortar in between. From a structural point of view no one would normally erect a free standing column of masonry of such dimensions. From a temperature technology point of view it is even more difficult to understand how the designers could have omitted to observe that if, as is bound to happen, only one of the flues were fired – even only to 200°C – and the others remained cold, that thermal expansion would cause the disc to crack, virtually regardless of its material of construction.

It is as if one was surprised if a large dish, even ovenproof, cracked when put on a say 3 hob cooker and only one hob was lighted.

Substantial variations of lining



thicknesses, between mid-feather and outer sections also lead to high thermal stress differentials.

The windshield did not allow for the need to offset the weakening effect of reinforcing ducts and the reinforcement in the ducts was not prestressed to offset shrinkage, the horizontal joints were badly formed and the weather bead seal misplaced. Small wonder that such chimneys destroyed themselves within 4 to 8 years of their construction and still do.

The Pirelli chimney failure has, for legal reasons, received much publicity and it is therefore important to state that provided this type of precast concrete chimney is well designed and constructed it will give good long term service.

The various requirements for chimney design and the solutions thereto can best be illustrated by an example of one type of steel multi flue chimney and an example of a pre-cast concrete multi flue chimney as these should be constructed and then, by showing the effects of design and/or construction deficiencies on concrete, steel, brick and GRP chimneys. Bad workmanship will always cause early failure as will inadequate design. In this respect there is little difference betwenn chimneys of whatever material of construction.

Chimney life

Finally having seen the various examples – what about the life expectancy of flues and windshields?

A steel chimney, flue and windshield, should be constructed so as to have a life of say 20 years. The main requirement to achieve this is to provide an adequate thickness of metal, increased at inlet bends, so that after allowance for a 20 year loss of thickness due to erosion and corrosion on the inner lining face and adequate initial rustproofing, there will still be sufficient material left for mechanical strength. Maintenance of all other surfaces as well as normal cleaning is required as a matter of course.

Concrete chimneys can be of two variants, steel flues within a concrete windshield and masonry flue linings within a concrete windshield.

In both cases, only subject to reasonable inspections, the life of the windshield should be virtually indefinite, but for practical purposes a 50 year life based on existing wind codes etc. should be assumed. The life expectancy of the steel flue liner should be identical to those within a steel windshield, that is again about 20 years.

Masonry linings within a well constructed, operated and cleaned chimney can also be constructed to have a life of 50 years.

As mentioned before, every firing and cooling sets up stresses in the flues and chimney life is therefore inversely proportional to the number of such cycles. It is doubtful whether the energy savings achieved by rapid cycling are justified as these may well be outweighed by increased chimney capital costs. Chimney life will be advantageously affected by sweeping, in particular where heavy fuels are used or in incinerator flues.

In all cases the assumption is that neither boiler type or fuel is changed throughout the life of the chimney. If this is done then other factors can cause rapid deterioration, for instance if a fuel containing sulphur has been used and there is a change over to natural gas, sulphuric acid will be produced within the chimney for quite a time and this will cause rapid deterioration of virtually all materials used. Chimneys must therefore be carefully inspected on fuel change over, they should certainly be cleaned and, if necessary, repaired prior to the refiring with a different fuel or a replaced new boiler installation.

EFFECTIVE USE OF EXECUTIVE TIME ***continued from page 7***

oiling the wheels) and of course telephone calls. All of these, whether formal or informal, can take up a considerable amount of executive time. It is therefore absolutely essential that this proportion of your time is well spent. Reference should be made to Figure 1 which illustrates the cost of meetings, as an example.

In the office

In the majority of cases a large proportion of the time is spent in the individual's private office. Some managers prefer to have their staff visit them regularly, by request or by appointment, whilst others prefer the open door principle. Alternatively, some may prefer to combine staff contacts with tours of inspection to see what is going on at the sharp end. (I wonder how many of you recall seeing the film 'The Goya Effect' at the old Keele Courses.) Such tours not only enable you to be aware of what is happening but can also help in raising morale because you cease to be an unknown grey eminence.

Secretaries & dictation

The amount of time spent on dictation to a secretary or a machine (if you want a happy life, never confuse the two!) varies with the type of job the manager has, or again with his ability. Some people write out their reports, etc., some dictate and of course many shoot everything out for someone else to deal with. Remember to make good use of your secretary, a really good girl can be the perfect Girl Friday who will sort out priorities, keep your diary up to date and remind you where you should be and when. I'm one of the lucky ones who has one like that and it makes a tremendous difference to your time.

Reading

This I know sounds very general, but I find it is exactly that – the amount of paper that lands on everyone's desk seems to increase daily. The question you should ask is do you really need to read it all, perhaps that is another advantage of a good secretary. If you are at a district, perhaps it is worth checking with your administrator whether or not it is worthwhile preparing and circulating a digest – you can then decide what you need to see.

Taking work home

We all know the picture of the busy executive arriving home with a bulging brief case, to be bitten by his wife and kissed by the dog and of course, facing a spoilt dinner, but this could be just another sign of failing to make the best use of your time. Emergencies happen to all of us – but not every day. So we come to the question 'What do you do about it? How should you make better use of this most important of all resources, your time?'

Perhaps the first stage is to look at yourself. Are you efficient and are you effective? Remember efficiency is doing the job right and effectiveness is doing the right job. Effective managers have got to grips with the two main issues. They have organised themselves properly and they have started to organise other people. The two areas are closely related because it will be understood that unless you yourself are properly organised you cannot delegate and we all know what happens to the man who cannot delegate.

Considering these two aspects:

Personal organising

The signs of the unorganised manager are obvious – his desk is always covered with files and piles of paper. He is usually the one who leaves last with that famous bulging briefcase.

His reports, etc. are almost always late and his items on an agenda frequently have to be deferred to the next meeting. Being unorganised also has side effects which will involve your staff – if you are not organised you cannot expect your staff to be organised. Your chief will soon notice too and whilst he might admit you always seem busy, sooner or later he will want to know exactly what you are busy at. It must also affect your inter office relationships because your colleagues will know they cannot rely on you to produce those figures for the next board or that report that the RWO has been chasing for weeks.

Organising others

The first and probably the major problem you have to face is what I have heard referred to as the delegation dilemma.

This poses many questions – Will so-and-

Figure 2 Effective use of time

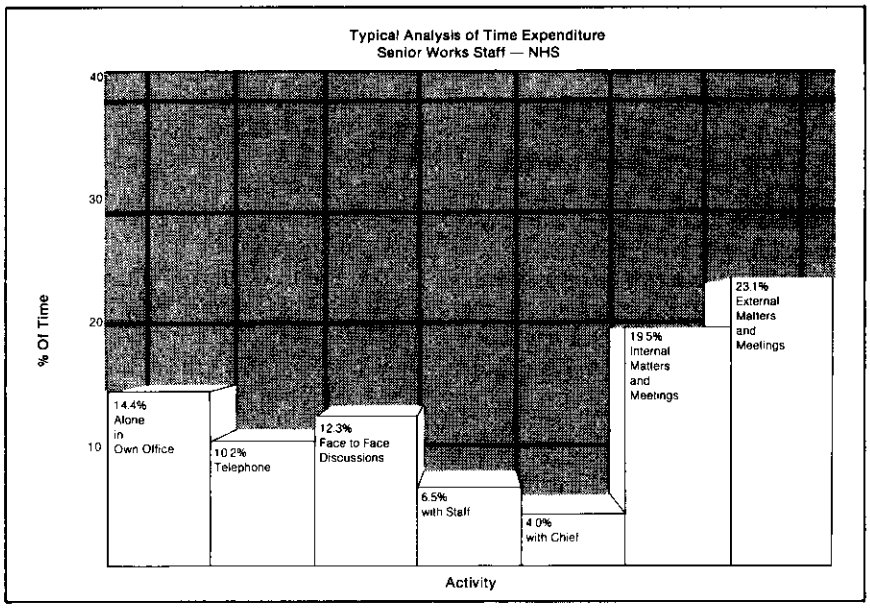
Day	Time	Brief description activity	Alone	Tele.	Face to face	Subordinates	Chief	Other internal	External	Change of activity

Notes on diary keeping:

1. Record as far as possible
Every change from talking with one person to another
All changes from working on your own, to talking and back again (each uninterrupted period of time spent 'going through mail' or 'attending meeting' should be recorded separately and not collected daily as a single item)
Each telephone call separately and its duration and note T to you, or F from you.
When changes of activity occur too rapidly to be recorded in detail please put a tick ( ) in change of Activity column.

2. If you prefer a different set of headings to suit your own particular job or require a different analysis of contacts then the sheet may be altered to suit your personal preference.

Figure 3 Typical analysis of time expenditure senior works staff – NHS



so let me down? Can I trust him to get on with it? What if he drops the almighty clanger? – I'll have to face the music – I know he can't do it as quickly as I could.

You also need to face and conquer those fears which we all have:

- Fear of losing control
- Fear of giving up jobs you enjoy doing yourself
- Fear that no one else can do the job as well as you can

It is so very easy to convince oneself that life is much easier if you just hang on to everything and follow DIY.

Well, what exactly do we do about it?

Present use of time

The first essential is to plan your time and to plan your time you need to know how you spend it at present.

The obvious thing to do is an analysis, but firstly you must record. Figure 2 shows a typical daily activity sheet which you should complete – I know, I can already here the complaints of being too busy, but it is worthwhile exercise. I gave this paper initially at a Senior Developing Management Effectiveness Course and asked those attending to complete their own activity sheets for the week previous to the course. The analysis, averaged out, of their responses is shown on Figure 3. I had conducted a similar exercise with my own staff and at other similar courses and the similarity of the results was quite remarkable, but of course all participants were NHS Works Staff. Before considering the analysis it is necessary to consider the recording of activities.

If the system is to be of use to you, and that after all is what it is about, it will demand:

Patience to become accustomed to the discipline of recording. You will need to find time at the end of the week to look through the sheets and make your own assessment. You may find it worthwhile to make a further analysis using a different form of diary.

You need to be absolutely honest in both your recording and analysis. After all it would be useless to spend half a day filling in the office pools coupon or writing to your girlfriend and then recording it as talking to your boss.

When you have completed the analysis and know exactly where your time has gone, there must be a willingness and readiness on your part to try different approaches to your method of working.

There are many advantages in recording for a minimum of two weeks, but much depends on your type of work. If you do decide after the first week to take some action on only the glaring examples and then continue to record, I am sure you would notice a difference. You may find it advantageous, having tried these suggestions, to draw up your own programme and own recording sheet.

I am quite sure you will find the exercise worthwhile. We all know the old adage, if you want anything done, find a busy man, but this is true. The reason is simple, anyone who is genuinely busy will have had to organise his time and himself and being properly organised he can tell what the priority is and by some re-arrangement, find time to do that essential extra job.

I am sure many of you will have asked yourselves 'Just how effectively do I manage?' When you ask this you are probably thinking about productivity, distribution of resources and man management. All very important, but these will vary from organisation to organisation and be germaine to your own field, but there are certain factors common to all managers. The art of managing has been defined as deciding what has to be done and then getting it done through other people. The definition I have always preferred was that offered by Mr. Derek Thompson, the RWO of Trent RHA – the beneficial manipulation of consenting adults.

Expanding on these definitions, it really crystallises into:

1) Deciding what has to be done – this involves gathering information

2) Planning and organising how to get it done

3) Executive action, which is the actual doing and is always through people. This in turn includes instructing, motivating

Checklist

A. Improving the organisation of your work

1. Do you know what your main goals are and do these relate to a realistic specification of your own job?

2. If you have not previously carried out an accurate check, say over one month, of exactly how your time is spent, can you be certain of how you spend your time?

3. How much time is available each day for your own work as opposed to time spent working with other members of your Organisation?

4. Is it practical for this time to be spent in one period rather than in small and isolated packages?

5. Is your work planned ahead, daily, weekly, or even monthly and are your priorities clearly identified?

6. Have you considered placing various jobs into subject groups to avoid constant change?

7. Can any of your work be eliminated or simplified without adverse effect and are you spending time on work which can quite satisfactorily be done by a subordinate? Once you have established a procedure, could constantly recurring problems be handled by others?

9. Are you able to get the quantity and quality of information you need to carry out your work effectively?

10. Can you restrict interruptions by setting fixed times when other personnel can see you?

11. Are you able to concentrate on one job at a time?

B. Can improvements in your own performance lead to more effective work by others?

1. Can the methods by which you communicate be made more efficient so that all concerned are immediately aware of what is expected of them?

2. Do you conduct your meetings in such a way as to avoid unnecessary debate?

3. Do you listen attentively when other people, particularly your own staff, are talking?

4. Can your decision making be improved?

5. Are you aware of the length of time during which you are able to fully concentrate on creative work?

6. Can you usually organise your creative work so as not to fall short of or to exceed this period of time?

7. When *you* interrupt other personnel in their work, are you certain it is necessary to do so either at that particular time or indeed at all?

C. Can improvements be made in organisation and working methods so that personnel can make more efficient use of their time?

1. Are the Organisation priorities and goals clearly defined?

2. Are responsibilities defined and understood so that proper delegation can take place?

3. Are senior positions properly designed, realistic and capable of being successfully filled?

4. Do staff understand how their own work is related to that of other personnel and departments?

5. Is adequate training undertaken to equip staff to shoulder more responsibility?

6. How ever much you may dislike the idea, would an O & M exercise improve current working methods?

7. Could improved mechanisation (eg dictating machines) cut down delays?

8. Do various meetings take up a lot of staff time and is it necessary for certain personnel to attend every meeting?

9. Is overstaffing a problem? (Drucker 'The Effective Executive' considers that Organisations are overstaffed if senior personnel spend more than 10% of their time on human relations.)

10. Is there sufficient liaison within and between departments to avoid paper work duplication?

11. Are staff made aware of various internal and external services that can be called upon for help with information and advice? (e.g. HSEs, Data Sheets, Study Group Reports, etc.)

and communicating.

When thinking of management, the first thought is usually of other people, but what about yourself? This again raises the point mentioned earlier. I am sure you all realise that you are unlikely to manage your own unit effectively, whatever it might be, if your self management is weak.

Your resources as an individual manager will vary considerably. You may handle a large budget, expensive equipment and a considerable number of people, whereas managers in a more humble situation such as a small shop, will have a limited budget, little stock and perhaps two or three female staff. None the less, all are managers, all have one thing in common and that is a resource unique to them – their time.

Consider time and its uniqueness:

- It is finite and we have the same time as each other
- It can never be stored
- It can never be replaced – last Monday which was wasted reading the Rugby reports will never return
- It is involved in every facet of the management process.

Efficiency and Effectiveness have already been mentioned. The phrase 'working like a beaver' conjures up the vision of a little man (or woman) burrowing away in an office, rarely lifting his head, always on time. There are many managers like that, keen, energetic, getting the job done quickly and efficiently. The question we need to ask is 'Does the job need to be done at all?' As Mallory said when asked why he wanted to climb Everest – 'Because it is there' – How many of us have done the same job month after month because it was there. Monthly reports for example, that are a continuation of an issued instruction by someone who has retired, which no one bothers to read, or again, regular meetings to analyse progress which over the years have degenerated into chat shows and coffee mornings with no one having the courage to be the first to say 'What are we doing here?' Is it really worthwhile double checking some complex ledger just to ensure some poor wretch does not receive 50p more than he should – procedures which cost an organisation far more than they could ever save. Such things can be most efficiently completed, but are they effective? I would suggest that it is only when you have critically examined your activities and can be sure that what you are doing is necessary, that you can claim to be effective.

In analysing what you do and questioning its need, the fact that tasks fall into two main categories, Active and Reactive, must be considered.

The active tasks are those which are essential for you to achieve the objectives of your role and your job, whereas the reactive are all the bits and pieces which arrive on your desk every morning and have to be dealt with to keep things running. The real danger that faces us all is that the reactive tasks can so easily win and you find yourself spending all your time clearing the day to day jobs with no time to spare for the positive or active tasks. There is a need to be ruthless with yourself as you analyse your activities and ensure you only categorise as active those jobs which help you build up the organisation and achieve its objectives.

When scheduling your work it is essential to differentiate between urgent and important tasks and to appreciate they are not necessarily the same. An urgent task is not always important, it can be trivial – sorting out a minor breakdown or an office personality clash – this should be dealt with right away, do not procrastinate and spend the minimum of time on it. As a rule positive tasks are generally the important tasks. An important task in my book would be something like finishing off the Department Reorganisation Report on time to go to the next Board meeting. If it is Monday and the Board meets on Friday, then that is an important and urgent task. If we are to manage properly we must be both efficient and effective with all that this entails. I would suggest the first step on a long hard road is to manage yourself and there you must start with the efficient use of your time.

We need to question ourselves regularly to check on whether or not we are still on the right lines. It is so easy to slip into a routine that is not the most beneficial to you or your organisation. In Tables 'A', 'B' & 'C' are questions which we should all be asking ourselves regularly if we are to manage efficiently.

We will all have become aware of the Griffiths Report which is really a management review of us all. Its main concern is of course to ensure efficient management. Similarly, the Evans Review of the Works Function is, in reality, another look at the management and efficiency of the Works Function. I have always thought that when such reviews are taking place, how pleasant it would be if you knew your department was efficiently organised and run and that like Caesar's wife, you were 'beyond reproach'. Possibly too optimistic a hope I realise, but surely something worth striving to achieve.

There is nothing really new by way of management theory in this paper. It is based on experiences and advice obtained from articles, management courses and books.

Management effectiveness is the essential feature of any efficient organisation, as I am sure we all realise.

I am indebted to the following for much of the information given in this paper, and would recommend these books, etc. for further study.

References

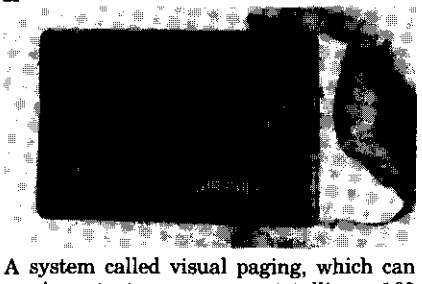
(1) British Institute of Management Booklets: **Time the essence**, Bruce Austin. Check sheets: **The efficient use of time. Are you Delegating?**

(2) Video Arts Production. **The unorganised manager**

(3) Peter Druker, **The effective executive**

Product News

'Pocket telex' service for medical use



A system called visual paging, which can receive text messages totalling 160 characters, and store them for display as needed, was launched earlier this year by Air Call plc for hospitals and medical centres with mobile staff.

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Further details from: Air Call plc, The Friars, High Street South, Dunstable, Beds. Tel: (0582) 603123

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REGIONAL GENERAL MANAGER.

The West Midlands Regional Health Authority is preparing to undertake the identification of its Regional General Manager, who will be principally responsible for four main activities:

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(ii) executing the RHA's decision,
(iii) leading the management team, and
(iv) reporting on progress towards the achievement of objectives.

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Further details will be sent on receipt of a full C.V., or are available on telephone request to The Chairman's office (021-454-4828 – Mrs. Rudge).

West Midlands Regional Health Authority, Arthur Thomson House, 146-150 Hagley Road, Birmingham B16 9PA.

The closing date for the receipt of C.V.s is 9th August 1984.

West Midlands Regional Health Authority

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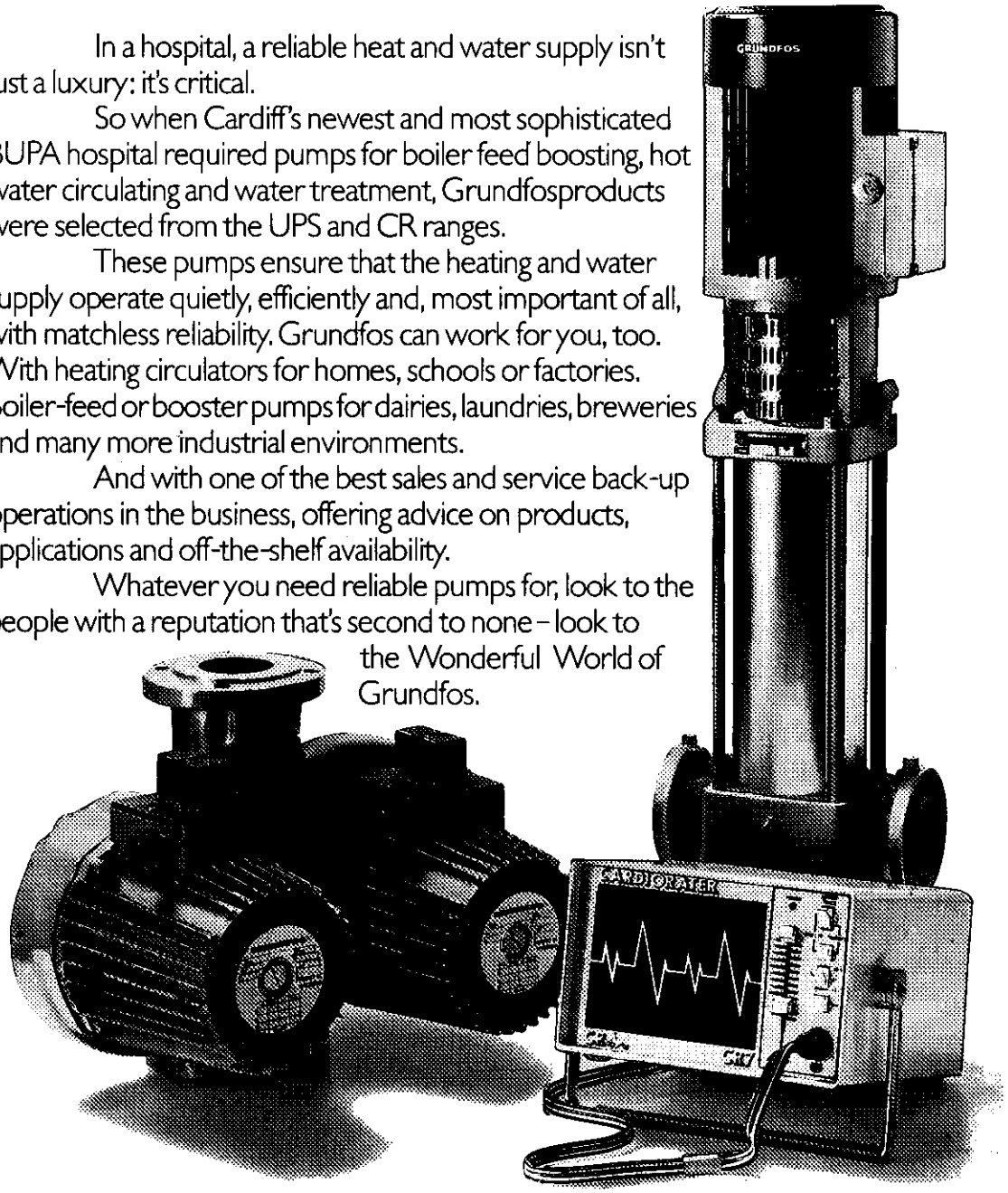

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