HOSPITAL ENGINEERING

November 1977

The Journal of the Institute of Hospital Engineering

Project Management Seminar

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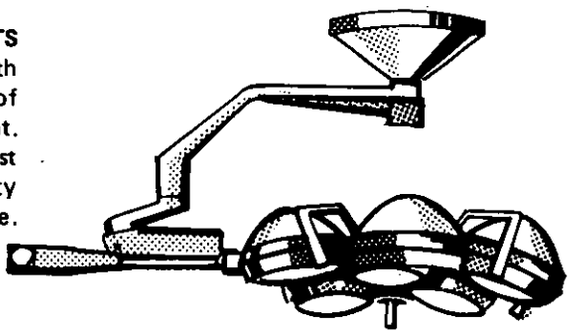

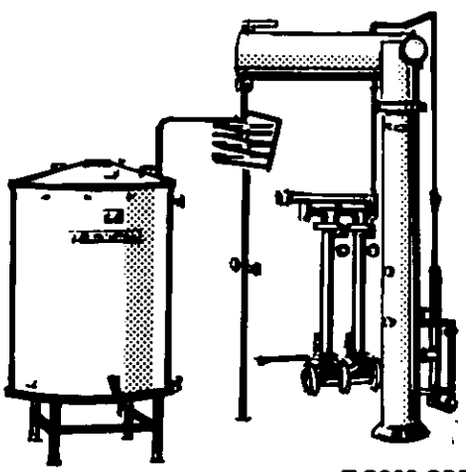

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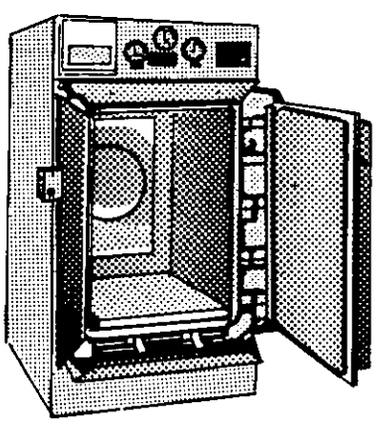

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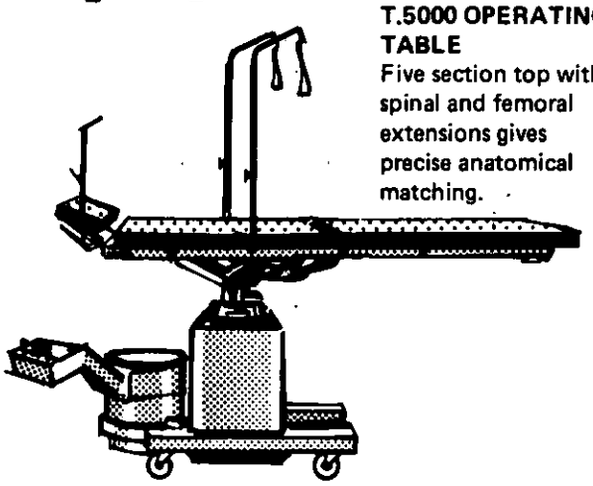

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'Hospital Engineering' is published monthly, except in January and July, by Earlsport Publications

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

Individual copies cost
£1.70 UK postage paid

The annual subscription is UK: £14.50
Overseas: £17.50 Americas: $40

Average circulation per issue
(January-December 1976): 2,228

ABC

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All correspondence relating to the Journal should be addressed to:
'Hospital Engineering',
Earlsport Publications,
17 St. Swithin's Lane,
London EC4, England
Telephone: 01-623 2235

UK ISSN 0309-7498

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HOSPITAL ENGINEERING

November 1977 **Vol. 31 No. 9**

The Journal of the Institute of Hospital Engineering

Contents

Institute News

East Anglian Branch

A Branch Meeting was held on Saturday, September 24, 1977 at St. Mary's Hospital, Bury St. Edmunds. Mr. W. Nicholas, Area Works Officer, Suffolk Area Health Authority, spoke on types of contract used by the building and engineering industry in general and in particular the types of contract commonly used in the Health Service Works organisation. (His talk is reproduced on pages 28-30 of this issue).

A meeting of the Branch Committee took place following the open meeting. Present: Mr. R. G. Kidsley (Chairman), Mr. F. D. Blackburn (Vice-Chairman), Mr. M. Brooke (Hon. Branch Secretary), Mr. R. G. Freestone.

Future Meetings

NOVEMBER — Visit to Lotus Cars, Norwich, on Wednesday, November 2.
JANUARY — Talk by Cass Electronics Ltd. on hospital communications at Fulbourn Hospital on Saturday, January 7, 1978.

Training of Engineering Staff

Concern was expressed at the lack of 'in-house' training of engineers within the East Anglian Region and in particular the lack of study days held since reorganisation of the Health Service in 1974.

Agreed that the Chairman would make a personal appeal to the Regional Works Officer on this matter.

Retirements

J. L. Clegg

J. L. Clegg retires from the post of District Works Officer with the Kirklees Area Health Authority at the end of the year, by which time he will have completed 49 years in the hospital service. A record of which anyone could be proud.

Mr. Clegg has been a member of the Institute since 1948 and has been a most regular and loyal supporter of Institute activities and branch meetings.

The good wishes of us all will accompany him into his most well-earned retirement.

William F. Ward

William F. Ward of Greenock has also retired, after 31 years in the Hospital Service.

Letters to the Editor

Dear Sir,

A Career Structure for Engineers – Impossible?

Following recent discussion on the lack of a national careers structure with the works function of the NHS, you may be interested to hear of recent correspondence received from the Institution of Mechanical Engineers, which appears to make promotion to Area Works Officer/Engineer theoretically impossible.

I am currently studying for a part-time degree in Environmental Engineering in the hope that this qualification will be acceptable to the Institution of Mechanical Engineers for entry to corporate membership. This has been the subject of correspondence between the Polytechnic of the South Bank and the Institution since the introduction of the course two years ago. I recently wrote to the Institution for clarification of this and also their minimum requirements in terms of posts of professional responsibility, within the Works Structure of the NHS. Whilst they were unable at this stage to clarify the academic aspect, they stated that they would normally expect prospective corporate members to have posts such as Area Works Officer / Engineer. District Works Officer/Engineers are in their view considered to be posts of a 'Technician' rather than 'Professional' level, and as such would not normally be acceptable.

Since these Area posts require corporate membership as a prerequisite for consideration, then the existing system becomes a nonsense.

Yours faithfully,

B. ANDERSON, M.I.Hosp.E.
Leytonstone House Hospital,
London, E.11

Dear Sir,

South West Thames Regional Health Authority Computer Centre

I was interested to read in your September issue (pages 4-5) the notes prepared by Messrs. Andrews Sherlock and Partners, referring to the background and sequence of work to tender stage on the above project.

It is regretted that probably due to an oversight no mention was made of the Consultant Engineers involved in the project, nor the sound consultants who were appointed for the specialist work on noise.

To give a little of the history, the South West Thames Regional Health Authority, Engineering Division, under the professional guidance of Mr. K. J. Eatwell, had undertaken work in depth on the problems of noise. Commencing with operating theatres and later in the construction of diesel generator housings, the problems had been faced and the parameters set which had proved effective in practice. It had also been realised that some projects justified the appointment of specialist sound consultants at an early stage in the design, rather than waiting until the problems arose during construction and commissioning. One of the major projects to which this principle was applied was Guildford District General Hospital.

When the Regional Computer Centre project was commenced, it was realised that there would be problems (a) within the hospital curtilage and (b) in the accommodation which was being constructed by Chelsea College on adjacent land. A decision was therefore made to employ the same Sound Consultants that had been used on the Guildford District General Hospital project, namely Sound Research Laboratories Ltd. This organisation worked with the Consultant Engineers, Messrs. Austin Associates and with the Consultant Architects, with a view to ensuring that the sound levels laid down both within the building and externally were met.

I am sure that the Consultant Architect will agree that the above gives a little more insight into the history of the project.

Yours faithfully,

J. WEST
CEng, FIEE, FCIBS, FIHospE
Sutton Coldfield,
West Midlands

New Members

Applications for membership have resulted in the following elections:

FELLOWS

ANDERSON, G. D., Hulley and Kirkwood.
AUSTIN, W. R., D. R. Chick and Partners.
BAREHAM, B. P., Hoare, Lea and Partners.
BEATON, J. P., Norfolk AHA.
CRANAGE, J. B., Cranage and Perkins.
DAVIES, A., Powys Health Authority.
FERGUSON, P. H., Ferguson and Partners.
GAULT, C. B., Dumfries and Galloway Health Authority.
GORMLEY, W., Scottish Health Service Common Services Agency.
HASLAM, E., Donald Rudd and Partners.
HATELEY, E. A., North Western RHA.
HIGGINS, W., Wallace, Whittle and Partners.
LAUDER, M. L., SE Thames RHA.
MATTHEWS, I. J., N. E. Hooloway and Partners.
PAPWORTH, J. C., SE Thames RHA.
RICHENS, A. J., Ferguson and Partners.
SMITH, E., Hulley and Kirkwood.
WALKER, J. A., Wallace, Whittle and Partners.
WATTS, K. R., Lambeth, Southwark and Lewisham AHA (T).

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ADEBANJO, A. A., Lagos University Teaching Hospital.
BACK, M. J., South Glamorgan Health Authority (T).
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BOOKER, G., Barnsley AHA.
CALLAN, G., Lancashire AHA.
CHEESEMAN, R. W. B., Croydon AHA.
COLLINS, B. E., Avon AHA (T).
DARKES, S. J., West Midlands RHA.
DAVIES, B. L., Davies Bros (Denton) Ltd.
DAVIES, S., Davies Bros (Denton) Ltd.
DAWSON, R. P., H. L. Dawson and Partners.
DICKSON, W. E., Northumberland AHA.
DOWNING, G. L., Northampton AHA.
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ELLAM, M. H., Kirklees AHA.
EVANS, J. R., Dale and Ewbank.
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FARMER, D. G., Mid Glamorgan Health Authority.
FEASEY, E. W., Hampshire AHA (T).
FRASER-WILLIAMS, W., Camden and Islington AHA (T).
GALLACHER, T. C., Department of Health, Dublin.
GLENNISTER, K., Ealing, Hammersmith and Hounslow AHA (T).
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HESLOP, N. L., Northumberland AHA.
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HOOD, G. W., Cleveland AHA.
INGALL, R. W., Surrey AHA.
JOHNSON, T., Oxford RHA.
JOHNSTON, F. E., Oxfordshire AHA (T).
JONES, C. J., Cheshire AHA.
KING, D., Cheshire AHA.
KINGSTON, L., South West Thames RHA.
LANE, S. R., Birmingham AHA (T).
LIDDY, T. P., Mid-Western Health Board, Limerick.
MACKAY, D., Hulley and Kirkwood.
MALPASS, K. E., Durham AHA.
MATTHEWS, A., Leeds AHA (T).
McEWAN, B. R., Staffordshire AHA.
McLAY, W. F. K., Hulley and Kirkwood.
MURPHY, M. A., Mid-Western Health Board, Limerick.
MURPHY, M. M., Buckinghamshire AHA.
OLKO, P. F., Nottingham AHA (T).
OSAWE, F. O. A., University of Benin Teaching Hospital.
PICK, F. A., The City and East London AHA (T).
RAFTERY, W. F., Western Health Board, Galway.
REID, J. E., Hoare, Lea and Partners.
RICKETT, P. J., Surrey AHA.
ROBERTS, C., Devon AHA.
ROBSON, W. A., Camden and Islington AHA (T).
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SMITH, B. A., Kent AHA.
SMITH, G. D., South Tyneside AHA.
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WIN, K., Rangoon General Hospital.
WRATTEN, S. D., Kent AHA.
WREATHALL, A. F., Leicestershire AHA (T).
YEW, P. B., Camden and Islington AHA (T).

GRADUATES

CHAI, T. Y. J., Leeng Consulting Engineers.
DALLMAN, P. H., Kensington and Chelsea and Westminster AHA (T).
HEWITT, R. M., Kensington and Chelsea and Westminster AHA (T).
PARRY, R. W., Cheshire AHA.
SMALL, S. D., Cleveland AHA.
TOMLINSON, P., Kensington and Chelsea and Westminster AHA (T).

STUDENT

SHATTOCK, C. S., South Glamorgan Health Authority.

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ADIO, R. O., Lagos University Teaching Hospital.
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LADVA, N. J., Refrigeration and Allied Equipment Ltd.
MORGAN, T. P., Varming, Mulcahy Reilly Associates.
REYNOLDS, C., Bradshaw, Gass and Hope.
SAUNDERS, B. D. T., R. W. Gregory and Partners.
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Seminar Papers

This is the first paper given at the Institute's successful symposium on Major Hospital Building — Project Management, held at the Institution of Mechanical Engineers on October 19.

Mr. Paget is an Assistant Secretary in the Health Building Division of DHSS.

Why Consider the need for Better Management of Health Building Projects

W. D. PAGET

As a starting point I take it as axiomatic that any organisation starting on a new building project would wish that partcular venture to be managed as ably as possible. To do otherwise is to contemplate the inefficient use of resources, the waste of money and of effort. I think we can take it that the National Health Service is like any other organisation in its desire to carry forward a building project without waste of scarce resources. So if I am to argue that there is a need for better management of health building projects I am required to produce evidence that this kind if ideal has not invariably been achieved. This I propose to do in the first part of what I say today, and this will inevitably bring me to the question of Public Accountability, on which I propose to say something in the latter section, in the course of which I hope to make clear the meaning that I put to that particular term in the present context.

I think I can say without fear of contradiction that there is a fair amount of public evidence of past weaknesses in the management of major health building projects (and 'major' here essentially means hospitals). To some extent this is the understandable consequence of history. In the years immediately before the 1939-45 war the amount of hospital building in this country was limited. Voluntary support for hospital building was failing, and the amount of local authority expenditure on hospital building, under powers that had become available in 1931, was limited by competition from other forms of expenditure that had to be met from local rates. Indeed one can say that it was failings of this kind that led Lord Beveridge to recommend towards the end of the 1939-45 war the setting up of a National Health Service.

But at the outset of the National Health Service there was little current experience of the management of hospital building projects. A diminshing amount of hospital building had been carried out immediately prior to the war. War-time building was limited to emergency hospitals built on simple standard lines not dissimilar from those used for barracks, other kinds of military establishment and Government offices. Immediately after the war this country had to restrict the amount of capital that could be spent on health building and, indeed, on many other forms of public capital development. It was not until the middle of the 1950s that we saw anything in the nature of substantial hospital building projects being planned. So we had lost a quarter of a century's experience of how to manage hospital building projects.

However, having made these excuses it now seems fairly clear that in the following twenty years those responsible for health building have not been as quick as they — or do I say 'we' — might have been in grasping the new problem of how to manage major health building projects as complex as those of a modern hospital. This brings me to the point where I need to cite some of the evidence dating twenty years after the middle 1950s.

The first evidence I wish to quote is that appearing in the Reports of the Parliamentary Public Accounts Committee. I indicated in my opening words that I would be dealing later with what I meant by Public Accountability, and it is then that I shall say something about the Public Accounts Committee. For the moment let me simply summarise a number of criticisms uttered by that Committee in reports published over the last few years.

In their Fourth Report of Session 1972-73 the Committee set down the vicissitudes, both in concept and in realisation, that beset the development of a new hospital at Boston in the period between the serious re-start of planning in 1956, and the building of Phase 2 which was still under construction when the Committee reported. There was a long-drawn history of changes of mind, changes of plan, and problems of funding, that led the Department to acknowledge to the Committee that the project provided lessons on the importance of the logical sequence of planning, the consideration of capital and running costs from the earliest stages, the cost implications of design decisions and of the site, and the relationships between phases and the whole project to ensure that each phase was compatible with the total development.

The Committee's report was not highly critical. The Committee clearly accepted the Department's line that this was an early example of how not to do it, and that from this and other examples of the same period the Department had gained the necessary experience to develop the Capricode Procedures first introduced in 1967.

In the Third Report of Session 1974 the Committee described the system of pre-contract cost control used in the National Health Service. It went on to report on its examination of three particular examples which revealed weaknesses in that system, as evidenced by significant increases in cost between design and tender. In its conclusions the Committee, while noting the difficulties created by inflation, was critical of

defects in pre-contract control that it did not attribute to inflation. It thought that planning had been allowed to run too far ahead of likely starting dates and that there had been reluctance to freeze design sufficiently early. The Committee called for tight discipline in the exercise of cost control to avoid expensive and time-consuming reduction exercises.

In the Third Report of Session 1974-75 the Committee looked further into the cost control of new hospital construction and went on to comment on weaknesses in post-contract control of six hospital schemes it had examined. All these schemes had shown marked increases in cost, additional to those attributable to wage and price increases, and the Department had been compelled to admit that failures to prepare adequately before contracts had been let was the common feature of these projects. The Committee noted that this, too, was a feature of projects examined by previous Committees. The Committee's disquiet was made very evident; they recorded that this was the third successive year in which Committees of Public Accounts had thought it necessary to report on defects in control of a hospital building and they thought the situation most unsatisfactory.

It might be as well at this point if I made it clear that some of the criticisms were directly aimed at the Department for its own failures in project management, since two of the six schemes that featured in the 1974-75 Report were the so-called 'Best Buy' projects for which, exceptionally, general management was provided by a Departmental Project Team instead of by the Hospital Boards.

Apart from the Public Account Committee's examination, the Department itself had been examining the performance of the National Health Service in post-contract cost control, and in 1971 and 1972 had carried out, with the help of outside management consultants, a study of time and cost overruns. This study, and other investigations, revealed a state of confusion and apparent deficiency in the then Boards' post-contract control of schemes. The Department felt that the result of these investigations presented a disturbing picture nationally. Indeed, the Department's view was such that it had no hesitation in saying this openly in a Circular Letter addressed to all Health Authorities in June 1975.

However, it would be wrong of me to present an unbalanced picture. Despite the criticisms I have quoted, the performance of Health Authorities has not compared too badly with the performance of other organisations in the public sector. The Wood Report, that is to say the report published by NEDO in 1975 on the Public Client and the Construction Industries, made comparisons between the performance of ten kinds of public projects. In this comparison it was found that Hospital Board projects were subject to fewer alterations than other projects (except universities), were more tightly controlled, and that they were no worse than average in matching final accounts to accepted tenders.

It would also be wrong of me to finish the first section on the evidence of need for better management without making it clear that the schemes that have appeared in the criticisms of the Public Accounts Committee are all schemes that were in planning some years ago, and that both the Department and the National Health Service have learned from those mistakes. Procedures introduced since the 1974-75 Report ensure a current awareness of the need to get planning and design advanced as far as possible before tenders are invited. All Health Authorities now carry out a formal review at quarterly intervals of progress of major building contracts, that is to say, those costing over £2m. However, there is as yet no public evidence, in the same sense as the evidence of the Public Accounts Committee's Reports, that we in the Department and the National Health Service have mended our ways. We still stand subject to criticism, and the Committee's very recent reference to the problems of Liverpool Teaching Hospital have done nothing to encourage the public to feel that everything is well under control.

Public Accountability

This brings me to the second section of what I want to say on the subject of Public Accountability. Public Accountability has a number of meanings. The sense in which I now use the words is that of the particular form of accountability that applies to those whose funds are provided by Parliamentary Votes. This means I need to say something about constitutional history, in particular the relationship between Parliament and the Executive Government in the control of voted monies. This goes back, as does much of our present constitutional practice, to the 17th century fights between Parliament and the Stuarts, and indeed further than that. There are a number of phrases that we still use that go back to the roots of our form of Parliamentary democracy. One of these is 'no taxation without representation'. While it is no part of my argument today to get into the question of taxation, it is relevant to remember that Members of Parliament are in effect the tax-payers' representatives who want to know what the Crown had done with the tax-payers' money.

Lest it be thought that I am stretching a point in our contemporary scene by talking about the battles between Parliament and the Crown, it may be helpful if I illustrate the constitutional position by quoting from the current edition of Erskine May, which is the bible on Parliamentary practice. I quote from p.695 of the 19th Edition (1976) thus:

> "The Sovereign, being the executive power, is charged with the management of all the revenue of the State, and with all payments for public service. The Crown, therefore, acting with the advice of its responsible Ministers, makes known to the Commons the pecuniary necessities of the Government; the Commons, in return, grants such aids or supplies as are required to satisfy these demands: and they provide by taxes, and by the appropriation of other sources of the public income, the ways and means to meet the supplies which they have granted. Thus the Crown demands money, the Commons grant it, and the Lords assent to the grant."

It is also to be noted that Parliament has long been concerned with seeing that the Crown has devoted money to the purposes for which Parliament granted it. This goes back well before the Stuarts, although the clauses appropriating grants to particular uses were first introduced into Bills of Supply shortly after the Restoration. They became the invariable practice after the Revolution of 1688.

Within the next century, that is by 1780, Parliament had appointed Commissioners of Public Accounts in order to secure adequate accounts of Parliamentary grants, so that Parliament could see that money granted to the Government had been spent on the purposes for which it had been granted. A number of Parliamentary Committees looked into this topic on a

number of occasions between 1780 and 1857 and this led to the setting up shortly thereafter, on a regular basis, of the Committee of Public Accounts. In 1866, Parliament passed the Exchequer and Audit Departments Act which established the Comptroller and Auditor General as an independent Officer of State responsible for examining and reporting to Parliament on the Accounts of Parliamentary Votes — the Appropriation Accounts as they are called.

For every Parliamentary Vote someone has to be accountable to Parliament. That someone is the Accounting Officer for the Vote, an appointment that derives from the Exchequer and Audit Departments Act. The Accounting Officer is usually the Permanent Secretary of the Government Department for which the money has been voted. It is his responsibility to sign the Appropriation Account of the Vote or Votes for which he is responsible and to submit those accounts to the Comptroller and Auditor General. He is also subject to examination by the Public Accounts Committee on the accounts he has signed. It is not a responsibility to be taken lightly for it is one that cannot be delegated and an Accounting Officer bears a personal pecuniary responsibility for the Votes for which he is appointed.

The examination of an Accounting Officer by the Public Accounts Committee is usually based on the reports that the Comptroller and Auditor General has presented to Parliament on the relevent Appropriation Account. The Public Accounts Committee is assisted by the Comptroller and Auditor General and by Treasury officials — the Treasury Officers of Accounts — in carrying out that examination. While the Public Accounts Committee, as first set up, was concerned with what one might call 'stewardship', over the years the concern has increasingly turned to wider aspects of financial administration and of getting value for money. It is this concern that is demonstrated in the criticisms to which I have already referred and it is this concern that has to be met.

But let me make it clear that I am not saying that the management of health building projects needs to be improved simply in order to spare the Permanent Secretary of the Department of Health and Social Security, in his capacity as Accounting Officer for National Health Service Votes, from difficult questioning by the Public Accounts Committee. My purpose in setting out briefly the constitutional position has been to demonstrate the principle involved. This is that the elected representatives of the people have granted money to the Crown for the purposes of the National Health Service. Those representatives want to be satisfied on behalf of those they represent — the tax-payers — that the Department and the National Health Service have done all that can be done to ensure that none of the tax-payers' money granted for those purposes is wasted. The evidence of recent years, as seen by the tax payers' representatives, gives no comfort to the tax-payer in relation to the management of health building projects.

So, in conclusion, may I summarise the points I have been trying to make, in the following way. The National Health Service needs, in its own interest, to ensure that there is no waste of the limited resources available for capital development. There is comparatively recent evidence that the overall management of a number of large projects has not achieved this end. There may have been past reasons for such a state of affairs; there is now every reason for looking to see whether the management of projects can be improved so that the risk of waste of time, money and effort can be eliminated. Added to that there is the special responsibility laid upon those of us who spend the tax-payers' money on building projects, namely that we need to be able to demonstrate to the tax-payers' representatives that the tax-payers have no cause to complain. At that point I leave it to the speakers that follow to suggest what can be done to remove any cause for complaint.

Mr. Graves was Project Controller for the National Exhibition Centre, as he describes here, in the second paper given to the Project Management Symposium. Mr. Graves is senior partner in Francis C. Graves and Partners.

Managing the National Exhibition Centre compared with Health Building Projects

FRANCIS C GRAVES FRICS FIQS FRSH

Major Hospital Building – Project Management

In order to endeavour to assist the debate which I hope this symposium will generate I have been asked to talk about the experience I obtained between the end of 1971 and the beginning of 1976, when I was appointed and acted as the Project Controller for the total National Exhibition Centre in Birmingham. Before getting into this in some detail, I think I must emphasise a point which other speakers are also making strongly.

The point is that, whatever scheme is finally developed in the Health Service, it will never, and I repeat never, work unless the person ultimately appointed to undertake the task is given general and genuine authority to go along with the responsibility which he is obviously taking upon his shoulders. That statement as you all know is the number one principle in any text book on management, and obviously the Health Service can be no exception to that basic principle.

What I am hoping to do is to recall the work which I did on the National Exhibition Centre, highlighting the terms of reference for the job, together with the pre- and post-contract activities in some little detail, and then to follow on with some com-

parisons between how I think project management should work and how clearly it is not working in the Health Service at the moment. In relating the comparisons I will be quoting experiences gained by my practice in having the privilege of working on both major and minor schemes for five different health authorities in England, and therefore will, I think, show the various comparisons as I see them.

Firstly, however, let us deal with the management of a construction project, namely the National Exhibition Centre. I will, by way of introduction, say that towards the end of 1972, when I had been operating as the Project Controller on the NEC for approximately 12 months, I was invited to present a paper to a Chartered Surveyors' Ordinary General Meeting at the RICS headquarters in Great George Street on the subject of *'The Chartered Surveyor or a Quantity Surveyor as a Project Controller'*.

In the paper, I spelt out what action I had taken to that date, and outlined what action I proposed to take in order to achieve the task which had been entrusted to me, in order to endeavour to ensure completion of the NEC project by the end of 1975 for a planned first exhibition at the beginning of 1976.

Also I recall saying at that time that in most cases lecturers at the headquarters of a learned body, like my institution, are experts on their subjects, but on that evening I trusted that the audience would forgive me because I was an exception to the rule. Today, I feel very little different, as principally I am a Chartered Quantity Surveyor who endeavoured to mould together a client with a small part of a fragmented construction industry of designers, surveyors, engineers, contractors, sub-contractors, suppliers and operatives, and to get them to pull together as one unified team for the benefit of the customer client, who as always was the same body to all the various constituent parts.

Finally, as introduction, I said in that paper at Great George Street that one day I would complete the final chapters of the story and see if the plans spelt out during that lecture *in 1972, worked out in practice.* I shall try to talk in general terms about the subject but I hope you will forgive me, if I refer to the NEC on which, for several years, I tried to put my theory into practice, and as a result learnt a lot of problems which can occur on a scheme of this magnitude and complexity. I shall refer several times later to team spirit and teamwork, but beyond all doubt my lasting impression and thanks are due to every one of over 2,000 women and men from the client, architect partners, construction directors and agents right through to the newest teaboy, who worked to make certain that something in the order of £50 million of construction work was completed on time and at the right cost — that is £50 million of public money — designed, tendered for and spent in under four years.

I always knew, but it has been convincingly confirmed to me, that no man can ever hope to be a leader unless he has the 110% backing of his colleagues and fellow men.

Terms of reference for the job

Quoting from the letter of appointment, my terms of reference were:

1. To ensure the programme of development is controlled in order to secure: (a) the earliest practical completion of the project and hence produce a return on investment; and (b) the most economical use of professional services;
2. To convene and chair all meetings of the Design Team, which are to be held at reasonably frequent intervals, and to be the sole contact between the Board and the Design Team in both directions;
3. To liaise and work in close collaboration with the commercial and marketing controllers (in hospital terms they might be the surgeons and the administrators);
4. To ascertain possible differences of viewpoint between the various technical members of the Design Team and to obtain solutions;
5. To initiate and formulate overall technical policies and receive instructions direct from the Chairman and the Board;
6. To give both written and verbal reports to the Directors for Board Meetings and to be available for cross-examination (with the Architects for NEC) if necessary at such meetings;
7. To examine the project technically *in the course of preparation to ensure* that the Company is obtaining value for money;
8. On issues of major importance to supervise dealings of a technical nature on behalf of the Company;
9. To watch the progress of contracts and to anticipate any delays which may occur.

I think that it can be agreed that these terms of reference are very straightforward and in general terms set two tasks — get it finished on time and get value for money. It is interesting to note that I was entitled 'Project Controller' and not 'Project Manager' or 'Project Co-ordinator'. This was significant because my task was initially only involved in controlling the building of the complex on a site acquired by the local authority and for others to manage, sell space in and hire out in due course. Also, I feel the title 'Controller' signifies and grants greater authority and power than the title 'Manager'. It is clear in a task of this nature that one cannot hope to succeed if one is given such responsibility without the full authority and power to act as one sees fit in emergency and in critical situations with full trust all round. Regrettably of late there has been a lot of unfortunate disagreement, and hence distrust, amongst the various professions as to who should do the task, whether the task is needed at all, how it is defined, what are its responsibilities and so forth. Perhaps during the discussion today we may all learn, and the regrettable disagreements even amongst the various divisions of my own institution will cease; because as I shall endeavour to describe later, it does not really matter who controls or manages as long as somebody brings together all aspects of a construction project. At this stage perhaps we must ask ourselves why a Project Controller was needed at all. On NEC it was reasonably obvious as the circumstances warranted it. Firstly, there was, and still is, a part-time Board of Directors, and hence no official officer or works engineer to make decisions for the client body. Secondly, there was a large site of over 300 acres (approximately the size of Hyde Park) on which was to be built a large complex of exhibition buildings by organisation A, a railway station by organisation B, a hotel by organisation C, a motel and petrol filling station by organisation D, warehousing and offices by organisations E and F and so on. *Thirdly, on the Exhibition Centre* complex alone there were three architectural organisations, two consulting engineers, two QS firms and several other consultants covering letting, catering, graphics, etc.

Therefore, at the inspiration of the client, a Project Controller was appointed and at this point I would say most sincerely that I do not think for one minute, and in fact no one should think, that a QS is of necessity the only person, nor in fact, necessarily the right person to be a Project Controller because many of the other technical professions could and do the job equally as well. I do, however, feel that a QS with his background of financial training qualifies pretty well for such an appointment, particularly during the pre-contract stages, because most QS's have their feet well planted on the deck — in other words — they are not clouded with æsthetics, colours, bending moments, heat loads, traffic loads, etc, but purely orientated towards seeing that value for money is obtained.

Pre-contract activities

From early in 1971, when many members of the Design Team had been appointed, there had been several schemes proposed, a public enquiry held and outline permissions obtained, but the principal tasks when I was appointed Project Controller at the end of 1971 were (1) to formulate and finalise a brief for the Design Team (this wasn't easy because the last exhibition centre built in Britain was the great Exhibition of 1851 and there weren't too many around who remembered that!); (2) obtain detailed planning permission by April 1972; (3) commence building operations by the beginning of 1973; (4) complete building operations by the end of 1975; and (5) open the first exhibition at the beginning of February 1976.

Design Team Meetings, under my Chairmanship, were set up on a regular fortnightly basis, and occasionally at more frequent intervals when a lot of decisions had to be made. It is important to stress that a Project Controller must fully accept the client's brief and alterations to a certain point in time, must not squash the design flair of the Architect, must not control too strongly the ideas and developments of the structural, mechanical and electrical engineers, and must use correctly the financial advice of one's Quantity Surveyors in the team. In other words, one must be the co-ordinator of ideas, and select as the client's representative the very best one can, at the right price, in order that the finished product is both functionally correct and correctly orientated as far as capital investment and maintenance are concerned.

I think that a Project Controller was needed on the NEC for the several reasons I spelt out earlier, but I also think there will be many other opportunities of such an appointment on other major projects like hospitals because in order to get the best balance on any product, whether it be a piece of machinery such as an aircraft or a motor car, or whether it is a building, it is perhaps not right for a designer to be given a free hand, otherwise a product may be produced which will not be economically right. Likewise nor is it right for the economics man, ie the pure QS to be in charge, otherwise the product produced may be too cheap and may not be functionally or æsthetically satisfactory. Again it would not work if a non-technical administrator were put in charge because, with the greatest respect to administrators or medical men, they would not be qualified to know about or make decisions on the complex building process.

In short, what I am endeavouring to say is that in the future as far as the building of hospitals are concorned there must be scope for an unbiased technically orientated, I repeat technically orientated, Chairman of a Design Team who will endeavour to keep a balance between client user, Architect, Engineer and Quantity Surveyor in order to make sure the dominance of one person or discipline does not overshadow the others. As stated earlier, a Project Controller does not have to be a QS but in my opinion he has to be a technical professional with authority because there has got to be only one captain on the bridge of a ship and he must not be biased towards design or functional use or cost. On several occasions I have likened the task of a Project Controller in the pre-tender stage to that of captaining a football team — at times you have to bully them, at other times give encouragement and coax them along, and at all times you have got to be firm but fair. As is all too often known in any Design Team, communication between the various members is probably the most difficult problem, and it is in this respect that I refer to football and to kicking the same ball. There is always a danger of two of your players designing a section of their own and dribbling the ball in the wrong direction, so all the time one has to keep at the front of one's mind the goal at which the whole team is aiming with æsthetics, design, functional use and cost to the fore, in order that at the end of the game one has produced the scheme the client wants and can afford in capital investment terms.

Here, I might add that when asked to undertake the NEC the Chairman said that "We are appointing you — not your firm". At the time this seemed strange because normally when one received a QS commission it was, and still is, normal for delegation to take place. With hindsight my Chairman was absolutely right because when one is being tough it's better to be at least of equal rank. By that I mean to tell a senior partner what to do is always taken better if one is at least a senior partner or a Chief Officer, with authority. I shall refer to this point again when comparing situations in the Health Service.

Basically, the only management tool used during the pre-tender stage was a critical path network which enabled the Project Controller to anticipate possible delays, to apply appropriate pressure and to settle differences of opinion in order that delays did not occur.

Post-contract activities

At the end of 1972, I recall saying at Great George Street, that after tenders were received later that month, I envisaged the Project Controller's function changing and becoming somewhat easier. Now with hindsight I was 50% correct, in that it changed but it certainly did not become any easier — in fact it became harder and more time-consuming.

For years I have been conscious that there has been a proverbial valley on any project between the designers and their professional allies on one hillside, and the contractor with his sub-contractor and supplier allies on the other hillside. Historically, one has seen each side in effect send representatives of each warring camp into the valley with swords drawn, and there they fight a bloody skirmish before withdrawing to their respective camps. The result after each battle is a temporary ceasefire but the outcome is delay (extension of time) and distrust (claims). Regrettably, the result of these feuds and battles is that the overall project is delayed, the team does not win the war and the ultimate casualty *in all*

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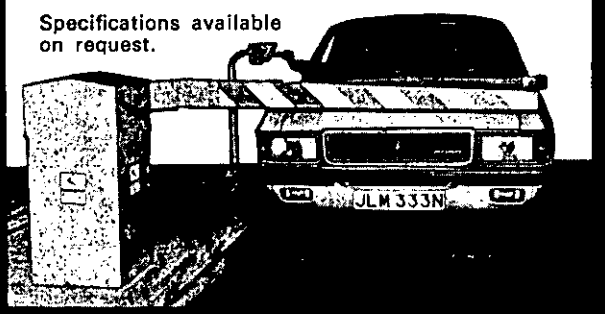

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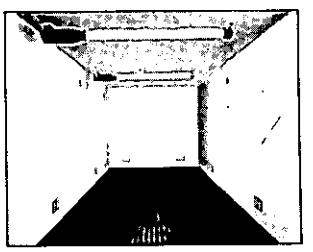

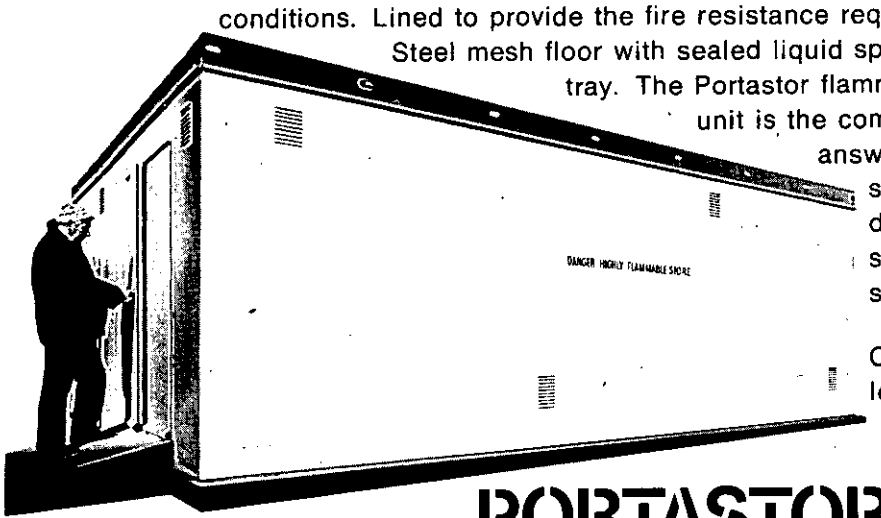

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terms is the poor customer/client who has his buildings handed over late and inevitably at a large extra cost. On this scheme I was determined to place a bridge over this proverbial valley and go from camp to camp to see that no armed troops entered the valley, and that delays on either side or in either camp did not materialise. In other words, I tried to properly interpret part nine of my terms of reference, ie:

"To watch the progress of contracts, to anticipate any delays which may occur and to ensure that the Company is obtaining value for money".

To achieve this aim, I appointed with the Board's approval, first one then two assistant Project Controllers to enforce the disciplines and goodwill upon both the Design Team and the Contractor. The task of the three of us was obviously to liaise with other operations within the site area because as I said earlier one foresaw several different contractors on the site being employed by different clients all being supervised by different design teams. Certainly, this became true because at the same time as the building of the Exhibition Centre complex, there was also built a multi-million £ hotel and conference centre and a new five-platform main-line railway station. In effect both these other schemes had Project Controllers in the form of a hotel owner in the first place, and a British Rail Project Controller on the station. Full liaison all over the site was therefore established with the same aim of completion.

As far as the Exhibition Centre contract, which was my principal responsibility, was concerned, I insisted that one of my assistants or myself sat in on every meeting on site between whatever party, and I had the contractor supply me with a full network analysis to compare with my own so that the Project Controller could anticipate any problem areas and delays that might occur. In the early days when the job started on site I assisted in the preparation of an Industrial Relations Site Agreement prepared between the Main Contractor and the three major Trade Unions. This idea was recommended in several publications and Government reports on major construction schemes which had got into problems. All other contractors and hundreds of sub-contractors, as well as all operatives entering onto the site were obliged to conform to the terms of this agreement. Concurrently with this I also set up a system for the Design Team to operate, in which no variation in the design and cost over a certain value was to be given without my authority or that of one of my assistants (note — my authority, not that of a committee) and any divergence from this instruction would result in the unauthorised cost being laid at the door of the guilty party. Throughout the whole construction period I still continued to hold Design Team meetings, normally on a monthly basis, but instantaneously if vital to the project, principally to monitor progress and to foster liaison and communication with all parties on the site. In dealing with the Contract in this way, and not being a party to the Contract, the Project Controller was in a position to involve himself with the Contractors and Sub-contractors to such an extent that full and complete trust was built up on both sides of the proverbial valley referred to earlier. For example, the Contractor as well as the designers, confided in me over many problems on delivery of materials, failure of performance of sub-contractors, shortage of labour, design snags and a multitude of other problems. As a basic philosophy I never allowed anyone to develop a 'them' and 'us' complex which ends up often by a person quoting 'it's your problem'. I always took the view that any problem was a problem to us all and all of us had to solve it.

On many occasions as Project Controller I personally sorted out problems of labour shortage and material delivery problems, and at all times encouraged all to treat this job as top priority. Two examples which come to mind are firstly when one of the major sub-contractors could not get skilled labour, I personally found his requirements and temporarily recruited, on his behalf, over fifty tradesmen for a short period which enabled him by overtime to get back on programme. Another occasion I personally went to Stockholm, to see the Managing Director of a supplier to bring delivery of some products forward by three months.

The last few examples show, I think, a mental attitude unusual in construction contracts because normally I suggest the attitude is for all parties to a construction contract to look after their own interest rather than all endeavouring to sort out everyone's problems. In the respect of teamwork I also recall visiting the site on many occasions in the middle of the night when night shifts were working on a critical element of the job, which was necessary to be completed in order that the overall programme did not suffer. However unorthodox this post-contract approach was seen to be by possible purists all that can be said is that the tug-of-war team pulled the rope in the same direction, which I believe should always happen, and the enthusiasm and pride which everyone on the site displayed needed to be seen to be believed.

As a rider to this paper, I suggest the articles that Derek Goode and I wrote in the May 1976 *'Chartered Surveyor'* Journal are read which show the team's achievements right up until the complex was opened by HM The Queen on Monday, February 2, 1976 — the second day of the first exhibition, which was the target set back at the end of 1971.

That then is basically the story of the National Exhibition Centre contract and I think from that story there are facts to be compared with the present set up of the Health Service. From now on I hope that what I say will not cause any ill feeling or offence if I appear to be critical of certain aspects of the present system of building hospitals, because all I am endeavouring to do is to assist in finding a solution.

In 1974, when the position of Regional Works Officer was established I cheered, because at last I thought here we have the making of Project Controllers to break down the historic, defensive and often unco-operative barriers between Regional Architects and their consultants, Regional Engineers and their allies, and Regional Quantity Surveyors and their chaps. Also I thought the RWO would be able to stop the client, ie the medical and nursing side changing their minds. In theory and in fact this should have happened but in my view it hasn't worked properly because regrettably the RWO has been given the responsibility but not the full authority to make it work. For example on any major hospital scheme, and I could name many, there is no one person as I see it who has the authority to make a final decision. Every decision seems to have to be made by a Committee and as we all know no committee ever make a real and final decision. Correction. There is one. That is a Committee of two with one member sending an apology.

Too often most of the poor RWO's life is spent in his Committee of Management of five — in effect four representing the client or user, ie the administrator, the treasurer, the medical officer and the nursing officer, plus the RWO who is trying ultimately to build the hospital if the other four would let him. Below this, and at the same time, the RWO has the Regional Architect, Regional Engineer and Regional Quantity Surveyor to design and build the job. Here again it goes wrong I am afraid because each discipline, whilst playing lip service to teamwork, really stays in watertight compartments with each discipline at staff or consultant level being responsible to and hence loyal to its superior.

On the NEC these barriers were broken down because a full team under ONE captain did the job not under THREE vice-captains. I remember on the NEC saying at the beginning because there happened to be 15 of us round the table that it reminded me of a rugby team and we were all going to pull together. As far as I was concerned, we were a team and to that team we would be loyal and faithful. Whether an Architect came from office A or engineer from office B or QS from office C, did not matter as at that moment of time they were all playing for me. Likewise, if they did not play as well as I considered they should, then I would have no hesitation in going back to their respective bosses and asking for a substitute player of that discipline.

I believe in the Health Service teams have to be set up on that theory, with the RWO or his nominee having full responsibility and authority to discipline the management of five, control properly the various disciplines within his team, and get everyone pulling the towrope in the same direction, including ultimately the contractor, etc. If it is to work then the Project Controller must report direct to the management of five, who after all are really the client, and hence decision makers.

Perhaps I have gone far enough in endeavouring to highlight the problems, but I am sure that I am correct in guessing that there will be several who are saying to themselves, and will say it later, that "what old Graves is saying is probably right, but it will never be accepted in the Health Service for all sorts of different reasons", like 'Public Accountability', 'existing standing orders', 'Historic Discipline Structures', 'approval of NALGO', etc. If that is the case, then gentlemen I believe that unless the Department or the Regions grasp the nettle and throw overboard all the historic objections, then you will only be playing lip service to Project Management and your will be no better off than you are now.

As the Chairman said: "Let's think forward and pull together, and perhaps bury some of the historic prejudices because we must not forget that it's the sick patient we are all working for and not our own pride or that of our particular disciplines". To me building hospitals on time and at the right cost is equally distinct and separate as healing and nursing the sick or administering the running of the hospital. I am certain that I would not presume to be qualified or to interfere with those functions, therefore can I appeal to the powers that a structure of responsibility and authority is established to allow the professionals who are qualified and experienced in technical management of building to get on and build the hospitals, which I believe are so urgently required in this country.

Evidence to the Royal Commission

Earlier this year (May issue) we published the Institute's own submission to the Royal Commission on the Health Service.

Several other interested bodies also made submissions, and we are re-printing extracts from two of them below.

Space does not permit us to publish the 22-page Report in full and we reproduce below Sections 2 and 3, together with the whole of the Summary and Recommendations.

Submission by Senior Works Officers

Introduction

This evidence was submitted to the Royal Commission on the National Health Service by senior officers responsible for the 'Works' function within the service. It was prepared by a Working Party drawn from Area Works Officers, Regional Works Officers, Regional Architects, Engineers and Quantity Surveyors of the Regional Health Authorities in England with the Director of the Building Division of the Common Services Agency in Scotland and the Director of Works of the Welsh Health Technical Services Organisation. Contributions were also made by the Chief Architect and Chief Engineer of the Northern Ireland Authority.

The 'Works' function in the NHS comprises the operation, maintenance, construction and replacement of the lands, buildings and services of the estate. The staff in Works departments in the United Kingdom total more than 28,000 and provide skills over a very wide range, including, for example, stokers, fitters, carpenters, painters, engineers, architects and surveyors. Works officers are responsible for some 10% of the total revenue expenditure (£3,428 m in

1976/77) and 85% of capital expenditure (£280 m in 1976/77).

The evidence was given in three sections; the first (*not reproduced here*) reviews the physical estate and the measures needed economically to maintain its operational capacity. The second consists exclusively of other matters concerning the Works function. The third section deals with matters, within the terms of reference of the Royal Commission, on which Works Officers have views and make recommendations as a result of their experience as managers of departments or as members of consensus management groups of officers.

A detailed description (*not reproduced here*) was given in Appendix A of the Works organisations at the different levels in the various parts of the United Kingdom.

Section 2: Difficulties affecting works functions

2.01 Before reorganisation, the structure for the new Works organisation was not considered at the same time as other disciplines. There was a delay in preparing and agreeing detailed structures and job descriptions and in negotiating salaries for the new designated posts with the result that whilst the first four members of the Regional Teams of Officers were in post before the end of 1973, the first of the Regional Works Officers appointments were not made until May 1974. The last RWO post was not filled until March 1975.

As a consequence there was considerable delay in filling senior posts at Areas and Districts; indeed some of them are still not filled.

2.02 Before the full Works structures could be implemented the effects of the economic situation on the NHS started to become apparent and this has now been followed by the formalised reductions in management costs.

2.03 Works responsibilities have been substantially increased following reorganisation. At Area and District the managerial structures have, in the main been established, although as noted above there are still some gaps. However, at the operational levels, up to and including third-in-line posts, the structures have not been revised and therefore remain incomplete. In anticipation of the next phase of national pay policy it is essential that negotiations on these grades should be started and brought to an early conclusion. Key staff formerly at Region obtained many of the new management posts at Areas. In consequence Regional staff, under the standstill, in some cases lack the balance between disciplines, specialists, and grades which are essential to efficiency and economical performance. The relativity between Regional staff and those at Areas and Districts requires investigation and negotiation in anticipation of the next phase of national pay policy.

2.04 The training of engineers in the NHS has progressed much faster than the training of building staff, but neither provides for the overall needs of the reorganised service. There is works representation on the recently established NHS National Training Committee to whom the Works organisations now look for policy on the development of Works training as a whole but with a bias in the early years towards building staff and to prospective managers of the total Works functions at various levels. An urgent need exists to train staff to fill posts at Area and District when the five-year moratorium which set aside qualifications expires.

2.05 The DMT's role is to manage the operational patient services within the Districts and in consequence they have less interest than the ATO in the longer term requirements of estate management and the protection of capital assets. The total budget for estate management should, therefore, be managed by the AWO.

Section 3: The National Health Service

3.01 Works Officers limit their submission on general (non-works) matters to the following issues:

a. The wide diversity of size of Regions, Areas and Districts.

b. The difficulties and dis-economies arising from the multi-level structure.

c. The problem of devolution versus centralisation.

d. Difficulties arising since reorganisation.

3.02 Reorganisation originally aimed at the establishment of a uniform structure within each of the levels of Region, Area and District. There has, effectively, been a standstill for over a year on staffing and this has delayed the implementation of the last phases of appointments. However, the vast majority of senior administrative posts was filled before recruitment slowed and the pattern in all disciplines was identical, regardless of the size of the authority and its work load.

Although the diversity is greater at Area and District, it is convenient to consider the range of size at Region where revenue allocations for 1976/77 varied from £120.7 m to £340.9 m, and similar ratios applied to staffed beds and population served. Such wide variations inherently demand a far greater flexibility of response, in relation to level of responsibilities, staffing structures, etc than has so far been envisaged. They also indicate that the provision of, in particular, specialist services can be made on a cross boundary basis with consequent economy and better performance. This has already occurred in some sectors of Works functions but it is capable of wider exploitation.

3.03 Works is one of the very few disciplines where a hierarchical structure between Region, Area and District has, in part, been established post-1974. District Works Officers are accountable to their Area Works Officer for the professional and technical content of the work and for personnel management. Area Works Officers are monitored and co-ordinated on professional and technical matters by their Regional Works Officer. This experience enables Works officers to comment from a different position to other representations being made to the Commission on the effectiveness of the present multi-district structures.

The 1974 reorganisation was a compromise between conflicting requirements for effective internal organisation for the delivery of care, and external control of the service. As with many compromises the adopted solution is felt to have few of the virtues of either course and some of the disadvantages of both. This is particularly apparent in the problem of the complex solution for relationships in the multi-district AHAs. The reasons for the adopted device are understood but the difficulties anticipated when it was announced have al materialised, together with some additional ones. Functional efficiency and economy in administration demand that a simpler (probably hierarchical) structure be substituted for the present three levels.

3.04 The medical structure of the health service is inherently nationally orientated. Freedom of referral, to consultant/hospital of choice, pays no regard to District/Area/Region or National boundaries. The concept of District independence was not prac-

ticable for these reasons even in the days of relative affluence; how much less possible it is to conceive it within predictable restrictions of future financial allocations of both revenue and capital. This point has been considered in the consultative document 'Devolution — The English Dimension' where the problems of disparate levels of health service are used to illustrate wider aspects of national devolution.

Pressure to increase delegation must be balanced by an increased recognition of, and the necessity of conforming to National standards in the great majority of aspects of provision of district health care. It is not essential that identical structures are provided in every part of the country. It is vital that the level of service provided to the public should, as far as is reasonable, be comparable and uniform. It is the level of service being made to exercise detailed control over the way in which the service is operated.

3.05 The Royal Commission has asked specifically for observations on the success of consensus decision-taking and the processes of consultation.

On consensus management the opinion of Works Officers is that it provides a speedy and efficient system at Regional level. At Area and District, however, it is less successful in dealing with Works matters. This is attributable to the Works representative not being a member of the Management Team. Although he can always be present for a predicted item on the agenda, his periodic absences mean that he is not adequately briefed to be able to predict policy requirements which should be taken into account in the continuing flow of decisions he is required to make. To overcome this difficulty it is strongly recommended that the Area Works Officer be made a full member of the ATO/AMT.

3.06 On consultation Works Officers consider that there can be no question of disagreement with the aim, in reorganisation, of achieving greater consultation within the service and greater sensitivity to the views of the public. It would, however, be wrong not to draw attention of the Commission to the very extensive delays and dis-economies which are now occurring in England in particular. The effect is felt particularly severely in service planning and, as this is the very first stage in preparing the brief for new construction, in the building programme. The inherent difficulty can be illustrated by quoting the bodies which have to be consulted by one, admittedly large, multi-district AHA(T) in the preparation of its service plan; they are detailed in Appendix 'B' (*not reproduced*). If the Service is to function efficiently and economically then the present consultative processes must be streamlined.

Summary and Recommendations

1. The majority of the inherited stock of health service buildings is rapidly approaching, or has passed, the time for renewal.

2. There is a gross and unacceptable disparity between the condition of the best and worst buildings in the NHS.

3. The public expects higher standards of NHS buildings than the present capital allocation can achieve. This gap between expectations and reality also applies to the achievable standards of operation and maintenance.

4. The land, buildings and services of the NHS constitute a major national capital asset. Their preservation demands the adoption of long-term policies for conservation and enhancement. Procedures developed jointly by DHSS and NHS for management of the estate (Estmancode) should be adopted throughout the NHS.

5. There has been a long standing failure to appreciate the staffing, maintenance and replacement costs inherent with ownership of a large estate. There is a large and growing backlog of deferred works.

6. The rapid growth of potential clinical activities and the expectations of higher standards in all fields result in demands which, unless controlled, can only be met at the expense of provident estate management. Demands on the NHS are potentialiy unlimited; the essential monies for operation, maintenance and renewal of the present estate must, therefore, be reserved before expenditure is incurred on any expansion of the existing level of provision.

7. An increase in the capital estate, whether buildings, X-ray/scientific equipment, ambulances, etc, should only be undertaken if its inevitable renewal can predictably be afforded within the future programme of capital allocations.

8. Excessively low cost limits for capital construction result in uneconomical design with high operational and maintenance costs. Cost limits must be kept under review to achieve a true economic balance.

9. The service planning, building design and constructional cycles are necessarily long. Changes in policy, or expectations of capital allocations, cause serious dislocation and great diseconomies.

10. The level of capital expenditure should not be used as a regulator of the economy.

11. Greater financial flexibility is required to avoid disruption of capital and revenue works programmes which, at present, are used as optional expenditures in balancing annual accounts. There is a need for a recognised and sacrosant budget for maintenance.

12. Alterations in the levels, or between sectors, of the NHS should be achieved by long-term plans. Attempts at short-term management should be avoided.

13. The posts of Works Officer at District Area and Region provide an essential and economic single point of contact for the wide range of disciplines and duties involved.

14. Discussions on the post-reorganisation Works structures were delayed and implementation has been frustrated by subsequent events.

15. Works structures are out of balance and negotiations should be undertaken and agreements reached in anticipation of the next phase of pay policy.

16. Training needs of Works staff must be revised to accord with the requirements of the reorganised NHS.

17. The total budget for estate management at Area and Districts should rest with the Area Works Officer.

18. The wide diversity of size of Districts, Areas and Regions requires a greater flexibility of staffing structures.

19. A simpler (probably hierarchical) structure should be substituted for the present three levels of Region, Area and District.

20. Increased delegation must be balanced against the necessity of conforming to National standards.

21. Identical structures are not essential, but it is vital that the levels of service throughout the country should be comparable.

22. The level of service being provided should be monitored rather than detailed control attempted.

23. Consensus Management works.

24. The Area Works Officer should be a member of the Area Team of Officers/Area Management Team.

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Submission by District Works Officers

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2. Size of working unit

This section sets out some of the most important functions of a Health District and suggests that there is a limit to the size of unit which can be effectively controlled.

3. The use and control of financial resources

This section describes the difference between revenue and capital expenditure, shows the need for careful control of the former at District and describes methods of control.

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An attempt is made to assess the future of the Health Service as it affects the nature of Works Department involvement. Suggestions are made as to the future roles of Regional, Area and District Works Departments.

1. Introduction

This paper sets out the views of District Works Officers in England concerning present and future aspects of the National Health Service. We have not compared views with colleagues in Scotland, Wales or Northern Ireland, primarily because of lack of time and secondly because there are substantial differences between all those Works Services which would invalidate direct comparison without a great deal of research.

One of the greatest contributions which, in our opinion, the Works Service can offer to the National Health Service is that of careful husbandry of existing assets comprising hospitals, services, clinics, grounds and staff. For that reason this paper is concerned mostly with the use and management of the resources of the Works Department. We do, nevertheless, stray into other areas where these are considered pertinent.

The nature of the Works Service is often over-simplified by major emphasis being placed on the provision of new buildings from capital allocations, whereas an equally, if not more, important function is the operation and maintenance of the existing estate. This second function takes up a considerable proportion of the National Health Service revenue expenditure and the management and control of it is completely different from that of provision of capital assets.

Operation and maintenance is essentially a local function having a direct relationship with the day-to-day functions of the Health District. One of our main arguments is that this local control is of prime importance to patients, the Service and its staff and should not be sacrificed simply to achieve questionable economies of scale.

Concentration of Works management at District level has followed the reorganisation precept of delegation of responsibility downwards. In addition, District Management Teams have been provided with a local Works Service capable of contributing considerably to long and short-term planning. This, we feel, is particularly useful as such advice can be provided close to the source of need.

2. Optimum size of working units

There is no straightforward way of defining the optimum geographical area appropriate for a Health District. Even if there were, it is probable that the area most suitable from, say, a medical viewpoint would not necessarily coincide with that most suitable for a Works Department.

It is clear, however, that in sizing Areas to make their boundaries coterminous with those of Local Authorities, instead of using workload as a criterion, many anomalies have been born. For example, there are cases where fully staffed single District Areas have a smaller workload than neighbouring Districts which are part of multi-District Areas. This suggests that there is either a surfeit of highly-paid managers in the former or insufficient in the latter.

It is necessary in considering this question of size to consider the duties of the District in providing medical care for the community and we would suggest that some of the more important duties are:

1. To create a suitable environment for patients and staff — by which is meant that patients and staff can identify with a well-defined and reasonably-sized organisation.
2. To ensure that the public can similarly identify with a reasonably-sized organisation instead of being given the impression that the National Health Service is a vast impersonal machine.
3. To ensure that managerial spans of control are sensible.
4. To control finance and resources.

What this means in practice is that a balance must be struck between what can be achieved in economies of scale whilst ensuring that the size of the unit is commensurate with what a manager can control and for which he can reasonably expect to be held accountable.

For day-to-day management purposes we firmly believe that for a Works Department, bigger does not mean better. The District Works Officer has statutory and other responsibilities under such Acts and requirements as the Factories Act, IEE Regulations, The Health and Safety at Work Act 1974, The Defective Premises Act 1972, Building Regulations and the Department of Health and Social Security requirements of all building services and workshops within his District. He is also required to manage a large technical and artisan workforce with all the many needs of good industrial relations and further, he has to organise and control a complicated budget which is described in Section 3.

We would suggest, from the experience of members of our Association since April 1974, that it is unreasonable to expect a Works Officer to be accountable under these important and diverse headings for a Works Department larger than that to be found in the average-sized District or Single District Area. Beyond this we would submit that the span of control is too wide and this opinion is borne out in industry where about 80% of companies in this country have a workforce and turnover similar to that of a typical District Works Organisation.

3. Use and control of financial resources

Financial allocations are expended in two ways:

a. on capital works; and
b. on revenue works.

Capital expenditure is that needed to add to or replace the aging assets

of the National Health Service and its deployment has to take account of major changes in the Service. Control of major capital expenditure can therefore only properly be exercised at Department and Regional level.

By contrast, revenue expenditure is that needed for the day-to-day running of the Service at local level. Revenue maintenance expenditure comprises: salaries and wages of the workforce, expenditure on day-to-day running, programmed maintenance and repairs. In order to ensure the most efficient utilisation of this scarce resource, it is important that decisions as to its deployment are made as close as possible to the place of need. At the same time delegation must not be so low that control of maintenance revenue becomes too difficult. To meet this need, systems of budgetary control are being developed at District level requiring close liaison between the District Works and Finance Departments. In some cases the systems are well developed and use is made of computers to provide information such as job costing, stores control and so on.

There are two ways of carrying out repairs and maintenance, either by directly employed labour or by using outside contractors. Despite varying opinions, neither of these can be said always to be cheaper and while it is probably more expensive to use directly employed labour for larger jobs instead of a contractor, who specialises in that type of work, it is probably more expensive to call in contractors to carry out the repairs and smaller jobs which arise continally. When considering repairs we have also to consider the fact that the Works Service is required to provide 24-hour cover which implies having staff available 'on-call' and, in the case of specialised equipment, local contractors are frequently unavailable. Balancing these various factors necessitates close control of workforce expenditure and it can be shown that bonus schemes do improve this control where direct labour is employed. Such control is a fairly complex job when it is remembered that the District workforce often numbers between one and two hundred people with a budget in excess of £1 million.

One method of controlling such a budget which is being developed and instituted is that of District functional budgeting (see Appendix 1) in which District functions, such as physiotherapy, works, supplies, etc are separately identified by function and given an annual budget, for which the respective managers are responsible. Identification of the Works budget is a matter of determining repairs and replacements which are needed along with the maintenance programmes, such as painting, which are to be undertaken. It is an exercise which takes some months to complete as it requires liaison not only with Works staff but also with Sector Administrators, Heads of Departments and other interested parties. Appendix 2 summarises the Estmancode Procedures, which are a guide for the preparation of Works budgets and Appendix 3 summarises the District Works Officer's role.

All works undertaken, represented by time, materials and overheads, are coded and costed to the appropriate job in question and this information is then processed by the District Finance Department so that a record of actual expenditure against the budgeted allocation can be produced on a continuous basis, and so enable the responsible budget officer — in this case the District Works Officer — to be aware of the progress of his programme and make any changes necessary.

In many cases implementation of functional budgeting is in its infancy. However, considerable progress has been made in the past year and we would recommend that controls of this nature are vitally important, especially when resources are becoming ever more scarce and expensive.

Control of workforce expenditure is vital and, having determined the desired balance between contract and directly employed labour, the principal control elements are: job costing, stores control (for materials usage), overtime and, where incorporated, bonus schemes.

To summarise what has been said so far in this section, we have identified the need to delegate revenue expenditure as close as possible to the identified need — ie to District and, once it is there, to control it by some form of budgetary control. It only remains to ensure that the District itself is monitored to ensure that the revenue is expended correctly.

Historically, Works budgets have frequently been re-allocated to meet other demands of the Service and it is now apparent that allocations for programmed repairs and replacements of plant and buildings are being further reduced. This trend became apparent before economies were being demanded as a result of national pressure and has been highlighted by a recent survey undertaken by the Chief Engineer which has shown that 'following reorganisation the rate of renewals of engineering plant and services replacement has dropped sharply'. This Report was circulated in the Chief Engineer's letter CE(76)9, which is attached as Appendix 4. It is apparent that any budget which can be readily diverted as problems arise will always be at risk but in a Service, where the average age of buildings is seventy years, it is clear that such actions can only have a long-term and cumulative detrimental effect on the Service. Already much of the National Health Service estate contains a high percentage of poor and unattractive buildings and estates with a significant proportion of plant and equipment in use which is obsolete and below the standards currently being demanded. In our view these reductions in allocations for work, which is essential for the safe operation of the Health Service, is entirely due to inadequate representation of Works Departments at the management levels where revenue allocations are determined.

In view of this we feel that the Works Organisation must either be more closely brought into the full line of management of the Health Service by including Works Officers on Management Teams at all levels or, alternatively, the maintenance organisation must be separately financed from the existing capital and revenue systems in order to ensure that standards of maintenance can be maintained at an acceptable and safe level.

Some means must be found to protect the Estate Management budget from being misappropriated and from being used to underwrite overspending in other budgetary headings either at Area or District.

4. Manpower control and personnel management

Over the past two decades the pattern of the Works Department workforce has changed considerably. Whilst, for example, we may now be recruiting skilled electronics technicians, people are now retiring who were first engaged to drive horse plough teams.

As with industry generally, one major change is from labour intensive tasks to those requiring less manual but more intellectual input. Thus, for example, requirements for building

maintenance have changed as modern prefabricated buildings have been introduced more and more since the 1960s with different maintenance needs from those of traditional buildings.

Also during these years, the cost of maintaining a directly employed labour force has escalated and it is now necessary to use work control and job costing techniques generally undreamed of in the National Health Service until quite recently (see Use and Control of Financial Resources).

These changes have brought with them major implications. The first is that a smaller, more intelligent workforce is needed than before, which means that the work appeals to younger people who have an interest in making a career out of the Service. This is true both for Professional and Technical supervisory staff and for Ancillary staff and we no longer look so much to recruiting older experienced people as in former years.

For the Service this is excellent news, but it does imply changes in attitude from management, which, perhaps, are not being recognised fast enough. This leads to frustration and a certain amount of resentment from Works staff who feel the need for change but see no improvement in their immediate station. The combination of a younger, more intelligent workforce with its demand for improvements, has led naturally to increased Trade Union activity and, in some cases, militancy.

Effective personnel management is crucial to maintaining equable relationships locally. Experience with the Trade Union and Labour Relations Act 1972 and with Industrial Relations Tribunals has identified the vital necessity of close local control of industrial relations, together with the maintenance of precise grievance and disciplinary procedures. Most disputes arise locally and have to be settled locally for, by the time the Area/Regional Authority has been brought in, the dispute has usually developed into confrontation. Hence the need for close liaison between District Personnel and District Works Officers for a serious dispute amongst Works staff could soon seriously affect the District.

Clearly then, in our opinion, effective manpower control and Personnel management can only be achieved by delegation locally. If the directly employed Works staff is of average size — say 100-200 people — then these delegated functions form a considerable part of the District Works Officer's job and it is important that it should do so if we are to achieve greater unity.

5. Career development and training

Modern trends towards increasing complexity and mechanisation are demanding better technical ability and management services capable of identifying and isolating problems, with a view to providing effective and economic solutions. In view of this, it is imperative that we comply with the spirit of the White Paper on the reorganisation of the Health Service, which laid down a great deal of emphasis in training and career development. Currently the only planned training programmes being undertaken are at Regional level, where a small number of graduate trainees are being sponsored to attend university courses, the remaining training involvement for Works Supervisors and Managers is limited to providing part-time day release facilities to junior members of staff after they have completed an apprenticeship within the Health Service but more often in outside industry.

Until comparatively recently, Works Departments have comprised craftsmen and supervisor/managers in the form of Hospital Engineers and Assistant Building Supervisors. Lately there has been recognition of the increased complexity in that Electronic and Bio-Medical Equipment (EBME) Technicians have now been introduced to cater for the specialist requirements of EBME equipment. We feel that developing technology has placed exceptional demands on Hospital Engineers and Building Supervisors and because of this, the concept of technicians should be further expanded to cater for other specialist services throughout the Health Service.

Hospital Works Supervisors continue to be recruited from electrical, mechanical or building trades and whilst further formal technical education is available in these fields, as already mentioned, there is no formal education in the special needs relating to Hospitals. Indeed no attempts have been made to identify specific national demands for such training.

At present there is a wide gap between craftsmen and the Supervisor/Manager grades which we feel should be closed to provide improved career structures and allow craftsmen with exceptional talents to be reclassified as technicians at the present traditional level of Assistant Hospital Engineer or Assistant Building Supervisors and, as technicians, should be able to advance along the particular specialist structures towards Assistant District or Area, Engineer or Building Officers.

One other serious training deficiency is that of training craftsmen to fit them for the role of Foremen. This first line supervisory role is, of course, of vital importance in any organisation and particularly in an organisation such as ours where staff can be spread over wide areas within Districts. Such training should be geared to enable these staff to correctly identify with both the tradesmen and management of the Service.

A major obstacle to logical career development and training to suit all levels of the Service is the present piecemeal structures where Regions, Areas and Districts use different grading and salary structures. Whilst we appreciate that there is a wide variety of expertise required at the different levels, such as surveying, building, electrical engineering, mechanical engineering and electronic engineering, there is a real need for cross fertilisation and facilities for widening experience of people employed throughout the Regions. Other Professions almost invariably use a common grading structure which would be a desirable and forward step in the Works Service to enable people to progress through the Service in the manner best suited for their particular abilities and the benefit of the Service as a whole.

Training in such a unified structure could then be geared to ensure the technical abilities necessary in such a diverse field with progressive management training used to supplement the technical training as an individual's career progresses. In this way we feel sure that the Works Service can more readily be built up to meet the standards recommended in the Woodbine-Parish and Tyler Reports with the ultimate aim of training and using professional Works Officers through all the senior levels of the Works Service. Such a unified structure would also facilitate the training of graduate apprentices in the diverse and demanding maintenance functions at District level. It would also enable us to move towards removing the built-in artificial barriers of qualifications and at the same time enable

suitably qualified Officers to move within the Service to obtain the experience needed by people who wish to become corporate members of their Professional Institutions.

6. Managerial relationships

It has already been argued that in order to maintain proper control of Works Organisations we should not seek to develop the size of the basic unit beyond that of the average Health District or Single District Area. It is equally important that careful consideration is given to managerial relationships both inside and outside the District.

The District Works Officer is, of course, at the head of the District Works Department and is responsible for a Professional and Technical Staff whose activities include maintenance, operation and design. Once the role of the District Works Officer has been defined, those of the other Works Officers fall into place, but we feel that much confusion has arisen through attempts to over-simplify the District Works Officer's role. It is our contention that a fundamental aspect of his work is that he must remain responsible, with the District Management Team, for operation and maintenance of the Estate but must be individually responsible, as a senior Works Professional, for technical standards, including compliance with Building Regulations, British Standards and the many statutory Regulations or Codes of Practice which apply to buildings and technical services. In this second role he acts as advisor to the District Management Team, which has to rely on his professional expertise (see Appendix 3). Monitoring of these standards is, of course, a Regional or Area function. From a District Management Team's viewpoint it is obvious that it is the operational responsibility of the District Works Officer which is of greatest importance, as its concern is that the District should run smoothly from day to day.

We would argue that both spheres of responsibility are of equal importance and that it would be inappropriate for the District Management Team to be in complete control of the Works aspect — thereby tending to subvert Professional accountability. Further, it would be equally wrong for the Area/Regional Teams to assume direct responsibility for this could both leave the District Management Team out of day-to-day operational decisions and modify the District Management Team's responsibility as occupier to a point where it would be difficult to ascertain individual responsibility and accountability.

Since April 1974 the relationships between Works, Medical, Nursing and other interests at District have, in many places, been developing on a team basis. We feel that it is in the interests of the Service that it should continue to do so and that we should not be putting forward proposals which will be divisive in their effect. If anything, we suggest that the teamwork aspect could be strengthened and that managerial relationships should be as follows:

a. Operational and maintenance activities (as defined above): the District Works Officer is held responsible by the District Management Team, which is itself responsible for maintenance revenue expenditure. The Area/Regional Teams will have an interest in these activities but not a direct responsibility except as discussed below.

b. Delegated capital expenditure and maintenance of Professional standards for which the Area Works Officer will hold the District Works Officer responsible. Here it is the District Management Team has an interest, but not direct responsibility.

Thus in each case it is the District Works Officer who performs the linking function. In many places these relationships have successfully developed naturally and we cannot see why they should not continue to do so.

There are two methods of control which will ensure that a District Management Team could not override Works interests by continuing to underspend on essential maintenance — as has happened in the past. The first control is implicit in the present structure whereby the Area/Regional Teams have a duty to monitor expenditure on a historical basis and take appropriate action if a District or Area continues to 'mis-spend'.

Secondly, it is suggested that the Works Officer should be a member of the District Management Team. This would enable him to speak for the District Management Team on all works aspects and prevent Area/Regional interest overriding essential District operational requirements without due consultation. He would be in a position to speak as an equal upon matters concerning District revenue budgets and could fairly be held responsible with the District Management Team for consensus decisions related to the District Works sphere.

To reinforce this last point, we would draw attention to Circular HM(65)15 issued by the Ministry of Health in 1965 (see Appendix 5). This Circular recognised the importance of the Group Engineer (then the Chief Technical Officer within a Group) being a Group Officer. In our opinion the reasons given are equally valid today.

7. Health Service organisation and control

The Working Party in preparing this paper became increasingly aware of problems of communication and decision-making within the Areas which seem to be exacerbated to some degree by the existence of Community Health Councils.

In some multi-District Areas the Area Health Authority is tending to identify with the Area Team of Officers to the extent that there is a real trend towards controlling Districts in a Hierarchical manner. This trend could develop to the point where Districts become too remote from the point of decision-making and also lines of communication could become so long as to effectively remove the District to Area Health Authority inter-change, which is necessary if we are to ensure that Area Health Authorities understand and appreciate the day-to-day problems of District and hence fully appreciate the planning needs and aspirations. Such future needs are most often identified in the first instance at the operational level.

Currently, one of the main areas of concern regarding communications is the interface between Districts, Areas, Area Health Authorities and Community Health Councils. It will be appreciated that with two Professional Management Organisations, a lay Management Committee and an Advisory Committee, there must be some difficulty in fully involving all the people who may wish, or need to be involved, in determining management policy. In our opinion such an involved structure can only be detrimental to the smooth running of the Service. The Health Service is probably unique in the extent of the involvement of lay members and we feel that the Management structure and communications could be greatly improved by a closer inter-linking or

possibly even a merging of the Lay Committees involved. Consideration could also be given to the possibility of inclusion of the Area Team of Officers in the Health Authority Committee, but such a step would, of course, need a great deal of forethought if we are to ensure that these Officers do not become too dominant in such an Organisation.

Another point which causes a great deal of concern and introduces avoidable difficulties, is the allocation and control of revenue and capital monies. With the present annual system, monies are allocated from the DHSS to the Regional Health Authority and in turn down to the Area Health Authority and finally to Districts. This process usually commences at the beginning of the financial year. Almost invariably this results in allocations finally being decided and reaching Districts as late as August or September and this means that we have effectively lost a period of five to six months in which work should have been planned and committed. We are then in the position where we have to commit the monies, prepare specifications and drawings and let contracts by November if we are to achieve the expenditure planned before the end of the financial year. This causes a great deal of unnecessary pressure and, for example, commits us quite often to doing work on heating systems during the heating season with the consequential problems.

A further problem is created by the various authorities each separately maintaining contingency funds which are released quite late in the year with the consequence that schemes and equipment are then selected on the basis of whether the monies can be spent in the remaining few weeks of the year rather than on the basis of need.

In our view the system of allocating finances should be streamlined or amended to enable allocations to reach Areas and Districts at the beginning of the Financial Year and so permit full consideration and timely action. There should also be a review of the method of coping with contingencies with a view to have one National Contingency Fund, controlled preferably by Regions.

8. The future

Any assessment of the future of the Health Service is bound to be conjectural; still more so, the nature of a Works Service involvement.

However, there are two fundamentals which we feel will shape the future: (i) the demand for total health care and (ii) whether the country can afford to meet that demand.

It is unlikely in our view that the demand for total health care will diminish particularly, but it is possible that whatever form is adopted of financing the Health Service, a smaller proportion of the GNP will be available to meet its needs.

This implies that units will not be able to attain self-sufficiency in all aspects of health care and services will have to be shared across boundaries. We may not be able to afford to replace or provide large new institutions but will instead have to look to more efficient and specialised hospital units.

If the total resources available to the Health District fall, then with a maintained demand for health care, a greater proportion of what is available will be required to keep the Service operative. Thus, we would expect to see a shift from capital to revenue expenditure.

Where in all this will a workforce fit? This should be considered separately for the two functions of the Works Service described earlier, ie provision of capital assets and operation and maintenance.

First, capital expenditure: as explained above, we would for the foreseeable future expect to see less emphasis upon large capital expenditure. At present both Area and Regional Works Departments concern themselves mainly in this field and we cannot see that they will both need to do so in the future.

Second, operation and maintenance: although we may see some change in types of buildings and can certainly expect to see changes in maintenance requirements as equipment becomes increasingly complex, the need for liaison with other disciplines, motivation of staff and providing a service as close as possible to the patient.

We would suggest that to meet this continuing need, operation and maintenance should remain broadly as it is now, ie District control perhaps with some strengthening of the District Works Officer's role as discussed under the heading 'Managerial Relationships'. Thus, concentration of works managerial expertise should remain at District — satisfying the needs of local requirements and establishing a sound career structure for District Staff.

Provision of major capital services should be the responsibility of the Regional Works Department where a concentration of specialist skills will be considerably more economical than will dispensing them to Areas or Districts. Overall monitoring of revenue maintenance expenditure by Area/District Management Teams should also be a Regional responsibility.

9. Conclusions

1. After a great deal of consideration, we consider that the present method of sizing Districts appears to give a manageable size and this is particularly so when considering Works Departments.
2. From the views expressed we can only come to the conclusion that the restriction on development of the Health Service, caused by basing the Area boundaries on Local Authority boundaries, has given rise to most of the problems being experienced in the two-District Areas and the anomaly of Single District Areas.
3. In our experience the present methods of allocating monies leave a lot to be desired and must be improved if we are to achieve any real degree of efficiency. We suggest that financial allocations for any given year must be advised at the beginning of that year and advanced commitments should be made several months before that date.
4. The system of functional budgeting, which is now gaining ground throughout the Service, should be expanded to all Districts and, coupled with Point 3, should result in a better use of Services and money. It would also encourage greater involvement of functional managers by ensuring that real authority is delegated and that Management Teams would have a positive method of assessing performance. In our view, the lack of such authority and methods of performance assessment has been a major cause of dissatisfaction and careless use of money in the past.
5. Following the recent spate of legislation on employment and conditions, we have clearly identified the District Works Officer's delegated responsibility for Works Personnel Management in close liaison with the District Personnel Officers. This responsibility should be more clearly acknowledged in any new Works Management documentation.

6. A widely held view among Works Personnel is that there should be a common grading structure throughout the National Health Service to facilitate proper training for all levels of management. In particular this would allow graduate trainees to be recruited and trained for the higher positions in Districts, Areas and Regions. There is also a pressing need for the Health Service to prepare training programmes designed to take possibly 'A' level students for training as Works Technicians to fill the middle technical and managerial posts.
7. If we are to ensure that proper allocations are made and a balanced emphasis of the needs of maintenance work is fully understood, consideration must be given to bringing Works Managers into the full Health Service line of management in an exactly similar manner to our colleagues the District Administrator and the District Finance Officer.
8. The present system of using lay members on two different Committees, namely the Community Health Council and the Area Health Authority, we feel protracts the time required for plans to be considered before onward transmission to the Regional Health Authority. We therefore consider that serious thought should be given to determining the real need and best use of lay involvement in Health Service Management.
9. Finally, we feel that a question from our Estmancode Procedures is warranted as it emphasises the need for a good and efficient Works Maintenance Service: "The relationship between each individual function in the field of estate management, the care and treatment of patients and the effect of the environment on staff morale should be clearly understood. Estate Maintenance is not an isolated, optional activity of a purely technical nature; it is an important, indispensable and integral part of the vital function of providing patients with the standard of care and treatment which the National Health Service is proud to sustain, and ensuring that all staff enjoy working conditions which will inspire them to give of their best in the interests of patients".

Appendix 3

The Present Role of the District Works Officer

1. The District Works Officer is the chief Works technical officer in multi-District Areas who provides a single point of direct contact for Works staff with the user of client professions and the district Management Team. He provides advice to the District Management Team on Works matters. He is operationally responsible to the District Administrator for Works and Maintenance operations included in the District budget; but is accountable to the Area Works Officer on professional and technical matters and for personnel management to the extent that these are not dealt with by the Personnel Department.
2. Supporting him is a staff comprising Professional Technical Officers qualified in both Building and Engineering.
3. The Technical Services for which these Officers are responsible include the following:
a. Electrical supply networks at both high and medium voltage.
b. Domestic, drinking, cleaning and other mains water services.
c. Sewage and its disposal.
d. Steam generating and distribution networks.
e. Heating, ventilating and air handling.
f. Medical gases systems comprising oxygen, nitrous oxide, vacuum, compressed air and certain gas mixtures.
g. Electronic and Bio-Medical equipment.
h. Domestic and industrial gas supply networks for space heating, cooking, etc.
j. Catering and laundry equipment.
4. Maintenance of the Estate can be broadly described under the following categories:
a. Maintenance of building fabric and services including safety of structures and compliance with standards.
b. Maintenance of grounds and gardens.
c. Preparation of estate records systems for the District.
5. The District Works Officer manages the District Works Staff comprising the following grades of staff:
a. Professional and Technical Staff, both building and engineering.
b. Administrative and Clerical support staff.
c. EMBE Technicians.
d. Engineering and Building artisan staff.
e. Gardening staff.
f. Ancillary grade staff.
6. *Operationally, the District Works* Officer is responsible to the District Management Team via the District Administrator for Works functions which are included in the District overall budget.
7. The District Works Officer is usually responsible for the composite Estate Management Budget which comprises the following elements:
a. Building maintenance
b. Plant and equipment renewal
c. Painting
d. Planned preventive maintenance
e. Medical and surgical equipment, maintenance and renewal
f. Gas
g. Water
h. Fuel oil/coal
j. Boilerhouse maintenance
k. Grounds and gardens maintenance
l. Salaries and wages
m. Contract services
n. Advice on vehicle purchase and maintenance
p. Electricity.

The District Works Officer is also responsible for elements which may be included in the budget of other District Managers, eg replacement of equipment in hospital kitchens.
8. The District Works Officer is accountable to the Area Works Officer on professional and technical matters. This technical accountability encompasses safety in the widest sense, eg:
a. Electrical saftey — this is a broad category and includes safety of all patients and staff and visiting members of the public.
b. Safety of buildings — this includes *safety of structures, floors, stairs,* windows, etc.
c. Safety of plant and equipment — this includes boilers, heating devices, lifts, cooking equipment, sterilising equipment, operating theatre equipment, etc.

Associated in an integral sense with this element of accountability is that of a responsibility for compliance with statutory and other regulations.
9. The District Works Officer is *responsible for the provision of emer*gency services. This is a responsibility peculiar to officers working at District level, for the provision of services in this category requires the management of integrated 'on-call' support manning.
10. In general, the role of the District Works Officer is perhaps best described as the Chief Works Technical Officer who provides a single point of contact between 'user clients', *ie doctors, nurses, heads of depart*ments — both service and paramedical, and the District Works force. That Works force serves and supports every single function carried out in every health care building.

A Guide to Current Developments in Technical Education for the Works Professions-I

Acknowledgements

This paper has been produced as a result of the work of the Works Organisation Steering Committee of the West Midlands Regional Health Authority and its Working Parties. It is, of course, applicable in all but detail to other Regions.

In addition to the individual contributions by members of the Steering Committee and its Working Parties, our particular thanks go to Mr. Graham Smith, Training Officer to the West Midlands Regional Health Authority and his colleagues for their work in compiling and editing this paper and for the considerable research that they have undertaken.

The completion of the paper will be in our December issue.

Introduction

In 1973, the Technician Education Council (TEC) was established, following a recommendation of the Haslegrave Committee on Technician Courses and Examinations, which reported in 1969.

Although a number of colleges in various parts of the country introduced TEC programmes in 1976, a significant number of programmes were introduced during September 1977. Many previously well established courses will no longer be available.

The effects of the decline of established courses and the introduction of new programmes will be felt by many — not in the least by students — and those most affected will, over the next few years, be the students who previously would have undertaken 'technician' courses, eg Ordinary and Higher National Certificates and Diplomas, and City and Guilds Technician Courses.

This paper has been produced to assist and inform those who will in one way or another encounter TEC courses, and it is intended that the information contained in Parts 3 and 4, which is incomplete as at August 1977, will be periodically updated.

Some of the references in this paper are applied particularly to situation in the West Midlands Region and to Works Training arrangements organised by the WMRHA. However, in broad terms, they may equally apply to other Regions in the UK.

It is intended to produce a Part 4 supplement to this paper as a similar guide to technical education in the Building Profession which will be published as a sequel to this document.

In this document the term 'Technician' is used and related to certain NHS works posts at District level. This is merely to align education to the principles and distinctions prescribed by CEI. We are aware that many Works Officers at District level hold professional qualifications.

Part 1: The Technician Education Council (TEC)

Introduction

It is important to understand the policy of TEC, and the information which follows has been extracted from or based on the Council's policy statement.[1] It was issued in 1974 and much of the policy has become embodied in programmes.

The Council's awards

The Council will make the following awards:

Certificate
Higher Certificate
Diploma
Higher Diploma

The range of awards will recognise different levels of performance and educational experience, but will not be associated with modes of attendance. It will be possible to obtain a TEC award through full-time, sandwich, block release, day release, evening study, or by a combination of modes. There will be opportunities for students who cannot study regularly in a college to obtain an award.

Standards of TEC awards

In seeking to establish acceptable standards, the Council will take the following into acount:

the objective of TEC programmes, which will include transmitting a body of knowledge and a command of certain skills and techniques, increasing the student's capacity to learn, to adapt to new situations and to communicate successfully with others, developing his attitudes to responsibility;

acceptability to the student in terms of his personal and vocational needs;

acceptability to the employers of technicians;

comparability with existing technician awards;

acceptability to professional and other qualifying bodies and industrial training boards;

acceptability to validating bodies in higher education for the purpose of admission to degree and comparable courses of higher education;

the extent to which the awards contribute to establishing technician education in its own rights and improving the status of the technician in the community;

comparability with technician awards overseas;

acceptability of awards for mutual recognition in the EEC.

The Certificate will be the basic award and is at a level approximately equivalent to the present Ordinary National Certificate or half way between Part I and Part II CGLI Technicians Certificate (equivalent to T3). The Higher Certificate will be at a level approximately equivalent to a Higher National Certificate of CGLI Technician T5.

The Diplomas will be more broadly based than the Certificates and in general can be considered as equivalent to the present Ordinary and Higher National Diplomas.

Acceptability of TEC awards to professional and other qualifying bodies

Although it will not be a primary requirement of a TEC award that it be acceptable to professional bodies, it is important where the award gives entry to a qualifying body so that the student is to be able to follow the occupation to which his programme of study is related. The Council will seek to involve those institutions which are concerned. It is anxious that the standard of its awards should be acceptable to bodies such as the Engineers' Registration Board and the Institute of Building which have established a clear relationship between nationally recognised qualifications and the designation of technician grades.

Failure rates

While the Council intends the standard of its awards should be high and generally acceptable in the community and to the student himself, *it does not wish the requirements for obtaining a reward to be unnecessarily demanding. It believes, with the Haslegrave Committee, that a student who meets the initial requirements for a programme and studies reasonably hard and well, should be entitled to expect that he will be successful in his studies. The Council will be concerned if, in practice, this does not happen.* (Emphasis added).

Methods of operation

College programmes — schemes may be submitted by colleges after consultation with local employing organisations.

Standard programmes — will be available and will be used where college programmes cannot be provided.

Standard units — the Council have decided to design standard units and *expect that programmes* will be composed of such units, together with units devised by a college to suit local needs.

Terminology

Programme — a scheme of study available to a student, leading to an award of the Technician Education Council. The programme will have a title which is related to an occupational activity or area of study and may be organised on a part-time, full-time *or sandwich basis or on more* than one mode of attendance.

Unit — a self-contained and significant component of a programme which may be separately assessed and if successfully completed, count for credit towards a student's award.

Admission requirements

The Council will expect colleges to operate a flexible policy on entry to TEC programmes whereby students can be admitted at different ages and levels of attainment. Credit for relevant previous study and experience will be given. Different units dealing with the same topic at several levels may be designed to cater for students entering the different standards of attainment. This is likely to occur most frequently with studies such as Mathematics and Science.

Entry to end on programmes, for example, from a craft course, will generally be possible.

Programme structures

Programmes will be made up of units which may be of three types:

Essential — (ie compulsory).

Optional — to be chosen from among alternatives. (An essential unit in one programme may be optional in another).

Supplementary — additional to the minimum number required for an award.

Size of units — each unit will require about 60 to 75 hours of study, and programmes may include half units and double units.

Design of units — the concept of a unit will be expressed not in (the currently accepted) syllabus *form but* as a statement of learning objectives.

Certificate will require a minimum of 900 hours' study and 12 units.[2]

Diploma will require 1800 to 2200 hours' study and 25 units.

Higher Certificate will require a minimum of 600 hours' study and 8 units.

Higher Diploma will require 1200 to 1500 hours' study and 16 units.

A student who has gained a Certificate may qualify for a Diploma by completing the required additional units. A student following a Diploma programme who does not qualify for this award, may be awarded a Certificate if he has completed the *required units. The provision will* apply to higher awards.

General studies and communication studies

It is essential that the Technician should be able to communicate clearly with other people. The communication of technical information will frequently be an integral part of his vocational studies.

Programmes leading to TEC higher awards should contain material which *may be related to supervisory or com*munication studies.

The Council believes that provision of general studies and communication studies need not be made exclusively by concentrating them in separate units. To associate such material with technical and vocational content can be highly effective.

Credits for TEC awards

A student will normally qualify for a TEC award by successfully completing the number and range of units approved (or by gaining credit for previous studies) and successfully completing the rest of the units in the programme. It is envisaged, for example, that a day release student who has obtained sufficient exemptions will be able to obtain a certificate in two years. Students may not normally be exempt for more than half the units in any programme by virtue of such previous studies. The student will be given credit for all the units he has completed successfully and should normally be required to re-take only those units which he has not passed. It will be possible for a student to proceed to the next stage of his programme if he has to repeat only one unit, but this may not apply if he has referral in several units.

Relationship between further education and training

TEC's main responsibility will be for the student's further education and the Council will not normally be

involved in the training aspect. The student's further education and training are seen as complementary in providing what is required by technicians, and the Council will be concerned that there should be an acceptable match between the two elements. The importance of suitable experience in employment will be reflected in the requirement for additional units in full-time programmes. The views of statutory bodies concerned with training will also be expressed through the Training Services Agency and individual training boards. The Council's committees will also include members from industrial firms and other employers of technicians, and trade unions who will be in a position to relate TEC programmes to the students' training and experience.

Patterns of study

BLOCK RELEASE AND DAY RELEASE STUDIES

The Council hopes that many part-time programmes leading to its awards will be organised on a block release basis. Not only may a block release programme lead to a certificate in a shorter time than a day release programme, but it can also, for the younger student, include more time for both general studies and private studies and the need for evening attendance at college can be avoided.

DAY RELEASE COMBINED WITH EVENING STUDY

Where the programme is organised on a day release basis, it is often necessary for day-time study to be supplemented by evening study. Frequently the student's attendance takes place on the same day, resulting in eight or nine hours' study at college in one day. The Council recognises the difficulties of studying over such lengthy periods and hopes colleges will make the best arrangements which are possible in the circumstances, in collaboration with employers.

EVENING ONLY STUDY

The Council recognises that evening only study may be the only practicable form for many older students. It does not, however, regard it as a satisfactory form of education for the younger student and hopes that evening only schemes for such students will be avoided as far as possible.

The Sector and Programme Committees

The Council will examine technician education in three areas — Sector A, covering engineering; Sector B, building; and Sector C, science. Each sector has a number of programme committees, in addition to which are a number of specialist panels which examine particular subjects in detail. Below is given a complete list of programme committees and specialist panels.

Sector A Programme Committees

A1 GENERAL PROGRAMME COMMITTEE A
A2 ELECTRONICS AND COMMUNICATIONS ENGINEERING
A3 ELECTRICAL ENGINEERING
A4 PLANT, PROCESS AND CONTROL ENGINEERING
A5 MECHANICAL AND PRODUCTION ENGINEERING
A6 FOUNDRY, FABRICATION AND METALLURGY
A7 MARITIME STUDIES
A8 ROAD TRANSPORT
A9 AEROSPACE STUDIES

Sector B Programme Committees

B1 GENERAL PROGRAMME COMMITTEE B
B2 ARCHITECTURE, BUILDING AND QUANTITY SURVEYING
B3 BUILDING ENGINEERING SERVICES
B4 CIVIL AND STRUCTURAL ENGINEERING
B5 CARTOGRAPHY, PLANNING AND LAND USE
B6 EXTRACTIVE INDUSTRIES

Sector C Programme Committees

C1 GENERAL PROGRAMME COMMITTEE C
C2 LIFE SCIENCES
C3 AGRICULTURE AND HORTICULTURE
C4 HOTEL, FOOD, CATERING AND INSTITUTIONAL MANAGEMENT
C5 APPLIED CHEMISTRY AND PHYSICS
C6 VISUAL AND GRAPHIC COMMUNICATION
C7 TEXTILES, CLOTHING AND FURNISHINGS

Specialist Panels

SP1 INDUSTRIAL SAFETY
SP2 QUALITY ASSURANCE
SP3 TRIBOLOGY
SP4 TEROTECHNOLOGY
SP5 MATHEMATICS AND ITS APPLICATIONS
SP6 WORK STUDY
SP7 PLANNING, ESTIMATING AND COSTING
SP8 INDUSTRIAL ORGANISATION
SP9 SUPERVISION AND INDUSTRIAL RELATIONS
SP10 COMMERCIAL ASPECTS (Economics; Packaging; Distribution; Sales).

Composition of the Sector and Programme Committees

The Sector Committees will consist of Council members, the Chairman of the programme committees in the Sector, members drawn from other committees and from the Business Education Council where appropriate, and a number of outside members. Programme Committees will be composed of members drawn from organisations which have substantial involvement and experience in technician education and training and are associated with existing award-making bodies. Appointment of Assessors — the Department of Education and Science, amongst others, will be asked to nominate assessors to serve on the Sector and Programme Committees.

Terms of office

The terms of office of the Sector and Programme Committees will normally be three years. Individual members may be re-appointed, but no member can serve for a period longer than six consecutive years.

The Business Education Council (BEC)

The Business Education Council is being established to examine technician education in commerce, for example, and there may be common areas of interest between BEC and TEC.

The Scottish Technical Education Council (SCOTEC)

TEC's operations will be mainly in England, Wales and Northern Ireland, SCOTEC providing programmes in Scotland.

Part 2: Practical considerations

Introduction

This section looks critically at the practical implication of TEC's policy statement and plans, comments on some of the practical difficulties being encountered and anticipates difficulties which will almost certainly affect works training.

A reading of Part 1 will have indicated that a major change in technician education is taking place, and after the next few years, the familiar 'National' and 'City and Guilds Technician' courses will no longer be available.

Structure of TEC — Membership of Programme and Sector Committees

Industry is represented, but an examination of committee membership reveals no NHS works membership. The NHS is a minority (works) employer and it is large employers who have a voice at national level. It is believed, for example, that the Post Office dominates programme committee A2 — electronics and communication engineering — understandably, perhaps!

Membership of Local (ad-hoc) Committees

TEC's structure allows local consultation, and we must make local needs known and devise programmes in conjunction with colleges. But here too, NHS works meet a problem — in the face of, for example, local MEB and CEGB competition, once again we are a minority employer. Colleges will only be able to offer viable programmes, themselves composed of viable units — (ie, requiring classes of 10 or 15 students). But if one manufucturing engineering company requires units in 'manufacturing technology and workshop processes', and can support five students, and a similar company can support a further five students to study that unit, how can NHS works staff expect to be able to use college resources in providing say, a 'terotechnology' unit for one or two students? (In fact, the Engineering Working Party began to devise two units in outline form — 'engineering safety' and 'management techniques', each with special reference to the NHS. It soon became apparent, though, that colleges would not be able to offer such units, because of non-viability. Ultimately, it may be possible to organise NHS units at one centre — perhaps at the Hospital Engineering Centre, but such considerations must be the subject of another paper).

As well as the problem of availability and content of relevant units, there is a problem in employer representation. RHA training staff Works Organisation Steering Committees and Working Party members have, relatively, a good knowledge of TEC. Some of the larger companies in the West Midlands do not seem to have that knowledge and so at meetings of employers and colleges, some employers say: "What's all this about and what can you provide?", and colleges say: "What do you want us to provide — the choice is yours". This will be, presumably, a short-term phenomenon. Colleges, from a sample analysis, seem to be offering either standard programmes or standard programmes with minor variations but still based on nationally devised units, and are presumably hoping that as employers gain a knowledge of TEC operations, they will be in a position to request changes.

The apparent lack of knowledge amongst some employers may mean that we have a short-term advantage — indeed so far as the Regional Training Scheme in Hospital Engineering is concerned, we were the first organisation to submit to Dudley Technical College proposals for replacing the Ordinary National Diploma with an Ordinary Technician Diploma. But unless we have a majority voice (in this case, two or three students per annum) we cannot expect to have our programme accepted in full. And, being less parochial, should we expect to use college resources in asking for, say a 'terotechnology' unit for two or three students when the remaining eight or 12 students from individual manufacturing industries require 'workshop processes'?

Whitley Council requirements

The recently introduced PTB Whitley Council handbook notes clearly the academic standards required by candidates for appointment or promotion. The qualifications listed are nationally recognised — an HNC in Building obtained in London represents the same achievement as an HNC in Building obtained in Birmingham, and it has been possible to work to national standards.

But consider: TEC programmes made up of, say, essential and optional units . . . standard units and college devised units . . . some credits for previous studies . . . different examination methods . . . colleges unable to offer every standard unit . . . and so on. The net effect of these considerations upon national qualification standards is hard to predict, but it seems likely that the PTB Whitley Council will not state the units required to be studied in a particular programme. To do so would be unworkable. Instead it may be that the Whitley Council will stipulate something like 'A course of study under programme committee . . . A3 . . .' together with 'or an alternative acceptable to the Secretary of State'.[3] It would then be for NHS employers, at selection interview, to investigate the units studied by candidates and at that time decide the relative worth of the award.

(Conversations with the DHSS Engineering Division confirm the above thoughts on Whitley ruling — but it is likely that although units will not be specified, recommended units, coded by TEC reference number, may be given. The DHSS Engineering Division will be pleased to answer any casework enquiries (submitted through normal channels), and it is reasonable to suppose that the DHSS Building Division will be prepared to do the same).

Bottom up or top down?

Under the policy statement and operating guidelines, programmes may be built up. We only know for certain (and even that certainty varies!) how certificate programmes and a few diploma programmes are shaping up. We do not yet know, for example, of their acceptability by professional bodies, or the acceptability for, say, university entrance.

There are no Higher Certificate level papers available. We are therefore considering Certificate and Diploma levels without any knowledge of the intention of TEC at the Higher level. This makes an assessment of the (lower) programmes of less value and may make the task of validating the Higher level programmes more difficult.

Critics argue that it would have been better to start 'top down' — work out the details of the final product and then ascertain the component parts.

There are too many unknowns for those used to the stability of national and City and Guilds technician courses, and, for example, for the Regional Training Schemes in Hospital Engineering and Building Supervision, we have decided to recruit to the diploma level programmes only when we are reasonably confident about programme validity, in order to ensure that there is no less opportunity than existed with the OND and HND courses.

Can you define your technician?

If you were asked to state the training and educational needs of NHS technicians, could you do it? *For TEC purposes* probably not; at least not easily. Here are some of the issues:

— What sort of technician have you got? — electrical, mechanical, building services, a generalist; design or operational; supervisory or staff — remember, too, that the technician categories cover, in AHAs, for example, all grades from Assistant Engineer/Building Supervisor up to and including District Works Officer and Assistant Area Engineer.[4]

— Can you decide the subject content? Should it be academic, ie be related to an understanding of theory, or vocational, ie biased towards application of the theory? Can you build up sixty hours' worth of mathematics by saying, for example, "Yes . . . solving quadratic equations of the type . . . is relevant to an electrical design technician".

— Specialisation versus generalisation — bearing in mind that programmes currently being offered affect 'courses' at about the ONC and OND levels, should we, in fact, carefully define our technician and specialise at this stage? The Engineering Working Party, for example, recognises on one hand that at AHAs some staff are required with a building services design expertise and therefore would benefit by study to obtain an award offered by programme committee B3 (building services); on the other hand, should the ONC and OND be replaced by their nearest TEC equivalent to allow for broader-based studies in the early career years?

— Does it matter? Even if the above can be adequately resolved, there is still the problem of viability and availability. If the local college does not offer what you want, your employee must travel to another college or study a programme not totally relevant.

Duplication of work

Who is examining TEC programme so far as NHS works staff are concerned? The DHSS obviously, but they, perhaps, do not have the local, regional knowledge particularly of college specialities (Garrets Green for building services, Birmingham Polytechnic for tribology, etc) — Region too, as you can guess from the production of this document, but Region do not have detailed information on AHA employees proposing to study — how many? Where? What previous educational background? And so on. The Works Organisation Steering Committee and its Working Parties believe that within the Region the level of knowledge about TEC and its implications is low, and in an effort to avoid duplication of work has issued the booklet on which this paper is based. But there may be other RHAs and perhaps AHAs too, who have already done some work on this subject and there must be considerable duplication of effort all round. The Enginering Working Party (which began to look at TEC before the Building Working Party) has recently strengthened its links with the DHSS in an attempt to avoid duplication.

Timetable

Within the area covered by the West Midlands Regional Health Authority we can expect the following general timetable.

1977/78
Certificate —
replaces Ordinary National Certificate

1978/79
Diploma —
replaces Ordinary National Diploma and Part 1 City and Guilds Technician

1979/80
Higher Certificate —
replaces Higher National Certificate and Part 2 City and Guilds Technician

1980/81
Higher Diploma —
replaces Higher National Diploma and Part 3 (Final) City and Guilds Technician.

Some colleges will offer opportunities for re-sits in the National and City and Guilds courses, though this cannot be guaranteed. (Perhaps at this point it is worth reminding the reader that it is only City and Guilds *Technician* courses which are affected. City and Guilds *Craft* Courses are not affected and will continue).

Standards

As mentioned in Part 1, under 'Failure rates', the Council believes that a student who . . . "studies reasonably hard and well, should be entitled to expect that he will be successful in his studies".

Colleges and employers alike are concerned about this aspect. It has always been important in technical subject areas for standards to be maintained. Could it be that an award is composed, say, of a high proportion of vocational subjects, with some of the success in studies based on hard work, and that some NHS personnel could be appointed on the basis of such a qualification? It is difficult to say at this stage. Careful selection of students, and employers' assessments of students upon and periodically after completion of the programmes may be necessary.

Of particular concern to those in engineering is that the current Higher National Certificate and Diploma allow exemption from the CEI Part I examination.* It is vitally important that this exemption can continue, and thus allow study for the degree level equivalent CEI Part II course or a degree course to run end on. For building staff a similar consideration must hold, with, for example, the standards of the HNC/HND being maintained in the Higher Certificate and Diploma, in order to allow studies for the Royal Institution of Chartered Surveyors' examinations to run end on.

Practical work

So far as we can tell from the information given in each unit there may be insufficient laboratory work in most programmes. In the workshop practice units this may mean . . . too little workshop practice!

Levels of study

We have become used to levels of study in the sense of, say, ONC first year, followed by ONC second year; the second year of study being generally more difficult than the first.

In Certificate and Diploma programmes three levels of units will be offered.

Level I — from which exemption will most easily be obtained.

Level II —. Level III —.

* Subject to certain other considerations.

A student who requires to complete 15 units for the certificate will not have to complete five at level I, five at level II, and five at level III. Only three level III units need be included.

This provision can be expected to create further variation in standards amongst students who, on the face of it, receive awards of the same title.

Modes of attendance

Although it is theoretically possible to study by various modes of attendance, or even a combination of modes, in practice this may not happen. Almost certainly, by custom and practice amongst employers, Certificate students will study via 'a day or half-day release and evening' and diploma students via sandwich courses.

For example: certificate — requires 15 units of sixty hours.

Intake, say 'O' level applicant with five exemptions from level I subjects. Then two years of study, five units per year on a day release and evening basis — isn't this the ONC format? Similarly —

Diploma — 25 units of 75 hours.

Intake, say 'O' level applicant who gains exemption from five level I units. Then two years of study by sandwich attendance, about 24 weeks per year — isn't this the OND format?

Alternatives will be possible, as the example document (taken in this case from Dudley Technical College) shows.

Who will TEC programmes affect?

So far as NHS works staff are concerned, immediate effects will probably be on only a small number.

From 1977 on —

Those craftsmen or craft apprentices who have successfully passed City and Guilds Craft courses and now wish to undertake technician studies —

(Note — *credit on a unit for subject basis or part-unit for subject basis may*

Possible Programme Arrangements

Level						
				—Unit—	½-Unit	
I	Mathematics	Physical Science	Workshop Process and Materials	Engineering Drawing	General Studies / Communication Studies	(a) (b)
Vocational Programme						
II	Mathematics G / Mathematics A	Engineering Science	Manufacturing Technology	Engineering Drawing and Design	General Studies / Communication Studies	(a) (b)
II/III	Engineering Science	Manufacturing Technology	Engineering Drawing and Design	Optional	Optional	(a) (c)
Academic Programme						
II	Mathematics G / Mathematics B	Engineering Science	Manufacturing Technology	Engineering Drawing and Design	General Studies / Communication Studies	(b) (d)
II/III	Engineering Science	Mechanical Science	Mathematics	Optional	Optional	(b) (d)
Four-year Vocational Programme						
I	Workshop Process and Materials	Engineering Drawing	Mathematics	General Studies / Communication Studies		(e)
I/II	Manufacturing Technology (II)	Engineering Drawing and Design (II)	Physical Science (I)	Mathematics G (II) / Communication Studies		(e)
II/III	Manufacturing Technology (III)	Engineering Drawing and Design (III)	Mathematics A (II) / General Studies	Engineering Science (II)		(e)
II/III	Optional	Optional	Engineering Science (III)			(e)

a = 3-year vocational programme; b = 3-year academic programme c = 2-year vocational programme (an unlikely combination); d = 2-year academic programme; e = 4-year vocational programme.

be given — intending students should carefully examine exemption possibilities with the college).
Those in Works Assistant Grades who wish to study for a qualification.
Those who wish to select a few units and study them, without enrolling for a complete programme. For example, electrical technicians who want to study, say, Illumination Engineering.
From 1979 on — as above and —
Those in Assistant Engineer/Building Supervisor positions who hold the minimum qualification of ONC and wish to obtain a higher qualification.

Other staff who would normally take, say, an HNC or possibly an HND course.

Action — some essential points

If you cannot find the information your require in this document, contact your local college or Training and Education Department, at Area or Region. They will either give you the information you require, or suggest a reference point;
Contact the DHSS (via casework enquiry route) to ensure that a proposed programme of study meets Whitley rulings. Unless of course any other guidance is issued by the PTB Whitley Council);
Ensure that the individual student's previous academic attainment is carefully made known to the college so that maximum possible exemption can be obtained;
Make any comments you have about TEC programmes and problems to the Training and Education Department of the Personnel Division of your Area or Regional Authority, as appropriate. *(To be concluded)*

References

[1] Technician Education Council Policy Statement June 1974. Copies available from 76 Portland Place, London W1N 4AA.

[2] In practice it seems that 900 hours of study will be obtained in 15 × 60 hour units for the certificate award.
[3] Possibly Programme Committees A3, A4, A5 and B2 and B3 being most commonly acceptable. (Since publication of this document the DHSS Chief Engineer letter CE(77)17 September 1977 has been issued and refers).
[4] Technician — as defined by professional institutions, for example, the Institution of Mechanical Engineers.

For recent entrants

Types of Contract

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The Author is Area Works Officer, Suffolk AHA. This article is based on a paper he gave to the East Anglian Branch on October 24, 1977.

Introduction

Generally, the type of contract chosen is dependent on the estimated cost of a project. We now have the following financial bands:
£0-£10,000 Revenue
£10,000-£50,000
Minor Capital Scheme
£50,000-£350,000
Intermediate Capital Schemes

Within standing orders for Suffolk, we have a breakdown of
£0-£2,000 worth of work being possible on 'quotation' and single tender or non-competitive tender, and
£2,000-£5,000 worth where competition is required but formal tendering procedures may be waived.

In my view, the complexity of the work rather than its cost is of greater importance and should be the main criterion used in deciding which type of contract is most suitable for the given situation.

Types available

As far as building and engineering work is concerned, there are six main types of contract, which are relevant and should be considered.

A lump sum contract
Measured term contract
Specialist term contract
Prime cost contract
Day work term contract
Small jobs or jobbing contract arrangements.

Lump sum contract

These are used in a situation where the contractor quotes a lump sum price for taking on and completing work shown and defined by written specification and/or Bills of Quantities and drawings. Specialist work is perhaps covered by prime cost sums. Before this type of contract can be regarded as suitable, the work must be reasonably certain in its scope and should be capable of being accurately defined and described to firms tendering. Small areas of uncertainty can, of course, be covered by provisional sums or provisional items.

Advantages
a. The client ends up with a known priced offer, and therefore knows his financial commitment before the work is started. This sum is obtained in competition, and the client is therefore reasonably certain that the work is being done at market value;
b. The contractor has a clear-cut defined objective and scope to use his most efficient methods;
c. The act of preparation of the specification/Bills of Quantities and drawings forces a detailed planning exercise which can, and does resolve difficulties at future stages and can avoid expensive hold-ups during the course of the contract. Time must, however, be allowed for this exercise and should be part of the recognised lead in time in any programme of work.

Disadvantages
a. This type of contract cannot be used in emergency situations, when there is insufficient time for the lead in time referred to above;
b. It cannot be used when the extent of the work is uncertain and cannot be accurately defined;
c. It cannot be used where there is a continuing multiplicity of small jobs.

There are four basic forms of the lump sum contract.
(i) *Agreement for Minor Building Works*
This form is only appropriate for works where little or no variation is expected and a schedule of rates for

valuing variations will not be required. It is a pre-requisite of this form that the extent of the work should be capable of clear definition in a specification and/or drawings. It is suitable for short contract periods of, say, 2 to 6 months' duration and of work valued up to, say, £10,000, but as stated before, this financial limit should not be the main criterion for deciding its suitability.

We now come to what is popularly and incorrectly, known as the RIBA form. This form is issued by the Joint Contracts Tribunal, the constituent bodies of which are: The National Federation of Building Trades Employers, The Royal Institution of Chartered Surveyors, the Association of County Councils, the Association of Metropolitan Authorities, the Association of District Councils, the Greater London Council, the Committee on Association of specialist Engineering Contractors, the Federation of Associations of Specialists and Sub-Contractors, the Association of Consulting Engineers, Scottish Building Contract Committee and, lastly but not least, the Royal Institute of British Architects.

There are two versions of this form.

(ii) *Standard Form of Building Contract, Local Authorities Edition, Without Quantities*

This is appropriate for more complex work, where variations are likely and indeed, expected, and where a schedule of rates will therefore be required for valuing the variations. This schedule may take the form of a priced specification or a schedule prepared by the specifier and priced by the Contractor. Where used in conjunction with maintenance it would be suitable for medium contract periods of, say, between four to nine months.

(iii) *Standard Form of Building Contract, Local Authorities Edition, With Quantities*

This form is suitable where, due to either the magnitude or complexity of the work a specification is inadequate and Bills of Quantities should be prepared and form part of the contract to provide a more analytical and comprehensive description of the works. Whereas this form could be applied to nearly all lump sum contracts, the documentation is normally only worthwhile for situations where the anticipated contract period is of at least six months' duration.

(iv) *The Engineering Institutions Model Form 'A'*

Appropriate for use in a lump sum situation for engineering works in a single contractor situation, where the scope of the work can be clearly defined. The disadvantage of this form is that it makes no provision for sub-contractors.

Measured term contract

This type of contract can be used for

a. Specific jobs where work can be specified but extent not defined.

b. For work of a broadly defined nature such as general maintenance.

This is a contract entered into after competition, with a minimum period of six months and a maximum period of two years. The basis is either a specially prepared schedule of rates, or the standard DOE schedule known as the Red Book, plus an agreed overall percentage adjustment. There is a distinct place for this type of contract within any maintenance organisation. Ideally it should be placed on a wide front to obtain maximum economy, possible on an Area wide basis and certainly on a District basis.

Advantages

a. No need to produce definitive drawings and specifications for each job, therefore labour and time saving.

b. The contractor can be used as an extension of the existing Works Organisation's own labour force — should it prove unsatisfactory can be disposed with much more readily.

Disadvantages

a. The operation can be undertaken only when adequate technical back-up staff is available, including preferably, an experienced surveyor. There is an on-going need to measure the work done.

b. Not viable in situations where a large in-house labour force is employed and is operating an incentive bonus scheme.

Practical considerations

(i) With a Forward Budget System in operation, it would be possible to identify and quantify, in financial terms, the forward work load over two years.

(ii) Furthermore, it should be possible to identify parcels of work related to Units and enable a maximisation of supervisory resources to be effective, work as required being called off by Unit Officers, allowing a greater concentration on monitoring of technical standards and the operation of plant inspections by senior District Officers. Draft forms to be used for the Invitation to Tender, setting out the various preliminaries etc, to be used in conjunction with this form of Contract where produced by the DHSS in July 1972. These, with modifications to make them suit present day conditions and our individual requirements, are available for the following:

a. Heating and Hot Water Installations.

b. Electrical Distribution Systems, external to buildings.

c. Electrical Installations in Buildings.

d. Decoration Work.

e. Building and Civil Engineering services.

Specialist term contract

This type should be used in a situation where term contract arrangements are required but it is intended to have only a partial service related to a specialist trade. One of the forms, as listed above, deals with that situation.

Prime cost contract (cost plus)

This is where the Contractor's charges are based on the actual cost to the Contractor of labour and materials used, plus either a fixed sum or a percentage on cost to cover the Contractor's overheads and profit. This, although it can be made the subject of a competitive tender, as a type of contract should only be used when the extent and nature of the work to be carried out cannot be defined in advance.

Advantages

There are none.

Disadvantages

Limited incentive to exercise economy in use of labour, materials and plant. There is in fact, a positive dis-incentive to economy as the overheads and profit element is directly related to the prime cost of labour and materials. Finally, the cost of the work cannot be known until after its completion. *This type of contract is not recommended* and there is no justification for its use in the maintenance field.

Day works term contract

This type of contract can be appropriate where the Contractor would provide workmen, sometimes materials, at agreed rates, which include for the overhead cost and profit element. As a type of contract, it could be of use in the building and

engineering field in cases where it is inappropriate to use in-house direct labour force, due either to the extreme geographical distance of the work location to the base of the DEL, or where there is a need to supplement it. Generally this type of contract is not recommended, and should be used only where no other alternatives are feasible.

Small job or jobbing contract arrangements

This type of contract is really an individual lump sum job of a very small nature. It can normally be let by an exchange of letters. In my introduction, I referred to the Standing Orders as they affect work in the Suffolk Area, and to the fact that there is a possibility of entering into a contract on the basis of a quotation. That is where formal tendering procedures were waived. To that extent, this type of contract would be appropriate. It is necessary, however, that even at this level of work, a contract should be formalised and you will remember that the DHSS issued a draft order form/invoice for jobbing work in June 1972. As far as Suffolk is concerned, it is considered that the official Works order form is an appropriate vehicle for the necessary formalisation.

Conclusion

It is appropriate to mention one other type. All the foregoing deal primarily with the creation or maintenance of an asset. There is, however, also a suitable building. That is the 'Form of Direct Contract' issued by the National Federation of Demolition Contractors — revised 1974.

Nucleus Hospitals

Designing for the future

By courtesy of the Board of Governors and the House Governor of the National Hospital, a London Branch meeting was held in the Wolfson Lecture Theatre of the hospital, on Tuesday, June 28, 1977, attracting a large attendance for a discussion on Nucleus Hospitals under the Chairmanship of Mr. W. Askew, Vice-Chairman London Branch.

Mr. S. Ratcliffe, Assistant Chief Engineer and Mr. B. Hitchcox, Superintending Architect, DHSS, the principal speakers were introduced to the meeting by Mr. W. Upton, the meeting organiser.

The first speaker, Mr. Hitchcox, said it was a privilege for him to be able to speak to such a large gathering of hospital engineers. He suspected, however, that many of those present did not have the chance or the time to involve themselves in research and development projects, but would welcome the opportunity to know more about the work being carried out at DHSS.

Nucleus hospitals were generated initially from the Best Buy and Harness projects as a measure to weather inflation, and accelerated politically in the atmosphere of a worsening world oil supply crisis, with the consequent national financial difficulties that followed it.

The Department's response to this situation was to design a small intensive use hospital, consisting of a series of clinical and services components.

Primarily, the Nucleus concept is the assembly of these 'standard parts' according to the specific requirements of the Medical Service Planning strategy determined by each individual project team.

A typical Nucleus solution, therefore, will be created by marrying together the service priorities of the District and the component parts to form an integrated and functional building, which is both economically viable and operationally flexible, to satisfy local needs both immediately it is built and later when it expands.

Mr. Hitchcox said that it was significant that, though initially the use of Nucleus was intended as a first phase for about 300 beds on a green site for a works cost of approximately £6 million, to be built within Capricode cost limits, there is now a second more valuable application. This lies in making additions to existing hospital developments, either of single departments or of groups or clusters of departments which, when built, will not only consolidate the effectiveness of the service, but may considerably reduce revenue costs.

Mr. Ratcliffe said that other basic features of the Nucleus concept were that—

(i) The hospital itself was capable of expansion by any sized increments at any time in its lifespan, and that the designs contained no built-in provision for the future.

(ii) Drawings should be re-used on different projects as much as possible with minimum alteration. These factors were reflected in the engineering design in the distribution of plant and the identical department/street function detailing.

The Harness design had required the preparation of fully detailed working drawings, leaving little flexibility for any individual preferences at all. With Nucleus, the Department were preparing details up to a preliminary stage which, whilst ensuring the optimum balance of planning, space and services, left final detailed trimming to the authorities responsible for building. In this way, the Nucleus designs could be re-used by putting together those elements required to meet the demands of any particular project.

The design work for the majority of hospital departments was now well advanced. Progress had also been made on kitchen design, stores and an industrial zone, and all were expected to be ready for a complete hospital in the near future.

The next speaker, Mr. Ratcliffe, went on to describe salient features of the Nucleus hospital. A minimal amount of Mechanical Ventilation had been provided. Instead, all windows were openable except in areas where fixed airflow patterns were essential. Core areas were supplied with notional cooling to offset the year-round gains inevitably met in internal areas. Where needed clinically, mechanical ventilation and/or air conditioning had been provided.

Smaller windows than used previously had been incorporated in the design to give the optimum balance between the need for daylighting, heat losses, and solar gains.

It was essential that the Nucleus design principles be accepted by the Fire Service Authorities at a sensible

level regarding adequate fire precautions, and the level had been agreed progressively at meetings between the DHSS Engineers and the Home Office held over the last two years or so.

Interest in the design and applications of Nucleus hospitals had resulted in active design work for Newham DGH, the NE Thames Region, and also Redhill and Chester hospitals, in other Regions, to name but a few in the more advanced stages of planning.

In conclusion Mr. Ratcliffe said that it had been estimated that over 50% of all hospital buildings in the United Kingdom were at least sixty years old. The 1976 Annual Capital expenditure was about £230 million, maintenance expenditure was about £120 million for the same year. As it seemed possible these sums would remain substantially constant and as we have no other figures, it seemed sensible to plan against them. Nucleus was seen as one method of extending the use of these resources as far as possible.

Discussion

In the following discussion many opinions and views were expressed. Answering an enquiry about the running costs for a Nucleus hospital, the speakers felt that these could only be set against a known project, although DHSS had taken them in account when arriving at decisions for Nucleus.

A questioner enquired if a comparison of running costs to the total cost of a building could be given, and Mr. Ratcliffe produced diagrams to show the relationship. On a question concerning window area, Mr. Ratcliffe said that it was a compromise related to the insulation, fabric losses and glazing ratio to ensure adequate daylight and to minimise heat losses in the winter months. A speaker suggested that labour was undoubtedly the most expensive commodity, and it was therefore essential to study and plan staff movements carefully within an environment. DHSS said this had been done within the limits of their planning. Mr. Hitchcox stressed concern with the hardening attitude of the Home Office and the local Fire Brigades toward fire protection and means of escape, not only in Nucleus but all hospital buildings, and the consequent disciplines that will be imposed on the client user.

Mr. Ratcliffe suggested that, of the total running cost for a typical DGH taken over sixty years, salaries accounted for approximately 50%, engineers services for about 10%. Nucleus hospital, Mr. Hitchcox concluded, guaranteed a substantial area reduction with lower capital costs, without loss of efficiency. It was now possible to complete a building design programme within 18 months from its first conception.

In answer to a question comparing a 300-bed hospital in Holland and Belgium to a Nucleus hospital, Mr. Hitchcox suggested that a Nucleus hospital could save approximately 20%-30% of the total area.

Mr. Upton congratulated the speakers for their very highly interesting discourse which the meeting endorsed with enthusiasm.

Product News

Fire Safety in Hospitals

Fire Safety in Hospitals, a new teaching package produced by the American National Fire Protection Association (NFPA), results from a case study of a tragic hospital fire that killed eight patients.

Designed to reduce the chance of hospital fires, the package provides valuable information for administrators, engineers, safety directors, staff, and architects of hospitals.

The package gives fundamental principles of firesafe operations in all hospital areas including patients' rooms, kitchens, laundries, and workshops. It covers specific hazards in electrical equipment, flammable gases, oxygen, combustible and flammable liquids, and smoking materials.

'Action' points are stressed for employees to correct and/or report fire hazards wherever discovered. In addition, procedures are given for fire emergencies, such as sounding the alarm, co-ordinating patient evacuation, and using portable fire extinguishers on small fires.

The package (SL-24) contains 79 35 mm slides, a cassette tape, an instructor's guide, and ten student workbooks. It may be ordered for $65 from the NFPA Publications Sales Department, 470 Atlantic Avenue, Boston, Massachusetts 02210, USA.

New Mass Spectrometer

The Medishield Corporation has produced a new Medical Mass Spectrometer which provides continuous breath-by-breath analysis of a range of respiratory gases in routine clinical situations, including oxygen, carbon dioxide, nitrous oxide, halothane, nitrogen, argon and helium.

For the respiratory physiologist carrying out diagnostic work in the lung function laboratory, the instrument enables a number of tests to be carried out by providing essential information of lung function and gas exchange. Its multigas capability makes it particularly versatile.

In the intensive care unit, the Medishield Medical Mass Spectrometer can be combined with a chart recorder to monitor and record inspired oxygen and expired gases, thus enabling ventilation to be controlled accurately. An automatic switching facility between oxygen and carbon dioxide simplifies long term monitoring.

The ability to provide continuous monitoring of gases permits the anaesthetist to achieve more precise control of administered anaesthetic, particularly where closed circuit techniques are used, and the paediatrician or neonatologist can use the unit to adjust the inspired oxygen level and ventilators accurately.

Controls are kept to a minimum, and those required for initial setting up and calibration are protected from unauthorised access by a locked panel. Calibration of oxygen and carbon dioxide can, in fact, be checked in room air at any time.

Reliability and simplicity have been major design criteria in the development of the Medishield Medical Mass Spectrometer. Designed to operate on the quadrupole principle, it uses components which have been tested over many years in a variety of industrial applications, and it is fully protected against power failure or incorrect operation.

The unit is compact and when mounted on its own trolley which

incorporates storage space for calibration gases and a chart recorder, it can be easily moved about the hospital by one person.

Only when the unit is not needed for several weeks should it be shut down completely. Otherwise, it is switched to stand-by mode, and can be ready for operation within minutes, working from a standard electrical socket.

The Medishield Medical Mass Spectrometer is not limited to research applications. Being a single channel instrument it is less expensive than other respiratory mass spectrometers and in clinical applications it combines the capabilities of several single gas analysers into one instrument for a lower cost.

For further information please contact (UK enquiries): *BOC Medishield, Priestley House, 12 Priestley Way, London NW2 7AF. Telephone: 01-450 8955.*

Overseas enquiries: *The Medishield Corporation Limited, Hammersmith House, London W6. Telephone: 01-748 2020.*

Water heater and blender tap

A new undersink water heater has been introduced by Stiebel Eltron to provide an efficient hot water supply for kitchens, cloakrooms, offices and surgeries. Known as the SNU 5, the new heater is normally sold in a boxed set with the company's WST blending tap — a single hole, high-neck swivel spout which enables users to preset the mix of hot and cold water.

The SNU 5 is a compact thermal storage heater with a five-litre capacity. It is an 'open-type' unit with a variable thermostat (35°C to 85°C) for maximum economy in use, and an integral frost protection circuit which allows the heater to be installed in an unheated location. The heater is connected to the mains water supply and has a 3 kW loading to ensure a rapid re-heat time.

The WST blending tap is specifically designed for use with the undersink heaters. The water temperature preselect facility saves time, energy and water compared to conventional mixing taps. The tap is supplied with plated copper pipes (tails) which can be bent by hand, and with compression fittings, for easy connection to the heater.

The heater/tap package also includes a chromium-plated tap hole stopper for use where the blending tap is replacing a conventional two-tap system and a chromium-plated stopcock which incorporates a half inch BSP to 8 mm reducer to allow the mains water supply to be connected to WST.

Further information: *Stiebel Eltron Ltd., 96 Belsize Lane, London NW3 5BE.*

Hospital roof waterproofed

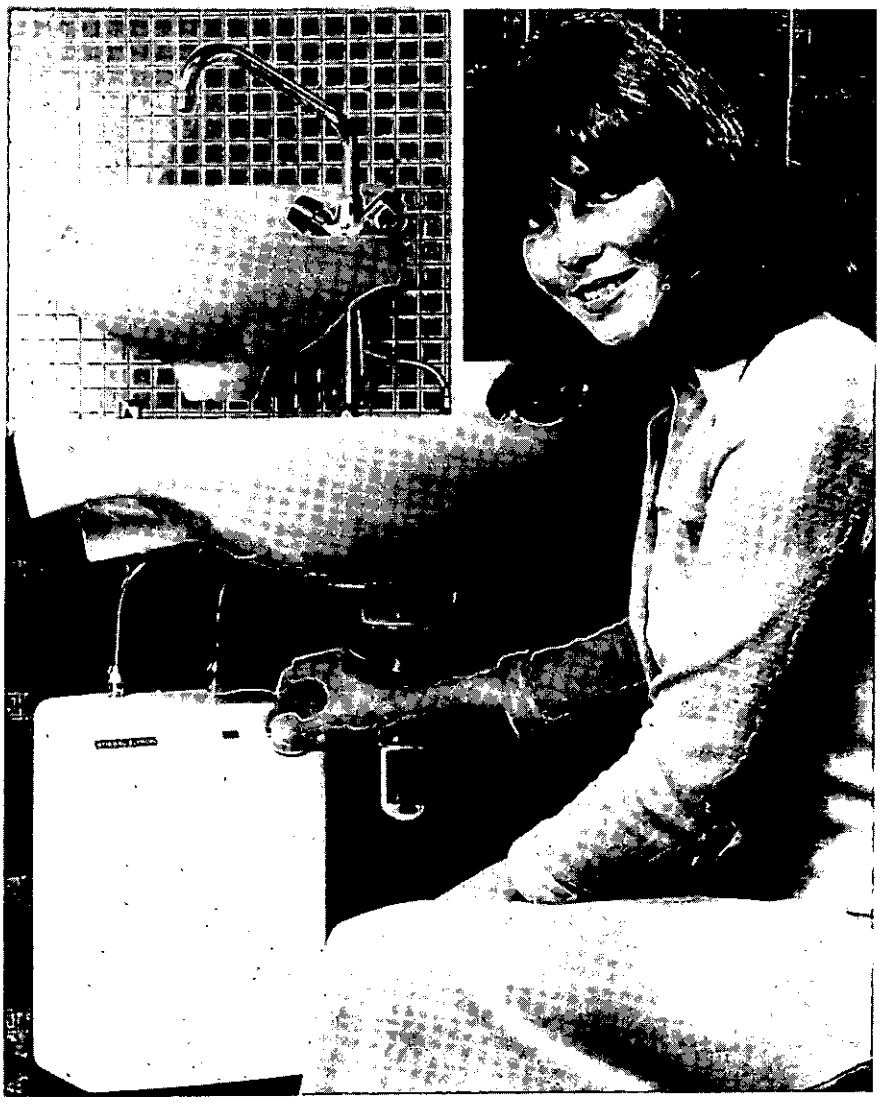
The Royal Hampshire County Hospital, Winchester, the general hospital for Winchester and district, has recently had its 2,000 square metres, 19th century roof waterproofed with the Evode System. The hospital, which deals with both medical and surgical cases, was built in 1868 by William Butterfield, who had consulted Florence Nightingale about the layout of the wards.

Although many alterations have been made to the main structure of the building the roof, which is of pitched timber and slate construction is still as the original design. In the recent past part of the roof had received a waterproofing treatment which had deteriorated seriously, and slated areas previously untreated were in urgent need of repair.

The decision to employ the Evode System was based on four main preferences: (1) prime cost and an assessment of long-term maintenance costs vis-a-vis other systems; (2) the fact that Evode Waterproofing Systems Ltd. manufacture the materials they apply, hence no split responsibility; (3) the company's five-year guarantee, plus its long-term reputation; (4) the Evode System carries Agrément Certification providing an independent assessment.

Further information: *Evode Waterproofing Systems.*

The Stiebel Eltron water heater and blender tap.



Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

GWYNEDD HEALTH AUTHORITY

TWO ASSISTANT AREA ENGINEERS

required, one for Area Headquarters, Caernarfon and one for area field duties.

These are new posts in the Area Works Department of this single district Health Authority, where a District General Hospital of 520 beds is under construction.

Salary scale: £4,371 p.a.-£5,262 p.a. plus £291 and second supplement.

Applicants must hold at least an HNC in certain engineering subjects or appropriate City and Guilds certificates and also certificates in industrial administration. Applicants must have managerial ability and be able to work effectively with colleagues of different disciplines.

The Area Works Officer, Mr. A. Hardy, will be pleased to answer enquiries and may be contacted at the Area Works Department, Bodfan, Eryri Hospital, Caernarfon, Gwynedd. Tel.: Caernarfon 4668.

Application forms and further information are available from: Area Personnel Officer, Gwynedd Health Authority, Area Offices, Coed Mawr, Bangor, Gwynedd, LL57 4TP. Tel.: Bangor 51551, Ext. 277.

Closing date: 21st November, 1977.

CLWYD HEALTH AUTHORITY — NORTH DISTRICT

HOSPITAL ENGINEER

for NEW DISTRICT GENERAL HOSPITAL soon to be opened at Bodelwyddan, Rhyl.
Salary scale: £3,351-£3,942 plus Stages I and II earnings related supplements and a special responsibility allowance of up to £150. Applicants must possess as a minimum HNC or HND in Mechanical or Electrical Engineering with endorsements in Industrial Organisation and Management, or acceptable equivalent qualifications, and have served a formal apprenticeship in either mechanical or electrical engineering.
Candidates will preferably have had a wide experience in the operation and maintenance of mechanical and electrical services and equipment such as is installed in a modern District General Hospital or comparable complex which includes gas/oil, automated steam raising plant, controlled water heating equipment, air conditioning and ventilation with centralised cooling plant, H.V. switchgear site electrical generation (steam), laundry equipment together with the usual general services.

Application form and job description from District Administrator, "Rhianfa", 83 Russell Road, Rhyl. Closing date 24th November.

Brent and Harrow Area Health Authority

Brent Health District

ASSISTANT ENGINEER

(Salary £3,900)

The Brent Health District has a vacancy for an Assistant Engineer to prepare drawings and specifications for minor capital works, particularly in the electrical engineering field. Applicants should have served an apprenticeship in mechanical or electrical engineering and should possess an ONC or equivalent qualification.

For further details, contact Mr. M. Woodroofe, District Engineer, on Ext. 223.

An application form and job description are obtainable from District Personnel Department, Central Middlesex Hospital, Acton Lane, London, NW10 7NS (01-965 5733, Ext. 601).

Portsmouth and South East Hampshire Health District

QUEEN ALEXANDRA HOSPITAL
COSHAM, PORTSMOUTH

ASSISTANT ENGINEER

Responsible to Hospital Engineer for day-to-day running of Engineering Department of busy, acute hospital, with a 500-bed District General Hospital about to be commissioned.

Salary scale: £3,063-£3,507 per annum, plus £291 stage I pay supplement plus 5% stage II supplement. (New entrants to Health Service start on minimum of scale.)

Apply to Personnel Officer for application form and job description.

Closing date 28-11-77.

Nottinghamshire Area Health Authority (Teaching)

NORTH NOTTINGHAM TEACHING DISTRICT
DISTRICT WORKS DEPARTMENT

Applications are invited for the post of

ASSISTANT ENGINEER

Initially the post will be based primarily at the Area Laundry, situated on the City/Sherwood Campus and applicants should therefore have experience or an interest in the maintenance of large laundries. There will also be opportunity in the future to undertake work of a more general nature within the District.
Minimum qualifications: ONC or equivalent in Mechanical or Electrical Engineering.
Salary: £3,063 per annum, rising by annual increments to £3,507 per annum, plus £291 and 5% per annum (minimum payment £130 per annum) stages I and II earnings supplements.
Application form and job description available from Personnel Services, Valebrook House, Sherwood Hospital, Hucknall Road, Nottingham. Tel.: Nottingham 625459 any time.
Closing date: 15th November, 1977.

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EARLSPORT PUBLICATIONS,
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London EC4
Telephone: 01-623 2235
by **November 23**

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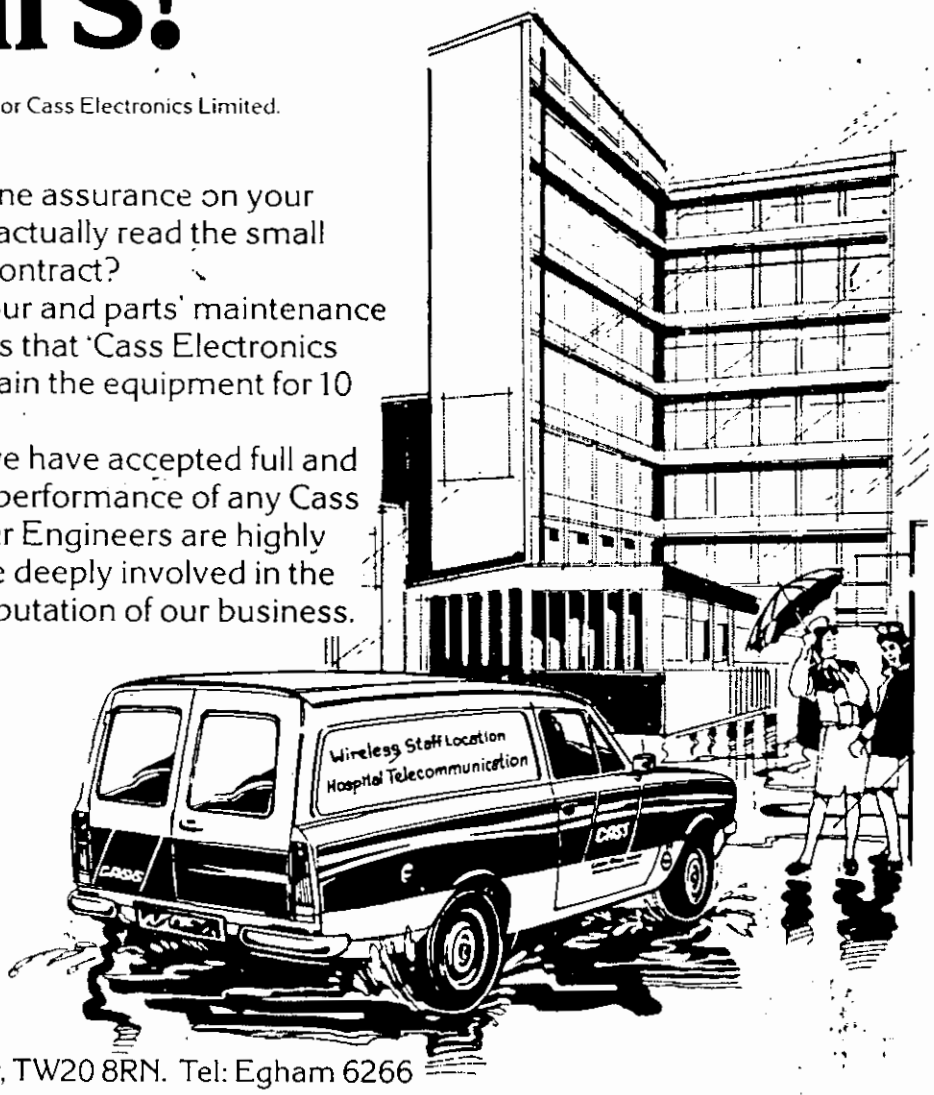

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