THE HOSPITAL ENGINEER

THE JOURNAL OF THE INSTITUTE OF HOSPITAL ENGINEERING

VOL XXIII No 10
OCTOBER 1969

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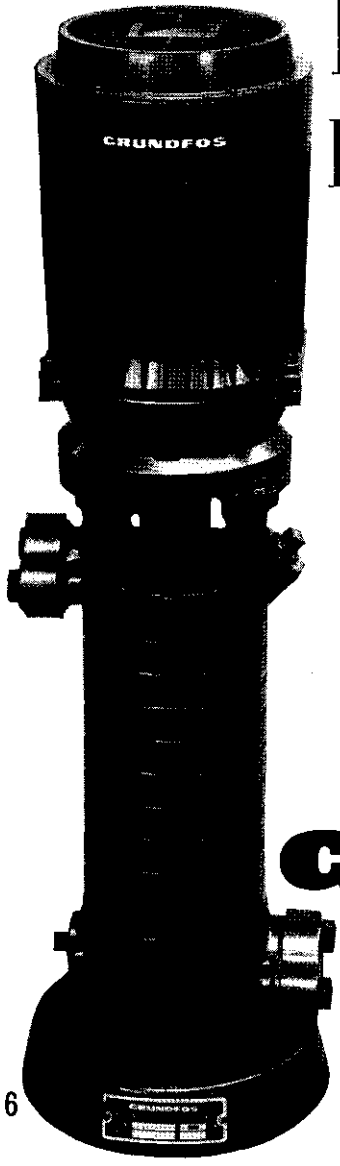

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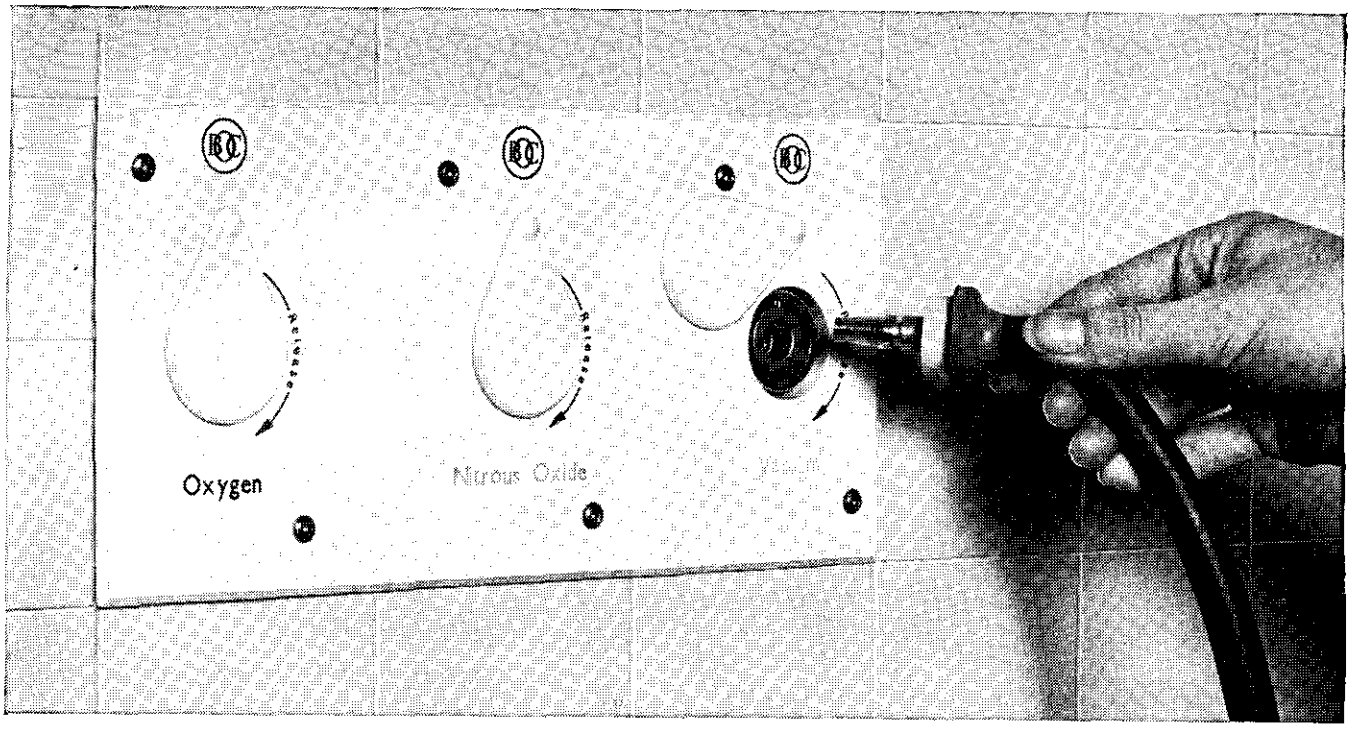

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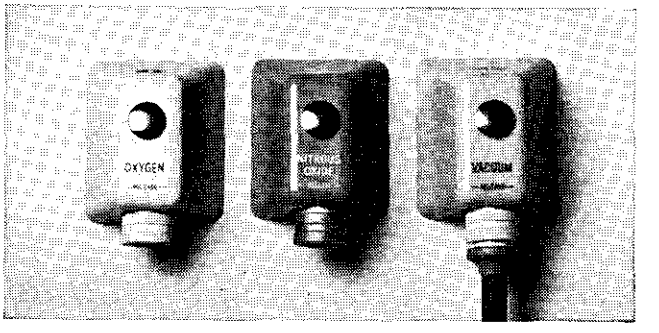

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THE
HOSPITAL ENGINEER

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OCTOBER 1969

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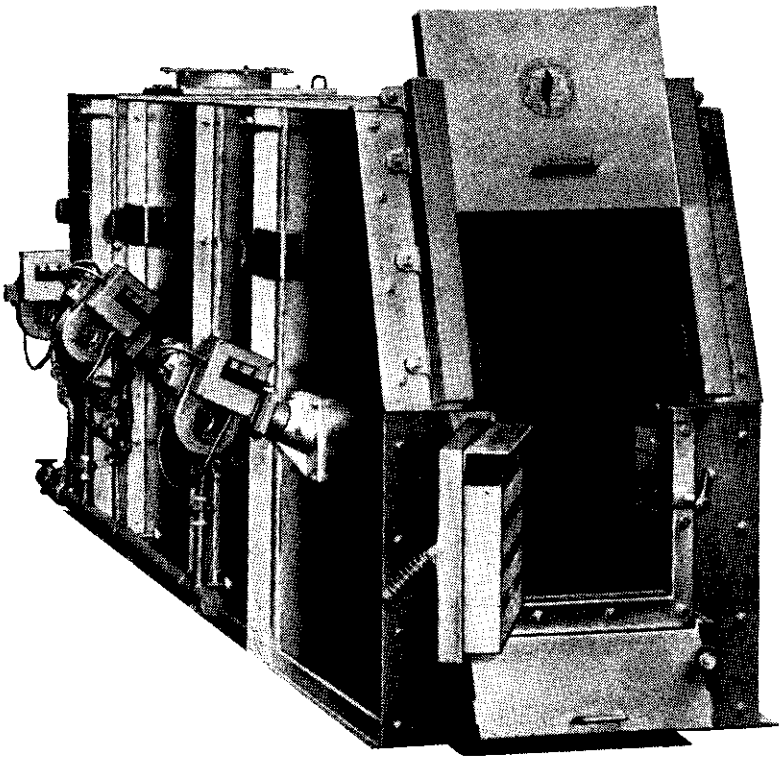
You won't hear of them!

You'll just hear less about waste disposal problems



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THE
HOSPITAL
ENGINEER

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The Engineer and his Journal

To the world, a Hospital Engineer is, inevitably, 'an engineer who works in a hospital'. What, then, is an Engineer? Would the world accept that a hospital engineer matches up to the following definition?

> One who is competent through his education and training to assume personal responsibility for developments in engineering; to apply the scientific outlook and method to the initiation, organisation and supervision of technical work; to give authoritative technical advice; and to exchange ideas with his fellows for the general furtherance of science and its applications.
>
> His general and higher education, practical training and early experience . . . form a broad basis upon which subsequent technical and administrative responsibilities may be built.
>
> Attainment of the degree of competency implied . . . will necessarily demand personal integrity as well as initiative and intelligence.*

In this particular issue of the Journal we have a paper entitled 'The role of the engineer in the hospital service', and the text of a talk on 'The complete engineer'. Hospital engineers are evidently aware that their status is a matter for concern; that their image is perhaps in need of repair.

As a first step towards improving the accepted status of members, the Institution of Hospital Engineers became, in 1966, the Institute of Hospital Engineering; thus opening its doors to consultants, manufacturers and others engaged in work connected with hospital engineering but not actually involved in the hospital service.

Now, the Journal, the voice of the Institute and its members, is to follow suit. As from next January, the title will become *Hospital Engineering*. As from this month, the policy of the Journal will be to tend towards a wider range of subjects, to invite discussion on development and other topics, and to narrow the apparent gap between 'hospital' and 'medical' engineering.

The basis of the Journal will remain the formal, authoritative paper—and a constant flow of these will be required if the Journal is to be worthy of an organisation of the standing of the Institute—but it is hoped to introduce features and reports of a more widespread, perhaps more specialised nature. This is not to say that it is to become unreadable—one of its objects must always be to keep the hospital in touch with the hospital engineer, as well as vice versa.

The hospital engineer has to bridge the disciplines of mechanical, civil and electrical engineering, and have some appreciation of electronics and materials science. The increasing variety of engineering services demands that he be a jack of all trades; its increasing complexity insists that he be a master of at least some. In both technical level, and in accepted status, the Journal must match up to the engineer.

* J.IEE, 1949, p.96

Opening Address

THE ROLE OF THE ENGINEER IN THE HOSPITAL SERVICE

by
A. S. Marre, C.B.
Second Permanent Under-Secretary of State,
Department of Health & Social Security

Introduction

I have to talk today about the role of hospital engineers. To put this in its setting, I want to start by saying something about the organisation of the National Health Service as a whole.

As you all know, Parliament has placed on the Secretary of State for Social Services the duty of promoting the establishment of a comprehensive National Health Service. He has to support him two Ministers of State, and a Department which provides them with advice and carries out their policies.

Different parts of the National Health Service stand in different constitutional relationships to the Secretary of State and his Department. The local health authorities, which provide a variety of personal health services, are County and County Borough Councils responsible to the local electorates; Parliament has laid specified duties on them, and has provided that they must secure the Secretary of State's approval to their proposals for carrying out these duties. The family-practitioner services (general practitioner, dentist, chemist and optician) are provided by the practitioners themselves, under contract with Executive Councils appointed in part by the Secretary of State, in part by the local health authority and in part by the professions themselves.

For the provision of the hospital service the Secretary of State has been given by Parliament the direct responsibility.

At the same time, Parliament has required him to appoint Regional Hospital Boards to act as his agents in administering the hospital service. And the Regional Boards are required to appoint Hospital Management Committees to act as their agents in the day-to-day management of hospitals. Teaching hospitals have Boards of Governors responsible directly to the Secretary of State, not through Regional Hospital Boards.

The general aim has been the maximum devolution of authority from one level to another. This aim is simpler to state than to achieve to everyone's satisfaction. At the local level, people like to feel that they are left alone to get on with their jobs. But some services and arrangements can best be organised nationally or regionally. Others, while organised locally, can be helped and improved by knowledge and advice derived from the wider span of regional or national interest. And what if, locally, things nevertheless are going wrong? Regional Boards are answerable to the Secretary of State for the standards and efficiency of the services in their regions, and the Secretary of State in turn is responsible to Parliament. The Boards must be expected to have at their disposal the means, and the information, to enable them to discharge these responsibilities. What is the right balance, and how it can best be achieved, is a subject for a talk in itself. I am straying from my main theme, to which I will now revert. That is the role of the engineer in the hospital side of this administrative setup.

Role of engineering staff

We have effectively three groups of engineers: one at the central department, in what is known as the Engineering Division; a second group at the Regional Hospital Boards providing mainly a design service; and a third group answerable to the Boards of Governors and Hospital Management Committees, largely controlling the day-to-day maintenance of the engineering services within the hospitals. I want now to look at the activities of each group in greater detail.

The department

Let me start, for convenience, at the centre. The engineers in my department are, like me, civil servants. (This includes our own new Chief Engineer, whom we were fortunate to attract in from the hospital world.) They provide their administrative and professional colleagues, and the Secretary of State, with engineering advice whenever they need it; they initiate, and play a large part in, much of the headquarters' engineering research and development work; and they review and help to establish standards in their professional field, after consulting interested parties.

Under the chief engineer of the Central Department there are three branches, each headed by an assistant chief engineer. These three branches deal with casework, central services and research and development.

As its name implies, the casework branch is the department's vetting unit. It is responsible for examining the programmes of work and specific schemes put forward by Regional Boards and Boards of Governors, to confirm that they fall within approved financial limits, and are designed in accordance with the department's standards of adequacy and economy.

The central-services branch has a variety of functions. It includes a costing section, which is the engineering parallel of the service given by the department's quantity surveying division on the building side, and is, therefore,

Mr. A. S. Marre, speaking at the opening session of the Conference. With him on the platform are Mr. J. Bolton (left) and Mr. G. A. Rooley, President of the Institute

concerned with the analysis of capital and revenue costs, the formulation of cost limits and general cost guidance. It has an intelligence section, which is concerned with the analysis and dissemination of engineering data, manages the department's engineering library (the services of which are available to any engineer in the hospital service), and is responsible for the publication of hospital service Engineering Bulletins—well known to the engineers here today. The branch also includes specialist sections dealing with mechanical, electrical, laundry and environmental work, with training and with planned preventive maintenance. These sections keep the department's standards constantly under review, and also initiate research and analytical work, in order to keep engineering-design standards at a proper and up-to-date level.

One of the sections which has been very active over the past few years is that concerned with planned preventive maintenance. It provides lecturers for regions etc., to explain the importance of this activity, and organises routine courses. These consist of a series of four separate days spaced at three- or six-week intervals, the time between being taken up with preparing surveys, calculations and schemes.

The training section, acting with the administrative divisions, is now charged with the responsibility for setting up a new training school at Falfield, near Bristol. We hope that this centre will help to train engineers for the service for the future, as well as help the present hospital engineers to keep up to date with the growing complexity of hospital engineering services today.

The research and development branch has the function of showing in practical terms what new developments are possible. It is at present engaged in the work of designing and building a new 800 bed hospital at Greenwich. It has played an active part in working up the 'best-buy' hospital project, which I am sure you all know about. The branch is also largely concerned with modular and industrial building techniques, and with taking a long forward look at the use of computers in building design and taking off quantities.

All three branches of the engineering division keep in close touch with outside bodies, such as professional institutions, the British Standards Institution, research associations etc. These wider contacts help to provide valuable ideas and experience for application to hospital work.

Work of the RHB engineering staff

Working outwards from the centre brings me first to the regional hospital boards. The RHB engineer, with his staff, are, of course, closer to the work on the ground than are those in the central department. As his main responsibilities are for the engineering aspects of new

hospital buildings and capital works, the regional engineer's staff includes professional and technical grades who can carry out whole-hospital design themselves, and can also supervise work which may be placed with outside consulting engineers. The Regional Engineer is the professional adviser to the Board on all aspects of engineering, and he plays a major part in forming Board policies for group laundries, central sterilising services etc. He also maintains very close links with the engineers of the HMCs, giving them help or advice, as appropriate, in the discharge of their responsibilities for day-to-day management.

Work of the HMC engineering staff

Moving out to the periphery brings me to the HMC level. Here the senior engineer is, of course, the Group Engineer. His main responsibility is for the operation and maintenance of engineering services and activities in the group. But from time to time he may have additional responsibility for the design and execution of minor capital works, and he may also be called upon to assist in the site supervision of capital works carried out by the RHB.

Group Engineers have hospital engineers to help them. Hospital engineers are responsible for the engineering services at one or more hospitals. There are also assistant engineers, who may work directly for the Group Engineer or for a hospital engineer; in some cases an assistant engineer has the direct responsibility for a smaller hospital.

Hospital engineers have the tremendous responsibility, which they carry out with great dedication (if I may say so), of keeping the hospital services and equipment going for 24 hours a day, day in, day out. Doing this may mean that one or more of them has to be at all times 'on call' for emergencies.

The array of plant and equipment that has to be maintained is constantly growing more sophisticated and complex, as well as more extensive. The wider range of expertise needed is inevitably calling increasingly for qualified engineering staff. In some cases help is being provided by the appointment of specialist staff such as electronics technicians.

The Tyler report, published in 1962, envisaged the assistant engineer as a young man who would be recruited into the service for training and subsequent promotion. This idea of an exclusive recruitment grade has not so far proved practicable. The first reason for this is that many men, some of quite mature age, had to be absorbed into the grade. Secondly, some of the duties they have to do could not be left to anyone without experience—I am thinking of cases where the assistant engineers are given the responsibility for a smaller hospital—and the service has had to try to recruit older men into the grade.

Work of teaching-hospital engineers

At teaching hospitals the engineer's responsibility has some special features. Because of their teaching and research, teaching hospitals need more complex and sophisticated equipment. Much of this is developed at the hospital, and the engineer plays an important part in this work.

Boards of Governors do not have professional engineers and architects in the same way as the RHBs. When there is some major development or rebuilding, a Board of Governors will always commission a consulting architect and a consulting engineer. But they rely on their own engineer to advise them on the proposals put forward, and the costs, and also about the installations and commissioning as the building goes ahead.

In an RHB, these jobs are done by the Regional Engineer, a professional engineer, and several Boards of Governors at teaching hospitals where some major development or rebuilding is taking place have appointed a professional engineer who has a responsibility for capital work as well as maintenance.

Change and growth in engineering services

So much for the general picture. But I would not like to leave anyone with the impression that the structure of the service and the demands made upon it are static. Change and growth are taking place all the time. The amount of equipment is constantly growing, and so are the services which it provides. So also are the numbers of engineers in the service. To take the last point first, I see that staff numbers, taking regional, group and hospital engineering staff together, have grown from 2 206 in 1964 to 2 573 in 1968; an increase of over 16% in four years. If we take group, hospital and assistant engineers only, the increase is 30%. Engineering takes a bigger and bigger proportion—now something like 40% —of the total capital cost of new hospital building, and there are more and more installations as it becomes apparent how much help machines, in the widest sense of the word, can give. I am thinking of diagnostic apparatus, and machines for treatment, monitoring and automatic testing. In addition, the 'traditional' services of water, heat, gas and electricity become steadily more sophisticated each year, and we have piped gases, air conditioning, filtration and so on.

Our difficulties in getting staff, and the fact that they cost more and more, provide a constant incentive to replace staff with machines. We need to do new tasks with machines, rather than people, whenever possible.

Within the memory of many of the older people here, electronics meant 'the wireless'—steam radio! Now you would find difficulty in walking through more than three rooms of a hospital without finding an elaborate piece of diagnostic or treatment equipment, a call system, or some supervisory system, probably based on modern solid-state electronics.

Modern hospital engineers have substantial responsibility for all this. It has not only increased their work burden but meant that they have had to learn entirely new skills. It has also meant setting up workshops of a new kind, so as to service equipment quickly and economically. Another example of equipment growing rapidly more sophisticated is the vital 'steriliser'. What was at one time simply a pan of boiling water is now an elaborate device, and it involves high vacuum, cycle timing and temperature control. Elaborate machinery of this kind can sometimes be disconcertingly temperamental, and in spite of this the services must go on without a hitch. You can almost equate the satisfactory operation of sterilisers with the satisfactory running of the hospital.

I could go on almost indefinitely dealing with the new machines and skills which the modern hospital requires to be provided and maintained by the engineer. All of you will know more than I of these. The fact is that there is no sign of slowing down in the increase in the amount and complexity of equipment. On the contrary, there are signs that it will build up. Modern medicine is finding that it needs more and more tests or factual data for a diagnosis. The demand for laboratory tests rises dramatically every year, and we are now reaching the stage where it can only be met by automated equipment. In addition, the department is financing some projects where computers will be linked to laboratory auto-analysers. Not only are computers already being used in RHBs, but increasingly they are being installed in hospitals together with computer-controlled communications network. Supervisory monitoring of engineering services could easily come within a quinquennium. Even though specialist contracts are arranged for the maintenance of computers, it is clear that automation, including computers, will increasingly impinge on general engineering services, and that the responsibilities of engineers will increase.

Training

Growth and change, more sophisticated equipment, increasing specialisation, all point to the importance of the next subject I should like briefly to touch on: training.

We need good training facilities, not only because this is the way to produce good engineers, but also because it helps recruitment. The Department of Health recognises this, and accepted, some years ago, that it was necessary to have something in addition to the basic technical training. Men needed to be specially equipped to deal with the particular problems of hospital plant and installations.

Some of the expertise can be learnt on the job, but most of it needs a properly equipped training environment, with trained instructors. It follows that the ideal arrangement is a special hospital-engineering training centre. Premises for the purpose have been acquired at Eastwood Park, Falfield, near Bristol—to which I referred earlier—and plans are going ahead to bring them into use as quickly as possible.

In formulating these plans the department has the help of the advisory committee on hospital-engineering training. This committee was appointed early in 1967 by the Minister of Health, in consultation with the Secretary of State for Scotland. Its terms of reference were:

> 'To advise on the content, organisation and management of the education and training of engineers and craftsmen in the Hospital Service.'

The committee has at its disposal a wide range of experience. It has representatives from the Department of Education and Science, the Post Office, the health departments, training departments of large industrial concerns, RHB engineers, hospital-group engineers and hospital administrators, as well as from the trade unions. It meets under the chairmanship of our chief engineer. It will advise on the equipping of the engineering training centre, and on the details of the training to be given to design engineers, hospital engineers and craftsmen, with emphasis on design, maintenance and operation, respectively.

To equip the centre, plan the courses and recruit the staff will take time. So, for the time being, employing authorities are being encouraged to use other training facilities. The Institute of Hospital Engineering, whose conference we are attending today, has for the last five years been running a series of residential courses for hospital engineers at Keele University, and there the emphasis is on management and administration. The Ministry of Public Building and Works also do some useful courses at a training centre of theirs at Cardington, and a good many private firms run training courses in special subjects, such as automatic controls and sterilisers.

Safety

While on the subject of training, I should like to add a few words about a matter with which engineers have always been particularly concerned, and where staff training and instruction can make a major contribution —safety. Employment in a hospital is probably one of the less hazardous occupations, but there have been some serious accidents which could have been prevented if established safety procedures had been adopted.

Each hospital authority requires a programme aimed at preventing accidents involving members of the staff, patients and the visiting public. A satisfactory safety programme needs the active interest and support of all members of the staff, and the role of engineers here is crucial.

For some time the department has seen the need for some general guidance on accident prevention. Many of you will be familiar with the draft technical memoranda that have already been issued about piped gases and high-voltage installation. We hope to follow these with a more general document dealing with the safety of other engineering installations and equipment.

Many accidents occur when people are working in unfamiliar circumstances and have not been made aware of possible dangers. Younger members of the staff have to be properly instructed and supervised, and I hope that the training centre will play a useful role here by providing facilities for practising safe techniques and procedure on appropriate plant and equipment.

Maintenance and running costs

I want now to turn to just one more of the engineer's many and varied responsibilities, without implying that I shall then have covered the whole range. I expect many people find building new hospitals the most glamorous side of hospital engineering. But this, perhaps, does less than justice to the contribution which engineers make to running and maintaining our existing and new hospitals. The cost of engineering maintenance and the running of engineering services, including fuel and electricity, is now of the order of £50m/year. This work entails tasks of effective management which possibly exceed in difficulty those associated with capital works, where the use of formulas may make it possible to check reasonable and economic capital costs. With such large sums of money being spent on maintenance and running costs, it is clearly not only necessary that they should

be undertaken in the most economical way, but also that this should be demonstrated.

In this context, I want to pay particular tribute to two activities of the engineering profession. First, for the way in which they have for many years computed the overall capital, maintenance and running costs of engineering services over the life of a new building. This is, of course, the proper assessment when taking design decisions. Secondly, and equally important, for having codified the proper maintenance of the various items of plant, in what is generally known as the 'planned-preventive-maintenance system', which results in greater efficiency and improved service. We are very keen to see planned preventive maintenance implemented nationally, and arrangements have been made for about 100 hospital and assistant engineers to attend courses run at headquarters this year. Building and engineering maintenance costs are currently about £40m/year, and the engineering element probably accounts for more than a third of this. Planned preventive maintenance secures not only good value for money, but also a reliable and efficient service with the minimum interference with medical use. It also lends itself to the necessary task of working out national incentive-pay schemes. Engineers are, I believe, fully convinced of the merits of p.p.m., and I hope that they will spread the gospel among their colleagues. Nationally, at the end of last year only 14·6% of beds were covered by operational schemes of planned preventive maintenance. The 'best' region had 34·6% coverage, and the 'worst' 3·5%. There seems to be some room for competition and emulation here!

Two other connected activities are also organised at headquarters. These are national reviews, and the assessment and promulgation of 'norms'. For example, there are reviews of electricity tariffs, so as to provide data for negotiating to get industrial tariffs for hospital boards nationally. As a result of these reviews it is also possible to assess the complex and variable tariffs against demand patterns for various types of hospital, and to reduce them to formulas so that hospital engineers can choose the best type of tariff. 'Norms' for items such as boiler houses (quoted, in this case, as cost per therm) are determined after reviews, and are promulgated so that management attention can be focused where it can be of the most benefit.

Career prospects and reorganisation

I have tried briefly this afternoon to show how the engineer fits into the administrative framework of the hospital service, and how his indispensable and unique contribution has been developing and expanding. I want finally to say something about the future.

You may be wondering about the effect on hospital-engineering services of possible changes in administrative organisation that have been the subject of much discussion both within and outside the National Health Service. Last year the then Minister of Health published a Green Paper on the administrative structure of the health service. Starting from the requirement that all the different kinds of treatment that an individual may need, in hospital or in the community, should be readily available, the paper developed the theme of a unified health service to replace the present tripartite administration. The proposals have been widely discussed, and the Secretary of State has considered many memoranda, including those submitted on behalf of bodies representing hospital engineers. Many comments accept that there is need for change, but suggest that to be effective the day-to-day administration should be based on a smaller unit than the 40 or 50 area boards suggested in the Green Paper. The Secretary of State has explained that he is now considering whether, to overcome this criticism, a two-tier system could be devised, with districts as the lower tier and above them a second tier of regional authorities, probably much smaller in number than the area boards. He will be putting forward revised proposals as soon as possible but not for some little time.

I know of the concern which is felt by engineers about the effect of the proposed reorganisation of the service. I know also of the uncertainty felt about the future of their building-maintenance activities, for which many engineers have responsibility, either with or without the assistance of a building supervisor. As you probably know, an independent committee has been set up, under the chairmanship of Mr. Woodbine-Parrish, to look into the whole question of hospital-building maintenance, and the work and qualifications of building supervisors. Their report is expected this year; its recommendations could well effect the responsibilities of the hospital engineer.

Whatever organisational changes come about, either as a result of a general reorganisation or of the Woodbine-Parrish committee recommendations, they will not make any difference to the fact that there will still be the hospitals to look after and new ones to plan, and that we must keep up the forward drive that is developing as engineers provide the growing expertise necessary for the modern hospital service. If there are any changes that affect engineering staff, they must be carried out in a way that is fair to them. The staffing problems for engineers, as much as for others, will have to be identified, assessed and dealt with in consultation with representatives of staff interests.

This brings me to the last point I want to make—career prospects. This is not the occasion for a talk about salary scales or complements. As I said earlier, we look to you engineers to reduce the manpower requirements in hospitals by machines, wherever this is economic. But whatever the amount of money which can be made available for the Health Service—and you will realise that, while its needs sometimes seems limitless, the amount which the country can afford to devote to it, in view of the competing claims of other services, is limited—I am certain that we are going to go on having a steady, inexorable shift to an ever-increasing proportion of engineering participation. The original poor-law building, with oil lamps and a shallow surface well for water, required no engineer for either construction or maintenance. Tomorrow's hospital—part computer managed—will be packed with sophisticated engineering plant. Somehow our planning, training, complements and salary scales must match the needs of the situation. I see no reason for any competent engineer of any grade in the Hospital Service to fear a shortage of work, but rather to look forward to an increase in the scope and fascination of tomorrow's tasks; a fascination which many laymen envy you.

Best-buy hospitals

by B. R. Joseph,* C.Eng., M.I.C.E., M.I.Mech.E., M.I.E.E.

Mr. B. R. Joseph, giving the final paper of this year's Conference

* Department of Health & Social Security

This paper is intended to indicate the basic design concepts of general interest. It is an introduction to the detailed presentation made to the conference on 4th June 1969.

The hospital provision of the health service is currently being planned on the basis of district general hospitals. These serve regional communities of between 150 000 and 200 000 people, and contain most specialities, with the exception of the 'super-specialities'. Nevertheless, it has been difficult to provide complete new hospitals at any one time, owing to the need to spread capital expenditure. The project described is an attempt to reduce the cost, and at the same time produce an improved service within the existing patterns of care.

By applying concepts such as intensive in-hospital treatment, full use of the accommodation within the hospital, and, where necessary, multiple use of space and facilities backed up by the fullest use of the community health and welfare services outside the hospital, it has been found possible to provide a hospital of 540 beds at a cost of £3¼m. This type of hospital, which is at the moment being designed for Bury St. Edmunds and also for Frimley, provides an equivalent service to that of a traditional hospital having 725 beds and costing £5½m—saving something like £2¼m or 40%. The important aspect of that saving is not merely that of getting a cheaper hospital for its own sake, but that over £2m is made available to improve the health and welfare services of the country further.

The hospital acts as the focal point of the health and care of the community, but it can only complement the community's own health and welfare services. There is considerable evidence that, no matter how lavish the hospital provision, it cannot function efficiently without their support. This was the approach of the Ministry of Health project team when planning the two new hospitals at Bury St. Edmunds and Frimley, and it is likely to set the pattern for the planning stages of many new hospitals.

It is axiomatic that planning without policies is impossible. Efficient planning is certainly impossible unless these policies can be identified at all levels of the service. Operational policies can be considered as applying at four levels: area, whole hospital, department and room. The Ministry team concentrated their efforts on two of these.

An efficient hospital needs an efficient supporting

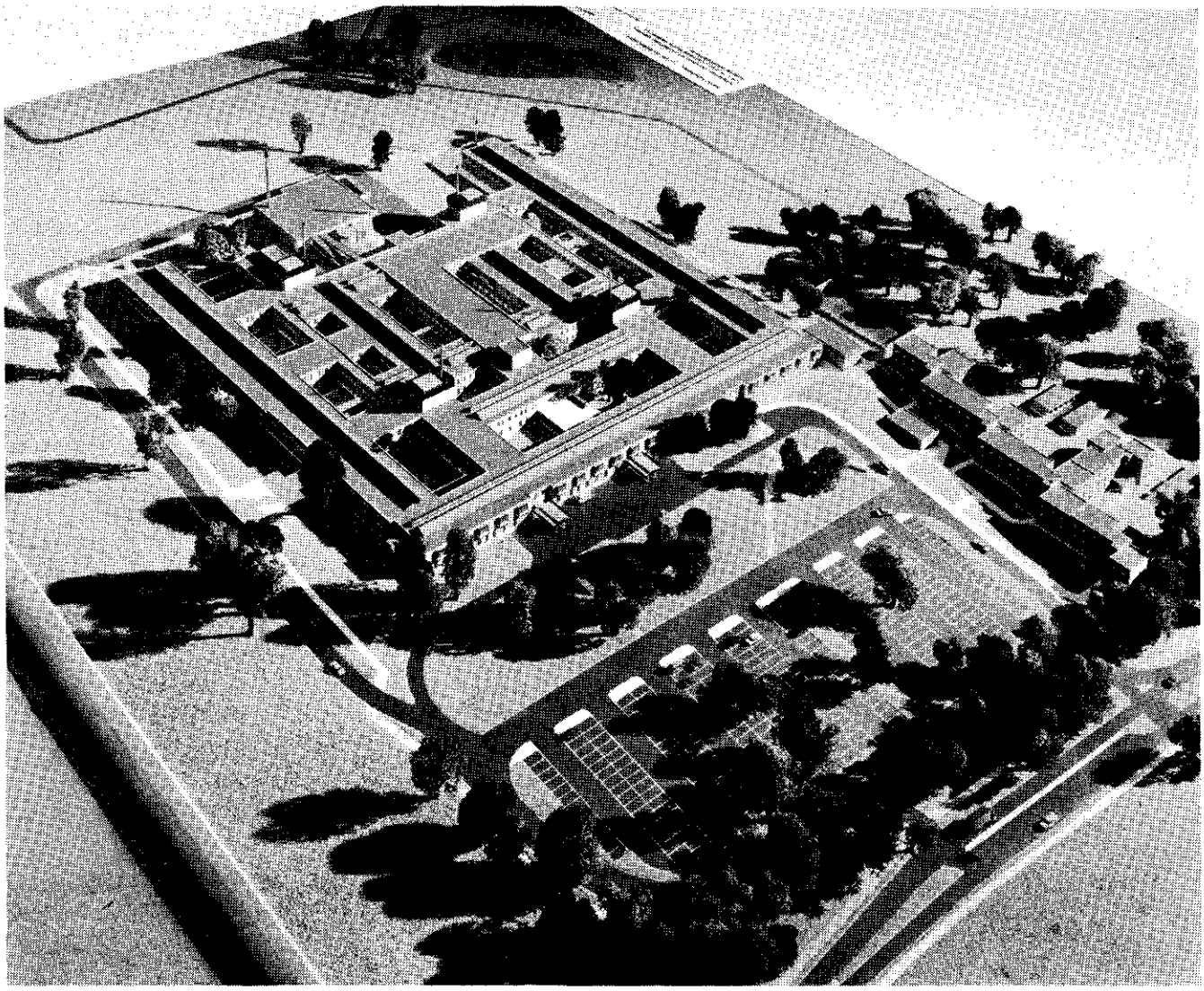

Fig. 1 Model of the hospital design. Note the open-ended square construction

community service, and this in turn needs efficient management and premises. The first step was therefore to survey and identify the existing local services, and to appraise their condition, paying particular attention to the psychiatric and geriatric services. The team was also concerned with the small local hospitals, often having a long tradition of service with pleasant and humane facilities, but difficult to integrate into an efficient health service. The surveys therefore included some consideration of possible alternative uses for the smaller units.

Not only did this area planning include the encouragement of such proposals as group practices and the secondment of nursing staff to them, but also the provision of supporting facilities such as central sterile supply and disposal units, laundries, area pathology laboratories, manufacturing pharmacies etc., which would improve the efficiency of many aspects of the health service, not just the specific hospital being planned. At all levels, every attempt was made to integrate all branches of the health service as far as existing legislation would allow.

The project's dual keynotes of economy and efficiency were applied at all levels in the hospital proper; traditional allocations, demarcation lines and degrees of responsibility were all questioned in the light of the need for growth and flexibility in the hospital.

Certain operational policies were laid down at a fairly early stage, and the implications considered as the scheme was developed. Progressive patient care, allied with nonallocation of beds and a housekeeper service, was proposed for the inpatient wards. It was assumed that the hospital would have an active policy of day surgery, and would incorporate day-hospital provision for both psychiatric and geriatric patients. It was also assumed that up to 100% of maternity patients would be able to have hospital delivery.

Studies on hospital traffic, supply and distribution systems made by the team suggested a predominantly horizontal distribution system, which led to the two-storey hospital broadly divided between inpatient care on the upper floor and outpatient care on the lower. Every attempt was made to blur the edges between

departments, to make the maximum use of accommodation irrespective of departmental demarcations.

The needs of ward flexibility led to a continuous ward band on three sides of the building, each ward accommodating the seasonal adjustment in ward-bed numbers by extension into the adjoining ward unit. This gives a very close relationship with the therapeutic–diagnostic department in the 'core' of the hospital. Ward-treatment rooms were removed from the wards and made a part of the central treatment suite. This also included theatres and delivery rooms sharing service facilities and changing accommodation.

At the lower level the outpatient department, antenatal clinic, fracture and accident departments were planned on a closely interrelated basis, merging also with the day hospitals and rehabilitation units.

Wherever practicable, design decisions were based on 'present worth' studies of the options available to the team. Some studies are listed later in this paper.

Studies on the interrelationship of building and engineering for various shapes of building confirmed the desirability of a two-storey structure with interspersed courtyards, incorporating clerestorey windows wherever required on the upper floor. This design provides a high degree of natural ventilation and lighting, and at the same time permits a compact building form.

The building consists of a series of structural bands, mainly of precast concrete components. 'H' frames are placed down the centre of each band, with floor slabs spanning to ring beams on load-bearing aerated-concrete walls. The use of aerated concrete for walls and roofs, and the achievement of a glass/masonry ratio of about 40% results in a high degree of thermal insulation.

The shape of the building is an open-ended square (see Fig. 1), and, as required by operational policies, it has been possible to locate departments requiring a high level of engineering services in the centre, or core, of the building. This concentration of high-energy-demand areas has contributed towards economies in plant and associated space requirements.

Steam demand is minimal because of the offsite industrial zone. The major requirement is two 10 ft³ autoclaves in the theatre sterile-supply unit; this is dealt with by local steam generation.

This limited steam requirement has made it possible to provide a boiler plant on a low-pressure hot-water basis. There are four rooftop boiler houses situated around the core zone of the building. The fuel in normal circumstances will be natural gas, and the plant and ancillaries are designed for automatic operation. Each boiler house accommodates cold- and hot-water plant, and all requirements for the hospital are met by the complex of boiler houses. The boilers are interconnected by a ring main on the roof of the hospital block (see Fig. 2).

Service mains from roof level are run in ducts associated with stairwells below the boiler houses, and enter a ceiling void on the ground floor. This void is part of the street 'ringing' the inner core of the hospital. Distribution to perimeter areas is by troughs which form part of the floor slabs.

An 11 kV supply serves two 750 kVA transformers located outside the buildings. Medium-voltage distribution is taken to the ceiling void and the distribution to perimeter areas follows the pattern described above.

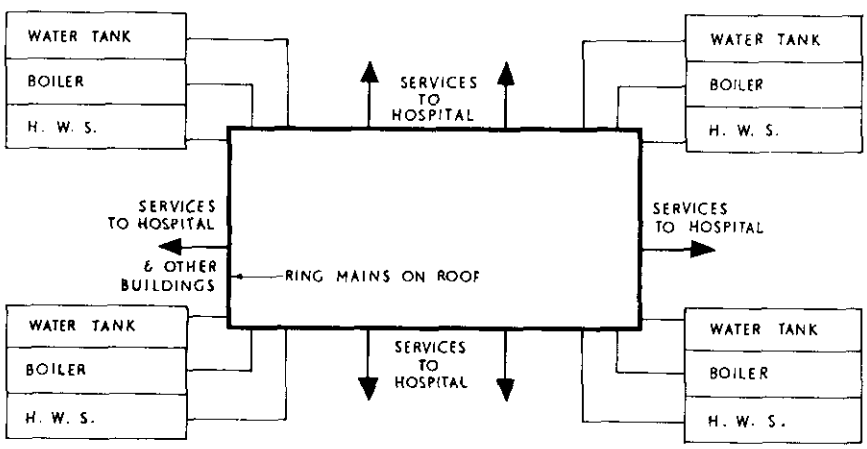

Fig. 2 Flow diagram of heating and domestic-water services from the roof-top boiler-house complex

In general, fluorescent lighting (including colour-matching units for clinical areas) is provided throughout the complex.

Mechanical ventilation is equated to clinical needs, and, wherever justified, is provided in internal areas. Air conditioning (incorporating cooling) is provided in the operating-theatre department.

The catering department is designed to provide a plated-meals service offering a choice of menu. It incorporates a single-conveyor-belt system, associated with food trollies having hot and cold compartments.

The supply and disposal system for the hospital is centred on an industrial complex consisting of a 'holding' store (4 days supply), works department and waste-incineration centre. Transport to and from the industrial zone is by electric floats via ramps (see Fig. 3).

The two-floor arrangement, and the associated operational policies and design of the hospital, has resulted in limiting the major vertical-communication requirements to two-bed passenger lifts.

Soil drainage above foundation level is based on the single-stack system, using u.p.v.c. throughout. Similar material is also used for rain-water disposal above foundation level.

The design of the engineering installations takes

account of the planned-maintenance system to be implemented in these hospitals, and duplication of plant is limited to those areas where failure of a service may cause serious inconvenience.

Site works are scheduled to start in September 1969, and commissioning teams have already started preparations for bringing each hospital into use on completion of construction during 1972.

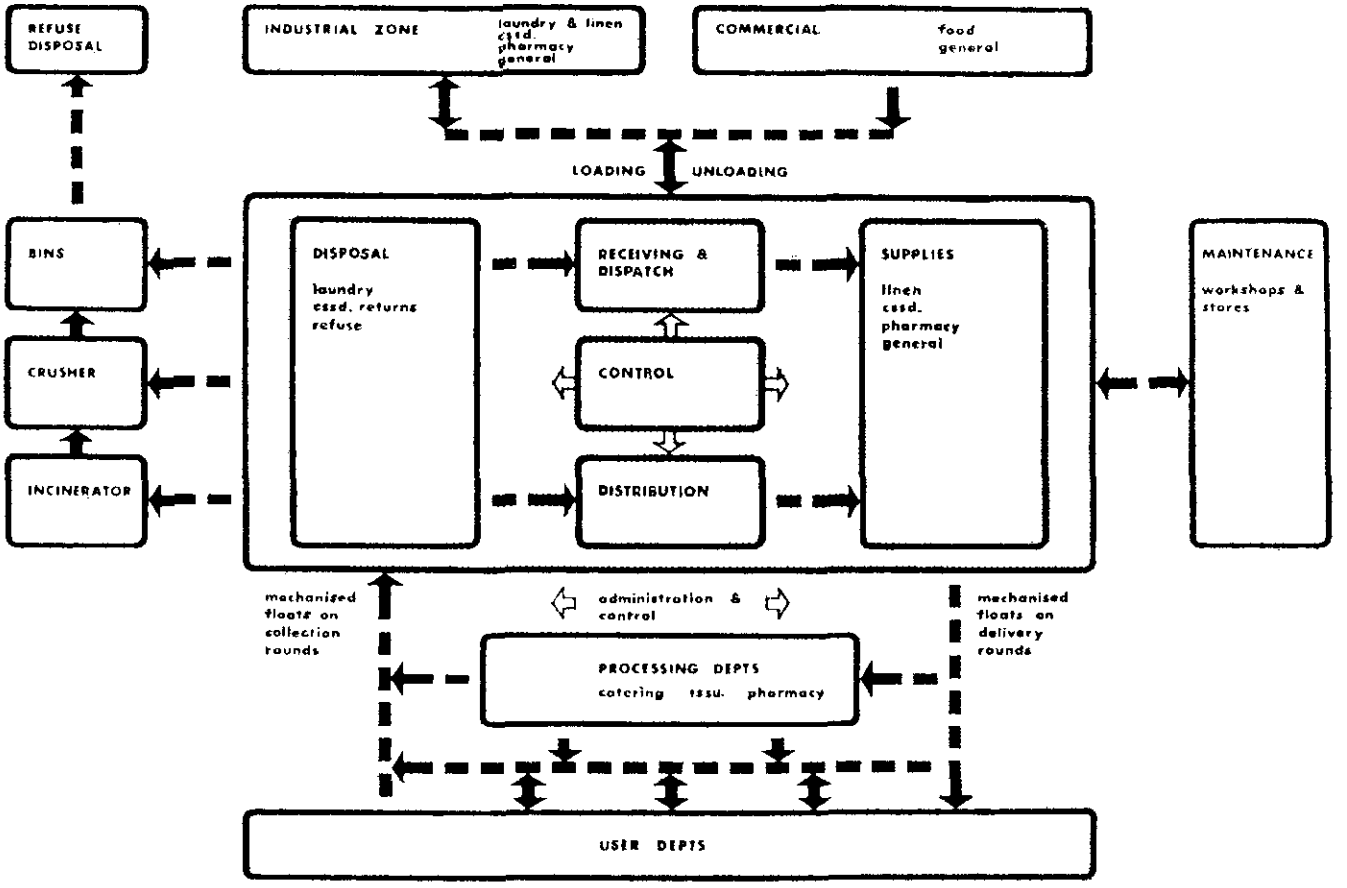

Fig. 3 Supply and disposal organisation

Examples of capital/revenue/cost comparisons

Construction

combinations of roof and wall construction; associated thermal insulation

types of structure, proprietory or otherwise

building: two-storey *or* three-storey

positions for boiler house; choice of fuel, and heat-transfer medium

roof: flat *or* pitched with clerestorey windows

enclosed pipe duct at roof level *or* mains run on roof

window construction; glazing

Operational policy

supplies

electric floats, and ramp from central supply point *or* lifts/hoists

catering

use of 'ready-dressed' vegetables *or* vegetable preparation in catering department

comparison of plated-meal-service systems

patients' beverages: from central catering area *or* from localised units in each 70-bed area

piped gases

piped oxygen and suction *or* portable units for intermediate and low-dependency areas

film processing (for six X ray rooms)

single dark room, with mechanical conveyor *or* two dark rooms, each providing direct access to three X ray rooms *or* three dark rooms, each serving two X ray rooms

operating theatres; instrument sterilising

offsite c.s.s.d. *or* onsite t.s.s.u.

Engineering

clock system: master-slave synchronous-mains-operated *or* battery-operated

telephone system: PABX3 *or* PMBX and PAX

lifts: electric *or* electrohydraulic

soil, waste and rainwater disposal: cast iron *or* copper *or* u.p.v.c.

all other pipework: u.p.v.c. *or* copper *or* mild steel *or* stainless steel

water supply (Bury St. Edmunds): borehole *or* mains

surface water (Bury St. Edmunds): main drainage *or* soakaways

heat source for residential accommodation: central *or* local

Disposal of Hospital Waste

by E. M. DAVIES,* C.Eng., M.I.Mech.E.

Introduction

The object of my paper is to highlight the subject of hospital waste, and to discuss methods by which it is removed.

In the paper there are illustrations of pieces of equipment, and I must point out that these are only typical of a type, and there could be many similar machines on the market both of British and continental makes.

The continuing introduction of disposables, the expanding area of complex packaging, changing medical requirements and higher patient-bed utilisation are a few of the factors contributing to the increasing problem of hospital-waste disposal. There are a number of methods of dealing with this waste, such as incineration, maceration, collection by local contractors, or collection by local authority.

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Hospital products for disposal

Typical products for disposal are as follows:

glassware	bottles and jars
metal cans	plastics
pathological waste	amputations
kitchen waste	paper
cardboard	human waste
medical and surgical dressings	wood
flowers	animals
	radioactive materials

Department of Health survey charts

In earlier years there was little factual information available to interested parties on the quantities of waste materials produced by hospitals. We have, of course, used certain average figures which were stated in BS 3316 (1960), 'Large incinerators for hospital use'.

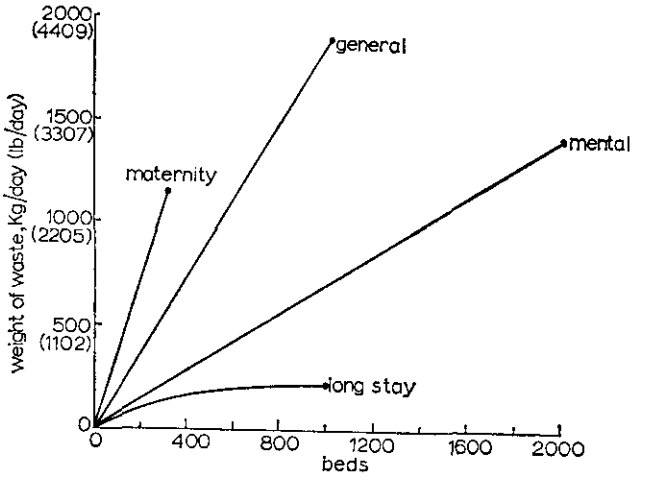


Fig. 1 Total-waste curves

However, in 1966-67, the Department of Health conducted a survey which has produced extremely useful information for indicating the loads of, and relationships between, different types of waste produced within a hospital. For convenience, these have been broken down into six classes.

Class A : Ward waste

ward and sanitary dressings, general ward waste, e.g. flowers
disposable waste-paper articles, floor sweepings; excluding uncontaminated tins, bottles, food waste, plastics and disposable bedpans

Class B : Plastics materials and dirty paper

disposable syringes, pituitory tissues
plasticised paper, food wrappings, paper cups

Class C : Theatre and laboratory waste

operating-theatre waste, human tissue
disposable theatre garments, plaster casts
pathological-laboratory waste, specimens, animals

Class D : Maternity waste

placenta, maternity dressings
disposable nappies, general maternity ward waste; excluding uncontaminated tins, bottles, food waste, plastics and disposable bedpans

Class E : Kitchen waste

all food waste, dirty paper from kitchen; excluding uncontaminated tins, bottles, and clean paper, cardboard, plastics

Class F : Clean paper

newspapers, letters, documents, cardboard, paper packing; must not have been in contact with infectious patients

One other item to which I will make reference later, not included in the list, is human waste.

Figures 1–5 show graphs produced by the Department of Health in their survey carried out in 1966-67.

Fig. 1 shows the relationship between the total waste curves for four types of hospital, maternity, general, mental and long-stay. Picking out a 200-bed hospital, the graph indicates that a maternity hospital produces about 750 kg/day, a general hospital about 400 kg/day, a mental hospital about 125 kg/day and a long-stay hospital about 90 kg/day. Note that the maternity and general-hospital curves increase at quite a steep angle, whereas the curves for the mental hospital, and, especially, the long-stay hospital, are flatter.

Fig. 2 shows the amount and class of waste produced in a long-stay hospital. The size indicated is up to 1000 beds, and the class of wastes normally produced are A, B, E and F.

The two larger classifications of waste appear to be general ward waste, and kitchen waste. Note that the area under curves *a* and *b* contains material normally suggested for incineration, the area under *c* is for material that can be incinerated, macerated, or taken for salvage, and the section bordered by *c* and *d* indicates material that can be taken for salvage or can be incinerated.

Typical figures taken from this graph indicate that a 400 bed hospital produces about

75 kg/day of Class A ward waste
25 kg/day of Class B waste
75 kg/day of Class E kitchen waste
40 kg/day of Class F waste paper

Fig. 3 shows the amount and class of waste produced in mental hospitals. The basic classes are A, B, E and F. As with the long-stay hospitals, the major amount of waste is contained in classes A and E. Reference to the sections for incineration, maceration, or salvage are as those referred to under the long-stay hospitals. Typical figures taken from this graph indicate that a 1 200 bed hospital produces about

375 kg/day of Class A waste
100 kg/day of Class B waste
400 kg/day of Class E waste
125 kg/day of Class F waste

Fig. 4 shows the amount and class of waste produced in maternity hospitals. This type of hospital produces a larger quantity of waste than do others in the general range of specialty hospitals. Classes A, B, D, E and F of waste are referred to. The area under *c* is normally considered for incineration, the area bounded by *c* and *d* for either incineration, salvage, or maceration, and the the area bounded by *d* and *e* for either incineration or

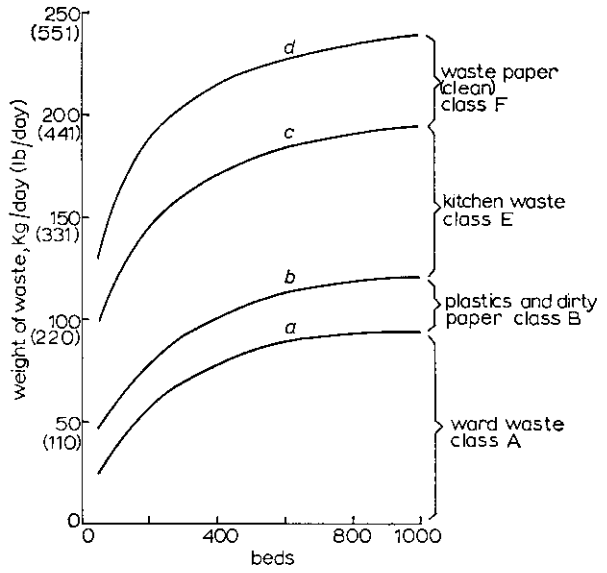


Fig. 2 Waste curves : long-stay hospital

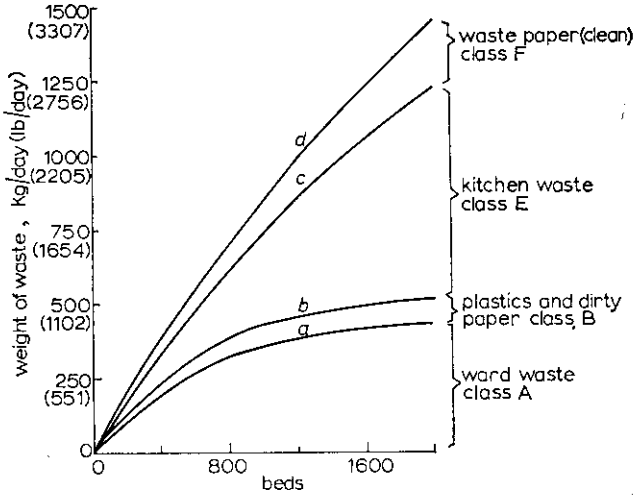


Fig. 3 Waste curves : mental hospital

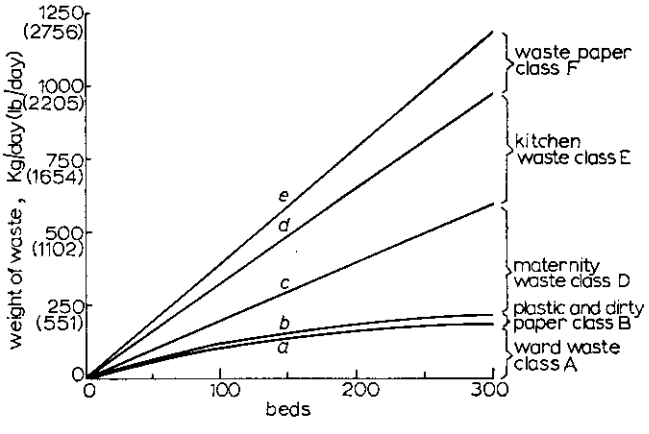


Fig. 4 Waste curves : maternity hospital

salvage. Typical figures from this graph indicate that a 200-bed hospital produces about

150 kg/day of Class A waste
75 kg/day of Class B waste
250 kg/day of Class D waste
250 kg/day of Class E waste
125 kg/day of Class F waste

Fig. 5 shows the amount and class of waste produced in general hospital of up to 1000 beds. All classes of waste are produced. The area under *d* indicates the normal waste for incineration, the area bounded by *d* and *e* indicates the waste for either incineration, salvage, or maceration and the area between *e* and *f* indicates the waste for either incineration or salvage. From this figure, for a 600-bed hospital, the following amounts of waste are produced:

375 kg/day of Class A waste
125 kg/day of Class B waste
75 kg/day of Class C waste
100 kg/day of Class D waste
200 kg/day of Class E waste
300 kg/day of Class F waste

Methods of disposal

The methods of waste disposal fall mainly into three categories: local authority, incineration or maceration.

Local authority

The 1936 Public Health (London) Act is not specific in referring to the removal of hospital waste. These are two sections which could be applicable.

(i) Section 87 :
'Removal of house refuse'

'It shall be the duty of every Sanitary Authority to secure the removal, at proper intervals, of house refuse from premises, and the cleansing and emptying at proper intervals of ash pits, earth closets, privies, and cesspools (if any) in their district, and the giving of sufficient notice of the times appointed for such removal, cleansing and emptying.'

(ii) Section 92 :
'Removal of trade refuse'

'If a Sanitary Authority are required by the Owner or Occupier of any premises to remove any trade refuse, the Authority shall do so, and the Owner or Occupier shall pay to the Authority in respect of the removal, a reasonable sum, the amount of which shall, in the case of dispute, be settled by an order made by a Petty Sessional Court on the application of either party.

'If any dispute or difference of opinion arises between the Owner or Occupier of premises and the Sanitary Authority as to what is to be considered for the purpose of this section as Trade Refuse, a Petty Sessional Court on complaint made by either party, may, by order, determine whether the subject matter of dispute is, or is not, trade refuse, and the decision of the Court shall be final.'

In my view, the majority of hospital waste falls into the category of house refuse. The major differing sections are theatre and pathological waste, and certain disposable products such as syringes.

This, to me, means that, provided that adequate containers and storage facilities are available, the larger portion of hospital waste should be the responsibility of the local authority. My own experience has shown that in different parts of the country the attitude of the local authority can vary considerably. Some are extremely helpful and provide a normal full service, as well as offering advice to the hospitals as to the way materials can be handled. Other authorities, I feel, have shirked their responsibilities, and have encouraged hospital authorities to process the majority of their own waste. Probably owing to the lack of knowledge, this has been accepted by many hospital authorities. Because of inadequate facilities and the problems of social conditions and infections, local authorities, in my view quite rightly, do not handle theatre waste. Some authorities do accept disposable syringes, but this has produced many problems with personnel.

It may be of interest to mention the information provided by one local authority concerning the removal of waste from a large new district general hospital currently being planned. They were prepared to accept class A, B, and F wastes, on the assumption that classes C and D were dealt with by our own incinerator, and that class E was dealt with by maceration. They suggested that eight $1\frac{1}{4}$ yd^3 containers would be necessary for the provision of a daily collection with the exception of Sundays. The basis of the collection would be one free day's collection per week, and a charge of 7s 6d per bin per collection for the days over and above the free-day collection.

However, if the hospital authorities were prepared to keep class F (waste paper—clean, dry and free of contraries, i.e., plastics and tinfoil), and the amount was guaranteed to be half a ton per day, they would be prepared to collect the rest of the waste mentioned at no cost to the hospital.

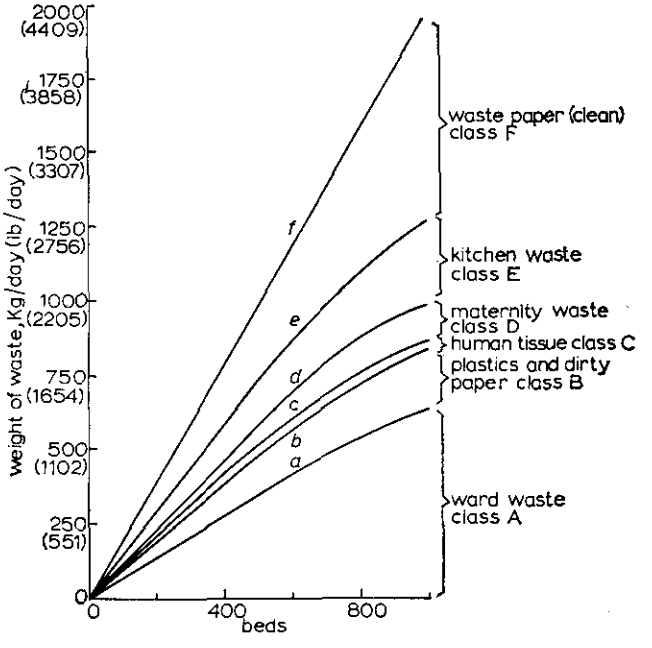


Fig. 5 Waste curves : general hospital

I suggest that this could mean that, if the hospital authorities were prepared to provide 6 times 8 containers, and associated storage facilities, the local authorities may be somewhat embarrassed at having to collect all this amount on one day.

The costs initially indicate that, bearing in mind an incinerator together with operating staff would have to be provided for classes C and D, it would be far cheaper for the hospital to deal with all consumable wastes. That is, of course, if the negotiations remain at 7s 6d per bin.

Incineration

There are two documents frequently mentioned concerning the requirements of a hospital incinerator; the most common is BS 3316 (1960) 'Large incinerators for hospital use', and the other is a manual issued by the Incinerator Institute of America. Both these documents contain useful information, but I intend to confine my observations to BS 3316.

'Standards for large incinerators'

What does this standard tell us? It quotes a combustion rate of 25 lb/hr per foot of grate area. It states states that 'no parts of the incinerator that can accidentally be touched shall have a surface temperature exceeding 95°C (200°F); the charging handle temperature not to exceed 50°C (120°F)'.

Fuels

The standard provides for the flexibility of using gas, oil, butane, propane and solid fuels. I cannot really understand the reference to solid-fuel incinerators for hospital use, as I have yet to see one in the hospital service. A direct approach to a number of manufacturers indicates that they would provide one if necessary, but the records show that very few, if any, have been supplied. Provision is made for flame-failure devices to be fitted where applicable. This is an obvious safety requirement.

Clean Air Act

We must, quite rightly, comply with the requirements of the Clean Air Act; the one currently in force is the 1956-1968 act. The act does not refer specifically to incinerators, but one assumes that for grit, dust and fumes, they are considered as furnaces burning solid waste or matter. Elimination of smoke production by correctly designed apparatus requires no further comment, but reference to grit arrestors must be made.

Section 6 of the 1956 Act (requirement that new furnaces shall be fitted with plant to arrest dust and grit) states that 'Subject to provision of this Section, no furnaces in any section of this building shall be used to

(a) burn pulverised fuel

(b) burn one ton or more of solid fuel, or solid waste'.

The 1968 Act repeals this, and under Section 3 states that 'Subject to provision of Section 4 of this Act, no furnace to which Section 2 above applies shall be used in a building to

(a) burn pulverised fuel

(b) burn at a rate of 100 lb weight or more an hour any other solid matter'.

This will obviously have an effect on hospital incinerators in added capital and maintenance cost.

Under Section 5 of the 1968 Act (measurement of grit, dust and fumes emitted from furnaces), reference is made to the measurement of grit emitted from the plant.

The working party which produced the report from which the 1968 Act was developed made specific reference to solids emitted by incinerators. They were unable to make recommendations on the acceptable levels, and suggested that a separate working party be formed to study this matter.

Basis of design capacity

The BS quoted states that 24 hours production of waste should be burned in an 8 hour shift which, in my view, is a maximum of 7 hours' working time. It refers to a material density of 10 lb/ft^3. This figure is known to vary from 5 to 15 lb/ft^3, depending on the particular operational policies at a hospital. I suggest that the design engineer should obtain information on the rate and density of material produced by a hospital if he is installing an incinerator on an existing site.

For a new site, I believe that 10 lb/ft^3 is a reasonable average figure. Careful consideration should be given to the amount of animals and amputations which need to be disposed of, and if this load is comparatively small, a solid hearth should be specified within the grate area. If the volume of this type of product is high, it is far better to consider a special incinerator with a total solid hearth for this purpose.

Recommendations for the siting, collection and burning of waste

Siting and installation

Although in some cases not entirely practicable, it is recommended that the incinerator should be placed so that there is as short a run as possible from the main waste-generating department. The incinerator should be housed in a building to provide adequate protection of the plant and the operator. It should be well lit and ventilated. An adequate supply of cold water should be available for regular hosing down within the building. Hot and cold water facilities should be provided for hand washing for the operator. The incinerator outlet flue should not be connected directly into the main boiler-plant flue.

Collection, transport and incineration of hospital waste

For an incinerator to be operated effectively, the following points are considered vital :

Staff

The incinerator is to be operated only by personnel who have

(a) been instructed and understand the plant manufacturer's operating requirements

(b) been properly trained in the correct procedures for handling and loading into the incinerator

(c) an understanding of the technique for maintaining correct combustion conditions in the incinerator, and at the same time conforming with the requirements of the Clean Air Act 1956-68.

Collection

Waste is to be collected regularly, and transported to the incinerator house in bins with well fitting lids, or preferably in sealed disposable containers of an appropriate size.

Storage

Where is is necessary to secure adequate periods of continuous operation, suitable arrangements are to be made for the safe storage of waste for a short time at the incinerator house.

Containers

If bins are used, they are never to be overfilled, and a sufficient number are to be provided to allow the requisite period of storage. After emptying, the bins are to be immediately cleaned, disinfected and dried, ready for reuse.

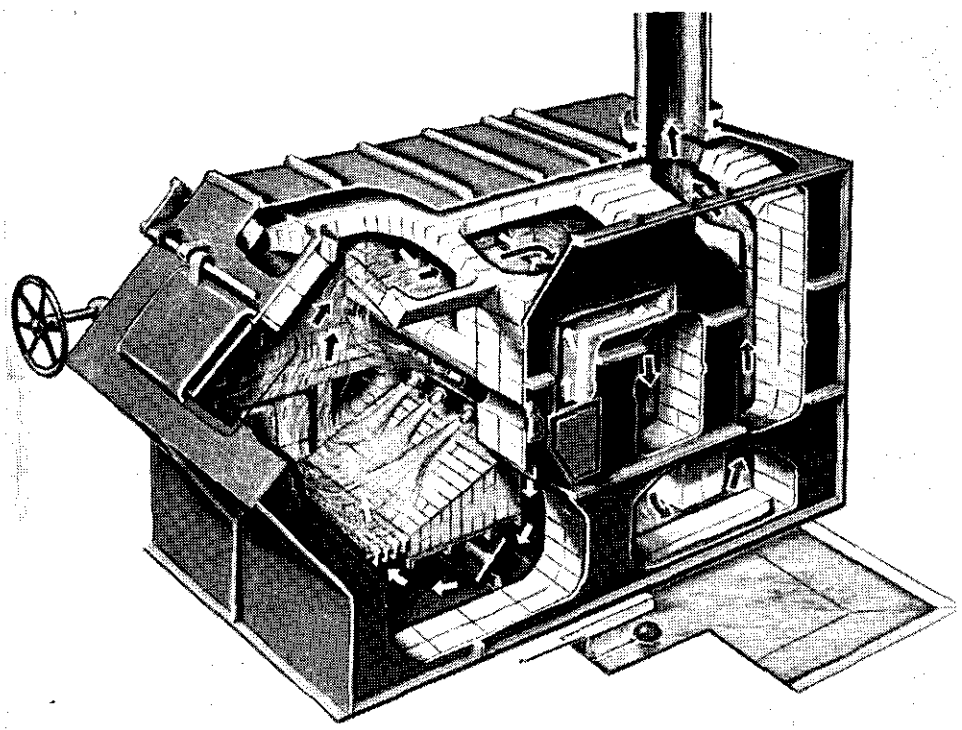


Fig. 6 Typical incinerator : cut-away view

Spillage

Waste spilled in or near the incinerator house is to be picked up with gloves, shovel or tongs, which then should be cleaned and disinfected. On no account should such material be touched with bare hands.

Cleaning of the incinerator

The incinerator is to be thoroughly cleaned out at the end of the working day, and should never be left banked up with waste overnight. All ash is to be removed from the ashpit, the combustion chamber cleaned out, and the damper and grit arrestor cleaned and examined. Where a water trough is fitted, any sludge should be removed and the water level adjusted.

Operation

Waste is only to be charged when the combustion chamber has reached its working temperature, the fire or burners are burning freely, and the air inlets and auxiliary burner controls are set to their normal working positions. Once the combustion chamber is hot, the charging door is only to be opened for the time needed for charging. Where bins are used the contents are to be tipped directly into the furnace. It is recommended that handling devices are fitted for the charging of waste.

The grate is to be evenly covered, and the appropriate depth of bed maintained to give the best burning rate with the type of waste loaded. The rated capacity of the incinerator is not to be exceeded; over-charging will lead to smoking, choking of the grate, and damage of the plant.

Special care is necessary when incinerating pathological wastes or plastics materials. Where these exceed 10% by weight of the charge, it may be necessary to establish by experiment special procedures to avoid the production of smoke, the clogging of firebars and the passing of melted, but unburnt, material directly into the ashpit. When shutting down after cleaning out, all doors are to be kept closed, to retain as much heat as possible in the incinerator.

Maintenance

Moving parts are to be examined, adjusted and lubricated, and all controls and safety devices tested every six weeks. A thorough examination of the plant as a whole should be carried out half yearly.

Incinerator installation

Fig. 6 shows a typical incinerator complying with the requirements of British Standards and the Clean Air Act. Internal furnace designs differ from manufacturer to manufacturer. In this one the white arrows indicate the flow of primary and secondary air, and the black arrows indicate the flow of the products of combustion. Note

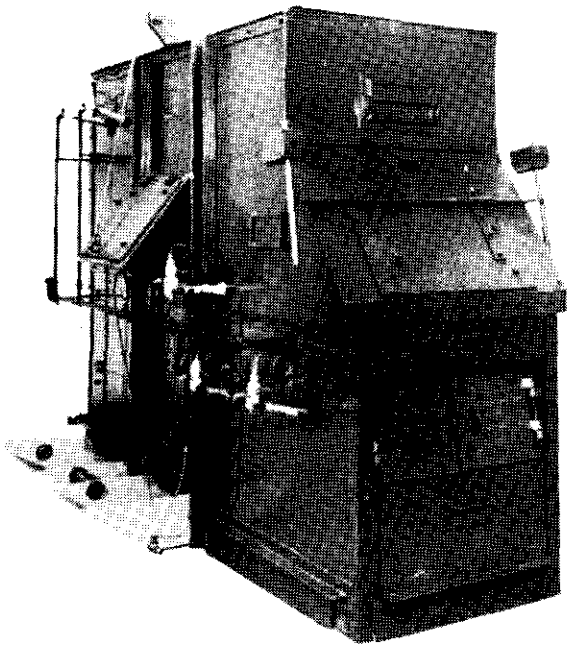


Fig. 7 (above) Typical incinerator : external view

that this installation includes a water trough for the collection of carried-over debris.

Fig. 7 shows a general external view of another make of hospital incinerator. Again, one can see the angled loading door, the gas-fired ignition burners at low level and further burners at high level. This unit is also fitted with water-trough debris collection.

Fig. 8 shows the hospital installation of a main incinerator dealing with general hospital waste, together with a pair of sputum-container incinerators. The main unit is rated at burning 8 yd^3 of mixed hospital refuse per day of 8 hours operation. Each sputum incinerator takes 20 cups at a charge, and has a burning time for each charge of 30-40 min. All units are gas fired.

Fig. 9 shows a different type of incinerator, of which there are many installed in the hospital service. I generally refer to this as a sealed-charge incinerator unit.

Maceration

We are, of course, all familiar with the kitchen waste-disposal unit, and how the basic principles were developed into the larger and more sophisticated machines to macerate materials of a heavier structure than kitchen waste. There are a number of machines available, and I propose to mention a cross-section of these.

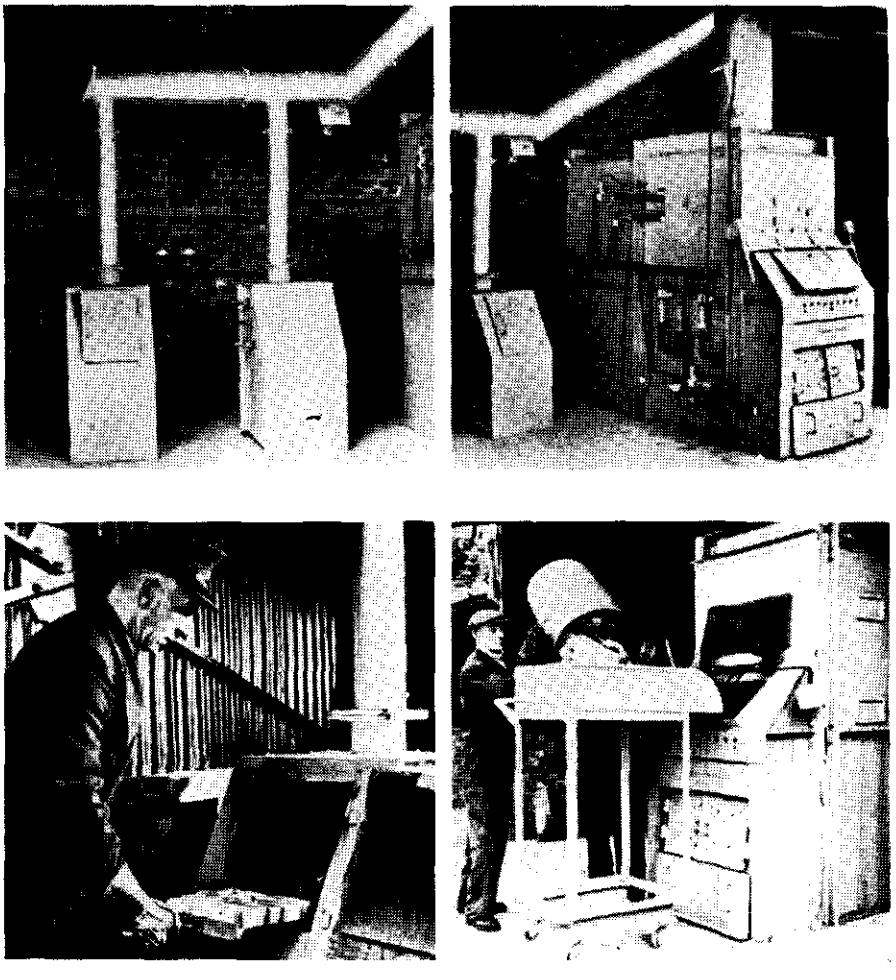


Fig. 8 Hospital main incinerator installation

Body waste :

For many years in the hospital service one has listened to the comments from staff and patients alike about the noise and the social conditions produced by the bedpan washer. These have been, and still are, a useful asset to the hospital service, but in recent years the change in nursing activities, and the introduction of disposables, has led many authorities to use the disposable-bedpan system. When the numbers were first considered, many people talked in terms of great masses of containers to be held in stock, with mountains of effluent to be discharged from the macerator unit, but, owing to the fact that patients are encouraged to leave their beds as rapidly as possible after what are considered major procedures, the consumption of these articles is nowhere near what some people originally estimated.

Those people with whom I have discussed the subject of bedpan disposal, and who have the equipment in their hospitals, have, with very few exceptions, spoken very highly of the system. Provided that the installation is correct as far as water and drainage are concerned, in my experience, the machines appear to have worked extremely well. One complaint often raised is that of noise. Within the normal day time, I would imagine that the general noise level within the ward is such that the machine running is not really noticed. During the night may be a different matter.

Fig. 10 shows one type of machine which has a quoted throughput of four bedpans, or five male urinals in a period of 90 s. It requires a water supply of approximately 7 gal for each disposal cycle.

Fig. 11 shows a machine of similar capacity, having an added facility for certain applications as a sanitary-towel disposal unit. This unit requires a water supply capable of delivering 8 gal/min into a machine cistern.

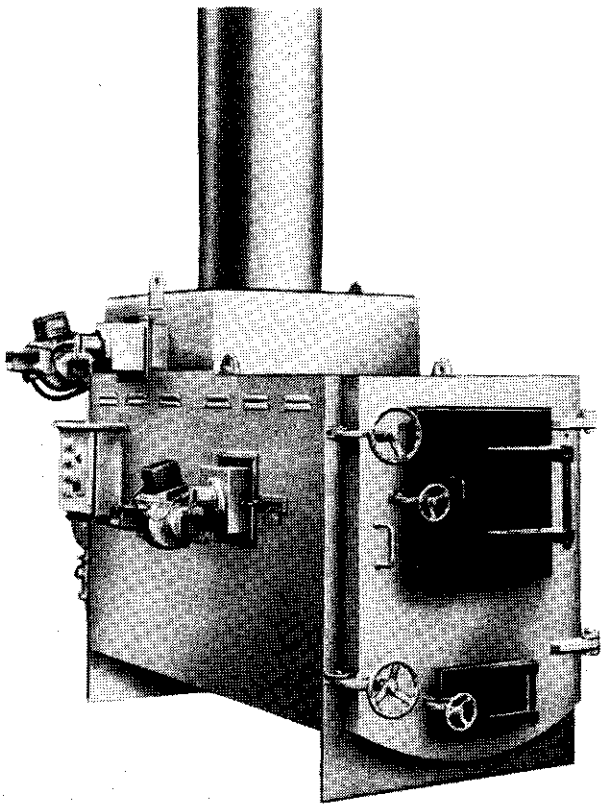


Fig. 9 Sealed-charge incinerator

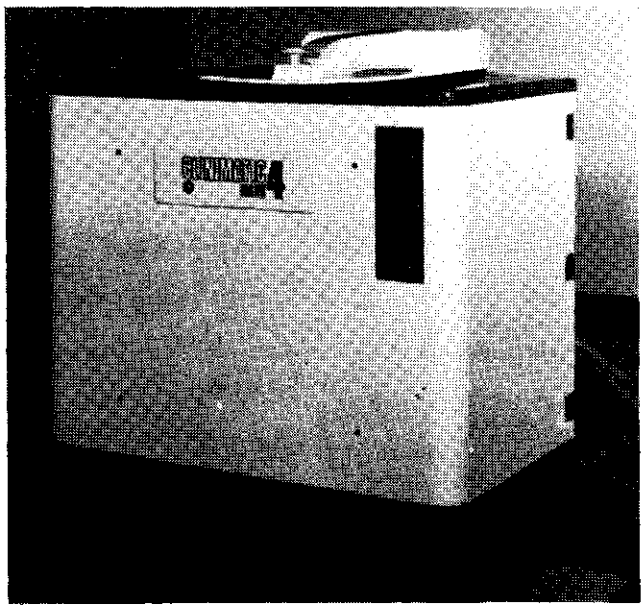


Fig. 10 Small macerator unit

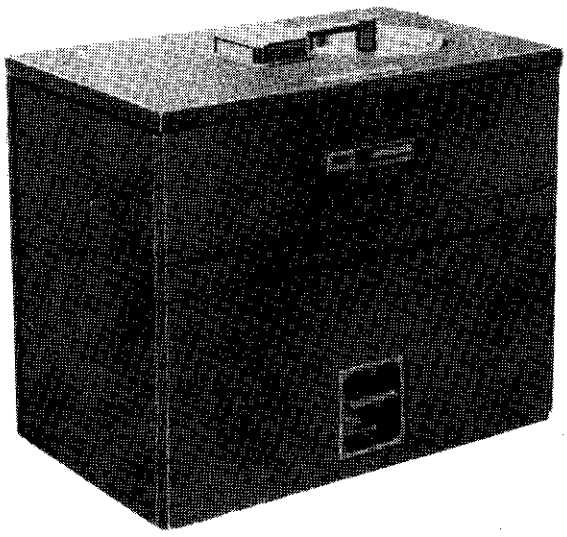


Fig. 11 Macerator similar to that of Fig. 10

Obviously the design and size of the machine must be related to the quantity and type of waste to be macerated.

Fig. 12 shows a unit which was initially designed for the disposal of sanitary towels and similar items in bulk. Fig. 13 shows a disposal unit for use in the consuming of small pathological specimens. This is a type of unit suited to laboratories, and is fitted with a dispenser for the injection of germicide into the water passing to the disposer.

A number of hospitals, especially maternity, have found a use for maceration equipment in the disposal of pathological waste, including placentas. The injection of the pulp from this machine has been found acceptable by the local authorities in the area in which these hospitals are situated.

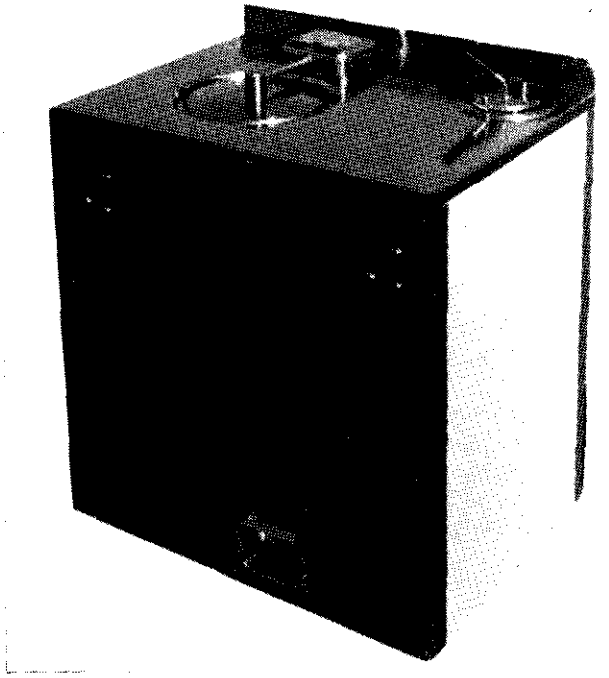


Fig. 12 Bulk macerator

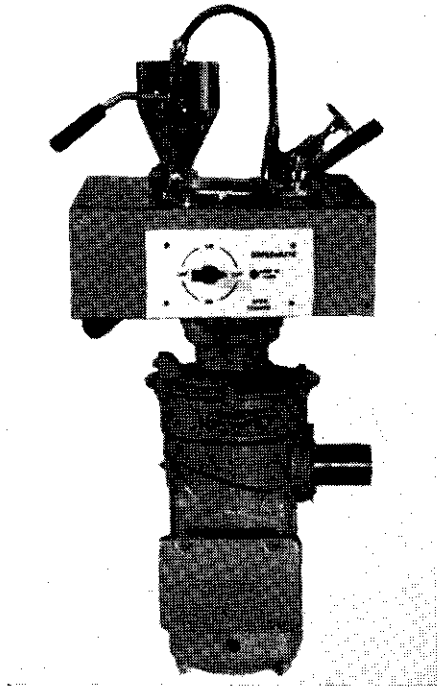


Fig. 13 Macerator for pathological specimens

The general impression given by those using the machines, and relating them to annual costs, would indicate that for the larger hospital, incinerators may be the answer, whereas this type of machine may be best applied to the smaller maternity or cottage-type hospital.

The disadvantages with the macerator at the present stage appear to be the large quantities of water consumed, and the noise generated from the machine power needed to pulverise the waste. An added complication is that of infection, especially if the machine jams with a partly consumed load inside. A recommendation has been made that if this happens, the machine should be filled to a high level with strong disinfectant before work is commenced to free the unit. An abrasion to the hand of the maintenance engineer caused by the machine while the unit contained infected material would constitute a serious hazard.

In conclusion, one asks: Where are we going in the future? Will local authorities take a more active part? Will maceration replace incineration? I believe that local authorities will need to take a more active part in the whole aspect of hospital-waste generation, since this is closely allied to the national problem of the increasing quantity of waste per head of population. There are enlightened local authorities who are already planning a wider service for hospitals, but unfortunately, as with many projects, available finance is a limiting factor.

The market of macerators has been on the increase in recent years, in many applications having taken the place of an incinerator. I believe their use will increase, but I doubt if they will ever completely take over the role of the incinerator. Intense heat is still the best medium for processing infected material.

There are many companies who manufacture either to their own design, or under licence, or just market incinerators. Except for a small minority, they appear to have little interest in the development of hospital incinerators, or even improving their existing designs. Is it that our market potential is too small? Are there too many companies selling incinerators? or is perhaps the sale of this plant only a minor sideline? There may be other reasons, but I am not qualified to discuss these aspects. In my view there is considerable room for improvement, and perhaps we can look forward optimistically.

The views I have expressed in my paper are purely personal, and are not necessarily those of the Board.

Acknowledgments

I would like to thank the Department of Health & Social Security for allowing the use of their survey information, and my colleagues of the British Standards Institution Subcommittee who were engaged on proposals for the revision of BS 3316.

I would also like to acknowledge the assistance given by Riley Products, The Incinerator Company, Universal Machinery Ltd., Vernon Products and Haigh Engineering.

The Conference Dinner

The five ingredients in the recipe for the fully integrated engineer were described by the Chief Engineer to the Department of Health, and another guest speaker, an MP, described the efforts being made to obtain recognition for the technician engineer, at the 26th annual dinner of the Institute of Hospital Engineering on 3rd June.

Both speakers, and also Mr. Northcroft, immediate past president of the Institute, contributed gay and witty speeches which made a perfect sequel to the excellent meal served at the Rembrandt Hotel, Knightsbridge.

Opportunity was taken to make Mr. Bolton, the principal guest, an honorary member of the Institute, and to present the Northcroft silver medal to a member, Mr. Bourne.

Mr. John Bolton, C.Eng., F.I.C.E., F.I.Mech.E., A.M.Inst.F., Hon.M.I.Hosp.E., F.R.S.H. (Chief Engineer, Department of Health & Social Security), proposing the toast of the Institute of Hospital Engineering, spoke as follows:

I have been specially honoured this week by the Institute of Hospital Engineering. In the first place, I was privileged to be asked to open this year's conference, the 26th conference of the Institute. In the second place, you have done me the very great honour of electing me an honorary member of your Institute, which I am proud to be; from what I gather, the ceremony will be performed later by your noble President.

In the third place, here I am on my feet once again, this time to propose the toast of the Institute. While I am speaking to you tonight, some of you may feel—and you may well be right—that the honour and the pleasure are more mine than yours. I am, in truth, as an engineer, more accustomed to sitting below the salt than I am above it. But I am bound to say that I can sympathise with you when I recall some of the long, dreary speeches to which I have been forced to listen in the past without the benefit of a third glass of port. I hasten to add, of course, that my remarks do not apply to anyone here tonight. I cannot promise that my speech will be good, or even tolerable, but I can promise you that it won't be too long.

My toast tonight is to the Institute. I said a lot of pleasant things yesterday about the Institute and I do not propose to bore you tonight by repeating what I said then. Instead, I shall say something about our noble profession, which is, in no small way, tied up with the Institute.

Dare I mention the words 'Green Paper'? I know that most of you here tonight have been for very many months gazing into very blank crystal balls, asking yourselves, 'Where do I fit into the new pattern?' And, of course, you are not the only profession who have asked that question.

In his talk yesterday, Mr. Marre referred to the very valuable work being carried out by hospital engineers*. He mentioned the increasing complexity of engineering services and equipment in hospitals, and said that whatever pattern might emerge in the future there would still be a need for the employment of all the engineers at present in the health service. But, you may say, that's all very well, but what about my future position *vis-à-vis* other officers in the health service? I cannot give you the answer to that here tonight. All I can say is to repeat what I have preached for years: that we cannot have status, responsibility—call it what we will—handed to us on a platter. We must achieve it for ourselves, because, unless we can achieve it, it will be worthless. Does the funeral undertaker have a better status because he is now called a mortician? Or the rat catcher because he is called a rodent operator? Or the plumber who describes himself as a heating engineer? No! As Shakespeare says: 'a rose by any other name would smell as sweet'. We must prove by our everyday contacts with people that our knowledge and expertise make us, not only worthy, but entitled, to occupy some of the seats of the mighty. We must make ourselves be wanted. It is not sufficient for an engineer to know that the wealth and the prosperity of the country depend upon technological expertise. The members of a civilised community comprise a plethora of the professions, arts and crafts, and after all, a good many of these would be hard put if asked to define an engineer, let alone what his place in society ought to be.

It is the people who project themselves whose images

*See *The role of the engineer in the hospital service* on page 216 of this issue

become known today. I know this is anathema to many engineers, particularly some of the older ones who prefer to maintain a dignified aloofness. But I ask you what is the point of a dignified aloofness, if it is only maintained 'below stairs'?

What, then, is the answer? What is the recipe for our fully integrated engineer?

I suggest, in the words of Mrs. Beeton, that there are five ingredients:

1 He must be technically educated and trained to a sufficient standard to enable him to carry out his work in an efficient manner.
2 He must have had a broad, general education such as to enable him to form decisions on grounds other than purely technical.
3 He must be trained in management techniques to enable him to adequately administer his duties and his responsibilities.
4 He must be able to sell himself and his ideas.
5 He must be imbued with the spirit of charity and tolerance.

Let us examine each of these ingredients in order. First of all, the one that he must be technically educated and trained, to a sufficient standard to enable him to carry out his work in an efficient manner. Of course, this goes without saying. The quality of technical education in this country is good. In fact, one might say that it is excellent. It has improved over the years and our general standard is very high compared with other countries. As far as training in the health service is concerned, a new national training centre at Falfield, near Bristol, has now been acquired—as most of you know—and I hope that it will not be too long before we receive our first batch for training. It is an excellent centre in ideal surroundings, and one which is bound to be appreciated by engineers in the service.

The second point, that he must have had a broad general education, so as to enable him to form decisions on grounds other than purely technical ones, is one on which an engineer is particularly vulnerable. Like many other specialists he tends to see only his own technical point of view. He finds it difficult to compromise, and very often fails to see a thing in a general overall perspective.

As an illustration of this, I would like to refer to some recent correspondence in *The Times*. Lord Jackson of Burnley urged in a letter that engineers should play a larger and fuller part in the conduct of, and decisions taken in, national affairs. He instanced the fact that in the USSR a considerable number from Kosygin down, through ministers, officials and ambassadors, are engineers, either by training or education. Of course, the letter produced the predictable reply. Dr. Szamuely, of Reading University, wrote that there was further evidence of engineer participation. For example, in the Politburo, which is the supreme decision-making body, there were fourteen engineers and four other technocrats. Their decisions were well known to the world: the invasion of Czechoslovakia, the writers' trials, mass arrests and other things too numerous to mention. He acknowledged his respect for engineers *qua* engineers, but expressed the opinion that we could regard ourselves as very fortunate indeed not to have our public affairs conducted by engineers and technologists. What a very useful illustration of my point and, at the same time, a damning indictment.

The third point: he must be trained in management techniques to enable him to adequately administer his duties and his responsibilities. This, as you all know, is a most important subject, and it is a great pity that it has become so prostituted over recent years as to be ignored by many people. It is true that in recent years many gimmicks have found their way into the subject, and a lot of people have climbed onto the bandwagon. Nevertheless, it is still a most important and worthwhile subject, and one which we should not ignore.

The fourth ingredient: he must be able to sell himself and his ideas. This is a difficult one. He must develop a sense of intuition and learn how to project himself and his ideas in the best possible way. The engineer must not be too brash or forceful, yet on the other hand he must not be a Uriah Heep. In short, he must blow his own trumpet—but not too loud. This is another area in which engineers are particularly vulnerable, especially when it comes to expressing themselves in writing. An excellent example of forceful writing, but one which I would not recommend in this day and age, is a letter which a member of Parliament sent to his constituents in 1747, when they asked him to oppose the Excise Bill.

The letter read:

> Gentlemen,
>
> I have received yours and am surprised at your insolence in troubling me about the Excise.
>
> You know what I very well know, that I bought you and, by God, I am determined to sell you. And I know what perhaps you think I do not know, that you are now selling yourselves to somebody else. And I know what you do not know, that I am buying another borough.
>
> May God's curse light on you all. May your houses be as open and common to all Excise officers as your wives and daughters were to me when I stood for your rascally constituency.
>
> Yours, etc.

I must apologise in case any part of that letter offended any ladies here tonight. I can only claim that it has assumed the mantle of respectability by virtue of the fact that is is an ancient document.

The last point is that he must be imbued with a spirit of charity and tolerance. In my opinion, this is a most important and essential attribute in the makeup of any man. Some time ago I read a book by Lord Boothby, which included his Rectorial Address to the University of St. Andrews. The theme was tolerance. In this address he listed what he felt were the elements of tolerance in its broad sense, and contrasted them with the tyranny and intolerance of dogma, both political and religious. Any right-thinking man would be bound to agree with his views, and it is an address that I would recommend anyone to read.

Here we have our five ingredients, and, as Mrs. Beeton might say: 'Stir well and turn out'. And you have, in my view, the complete engineer. Let us all hope that this is the sort of engineer who will emerge, for the future of our country in no small way will depend upon him.

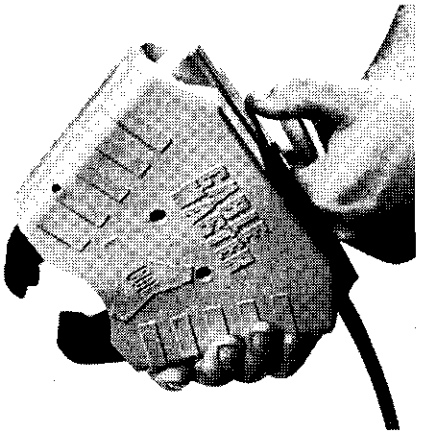
* Market News *

For further details, simply encircle the relevant number on the reply-paid postcard

CableMaster equipment

Cable Covers Ltd. have completed the development of their CableMaster equipment, and it is now available from stock.

CableMaster is a compression system designed for jointing and terminating underground power cables, and comprises one hand-operated hydraulic tool, with no dies, and associated fittings for terminating or tee



or phase jointing on any cables, irrespective of type, material or construction, up to 0·5 in, 2 or 4 core.

The tool head shown is completely insulated and is operated via a high-pressure insulated hose rated at 100 kV/ft for 5 min.

The system using no dies claims many advantages over more conventional equipment, but undoubtedly its most attractive feature is its ease of access. For example, when effecting a tee joint the core to be tapped needs a clearance of $\frac{3}{8}$ in.

Cable Covers Ltd., Electrical Divn., Cabco House, Ewell Road, Surbiton, Surrey. **HE 80**

Prices for pumps

Goodenough Pumps Ltd. have issued new price lists for their range of self-priming centrifugal pumps. These reveal that prices have apparently held firm and, in several instances, have even been reduced. Copies of the new price lists are available on request. **HE 81**

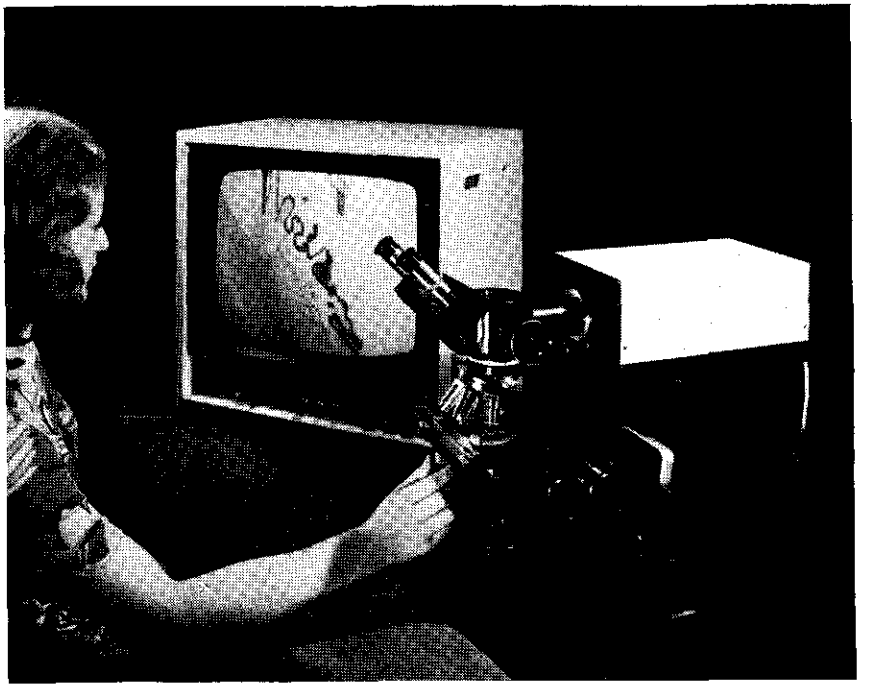
Goodenough Pumps Ltd., 39 Jermyn St., London, SW1.

CCTV conference microscope

The new Gillett & Sibert CCTV conference microscope is said by the makers to give a good quality, clean picture that will produce linearly every detail of the standard test card, and a good signal/noise ratio. This new British-designed and manufactured microscope is extremely simple to use; the camera has only an on–off switch, and the monitor has automatic brightness control. A 19 in tube is supplied but larger or smaller tubes can be ordered.

The research microscope can be used conventionally to establish the field of view to be displayed either with, or without, the t.v. system in circuit. With a 19 in monitor, magnifications from 200 to 4 000 times can be obtained in five or six steps. The system will reproduce successfully phase-contrast and dark-ground pictures. **HE 82**

Gillett & Sibert Ltd., 98 Lavender Hill, London, SW11.



Automated infusion unit

Decca Radar Ltd. announce the introduction of automated infusion unit, type 460—the Decca group's first product in the medical-electronics field. The unit, which is an aid to the control and monitoring of intravenous infusions, is now in quantity production following some $3\frac{1}{2}$ years of development engineering and trials. Test units have already been in service in the UK for several months.

It is expected that the main demand for the new unit will stem from the need to control infusions effectively at low drip rates with concentrated drug solutions, but the equipment is also suitable as an aid to the control of the infusion of more conventional fluids such as blood, plasma etc.

The unit provides continuous monitoring and control of the drip rate of all standard disposable giving sets (including microdrips) at any desired rate between 4 and 60 drip/min. It can be mounted on any infusion stand and does not occupy any additional space round the bed, and will operate on all infusion fluids, whether opaque or translucent.

Once set, the unit will adjust the drip rate automatically to the required rate, and will thereafter maintain that rate, automatically compensating for patient movement, changes in temperature and pressure and changes in head of the infusion fluid.

Visual and audible alarms, which can be local or remote, warn the nurse if the drip stops for any reason, e.g. if the bottle empties, or if the

mains supply fails. In the event of a power failure, the system continues to operate in the same way as a normal giving set, without requiring any immediate attention.

The drip rate at any time is indicated on a meter which is clearly visible at some distance from the bed. **HE 83**

Decca Radar Ltd., 9 Albert Embankment, London SE1.

IV pocket computer

An intravenous ratemeter which provides a new method for nurses and medical staff to check i.v. flow rates quickly, has been introduced by Tekmar Electronics Ltd.

The Ivac 50 automatically computes the time between two drops, and immediately displays the feeding rate in cm^3/h or drop/minute. It is lightweight and battery operated, and so can be carried in the pocket of a nurse's uniform and operated with one hand. **HE 84**

Tekmar Electronics Ltd., 102 High St., Harrow-on-the-Hill, Middx.

Mullard diagnostic equipment

One exhibitor at the XII International Congress of Radiology, in Tokyo, 5th-11th October 1969 is Mullard, showing a range of *X* ray tubes and other components for medical diagnostic radiology equipment. These include diagnostic *X* ray tubes and *X* ray image intensifiers.

The Mullard Guardian range of *X* ray tubes contains types for virtually all diagnostic procedures. They have a high degree of radiation protection —the maximum leakage radiation is one tenth of that permitted by the International Commission on Radiological Protection recommendations. A feature of the Guardian tube is its large deep window designed to allow the fitting of proximal moving or fixed collimating diaphragms very close to the focus. This enables 'off-focus' radiation to be reduced to a minimum, improving the diagnostic image.

Among examples of *X* ray tubes on display are the Guardian 150, the Compact Guardian 150 and the Guardian 125. They are suitable for general radiology and can be mounted under or over the examination table.

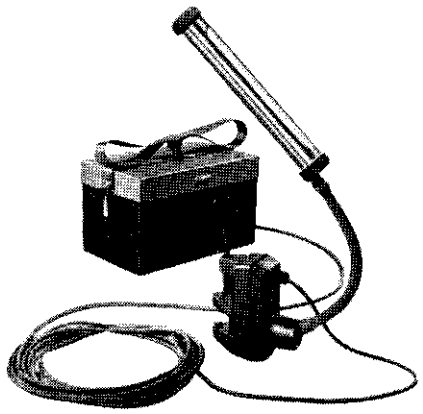
Two sizes of *X* ray image intensifiers for diagnostic purposes are on show. Both are suitable for use with closed-circuit television, cine radiography or 70 mm radiography. **HE 85**

Mullard Ltd., Torrington Place, London, WC1.

Inspection lamp

A safe compact fluorescent light for use in many working conditions on maintenance, breakdowns and emergency repairs, has been introduced by Bardic Systems Ltd.

The lamp is intended to provide a concentrated working light in restricted places such as repair areas, or near machinery where a.c. power supply is not available and oil or gas lanterns could be hazardous.



The light source is a 12 in 8 W fluorescent tube which gives a diffused and even light output. The reflector behind the tube ensures that all light is directed to the overall working area without glare, and a flexible stem attached to a ball joint gives further control over the light direction.

A clamp enables fixing on any convenient projection leaving both hands free. **HE 86**

Bardic Systems Ltd., William St., Southampton SO1 1GH.

Cooling-systems cleaner

The multiphase water-treatment service of Forestal Chemicals has announced a new material, DP 728, for the treatment of heat exchangers and related equipment in open recirculating cooling systems. This consists of a blend of physical and chemical reactants which is highly effective in mobilising calcium-phosphate sludge, organic and inorganic scale, silt, corrosion products and dead organic growths, and dispersing oil residues. The polymeric antifoulants dislodge and disperse precipitates, and enable the complete system to be flushed clean by the normal process of water circulation.

DP 728 is an easily dosed liquid which provides a unique online cleaning function. **HE 87**

Forestal Industries (UK) Ltd., Dearborn Pittam Division, Ditton, Widnes, Lancs.

Information service

Within weeks of Handy Angle opening its hospital-information register, over 300 hospitals had registered so as to obtain, on a continuing basis, information about structural designs and applications for storage and general maintenance aids in hospitals.

One of the main aims of the register is to interchange ideas on structural aids, many of which have been designed by hospital personnel themselves to meet specific needs. The adaptability of the structural material allows for the easy design of almost unlimited kinds of structures, including therapy aids, lockers, overbed tables, partitioning, storage units, access ladders, work benches, clothing racks, reception areas and trolleys.

Those registering receive illustrated brochures describing various structures, plus the benefit of a free advisory service. **HE 88**

Handy Angle,
Uxbridge Road, Hayes, Middx.

Temset valves leaflet

The Temset range of thermostatic radiator valves, i.e. $\frac{3}{8}$ in, $\frac{1}{2}$ in and $\frac{3}{4}$ in sizes, is now being manufactured with a remodelled regulating upper part. A leaflet entitled 'Temset—technical information' is now available. It gives comprehensive specifications for the range of valves, and instructions for planning a hot-water radiator system or for installing and operating the new Temset valves.

The leaflet details the various types of valve available, their dimensions, performance and relative technical data. The construction of the valves and their method of working are described, and the instructions cover positioning, fitting, calibration and operation. The leaflet is available together with price list and end user's leaflet. **HE 89**

Temfix Engineering Co. Ltd., Bainbridge House, Bainbridge Street, London WC1.

* Members Diary *

THE INSTITUTE'S JOURNAL

In keeping with the widening scope of both the Institute and its Journal, Council have decided that, as from January 1970, the title of the Journal shall change from *The Hospital Engineer* to *Hospital Engineering*. This reflects the changing emphasis of the Institute, as it widens in scope to include engineers not actually employed in the hospital service.

Council are anxious that the Journal should become a known and authoritative voice in this field, and that it should truly represent the membership of the Institute. Please, therefore, watch out for items of interest to members, for subjects that could be written up as a paper, or a page, or a column, and send them either to the Institute Secretary, or to the editor.

Perhaps you have already noticed changes in the Journal. If so, this is because this issue is the first to come from the Institute's new publishers, Peter Peregrinus Limited (PPL), who are a subsidiary company of the Institution of Electrical Engineers. The member of their staff who will be acting as editor is Mr. D. J. Haddrell; we take this opportunity to wish him welcome, and to assure him that we look forward to a long and fruitful association with him and with PPL.

It would be appropriate here to express our appreciation to Mr. M. J. M. Bosley who has acted as editor for over 16 years, as well as being the Secretary of the old Institution until March 1966. We thank him, of course, for his contribution to the life of the Institute, and wish him well in his new career in industry.

We close with a plea for encouragement. The editor and the Council are most anxious to know of your response to the new Journal. If you have complaints, suggestions, or congratulations, please, please let us know. *Hospital Engineering* is YOUR Journal.

REGISTRATION OF TECHNICIAN ENGINEERS AND TECHNICIANS

The Council of Engineering Institutions (CEI) has announced its intention to set up, in collaboration with other interested parties, an organisation to administer a system of qualification and title, and to establish a composite register of chartered engineers, technician engineers and technicians.

Commenting on the proposals this week, Mr. R. Gresham Cooke, CBE, MP, Chairman of the Standing Conference for National Qualification and Title (SCNQT) said:

'I am sure the Standing Conference for National Qualification and Title, which over the past 20 months has been working towards the establishment of nationally accepted titles for technician engineers and technicians, will be pleased that the CEI agrees with what the Standing Conference has been advocating—namely the setting up of a separate organisation to create and administer a system of qualification and title. The Conference will be pleased to collaborate with the CEI in the terms of the resolution passed by the Board of the CEI, as a follow-up to the talks which have already been held between the two bodies.

'Another important result of the work of SCNQT and its specialist committees (a notable feature of which has been the ample opportunity given for consultation between member-organisations' representatives and their Councils) is the general acceptance of the Higher National Certificate and the City and Guilds of London Institute's Full Technological Certificate as the technical awards appropriate for a qualified technician engineer —a title adopted not only by SCNQT but by CEI, Mintech, Industrial Training Boards and many more. Added to these technical-educational requirements are firm stipulations on training and superior experience. Appropriately lower levels will need to be established for technicians.

'All this can be regarded as a major achievement for SCNQT. The exercise spanned a widely diversified field of engineering interests—from agriculture to quarrying, building to lighting, automobiles to welding —with all manner of titles, qualifications and standards for entry and grading of members.

There is plenty of evidence that the 95 000 technician engineers that SCNQT represents will welcome a national title. Now everybody must work together towards a common goal which, when reached, should prove of inestimable benefit, not only to engineering, but to the country as a whole.'

The address of the Standing Conference is 46 Victoria Street, London, SW1. Tel. 01-799 6429. Mr. H. W. Payne is the Hon. Secretary.

NEW MEMBERS

Applications for membership have resulted in the following elections:

Members

Adlington, A.	Sheffield	*Sheffield No. 3 HMC*
Boreham, K. A.	Dagenham	*Sir Frederick Snow & Partners*
Sancroft, J. F.	Kingston upon Thames	*Kingston & Long Grove Group HMC*
Thomas, G. S.	Westbury-on-Trym	*Southmead HMC*
Yorath, W. G.	Cannock	*Birmingham RHB*

Associate Members

Badger, D.	Blackburn	*Bayliss Kenton Installations Ltd.*
Chatwin, R. J.	Rednal	*Mid Worcester HMC*
Fyfe, J.	Stockport	*Oscar Faber & Partners*
Heal, J. K.	Bristol	*Hoare, Lea & Partners*
Higgins, R. D.	Stepney, E14	*North East Metropolitan RHB*
Lai, C. K.	Hong Kong	*Alice Ho Mui Ling Nethersole Hospital*
Main, P. E.	Ruberry	*Birmingham RHB*
McCusker, F. J.	St. Asaph	*Clwyd & Deeside HMC*
Paton, J.	Glasgow	*Glasgow Royal Infirmary & Associated Hospitals BOM*
Stiddard, H. R.	Bristol	*Hoare, Lea & Partners*
Thornton, T. R.	Nelson	*Burnley & District HMC*

Graduates

Beard, F. J.	Cassington	*United Oxford Hospitals*
Breen, M.	Glasgow	*Glasgow Western & Gartnavel Hospitals BOM*

Carthy, R. J.	Bristol	*Hoare, Lea & Partners*
Chivers, R. C.	Newport	*The United Cardiff Hospitals*
Hewitt, P.	Dumfries	*Dumfries & Galloway Hospitals BOM*
Lee, K. G.	Sutton Coldfield	*Birmingham (Dudley Road) Group HMC*
Reynoldson, A. J.	Natal, S.A.	*Charles Johnson Memorial Hospital*
Vallance, D.	Mauchline	*Southern Ayrshire Hospitals BOM*
Wavell, A. J.	Maiden Newton	*West Dorset Group HMC*
Whittle, A. J.	Kingswinford	*Birmingham (Dudley Road) Group HMC*
Winn, J. E.	Abingdon	*United Oxford Hospitals*
Student		
Mobberley, R.	Stoke on Trent	*North Staffordshire HMC*
Affiliate Member		
Clifford Partitioning Co. Ltd.	New Malden	

* Among the Branches *

MIDLANDS VENTURE

By the time this copy of *The Hospital Engineer* reaches you, the hundred-odd members of the Midlands branch will probably have read the second issue of their new branch newsletter. If it is as informative and readable as No. 1, published in June, then the Editor, Mr. D. L. Hall, and the Branch Committee, are indeed to be congratulated on a most useful project.

The newsletter is to be published quarterly, and the first issue ran to 6 duplicated foolscap pages. We are somewhat relieved to see that the editor is not intending to challenge *The Hospital Engineer*—but then a little competition might well prove mutually stimulating!

The Institute Secretary brought the newsletter to our attention (see his letter on page 242); we hope that in future Branch secretaries, and others, will follow his lead by informing us of any local news worthy of mention in the Journal. Please give us as much notice as possible—our Press dates are somewhat more stringent than Mr. Hall's!

It is unfortunate that Issue No. 1 of the Midlands newsletter is, by now, 3 months out of date. However, much of the factual content still stands and since other branches will no doubt be interested in the venture we reprint, with the kind permission of the Midlands branch, the entire text here.

INTERCOM

(The official newsletter of the Institute of Hospital Engineering—Midlands Branch)
Volume 1, Number 1. June, 1969.

JOINING THE MEN OF THE MIDLANDS

The Midlands Branch has steadily expanded its membership since the new Institute was born in 1967 and its numbers approach the century mark. This is because people in hospital engineering have heard how active we are in the Midlands. Meetings used to be held every 2 months but now because of a demand for visits and special discussions on topical developments, there has been a meeting of one kind or another in almost every month of the past year. Are you as a member missing out on all this? Are your colleagues missing out through not being members or coming along to our gatherings as visitors? If you have any special topic that you would like discussed, tell the Editor and your Committee will see if it can be laid on.

MIDLAND ARTICLES FOR THE JOURNAL

Your Committee would like to see the Northcroft Silver Medal come to the Midlands this year. Many of our members are associated with a great deal of development and other activities and must have a great deal about which to write. Why not send an article for publication in *The Hospital Engineer*?

EDITORIAL

Your committee has felt for some time that communications within the Midlands Branch could be improved, and that members could be made more aware of the activities of the parent body. The purpose of this newsletter is not to replace, but to supplement, the Journal *The Hospital Engineer* with more local information and news. Tentatively, it has been called *Intercom*, but I should be very pleased to receive constructive suggestions for a new title from members—*Short Circuit* is already in use elsewhere, and *Boilerhouse Blues* has already been discarded!

A venture such as *Intercom* will need a continual supply of articles, letters, comments, news etc. in order to carry on, and we hope that in the main these will come from members.

Articles and any correspondence should be addressed to:

Mr. D. Hall, The Editor, *Intercom*,
91 Wolverhampton Road South,
Harborne, Birmingham 32.

to arrive not later than 20th September 1969 for the next issue. It would not, of course, be possible to reproduce photographs, but simple graphs and diagrams could be used.

YOUR BRANCH COMMITTEE FOR 1969/70

Chairman	Mr. E. J. Williams
Vice-Chairman	Mr. S. C. Stapley
Secretary/Treasurer	Mr. H. R. Martin
Area Council Member	Mr. R. G. Smith

Papers Sub-Committee	*Social Sub-Committee*
Mr. B. A. Hermon	Mr. F. J. Williams
Mr. R. G. Smith	Mr. E. F. Austin
Mr. K. W. Ashton	Mr. S. C. Stapley
Mr. A. H. Chater	Mr. D. Hall

[Mr. H. R. Martin (in attendance)]

Public Relations Officer Mr. D. L. Hall

NATIONAL COUNCIL

It was thought that you might also find it useful to have the names of those members serving on your National Council:

President: Mr. G. A. Rooley
Chairman of the Committees: Mr. H. A. Adams
Members:

Mr. K. W. Ashton*	Mr. K. C. Magee
Mr. M. J. M. Bosley	Mr. D. H. Mellows
Mr. K. J. Eatwell	Mr. D. C. Nicholson
Mr. G. S. Gillard	Mr. V. Riley
Mr. B. A. Hermon*	Mr. R. G. Smith*
Mr. R. Luke	

Secretary: Mr. J. E. Furness

* *Midland's Branch members*

HERE AND THERE

'Management in Hospitals'

A working party composed of Mr. K. W. Ashton, Mr. R. G. Smith and Mr. F. J. Williams, set up by the Midlands Branch, has produced a comprehensive 50-page report under this title. The report has been submitted, via the Institute of Hospital Engineering, to the King Edward's Hospital Fund for London's 'Engineering

Panel'. Incidentally, the 'Engineering Panel' is made up of:

Mr. D. Ayres (*Regional Engineer*)
Mr. M. Burke (*Department of Health*)
Mr. K. Eatwell (*Regional Engineer*)
Mr. B. A. Hermon (*Deputy Regional Engineer*)
Mr. B. P. Holloway (*Chief Engineer, St. Thomas's Hospital*)
Mr. F. Kirton (*Deputy Regional Engineer*)
Mr. D. H. Mellows (*Group Engineer*)

I.H.E. Northcroft Silver Medal Award

The Council has recommended that a Silver Medal Award should be made to Mr. K. H. Bourne (London Branch) for his paper on 'Environmental Controls', and that Mr. D. J. Helm be commended for his paper entitled 'Materials in Medicine'.

Committee of Inquiry on Hospital Building Maintenance and the work of Building Supervisors ('Woodbine-Parrish' Committee)

Your Institute's submission has now been received by the Committee of Inquiry. Permission is being sought to give this wide distribution and, indeed, to publish it in the Journal at the appropriate time.

Crest

Designs for the official Institute Crest are at present in the hands of the College of Heralds.

I.H.E. Summer Conference 1970—In BIRMINGHAM

As next year's Summer Conference is to be held in Birmingham, a considerable amount of work in connection with this has already been carried out by your Committee.

The Conference itself is to be held at the University of Aston in Birmingham from the 6th to the 8th May 1970 inclusive. The Dinner will be held on the evening of 7th May 1970 at the Savoy Hotel, and a list of Official Guests is being submitted to the Institute's Finance and General Purposes Committee for ratification. A suggested list of papers has also been drawn up, and has gone forward to the Institute's Education Committee for their approval. Your Committee hopes to arrange other events to complement the Summer Conference, and details will be released as soon as possible.

Your Committee hopes that you have made a note of the Conference dates, and that you will be able to make arrangements to attend both the Conference and Dinner. This is the first occasion on which the Conference has been held in Birmingham. More news of the arrangements in the next issue.

SOCIAL WHIRL

Cheese and Wine Party, 14th March 1969

A very successful Cheese and Wine Party was held recently in the welcoming atmosphere of the Barnsley Hall Hospital Social Club. A most enjoyable evening was highlighted by the showing of the film 'A Home Of Our Own'—guaranteed to get any social gathering 'off the ground'. A small profit has been paid into a Social Fund.

Visit to Blithfield Hall and Reservoir, 7th June 1969

Members of the Midlands Branch and their families combined business with pleasure on Saturday afternoon, 7th June, when about 30 visited the grounds and the Hall at Blithfield.

The party met at the Hall then the majority proceeded to the Reservoir, about a mile away, where they were taken on a conducted tour by staff of the South Staffordshire Waterworks Company. They returned to Blithfield Hall for tea and the day was completed with a conducted tour of the Hall.

A Hundred Per Cent Turn-Out

. . . is expected for the forthcoming visit to Ansells Brewery, Aston, Birmingham, on 3rd September 1969 at 7.30 p.m. You are advised to return the attendance slip to Mr. Martin as soon after receipt as possible.

COME AND JOIN US

Your Committee would hate to think they might be the only members attending the following meetings, as they have gone to a great deal of trouble to arrange the summer programme in towns which provide entertainment for the whole family—while the Engineer-Boss-Husband gets more intellectual stimulation . . .

5th July 1969— Nurse Training Unit, Dudley Guest Hospital. *Paper:* 'Water Supply, Storage Distribution and Regulations'—presented by Mr. Hawkeley and Mr. Deebank of South Staffordshire Waterworks Co. *Film:* 'Introduction to Ion Exchange'.
FAMILY: (for you to arrange) Dudley Zoo and Castle.

(Please return your attendance slip to Mr. Martin if you have not already done so.)

6th September 1969—Stratford upon Avon Hospital.
Paper: 'Smut Emission and Corrosion of Chimneys'—presented by Mr. M. Beaumont, Director of F. E. Beaumont Limited.
FAMILY: (for you to arrange) The River (and swans); local history; shopping and the Shakespeare Memorial Theatre ('The Winter's Tale' 2 p.m. and 'Twelfth Night' 7.30 p.m.—The Management state that there are 20 seats and 80 standing tickets available each day to personal applicants at the box office, but as the seats appear to be limited to two to each applicant and the box office opens at 10.30 a.m., we feel it would be advisable to book in advance).

(Mr. Martin will, of course, be sending more details of the meeting nearer the date.)

PAPER CHASE

Have you kept yourself up to date? The following is a check list of official circulars and correspondence of special interest to our Members in the Health Service:

Department of Health

H.M. (69) 13—Encloses P.T.B. Circular No. 233—Medical Physics Techns.
" 16—Abstracting and impounding of underground or surface water
" 17—Subscriptions to Associations
" 19—Enclosing G.C. Circular No. 84—Removal expenses
" 21—Index of Hospital Memoranda
" 26—Encloses P.T.B. Circular No. 236—R.H.B. Prof. and Tech. Staff
" 30—Annual Financial Statements
" 31—Encloses P.T.B. 239—Hospital engineers and building supervisors
" 32—Encloses A.S.C. Circular Nos. 96, 45, 20 and 13
" 38—Encloses G.C. Circular No. 85—Subsistence allowances
" 41—Encloses G.C. Circular No. 86—Mileage allowances
" 45—Engineering Employees—Rates of pay and conditions of service
" 48—Encloses G.C. Circular No. 87—Removal expenses

Advance Letters:

G.C. 1/69—Revised arrangements for the carry over of annual leave
A.S.C. 3/69—Revised rates of night and day subsistence allowances
A.S.C. 4/69—Engineering Craftsmen and Electricians—Stand-by duty on Bank Holidays

Letters:

5th May 1969—Ref. C.S. 897—Bowie Dick tests
21st May 1969—Explosion of Slater's Sterilizers
12th May 1969—Switch socket outlets in anaesthetic areas

Staff Training Memoranda: Nos. 1, 2, 3 and 4/69 have been issued

Birmingham Regional Hospital Board Circulars

RB(S)69/14—Fire Precautions
RB(S)69/15—Laundry Fires

Reports:

Beg, borrow or buy (7s. from H.M.S.O.) a copy of the ZUCKERMAN COMMITTEE'S REPORT ON HOSPITAL SCIENTIFIC AND TECHNICAL SERVICES—which has certain implications for engineering departments.

Report of the Royal Commission of Local Government in England Short Version: Cmnd No. 4039 Local Government Affairs 3s. 6d. H.M.S.O.

MEMBERS IN THE NEWS

Congratulations to:

Mr. B. A. Hermon, who has been appointed Regional Engineer to the Oxford Regional Hospital Board and takes up his duties there on 18th August. Mr. Hermon came to the Birmingham Regional Hospital Board in January 1961 as Deputy Regional Engineer, having previously been Assistant Regional Engineer at Sheffield. He has, of course, been a very active member of the Midlands Branch Committee of the I.H.E. for some time and perhaps we may be forgiven if our very sincere congratulations are also tinged with regret!

and

Mr. R. H. Bilboe, Assistant Engineer to Selly Oak Hospital, who has recently been appointed Deputy Group Engineer to the Harefield and Northwood Hospital Management Committee. Mr. Bilboe has recently completed the Inter-Regional Training Scheme for Group Engineers.

OBITUARY

It was with deep regret that your Committee at its meeting on 2nd June received the sad news of the recent death of Mr. R. E. Rogers, M.I.Mar.E., a very active member in the formation of this Institute. Mr. Rogers before his retirement was Group Engineer to the South Warwickshire Hospital Management Committee. A letter of condolence has been sent to his family.

NEXT EDITION

It is hoped that the next edition of this news letter will go to press early in October.

STOP PRESS

Dr. Tidd, the newly appointed Principal of the North Birmingham Technical College, has been asked to give a lecture to members on 'The Development of technical education in Birmingham' before the commencement of the next academic year. More details will be issued by circular in due course.

DECISION—COMMUNICATION—OPERATION

The following is the first article commissioned by the Editor. It finalises our theme of 'Communications', which it is hoped this newsletter will help to achieve. It has been printed on a separate sheet of paper so that it can be easily retained when this edition of the newsletter is discarded.

DECISION—COMMUNICATION—OPERATION

In a one-man organisation there is no difficulty in the right hand knowing what the left hand is doing. The one man seeks orders, decides priorities, orders materials, executes the orders, sends his accounts and settles his debts. He knows exactly how he stands at any instant.

The more complex the organisation the greater is the bridge to be crossed between 'decision' and 'operation', and it is essential that a good communication network *is constructed* to assist in this.

The words 'is constructed' are italicised because the communication network for out-flow, cross-flow and feed-back of information must be most carefully thought out and set.

Each person with any control, at whichever level he is operating, must know everything appertaining to his position if he is to make the best and most efficient use of the people he controls. This knowledge enables him to put the right emphasis on each job, keep his priorities right, function within his budget etc.

The necessary information may range from knowing the length of time a ward can be cleared of patients to allow necessary work to be accomplished to prior knowledge of a hospital closing down in, say, five years' time. The former case allows the foreman to judge the number of men to put on to the work and the latter determines the Group Engineer's policy with regard to the amount and type of maintenance done to the plant and buildings.

Information on policy, budgets, contracts, work schedules, consumptions etc., can be relayed in several different ways, each method being most suitable for some particular aspect.

Some methods used are as follows:

1 Technical press, circulars
2 Committees
3 Memoranda and letters
4 Graphs, charts and reports
5 Time cards and log sheets
6 Informal word-of-mouth

Item 1 would generally convey information from outside the organisation.

Items 2 and 3 would convey information across and a little way up or down the organisation.

Items 4 and 5 would convey information across and up the organisation.

Item 6 can convey information, down, up, through and across the organisation faster and cheaper than any other method but not as reliably. There is the example of the request 'Send up reinforcements; we're going to advance', that after word-of-mouth repetition arrived at its destination as 'Lend us three and fourpence; we're going to a dance'.

The well constructed communication system would cater for all necessary information to reach the people concerned, either for action or for information only.

This newsheet will be another means of communication that will serve its purpose best if it is used to spread knowledge of what is available; to show us that we are not as isolated as we may at times think and to publish subject matter which may give us a new slant on an old problem and so lead to discussion, either at local level or by letters in its pages.

EAST ANGLIA BRANCH

The branch met at St. Nicholas' Hospital, Great Yarmouth, on 5th July 1969, under the chairmanship of Mr. H. Holtz.

The speaker, Mr. T. Wade, chose as his topic, 'Hospital linen and laundry services—past, present and future'. He is the Area Laundry Manager Advisor, from St. Andrew's Hospital, Thorpe, Norwich, and his informative talk demonstrated his own experience in the field, ranging from the appointment of the first laundry manager before the Second World War, to the present-day changes brought about by the use of more efficient detergents and more rugged textile materials, to the prediction of much improved plant efficiencies when standardisation of sheets, uniforms etc. could be introduced.

* New Standards *

New British Standards

BS 957
Feeler gauges
957: Part 2: 1969
Metric units
8pp 6s **M**
Covers a series of gauging blades of graded thicknesses in metric units, either assembled in a protective sheath or supplied separately, with blades from 0·03 mm to 1·00 mm inclusive. Material, dimensions of blades, finish, limits of accuracy, sheath, marking, packing, and recommended blade combinations. (SBN: 580 05830 1)

BS 1000
Universal decimal classification English full edition
1000 (654): 1969
Telecommunication services: organisation, administration and operation
12pp 10s **N**
Classification of matter pertaining to the organisation, administration and operation of telecommunication services, including alarm systems and long-distance communication by means of visual and acoustic signals. (SBN: 580 05039 4)

2464
Hose couplings for petrol, oil and lubricants
2464: Part 2: 1969
High pressure couplings
20pp 8s **M**
Applies to couplings of 2 in, $2\frac{1}{2}$ in, 3 in and 4 in nominal sizes with ribbed tails and hexagons for use at pressures not exceeding 1 150 kN/m^2 (225 lbf/in^2). Materials, dimensions, workmanship, marking and hydrostatic testing. Illustrations of couplings and full dimensional particulars. Constitutes further partial revision of BS 2464: 1954 (SBN: 580 05850 6)

2655
Lifts, escalators, passenger conveyors and paternosters
2655: Part 4: 1969
General requirements for escalators and passenger conveyors
28pp 10s **M + I**
Minimum requirements for construction and safety of escalators and passenger conveyors (latter having a passenger-carrying surface which remains parallel to the direction of motion and is uninterrupted). Limits of speed, width and angles of inclination, together with methods of assessing loading, requirements for guarding, handrails, step or belts, driving machinery and safety devices. Potential hazards to users discussed in an appendix. (SBN: 058 05631 7)

4466: 1969
Bending dimensions and scheduling of bars for the reinforcement of concrete
24pp 10s **M**
Form-of-bar schedule, bending dimensions, hooks and bends, cutting and bending tolerances, curved bars and end anchorages, data-processing recommendations and illustrations of measurement of bending dimensions for 14 preferred shapes and 17 other shapes. (SBN: 580 05329 6)

4475: 1969
Straight mineral lubricating oils
12pp 6s **M**
Oils of 39 viscosity grades grouped in 3 quality levels, containing no additives except pour-point depressants, suitable for many industrial applications. (SBN: 580 05710 0)

4500: 1969
ISO Limits and fits
72pp 40s **M**
Supersedes the metric tables in BS 1916, Parts 1 and 3. Gives standard tolerances and fundamental deviations for sizes from 0 to 3150 mm; limits of tolerance for commonly used shafts and holes for general engineering purposes, and for high precision work and horology; recommendations on selected fits. Explanation of system, terminology and definitions. (SBN: 580 05600 7)

New Code of Practice

CP 118: 1969
The structural use of aluminium
188pp 60s
Design recommendations for the use of aluminium in all types of structure, except those covered by other standards. Deals with 3 principle alloys (H30, N8 and H9), 6 supplementary alloys, and gives advice on others. Sections on material, loading, design, testing, fabrication and erection, protection. There are 13 appendixes. (SBN: 580 05520 5)

Revised British Standards

67: 1969
Ceiling roses
16pp 8s
Supersedes the 1938 edition, and specifies ceiling roses of surface and semi recessed types for use in 250 V circuits. (SBN: 580 05269 9)

Special Issues

PD 6431: 1969
New designation system for alloy steels
12pp 6s
Gives details of a new 6-digit designation system for alloy steels, which will replace the existing En numbering system in BS 970 and other steel specifications. (SBN: 580 05590 6)

PD 6432
Dimensional co-ordination in building. Arrangement of building components and assemblies within functional groups
PD 6432: Part 1: 1969
Functional groups 1, 2, 3 and 4
44pp 30s
A listing of building components and assemblies within functional groups 1 (structure), 2 (external envelope), 3 (internal sub division) and 4 (services and drainage), with a series of gradings indicating their relative importance for the purpose of dimensional co-ordination. The co-ordinating dimensions of components and assemblies are also identified, and a general grouping of the materials of construction is included to cover all components. (SBN: 580 05550 7)

PD 6433: 1969
Guide to the application of stress analysis to design
12pp 10s **N**
Is intended to assist designers in assessing the margin of safety in a pressure vessel by the use of stress analysis and a knowledge of the properties of the material of construction. The use of elastic analysis, limit analysis, shakedown analysis and elasto plastic analysis are discussed with particularly reference to their application in BS 1515 and the ASME Pressure-Vessel Code, Section III. A list of references is included. (SBN: 580 05570 1)

On the off-beat

Recent developments in patent-monitoring techniques have led to increased interest in the possibility of predicting certain heart disorders by observation of the changing pattern of the electrocardiogram (e.c.g.). The detection of changes in the heart rate is usually accomplished by a simple heart-monitoring device, coupled to an alarm which operates when the rate rises above a preset critical level. Unfortunately, this is suitable only for the less serious, and more easily detected, perturbations.

Of those defects that develop slowly enough to be observed before they reach a dangerous stage, perhaps the most serious are those originating in the main chambers of the heart, the ventricles. Ventricular arrythmias usually take the form of occasional widened pulse beats, or premature pulses. Over a period of time these may become more and more frequent, and lead to the onset of a highly dangerous fibrillation, in which the muscles of the heart flutter continuously without beating at all. In the early stages of development these arrythmias can be successfully and straightforwardly treated, but clearly they are most difficult to observe or detect—even if a continuous watch is kept on the oscilloscope display.

A system specifically designed to detect and record these transient irregularities has now been developed by scientists at Hewlett-Packard*.

The apparatus is based on a small fixed-program hybrid computer which monitors the output of a standard e.c.g. amplifier. Each individual pulse is examined for width and timing by comparing it with a stored reference, and when any abnormality is detected the machine can perform one or more of a number of tasks, depending on how it has been set.

(i) Any beat which is premature or widened can be written out on the e.c.g. machine. This is accomplished by feeding all signals to the writer via a 3 s tape delay loop; abnormal beats cause the writer to be switched on for about 4 s. Thus the offending pulse is recorded, normally together with the pulses on either side of it. The resulting printout is a compact record of all abnormal pulses.

(ii) The trend recorder can be activated. This plots the number of widened, or premature (but not both), beats per minute, and is especially useful in observing the response of the heart to drugs, for example.

(iii) If the frequency of abnormal beats rises above a certain preset level, or if more than a selected number occur consecutively, an alarm can be given.

The monitor is preset for each patient. When a button is pressed the computer stores a sequence of heart pulses from the e.c.g., and automatically prints them out so that they can be checked for normality. These are then used as the reference pulses, against which the width of all other pulses are checked. The timing of pulses is compared with a running average, which is only allowed to vary within predefined limits.

**Biomed. Engng.*, July 1969.

* Post Box *

From the Secretary

Dear Sir,

I am sure that you will agree that one of the major problems facing any organisation is that of communications and the dissemination of news and information. It is necessary, constantly, to seek ways and means of combating this problem.

The Midlands Branch of the Institute has taken a great step in this direction by launching an internal Newsletter, which has been provisionally christened 'Intercom', and I think that the Branch is to be congratulated highly on this venture.

The Newsletter was designed, primarily, for the members of the Midlands Branch. However, the first issue is so informative that I feel sure that it would be of interest to the entire Institute membership. I shall be grateful, therefore, if you will publish this in the Journal in its entirety, so that our whole readership may see this first result of the Midland Branch initiative.

J. E. Furness

Secretary,
The Institute of Hospital Engineering

The text of the newsletter is reproduced on pp. 238-240

Clippings

Demonstrated at Datafair by ICL was a program for monitoring the availability and use of hospital beds. It is designed to increase efficiency and reduce patient waiting time. The program works on three master files held in the disc store. The first describes each bed in terms of its ward, the second describes the capability of each bed, i.e. for what purpose it is intended, the level of service it receives, etc., and the third lists all beds of the same type and connects each bed with its type. Given this information the program can provide answers to inquiries such as:

how many beds are reserved for admission?

how many patients does a particular consultant have?

what is the nursing load in a particular ward?

In addition, of course, the program enables the admissions officer to reserve enough beds for emergency use, while ensuring maximum possible bed usage.

The program was demonstrated in use for a hypothetical 100 bed hospital.

An appeal has been launched to finance the provision of a postgraduate medical centre at the new Basildon & District Hospital, which is due to be opened in April 1971. This is felt to be an ideal site; it is close to both the Basildon and the Thurrock urban districts, and serves an area containing about 300 000 people, with 150 doctors and dentists.

The proposed centre will provide a lecture theatre, library and tutorial rooms, and meeting area for industrial medical officers, family doctors and hospital medical staffs.

Such centres are not provided by the National Health Service; the total cost of building and equipment has to be met by voluntary contributions. The appeal target is £80 000 over the next three years, of which about £50 000 will be used for the building, the rest covering the equipment and the establishment of a research fund.

The information service of the Construction Industry Research and Information Association (CIRIA) is in future to be handled by the Building Research Station. The changeover is expected to be complete by June 1970. The present information service of the BRS handles about 20 000 inquiries every year, each one free of charge unless the work involved takes longer than half a day.

As from August 1969, the Plessey subsidiary, British Telecommunications Research Ltd., has been operating under its new title of Plessey BTR Ltd. No other change in their business is involved.

Classified Advertisements

For full information please write or telephone:
Classified Advertisement Department, *THE HOSPITAL ENGINEER*
Peter Peregrinus Ltd.,
PO Box 8, Southgate House,
Stevenage, Herts
Telephone Stevenage (s.t.d. 0438) 3311 ext 27

OFFICIAL APPOINTMENTS
SITUATIONS VACANT
MISCELLANEOUS

APPOINTMENTS AND SITUATIONS VACANT

DISTRICT GENERAL HOSPITAL—WALSGRAVE

ELECTRONICS TECHNICIAN required to be responsible to the Group Engineer for the organisation and operation of a Planned Maintenance System of a wide variety of electronic and electro medical apparatus.

Applicants must hold the H.N.C. or H.N.D. or O.N.C. in Electronics or Light Current Engineering or Final City and Guilds Telecommunications Engineering Certificate.

An extensive experience in the electronic field is required and experience of Hospital equipment would be an advantage.

Salary scale £1,030 to £1,365. Plus overtime, if worked.

Applications, stating age, qualifications and experience, together with *names of three referees to the: Group Secretary, Coventry Hospital* Management Committee, The Birches, Tamworth Road, Keresley, Coventry, CV7 8NN.

Boston Group Hospital Management Committee

GROUP ENGINEER

Salary £1,750 to £2,055 a year plus £175 special responsibility allowance

The post of group Engineer to this Group of fourteen hospitals becomes vacant upon the retirement of the present holder early in 1970.

A new district general hospital (Pilgrim Hospital) is under construction in Boston and the first phase is nearing completion. This includes the main boiler plant and other major engineering services some of which are in course of commissioning. Phase II of Pilgrim Hospital is due for completion in 1973/74 and will accommodate approximately 570 beds.

Applicants should have had wide experience in the management of engineering services at a senior level, preferably in hospitals and hold:

(i) H.N.C. or H.N.D. in Mechanical Engineering with endorsements in Industrial Organisation and Management and Principles of Electricity or Electro-Technology, if this was not taken as a subject of the course; or

(ii) H.N.C. or H.N.D. in Electrical Engineering with endorsements in Industrial Organisation and Management and including (at S.III or O2 level, or with endorsement in) Applied Heat and Applied Mechanics, provided he has suitable practical experience in mechanical engineering; or

(iii) City and Guilds Mechanical Engineering Technicians Full Technological Certificate (Part III) which must include Plant Maintenance and Works Service.

Request for application forms and further details about the post should be sent to the Group Secretary, Boston Group Hospital Management Committee, East Shirbeck House, Sibsey Road, Boston, to whom completed applications should be sent by 24th October, 1969.

THE UNITED NEWCASTLE UPON TYNE HOSPITALS

GROUP ENGINEER

The post will become vacant on 12 May, 1970, upon the retirement of the present holder.

Applicants must hold an approved engineering qualification in accordance with P.T.B. Circular 191.

Current salary scale is £1,850—£2,180 (48½—60 points) per annum, plus a special responsibility allowance of £200 per annum.

Further particulars and job description, available from the House Governor and Secretary, Royal Victoria Infirmary, Newcastle upon Tyne. Applications giving full details and names and addresses of three referees should be submitted by 14th November, 1969.

GROVE PARK HOSPITAL

MARVELS LANE, LONDON, S.E.12.

ASSISTANT ENGINEER required. Ordinary National Certificate or equivalent qualification required. (Unqualified candidates may be considered but will be subject to an abated salary scale.) Application forms available from Hospital Secretary.

BARNSLEY HOSPITAL MANAGEMENT COMMITTEE

ASSISTANT ENGINEER

Assistant Engineer required at the Barnsley District General Hospital (402 beds) to assist the Hospital Engineer in the management and organisation of engineering services, operation and maintenance.

Responsibilities involve electrical and mechanical services and the control of Planned Maintenance.

Applicants must possess O.N.C. or O.N.D. in electrical or mechanical engineering or an approved equivalent qualification.

Salary commencing £975 per annum rising to £1,270 per annum.

Apply in writing, stating age, experience and qualifications, with names and addresses of two referees to the Group Secretary, Barnsley Hospital Management Committee, 33 Gawber Road, Barnsley, Yorkshire.

ST. CRISPIN HOSPITAL MANAGEMENT COMMITTEE

HOSPITAL ENGINEER required for the new PRINCESS MARINA HOSPITAL—550 beds for the mentally subnormal. Phase I consisting of the first 270 beds is due to be commissioned in the near future and the building of Phase II is expected to carry on almost immediately.

Applicants must have a sound knowledge of mechanical and electrical equipment, wide experience in their maintenance and should possess one of the following qualifications, or an equivalent qualification approved by the Minister of Health:

(i) City and Guilds Mechanical Engineering Technicians Certificate (Part II) which must include Plant Maintenance and Works Service; or

(ii) City and Guilds Certificate in Plant Engineering; or

(iii) Ministry of Transport First Class Certificate of Competency if it includes an Ordinary National Diploma or Ordinary National Certificate.

Salary scale £1,270 to £1,500 plus special responsibility allowance £25.

The person appointed will be responsible to the Group Engineer for the operation and co-ordination of all maintenance works in the Hospital.

Applications, giving details of training, qualifications, etc., and names and addresses of two referees, should be forwarded to the Group Secretary, St. Crispin Hospital, Duston, Northampton not later than 20th October, 1969.

CHELSEA AND KENSINGTON HOSPITAL MANAGEMENT COMMITTEE.

DEPUTY GROUP ENGINEER

Applications are invited for the post of Deputy Group Engineer for this Group of six hospitals. Salary scale inclusive of London Weighting and responsibility allowances: £1,585 rising to £1,820 per annum. Qualifications required: H.N.C./H.N.D. in Mech. Engr. or Electrical Engineering with specific endorsements or City and Guilds Mech. Eng. Technicians' Full Technological Certificate (Part III), including Plant Maintenance and Works Service. Consideration would be given to the appointment on an abated scale of candidates without the stipulated qualifications but wide experience in the management of hospital plant or similar engineering plant essential. Application forms and job description from The Secretary, 5 Collingham Gardens, Earl's Court, London, S.W.5.

BOARD OF MANAGEMENT FOR THE COUNTY AND CITY OF PERTH GENERAL HOSPITALS

ASSISTANT HOSPITAL ENGINEER

Applications are invited for the post of Assistant Hospital Engineer based at Perth Royal Infirmary which has become vacant due to the promotion of the present holder. The post offers excellent experience for a young engineer seeking advancement and day release facilities can be given for further study. The salary scale is £975 rising by annual increments to £1,270 p.a. Applicants must have completed an apprenticeship in mechanical or electrical engineering or have otherwise acquired a thorough practical training as appropriate to the duties and responsibilities of the post and should possess an Ordinary National Certificate in Engineering or equivalent qualifications. A rented house may be made available.

Application forms (with further details and a job description) available from the Group Secretary and Treasurer, Taymount Terrace, Perth, to be returned by 22nd October, 1969.

ASSISTANT ENGINEER required at ST. JOHN'S HOSPITAL, St. John's Hill, London, S.W.11. Salary scale £975—£1,270 plus £90 London Weighting. O.N.C. or equivalent essential. Luncheon facilities. Application forms and further particulars from and returnable to the Group Secretary, Battersea, Putney & Tooting Group Hospital Management Committee, Tooting Bec Hospital, Tooting Bec Road, London, S.W.17.

LEWISHAM GROUP HOSPITAL MANAGEMENT COMMITTEE

DEPUTY GROUP ENGINEER required. A new post in busy acute hospital group. Salary £1,635—£1,870 p.a. including London Weighting, and special responsibility allowances. Applicant mut be experienced in accordance with P.T.B.191 (or equivalent approved by Department of Health) Job Description and application form from Group Secretary, Lewisham Hospital, London, S.E.13.

King Edward VII Hospital

Midhurst, Sussex

RESIDENT ENGINEER

Applications are invited for the above post which becomes vacant on 31st December, 1969. The successful candidate will be directly responsible for the maintenance and economic running of all engineering services, building maintenance and fire protection. He must have a sound knowledge of automatic oil fired steam boilers, water works and laundry equipment, lifts, etc. He should have served an engineering apprenticeship and hold a recognised certificate or diploma in engineering.

Salary £1,270-£1,500; an unfurnished house will be available if required. A contributory pension scheme is in operation and National Health Service entitlement is transferable.

Applications stating age, education, experience and qualifications with the names of three referees to The Secretary, King Edward VII Hospital, Midhurst, Sussex.

SOUTH WEST LONDON HOSPITAL GROUP

DEPUTY GROUP ENGINEER

Required for this new post in a busy acute Group of 7 hospitals. Salary scale £1,610 to £1,845 per annum, inclusive of responsibility allowance and London Weighting.

Applicants should hold a Higher National Certificate or Diploma in Electrical Engineering, including Applied Heat and Applied Mechanics or an approved equivalent qualification (i.e. H.N.C. Mechanical).

Small unfurnished flat available.

Application forms and Job Description from Group Secretary, South West London Hospital Group, St. James' Hospital, 72 St. James's Drive, London, S.W.17, to be returned by 25th October, 1969.

COLINDALE HOSPITAL, COLINDALE AVENUE, N.W.9

This is an excellent opportunity for a young man, preferably with an O.N.C. in Engineering. He will be responsible to the Hospital Engineer for the operation and maintenance of Engineering Services which includes a new oil-fired central steam raising boiler house. Opportunities for day release for further study will be given.

Salary scale £975 p.a. rising by seven increments to £1,270 p.a. plus £90 London Weighting.

Applications to Group Personnel Officer, Edgware General Hospital, Edgware, Middx. Tel: 01-952 2381.

CHIEF HOSPITAL ENGINEER

Required by the GOVERNMENT OF BAHRAIN on contract for 2 years, with prospects of renewal or admission to the permanent establishment. Salary B.D.3,000 a year (£2,625) rising by annual increments of B.D.60 a year (£52). There is NO INCOME TAX IN BAHRAIN AT PRESENT. FREE FURNISHED ACCOMMODATION. Free passages. A gratuity equal to one month's salary for every twelve months' service is payable on completion of contract.

Candidates must hold a 1st Class B.O.T./M.O.T. Certificate or H.N.C. (Mechanical) and have served an apprenticeship in mechanical engineering. Experience of boiler house plant, air conditioning and allied controls and the repair and maintenance of engineering and electrical plant is essential. Organising ability and administrative experience are also essential.

The engineer will be responsible for the general administration of the maintenance of and daily repairs to equipment at twelve hospitals and clinics. The staff is almost entirely Bahraini.

Apply to CROWN AGENTS, 'M' Division, 4 Millbank, London, S.W.1, for application form and further particulars stating name, age, brief details of qualifications and experience and quoting reference number M2S/690715/HR.

continued overleaf ▶

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continued from previous page

APPOINTMENTS and SITUATIONS VACANT

HARROGATE AND RIPON HOSPITAL MANAGEMENT COMMITTEE

SCOTTON BANKS HOSPITAL, RIPLEY ROAD, KNARESBOROUGH

ASSISTANT ENGINEER

Applications are invited for the above post at this mainly acute hospital. Salary scale £975 × £35(5) × £40(3) to £1,270.

Applicants should have served a Mechanical or Electrical Engineering Apprenticeship and possess an Ordinary National Diploma or Certificate in Mechanical or Electrical Engineering or equivalent qualification.

This post offers experience for an engineer wishing to advance in the Hospital Service to the posts of Hospital Engineer and Group Engineer.

Day release facilities may be granted for courses leading to higher qualifications.

A house is available at a reasonable rental.

Applications giving full details of education, training, past and present posts and qualifications held should be sent to The Group Engineer, Harrogate General Hospital, Knaresborough Road, Harrogate, Yorkshire, within two weeks of the appearance of this advertisement, and should include the names and addresses of two referees.

BROMSGROVE GENERAL HOSPITAL, BROMSGROVE HOSPITAL ENGINEER

Applications are invited for the above post. Salary scale £1,270-£1,500 plus £25 responsibility allowance.

Applicants must be in possession of at least Higher National Certificate in Mechanical or Electrical Engineering, or equivalent qualifications approved by the Department of Health.

Applications, together with the names of two referees, to be returned by 6th October, 1969, to the Group Secretary, Mid-Worcestershire Hospital Management Committee, 165a Birmingham Road, Bromsgrove, Worcs.

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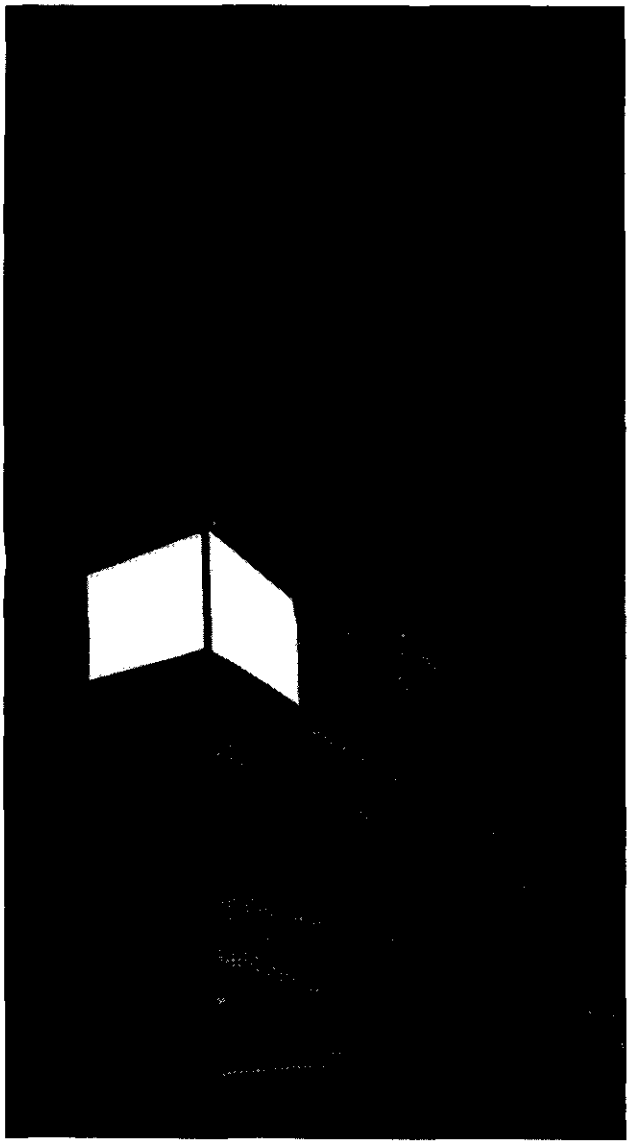

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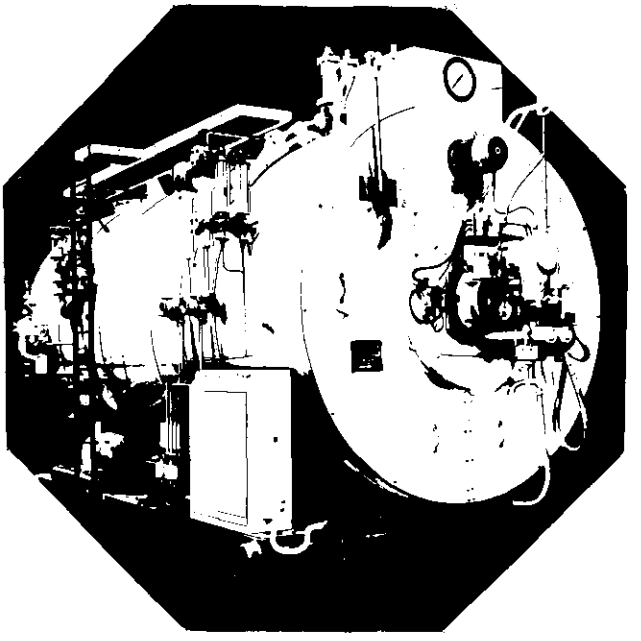

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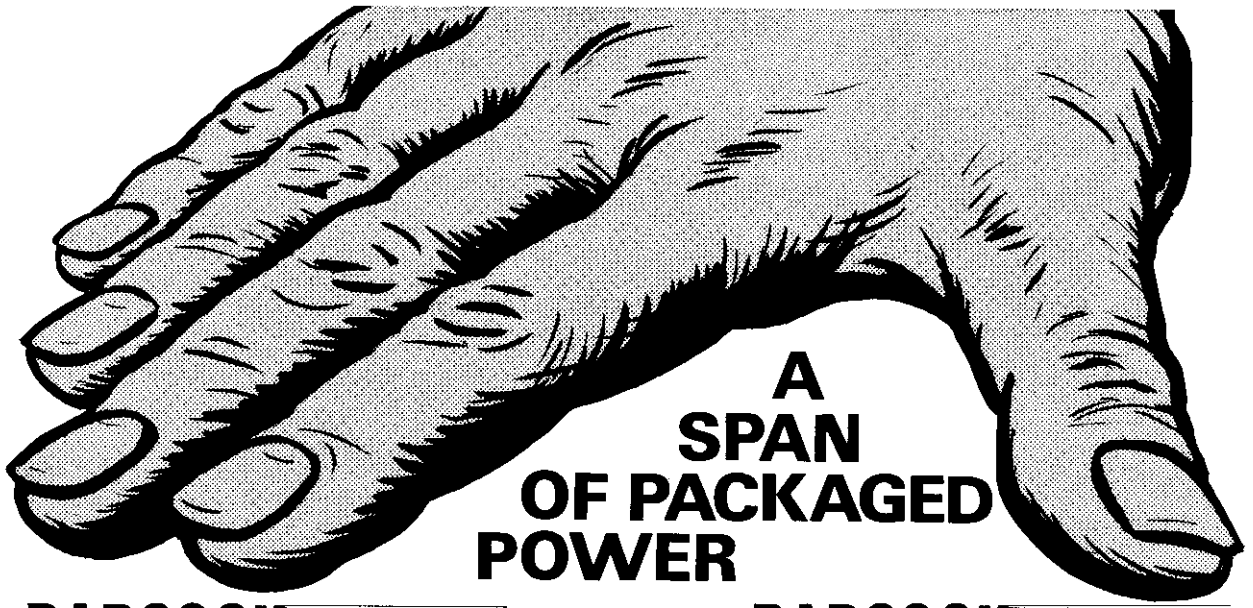

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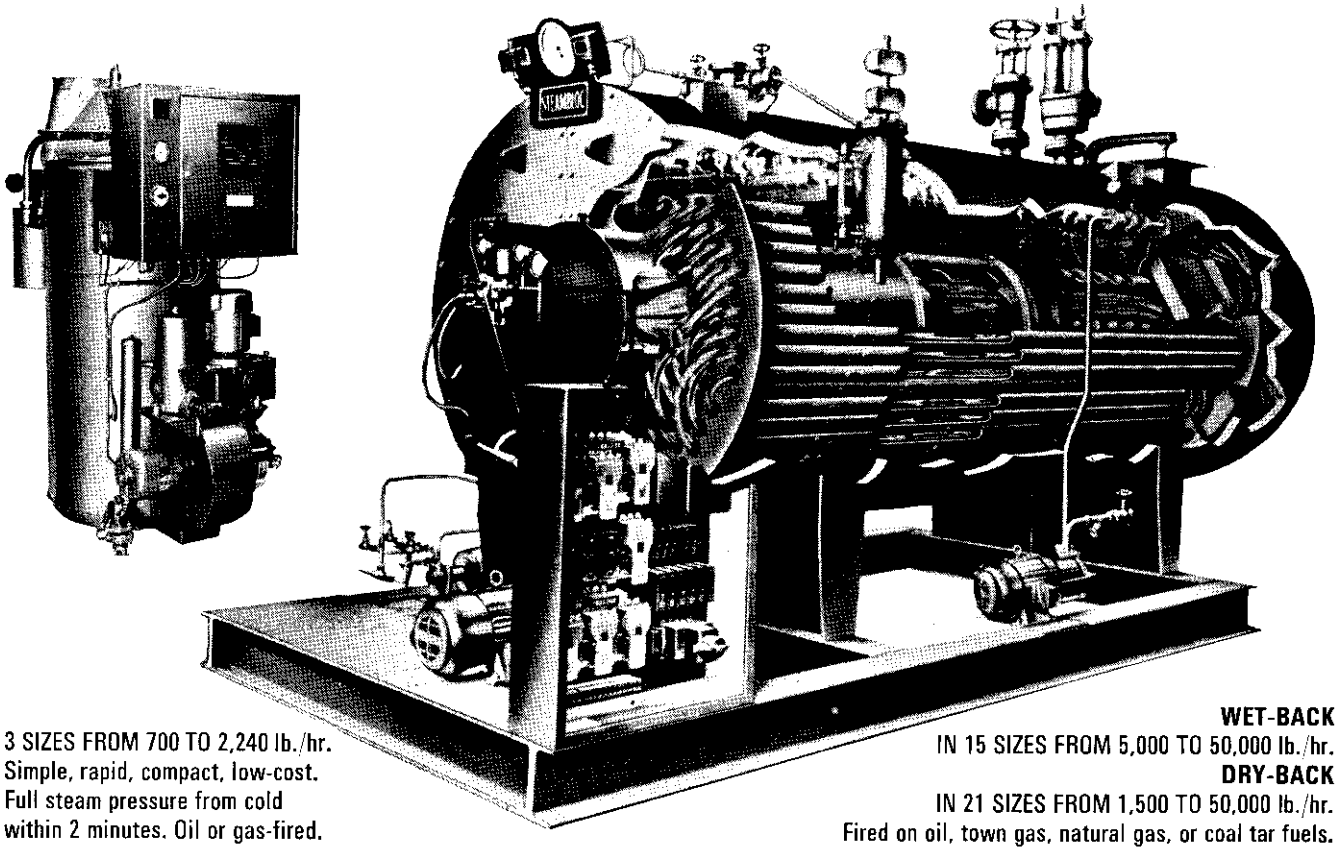

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