Hospital Engineering

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Contents

Features

News

Departments

NOTICE

This issue is the first to be entitled *Hospital Engineering*. The title until December 1969 (Vol. 23, No. 12) was *The Hospital Engineer*.

Hospital Engineering

Vol. 24
January 1970
Pages 1-22

Report of the Royal Commission on local government in England 1966-69: possible implications for the health service

by Councillor W. J. Wilson, J.P.

This paper was presented to a well attended open meeting of the Institute at the Metropolitan Regional Hospital Board offices on the 25th November, 1969. The meeting was chaired by the President, G. A. Rooley

At the onset, may I say how delighted I am, and that I deem it no small honour to have been invited to give this lecture. I have been intimately connected with local government for many years, and have served on my own Borough (City) Council for nearly ten years. As an official in the employ of the Regional Hospital Board, after being a teacher for more than fifteen years, I have had the fortune—whether it is good or bad I will not reveal—to find that every aspect of my work, as teacher, local Councillor and in the Health Service, has become or will become the subject of the closest possible scrutiny of a Royal Commission, or of a committee report of some kind or other. I think that the decade 1959–69 must have produced more far-reaching and important committee reports than the previous quarter of a century. From Crowther, Robbins, Newsom, Plowden, through Seebohm, Maud, Mallaby, to Guilleband, Todd, Lycett-Green, Godber and Farquharson Lang, the Green Paper and Redcliffe-Maud will have produced and collated enough material for dozens of doctorial theses for the next twenty years. Amateur committee-report readers such as myself read the conclusions and recommendations in the last chapter, and hope that some information sticks.

Unfortunately, Redcliffe-Maud has 115 recommendations, having the most tremendous effect on the whole pattern of local government. This means, and has meant in my case, reading practically all the report, except, I must admit, the arguments and details for the individual unitary areas.

The Prime Minister, when addressing the Association of Municipal Corporations in September at Scarborough—the first Prime Minister to do so, I understand, since Mr. Gladstone in 1873—stated in his opening remarks:

> In the next few months decisions have to be taken which will shape the structure, organisation and development of local government and local-government services to the end of, and indeed well beyond, this present century. The main structure of English local government has remained virtually unchanged since the Acts of 1888 and 1894 which created the present system of county councils and county district councils. Not one of our thirty thousand Councillors has ever served under any other system, and few of their fathers. The structure was laid down before the age of the motor car, in an era when any power-driven vehicle had to be preceded by a man with a red flag, before a single council house had been built, and at a time when modern conceptions of town and country planning were no more than a dream in the hearts of a handful of visionaries.

This is a fair indication of the Government's thoughts

Warden/Tutor, Birmingham Regional Hospital Board

on this matter, but further on in the same speech he made this comment:

> The Government are also engaged in consultations on the future administration of the National Health Service and on the Seebohm Committee proposals. All these topics are linked together, but I do not intend to see a situation develop in which consultations on any one of these can hold up decisions on the central issue. Insofar as we can indicate conclusions following the consultations either on the Health-Service questions or on Seebohm, ahead of the White Paper, this will be done. The Secretary of State for Social Services in fact aims to make a statement about Seebohm during this autumn, and also about certain aspects of the Health Service on which he is now planning a further Green Paper.

This means that, by the early part of 1970, we, as officials in the health service and as, in some cases, local Councillors, are going to know our respective fates.

Let us, then take a look at the Redcliffe-Maud proposals. You will remember that the first Maud dealt in detail with management of local government, whereas the second Maud was asked to examine the structure of local government.

It is necessary, I think, to remind ourselves of the present pattern, so that we are able to make a comparison. There are outside Greater London—which was not covered — 1210 authorities, comprising 79 county boroughs, 45 counties, 227 noncounty boroughs, 449 urban district councils and 410 rural districts. I suppose that in functional operation the county boroughs and county councils are close together, as are the noncounty borough and urban district councils, although there are many minor points of difference.

The present system

The Commission listed four basic faults of the system:

1 the failure of local-government areas to match the patterns of life and work in modern England
2 the impossibility of planning development and transportation properly when England is divided between county boroughs and counties, separating town from country
3 the splitting up of services within each county between the county council and a number of county district councils
4 the size of many local authorities, which prevents them from employing the highly qualified manpower and the technical equipment that modern services need.

The result—less than half the electorate bother to vote at local elections. I have yet to be convinced that the introduction of Maud's proposals will lift the voting patterns of decades, but I hope I am wrong on this!

Aims of local government

The Royal Commission says that the pattern and character of local government must enable it to do four things:

1 perform efficiently a wide range of important jobs concerned with the health, safety and wellbeing of people in different localities
2 attract and hold the interest (and, I would add, respect) of its citizens
3 deal with national government in a valid partnership
4 adapt itself continuously to changes in the way people live, work, move, shop and enjoy themselves.

This is where the present system fails. Population changes, changes from rural to urban conditions, new towns and changed methods of communications have made many local authorities irrelevant and unnecessary. In particular, the increase in the number of motor cars has given rise to problems which could not even be imagined when the local authorities were given many of their powers in the 19th century.

Proposed reforms

To put the situation right, the Commission has made a large number of highly detailed, and indeed revolutionary, proposals. It first asked itself one fundamental question: what size of authority, or range of sizes in terms of population and of area, is needed for the democratic and efficient provision of particular services, and for local self government as a whole?

The Commission decided that the answers to this question had to be found by trying to apply to each part of the country the following general principles.

(*a*) Local-authority areas must be so defined that they enable citizens and their elected representatives to have a sense of common purpose.

(*b*) The areas must be based on the interdependence of town and country.

(*c*) In each part of the country, all services concerned with the physical environment (planning, transportation and major development) must be in the hands of one authority.

(*d*) All personal services (education, personal social services, health and housing), being closely linked in operation and effect, must also be in the hands of one authority, as strongly recommended by the recent report of the Seebohm committee.

(*e*) If possible, both the environmental and the personal groups of services should be in the hands of the same authority (as in the present county borough), because the influence of one on the other is great and likely to increase.

(*f*) Authorities must, however, be bigger than are most county boroughs (and all county districts) at present, if they are to command the resources and skilled manpower which they need.

(*g*) The population of each authority for the personal services should fall approximately within the range 250 000–1 000 000.

(*h*) Where the area required for planning and the other environmental services contains too large a population for the personal services, a single authority for all services would not be appropriate. In these parts of the country, responsibilities must be clearly divided between two tiers, and related services kept together.

(*i*) So far as is consistent with these principles, the common interests, traditions and loyalties inherent in the present pattern of local government must be respected in the new organisation.

Applying the principles

The Commission decided that the best way in which these principles could be applied would be the establishment of 61 new local-government areas (each covering town and country) grouped in eight provinces. Each of these 61 main authorities would have a maximum of 75 elected members. In 58 of these local-government areas single authorities, which the Commission calls 'unitary authorities' would be responsible for all services.

In the three very large metropolitan areas around Birmingham, Liverpool and Manchester, responsibility for services should be divided in each case between two tiers: a metropolitan authority, whose key functions would be planning, transportation and major development; and a number of metropolitan district authorities, whose key functions would be education, the personal social services, health and housing. There would be 20 metropolitan districts in all—seven in the Birmingham area, four in the Liverpool area and nine in the Manchester area. These 61 new local-government areas should be grouped, together with Greater London, in eight provinces, each with its own provincial council. Provincial councils would be elected by the authorities for the unitary and metropolitan areas (including, in the South-East, the Greater London authorities), but would also include a number of co-opted members (between 20 and 25% of the total membership).

The main function of these councils would be to settle the provincial strategy and planning framework within which the main authorities must operate. They would replace the present regional economic-planning councils, and would co-operate with central government in the economic and social development of each province. In particular, they should take over from present regional arts and sports councils.

The way in which the 61 new local-government areas would be grouped can be seen from Table 1, which also shows the number of members recommended for each provincial council.

Table 1 Recommended local-government areas

Province	Number of unitary authorities	Number of metropolitan areas	Number of members (elected members in brackets)
North-East	5	–	24 – 25 (19)
Yorkshire	10	–	44 – 47 (35)
North-West	6	2	51 – 55 (41)
West Midlands	4	1	36 – 39 (29)
East Midlands	4	–	22 – 24 (18)
South-West	8	–	36 – 39 (29)
East Anglia	4	–	18 – 19 (14)
South-East	17	1	101 – 108 (81)

There are, of course, bound to be large variations in the size and wealth of the new authorities. In terms of population the unitary area based on South Yorkshire (Sheffield, Rotherham and Barnsley) is the largest, with a population in 1968 of 1 081 000. The Halifax unitary area with 195 000 will be the smallest. Areas range from 2227 mile^2 (Exeter and Devon) to 93 mile^2 (Sunderland and East Durham).

The richest unitary area, measured in terms of rateable value per head of population will be Brighton and mid-Sussex with £65·8, and the poorest Halifax with £28·4. Although these contrasts may seem extreme, they are of course very small compared with the present system. In any case the commission found no clear link between size and efficiency.

Local councils

In addition to the provincial councils and the unitary authorities, the commission also proposes that within the 58 unitary areas, and wherever they are wanted within the three metropolitan areas, local councils should be elected to represent and communicate the wishes of cities, towns and villages in all matters of special concern to the inhabitants. To begin with, these local councils would succeed existing borough, urban district and parish councils, though later on it would be possible to adjust them. Their only duty would be to represent local opinion, but they would have the right to be consulted on matters of special interest to their inhabitants, and they would have the power to do for the local community a number of things best done locally, such as looking after village greens, municipal parks, fairgrounds, theatres, community centres and concert halls.

Local councils could also provide services like house-building on a small scale, house improvement, preservation, conservation, highway improvement and appointment of school governors and managers. The cost would be borne by local ratepayers.

Other recommendations

In the space available, it has not been possible to give more than an outline of the Commission's report—the main volume alone runs to 376 pages, and taken with volumes 2 and 3 there are about 900 pages to read and 17 maps to study. We can, however, briefly mention some other recommendations contained in the report.

There should be an inquiry into whether the new authorities should hold office for three or four years, and whether elections should be held in spring or autumn.

Main authorities should collect local council's taxes with their own. Provincial councils would raise the money they require through the main authorities.

The present local-taxation system should be examined, and its shortcomings removed. Local government should be given a wider tax base, by transferring some taxes from central government. The commission says that it will become increasingly odd to exempt agricultural land and buildings from all rates.

The office of alderman should be abolished.

Single-member constituencies would be the rule for both main authorities and local councils.

Government reaction

The Government's reaction to the commission's report came on the same day as the report was published. Speaking in the House of Commons on the 11th June 1969, the Prime Minister said that the Government accepted the need for a fundamental reorganisation, for a reduction in the number of main authorities, and for the abolition of the distinction between town and country. He promised that, after a period of thorough discussion, the Government would bring forward legislation as quickly as possible.

Mr. George Thomas, Minister Without Portfolio, has taken on the job of co-ordinating the Government's consideration of the report and of the report of the Royal Commission on Local Government in Scotland when that is published (it is expected later this year).

I have deliberately not attempted to discuss the major objections—that of Mr. Derek Senior being a report in itself. Lord Redcliffe-Maud, at a meeting I attended last October, was utterly convinced that local government needed this catharsis simply to keep alive.

It is a study in itself to read the various comments of the many interested parties, NALGO, AMC, CCA and the Rural Districts Organisation; since the rural district councils will simply wither away and disappear, they are quite naturally upset. My own view is that the officers are rightly perturbed, and one cannot blame them for taking almost any steps to protect their interests.

Unfortunately, and here I agree with the NALGO observations, the suggestion that we keep the local councils with very limited powers and functions, with the duty to advise, and with some power to raise a rate (excepting the rural district council) is a serious mistake. I could foresee local advisory bodies helping to run certain services of a local and specialised nature, but imagine the ire of the local borough with nothing but the parks and cemetery to look after! People will not want to serve on such bodies, any more than busy people want to spend their time serving on parish councils—hence the great number of vacancies there are on many of these bodies.

Some matters relating to staffing are vague and will need watching; I have little doubt that all unions and professional associations will follow the progress of redundant town clerks, borough treasurers and chief engineers. As a former teacher, I must admit that amalgamations between schools never did me much good—though they helped the lucky headmaster, and in the end I suppose the children were better off with better buildings, amenities and the like.

So far we have not specifically mentioned the health service—this is the great imponderable. With the three arms: the hospitals, the executive councils and the local authority services, there would seem to be unlimited opportunity for unification and centralisation. But the Royal Commission is surprisingly brief in its comments on the health services.

The Royal Commission certainly believes that unitary area boundaries, and those of any new health area, should, be coterminous. Lord Redcliffe-Maud stated as much at a meeting early last year. However, the reorganisation of the National Health Service was not one of his tasks. I suspect the Royal Commission was not altogether sorry that it was not. The pattern for the service, though, will be made clear in the next Green Paper, which I understand is likely to be published at the end of January 1970.

Here I must become speculative. The structure at present consists of about 330 HMCs organised into 15 RHBs and 36 teaching hospitals, 134 executive councils providing the general-practitioner, dental, pharmaceutical and optical services of the NHS, and 174 local health authorities (county councils and county boroughs) responsible for a wide range of personal health services outside the hospital service. The new structure as I see it, will be that of district/area health committees responsible for hospitals, GP and other NHS services, and for some functions at present carried out by the local authorities. I think it possible that the responsibility for the development of health centres will be transferred from the local authorities to the district health committees. The DHC areas will, I am certain, coincide with the metropolitan district and unitary areas, but people are anxious to know this, they will not be responsible to the local councils, but organised as in unitary areas.

Certainly there will have to be persons elected onto the district health committees from the unitary councils, and they may well make up an influential and important proportion. Whether those persons are elected councillors or not will remain to be seen, but I would have thought that the dual role of serving both a unitary area and a district health committee would be too much for even the most ardent committee member.

What of the RHBs? I do not think that they will wither away. I believe that the services, and the planning, medical, scientific, technical and engineering expertise will still be very much required, and that many of these services will tend to develop even more. I suspect, though, that there may be more, rather than fewer, RHBs; 18 to 20 would seem to be a possible number. I do not think that the Maud provincial councils will, in fact, have anything to do with the RHBs, which in any case may well be elected from the district health committees; they may well have a right to nomination. There is no certainty that provincial councils will be set up, and I understand that no decision will be made about these for at least two years, following, possibly, the present Crowther Committee on the Constitution. I personally think there is a very good case for provincial councils—regional government if you like—for Scotland and Wales. I am not so sure about parts of England being regionalised; I think it slightly retrograde, and certainly a questionable development of bureaucracy.

And where does the hospital engineer fit into this new and exciting picture? I believe that, with the increasing demands of industry for skilled and technical personnel, the hospital engineer will become a voice to be reckoned with, insofar as he will, I believe, have direct representation as of right on the district health committees. Comparisons are odious, I know, but the remuneration of many junior, i.e. hospital-level, engineers, is positively subnormal. Without wishing to begin another paper about the subject of renumeration, I believe that, with the developing pattern of local government and the health service, there will be such a need for the expertise of the engineer as to force both government and local authorities to recognise it in a more tangible way. The last ten years have been hectic in the health service, but I believe that the pace in the next ten years, with the developments in local government, the hospitals and the mental hospitals, will be on a scale hitherto unimagined.

British laundry claims world 'first'

The British Launderers' Research Association has recently opened a complete new laundry plant at their London laboratories, which is claimed to be the first of its kind in the world. Steam heating has been entirely eliminated; the complete heating load is carried by a liquid-phase heater supplied by Kestner-Stone-Vapor. High-temperature heat-transfer fluid is circulated to each of the laundry machines via an effectively closed-circuit system, and as the entire laundry facilities of washing, drying and pressing are included the problems particularly associated with the use of steam are completely removed.

Heat-transfer fluid has many advantages over the steam it replaces. One of the most notable of these is that no pressure vessels are needed, as the entire plant operates at atmospheric pressure. Correct choice of materials also ensures that corrosion problems are eliminated. Needless to say, this will lead to an appreciable saving in maintenance and replacement costs. In addition, the heating system is more controllable, so that the supply of heat to individual machines may be kept under more rigid supervision, and this will not only enable the treatment itself to be better controlled, but will also enable the laundry equipment to run at a higher efficiency, using less power. The BLRA is expecting an increase of productivity of up to 60% from individual machines.

The heat-transfer fluid used is non-corrosive and fire resistant, and is used at 450 °F (230 °C), which is well below its boiling point. The heater is rated at 2·5 MBtu, but the laundry is unlikely to require the full output.

At present, the entire plant is being studied with a view to increasing the efficiency of each machine by increasing output and reducing costs. Tests on the heating equipment are expected to continue for around two years, though the laundry itself is, of course, permanent. After the first three months the BLRA engineer states that the plant is running well, and is giving no trouble at all.

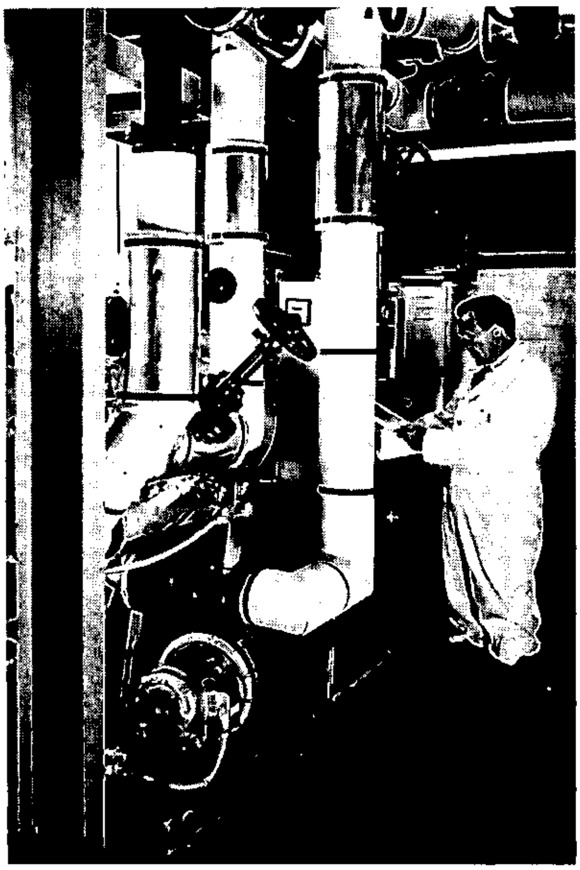

Fig. 1 Surgical-instrument cleaner installed at North Lonsdale Hospital, Barrow-in-Furness

Industry has recognised the efficiency of ultrasonic cleaning techniques for many years. Hospitals have, in general, continued to use manual methods, even though equipment is available with which large numbers of surgical instruments can be cleaned in a few minutes.

ULTRASONIC CLEANING OF SURGICAL INSTRUMENTS

The thorough cleaning of surgical instruments is clearly a vital matter to patients undergoing operations. Dried blood and small particles of tissue form deposits which adhere tenaciously to the teeth of forceps and to other instruments, and these deposits must be removed before the instruments are sterilised.

While its importance is fully realised, instrument cleaning is a chore which prevents hospital staff from getting on with the many other tasks essential to the running of an operating theatre. Scrubbing instruments by hand—the traditional method of removing deposits—is extremely time-consuming and expensive. Fortunately ultrasonic cleaning offers a better alternative.

Ultrasonic cleaning is a high-speed method of removing tenacious soils and deposits. The parts to be cleaned are put into a basket which is then placed in the stainless-steel tank of the ultrasonic cleaning unit. The tank contains a solution of detergent, or some similar additive, in water. Ultrasonic energy, supplied by an electronic power generator, is transmitted to the solution through transducers (energy convertors), which are generally mounted on the underside of the tank. The transducers subject the solution to intense ultrasonic vibration, which causes cavitation in the solution. Cavitation is the rapid formation and collapse of vapour bubbles in the liquid; this has the effect of 'scrubbing' the parts to be cleaned. The scrubbing action is effective even in deep holes and crevices, where it would be difficult to clean by other methods. Ultrasonic cleaning, already widely used in industry, has proved to be the most effective method of cleaning inaccessible instrument surfaces, 'frozen' syringes, blocked needles, badly stained forceps, scalpel blades, clips, retractors, bowls, basins and other surgical equipment. The routine cleaning of new instruments usually takes less than three minutes; heavily stained instruments take a little longer. However, subsequent routine cleaning will maintain the instruments in perfect condition.

A typical application is at North Lonsdale Hospital, Barrow-in-Furness, the general hospital for the area. Twin operating theatres are served by a single sluice and sterilising room containing a Soniclean surgical-instrument cleaner, type 1170D, made by Dawe Instruments Ltd. This is a standard two-tank unit designed for manual operation, giving the operator complete control over the timing of the individual operations. The unit is constructed of stainless steel, with smooth surfaces and flush-mounting panels to facilitate cleaning of the exterior. It measures 39½ x 24 x 33½ in (100 x 61 x 85 cm), and the control panel adds 8 in (20 cm) to the height (Fig. 1).

The cleaner is connected to mains water, drainage and electricity supplies. Solenoid valves are used to control the filling and draining of the tanks and the supply to the spray hose, so that all operations are electrically controlled by the switches on the raised control panel at the rear of the console.

Ultrasonic cleaning is carried out in the left-hand tank which contains about 5 gal (23 l) of cleaning fluid. Ultrasonic power is provided by a built-in generator which produces 600 W average (1200 W peak) of ultrasonic power at a frequency of 25 kHz, pulsed at twice the mains frequency. Modern tuning techniques automatically maintain a constant level of cleaning activity in the tank, regardless of changes in the liquid level, cleaning load or temperature. Safety devices ensure that the ultrasonic tank fills to the correct level, and that power

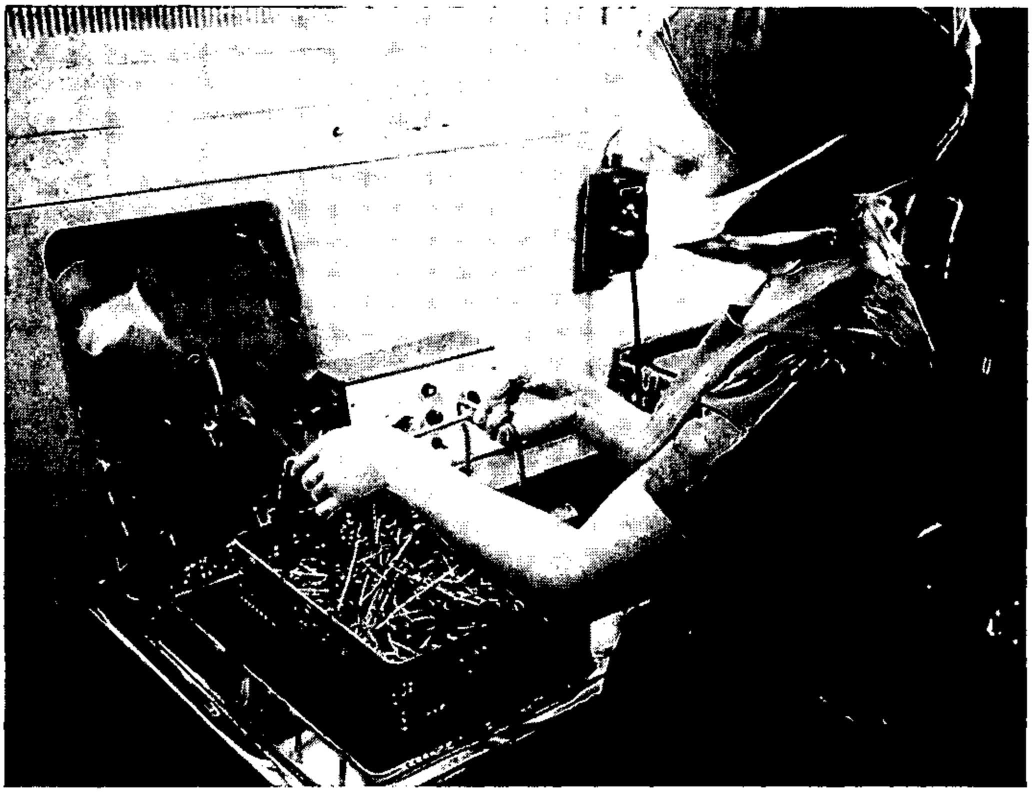

Fig. 2 Removing surgical instruments from the ultrasonic tank

Fig. 3 Rinsing the cleaned instruments

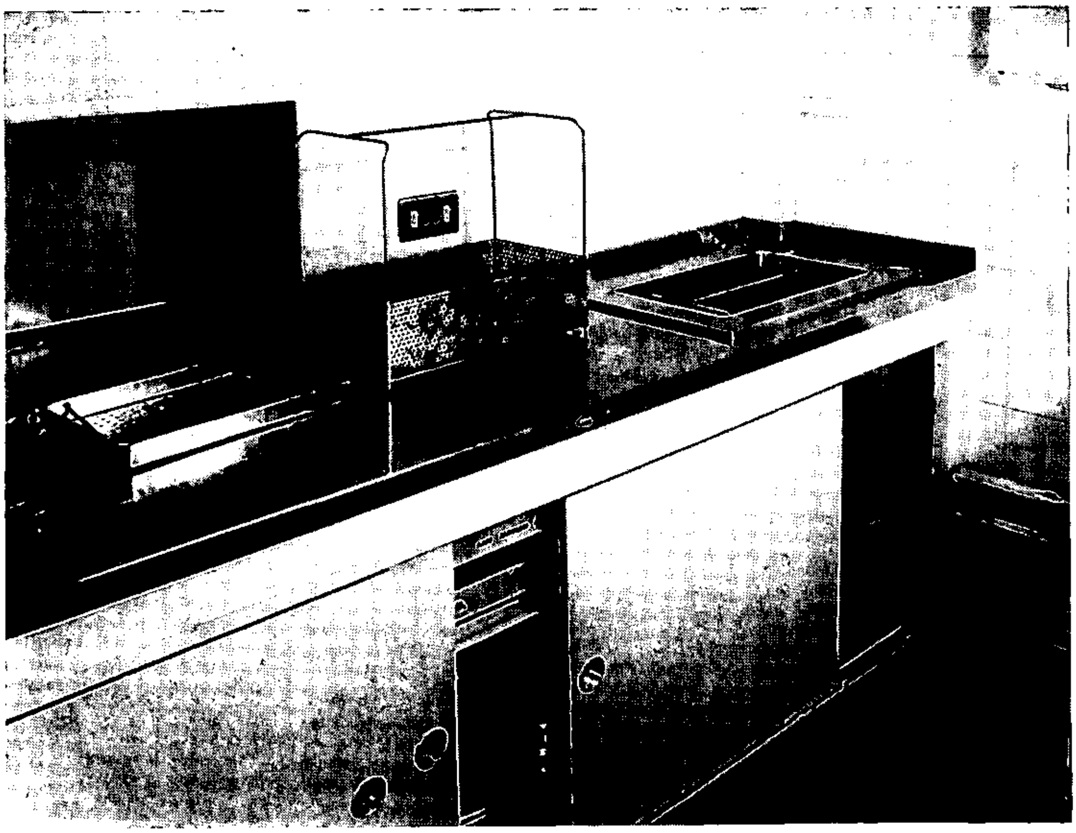

Fig. 4 Ultrasonic sink in the working top of the sluice room at St. Chad's Hospital, Birmingham. The generator is installed in the space below

cannot be applied to an empty tank.

North Lonsdale is a very active hospital from which patients are moved a few days after operation to convalesce elsewhere. The theatres are in continual use, except at weekends when emergencies only are handled. New cases are constantly arriving, and the twin operating theatres handle at least 60 general operations a week, plus ear, nose and throat cases.

Each theatre has sufficient instruments for two consecutive major operations; so, while one operation is in progress, the instruments used in the previous operation are cleaned, dried, stored and put through the autoclave ready for reuse. In the past, the instruments were washed by hand in a detergent solution and manually scrubbed clean with a nail brush, but now the ultrasonic cleaner has relieved the staff of this chore.

Instruments to be cleaned are dismantled to expose the jaws and are stacked in a stainless-steel basket for immersion in the cleaning solution (Fig. 2). After ultrasonic cleaning for about 5 min the cleaning solution is drained off, and the basket is transferred to the right-hand tank for rinsing. There the instruments could be soaked, but it has been found better to spray them with a hand shower (Fig. 3), using hot and then cold water. The flexible lead of the shower is sufficiently long to reach the left-hand (ultrasonic) tank if the instruments are urgently required for reuse.

Ultrasonic cleaning had been used for some time in the sterilising department at North Lonsdale, but the 1170D is the first ultrasonic cleaner to be used in the operating-theatre suite, where it has proved to be very effective in its six months of intensive service.

The model described above is manually controlled, but there are also fully automatic (type 1171B) and mobile (type 1173B) units. All units in the range are self-contained (except for normal mains services), and they are available as standard. However, with more and more hospitals building sluice rooms adjacent to the operating theatres, there is a parallel need for equipment for incorporation into built-in working tops. Dawe has catered for this need by designing each of the tanks with a stainless-steel lip and fitted with both inlet and outlet pipes so that the mains water supply and drainage can be plumbed in. The generators are self-contained, and can be built into a bench unit or left free-standing as required.

Typical equipment of this type is installed at St. Chad's Hospital, Birmingham, where one side of the single operating theatre leads off to interconnected sterilising and sluice rooms. Instruments are passed through a serving hatch connecting the sterilising and sluice rooms (Fig. 4), and are stacked on a stainless-steel working top running the full length of the interconnecting wall on the sluice-room side of the hatch. Built into this working top is a Dawe ultrasonic-cleaning tank which takes the form of an ultrasonic sink which is fully plumbed in. The cold water supplied is heated in the tank itself to about 120 °F (50 °C) for ultrasonic cleaning. The drain hole is of 1 in diameter to allow quick draining of contaminated cleaning fluid. After cleaning, the instruments are removed to an adjacent sink, by means of the stainless-steel basket, for rinsing.

The ultrasonic cleaning equipment has been installed at St. Chad's for about eight months, and, like the theatre equipment at North Lonsdale, it is in constant use. In this case the installation was designed by the hospital authorities, with the assistance of Dawe engineers.

✱ Browsing Around ✱

CORRESPONDENCE EDUCATION AND THE HOSPITAL

Hospital Research and Educational Trust, pp. 50, $2.

This small American book is a summary report of an investigation into correspondence courses for continuing education in hospitals. The approach is typically American, and the reader must weigh the opinions expressed against practice within his own country. Nevertheless, the data and the conclusions could be of use to engineers seeking some clarification of their own thoughts when organising training arrangements for their staffs.

There is a section dealing essentially with departmental training needs; this includes a subsection on laundries and maintenance departments.

MACHINES IN MEDICINE—

The medical practice of the future

DONALD LONGMORE

Aldus Books, pp. 192, 16s.

This is a further book in the very good Science & Technology Series, and this, coupled with the name of Donald Longmore, who has become almost a household figure through his close association with the British heart-transplant team, stimulates considerable interest even before the covers are opened.

I do not know whether the author would be flattered if I called this a plain man's guide to machines in medicine, but certainly reading it as an engineer, I found I was beginning to understand many things which had in the past been clouded with a certain amount of mystery. Mr. Longmore says: 'from the start I was determined not to compose an extended catalogue of medical machinery; instead I set out to describe the fundamental processes on which bio-engineering rests.' It is because of this that so much of the information given is of terrific use to engineers working in the hospital field.

In particular, Chapter 5, 'Therapeutic medicine', Chapter 6, 'Computers and medicine', and the Appendix on 'Machines in use' are of great interest, and the comparatively small section headed 'Suggested reading' provides the reader with a basic course of further study.

THE INSULATION HANDBOOK 1969/70

Metric Edition

Lomax, Erskine Publications Ltd., pp. 304, 15s.

Handbooks seem to provide the foundation of the design and installation engineer's library, and here is one which should prove to be of considerable use. The new edition is somewhat larger than its predecessor and marks the important step which the whole insulation industry will be facing in the next two years; i.e. the changeover from imperial to metric (SI) units. The publishers say that it has been the intention to set the pace for the changeover, and to provide data in a form that will accustom both producer and consumer to use the new language.

The contents include dimensions and insulation values of all important thermal-, acoustic- and vibration-insulation materials on the market in the UK, fixing systems and adhesives and legal requirements, and a directory of all associations, institutions, manufacturers, contractors and trading and proprietory names.

✱ Postbox ✱

Dear Sir,

I wonder whether, through your publication, it would be possible for me to write a short letter of thanks to the members of the London Branch?

Recently my husband resigned from the post of Branch Secretary, and many members, in their open-handed generosity, contributed to a presentation to him. The actual gifts were given to us at the Branch Ladies' Night in October, but I know that many of those who contributed were not there, and it is to these kind folk that this letter is written.

My husband received a much coveted 'Longine' wrist watch, an article which he never expected to own. Bathing in reflected glory, I too received a gift! I had the most beautiful set of cut-crystal sherry glasses, plus a set of equally lovely whisky glasses.

To all those who made this presentation possible, let me say what very great pleasure these gifts have given both of us; just to say 'Thank you' seems totally inadequate. None the less I do, most sincerely. I know one always says on these occasions that the articles will be a constant reminder of a long and happy association, and I am not going to depart from this time-honoured custom! My own contribution to the secretaryship was indeed small, and my reward out of all proportion. I enjoyed very much the small routine jobs that fell to my lot.

I do know that, in his fast-approaching retirement from the hospital service, my husband will continue to take a lively interest in all things pertaining to the hospital-engineering world.

Very sincerely yours,

Patricia Vedast

59 Oakfield Gardens
Edmonton
London N18

A Happy New Year

to all readers of

Hospital Engineering

This paper has appeared, in slightly different form, in 'Hospital Service Engineering'

Battery-operated standby power equipment

by D. Heatlie-Jackson

Over the past few years steady improvements have been made in the design and operation of battery-operated standby power equipment. The rapid development of transistors and other solid-state devices, coupled with a rapid decrease in the cost of such devices, have contributed to these changes.

Automatic battery chargers used to incorporate hot-wire vacuum switches to sense the battery voltage and switch on a charge as necessary, but of recent years these have been increasingly difficult to obtain, and have tended to have much wider operating tolerances than is reasonable. Fully transistorised voltage-sensing devices are now used and this makes possible much more accurate sensing of battery condition. Two basic techniques are at present used: the trickle-charge/automatic-quick-charge system and the pulse-charge system. The first is self-explanatory, and the pulse-charge system is simply one in which the open-circuit losses in battery capacity are replaced by means of a short pulse at the quick-charge rate.

Both methods result in the battery being maintained closer to its fully charged condition, without either excess gassing of the plates or overcharging. This leads to a smaller loss of electrolyte, and gives a longer interval between topping up—it is not uncommon to find perfectly healthy batteries which only require topping up at six-monthly or even longer intervals.

The obvious advantage of automatic charging is that, in the event of an emergency or test discharge, the charger begins recharging the battery as soon as the mains supply is resumed. The battery is thus returned to a fully charged condition at the earliest possible opportunity, and, equally important, the charge is terminated at the correct point—overcharging is one of the surest ways of shortening the life expectancy of any battery.

It should be borne in mind, however, that in many hospitals the emergency supply for the operating theatre is taken direct from the battery to a failure-detection relay in, or adjacent to, the operating theatre itself. In this case, should there be a local supply failure, the subcircuit would become connected to the battery output, and with automatic charging circuits the battery could be receiving a charge at a higher-than-normal voltage. The higher voltage would be carried through to the secondary lamps; this could be as much as 30–40% above the rated voltage, which would obviously result in early lamp failures. It is therefore important to ensure that the charger circuitry incorporates a means of interrupting the charge circuit the moment that the battery discharges through the load. This can be accomplished by means of an additional sensing circuit, which feeds back to a relay in the charge circuit. It is now becoming regular practice to incorporate the local-failure relays in the battery charger, and to provide detection feeds from the theatre suite to the battery charger (Fig. 1).

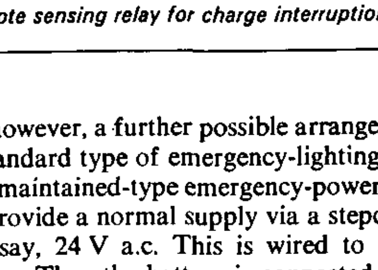

Fig. 1 Remote sensing relay for charge interruption

There is, however, a further possible arrangement which utilises a standard type of emergency-lighting equipment (Fig. 2). A maintained-type emergency-power equipment is used to provide a normal supply via a stepdown transformer at, say, 24 V a.c. This is wired to the normal theatre relays. Thus the battery is connected to the load only when the mains supply to the charger unit itself has failed. Failure of the local circuit simply leads to the supply being taken from the stepdown transformer. If the mains supply to the charger cubicle failed, and the battery were then connected to the output or safety circuit, then the battery could obviously not be receiving a charge. This system has the additional benefit of only discharging the battery when a general supply failure occurs, and not in the event of a purely local failure.

Manager, Station Battery Department, Oldham & Son Ltd.

Charger development

Transistor and thyristor devices have also been used to provide automatic 'float' chargers at very little more cost than the old manually adjusted float-charger systems. These can now be used for complete no-break d.c. supplies where varying load conditions are met, allowing switching of individual subcircuits without manual adjustment of the charger output.

The unit shown in Fig. 3 is suitable for supplying loads up to 10 A at 12 V d.c., and incorporates a battery capable of carrying the maximum load for a period of 3 h in the event of failure of the mains supply. Used in conjunction with transistorised fluorescent-light fittings, this unit could supply ten 13 W lighting points for a full 3 h emergency coverage, at a cost, including lighting fittings, of £140 plus installation and wiring costs. The light output would be equivalent to tungsten lamps of 40–60 W each.

Physically, charger design itself has tended to provide cleaner, neater and more simple cubicles which require no special battery room and can be housed in stairwells, corridors etc., enabling a considerable saving in construction costs.

Battery developments

Some years ago the traditional Planté-type battery gave way to the high-performance version using thinner positive plates and pasted negative plates, giving equiva-

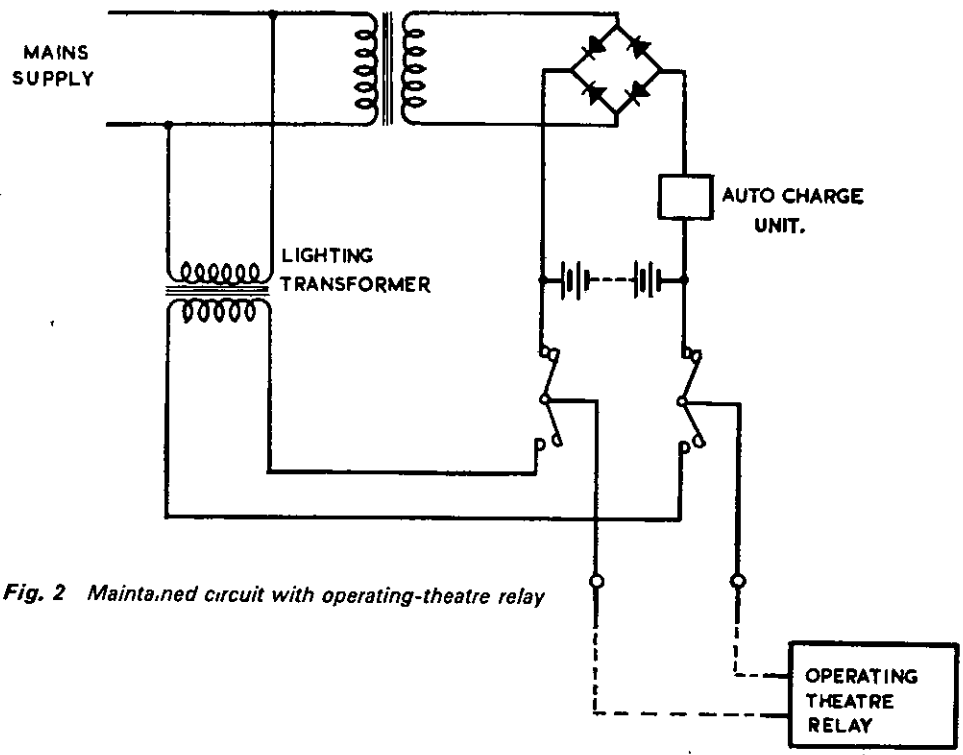

Fig. 2 Maintained circuit with operating-theatre relay

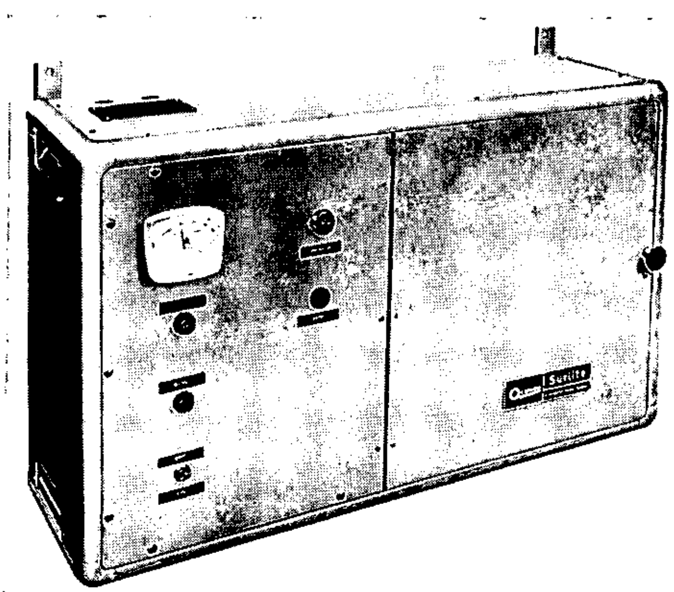

Fig. 3 Self-contained automatic float equipment providing 3 h discharge at 10 A, 12V

lent battery capacity in less space and with reduced weight.

Shortly afterwards the multisleeve tubular battery was developed specifically for stationary applications and led to even greater savings in space, weight and, perhaps more important, cost. The reduced space requirements have resulted in a greater tendency to contain the battery and charger in one selfcontained cubicle. Such equipments range from 12 V 240 W 1 h capacity, in a cubicle 22 x 15 x 19 in, to 110 V 10 kW 3 h capacity, in a cubicle 72 x 60 x 24 in. The multisleeve tubular stationary battery now has a proven life in excess of 15 years and is generally accepted for standby duties.

Static invertors

The static invertor is a system for the provision of alternating current from a direct current (battery) source, and is therefore principally used to provide minimum-break or no-break supplies. As well as supplying the requirements of a.c. apparatus, the static invertor is also able to supply emergency lighting systems using existing standard fittings and distribution circuits. Where existing fluorescent lighting fittings are utilised, greater light output is achieved from a given battery compared with d.c.-fed tungsten or fluorescent fittings.

Standby type

The normal mains supply passes through this equipment, and in the event of failure of the normal supply the invertor system strikes up and supplies the load circuit. The changeover period from mains to invertor output is around 250 ms or less. While the mains supply is held, the filter chokes and output transformer are utilised in the automatic battery-charger circuit, thus reducing the

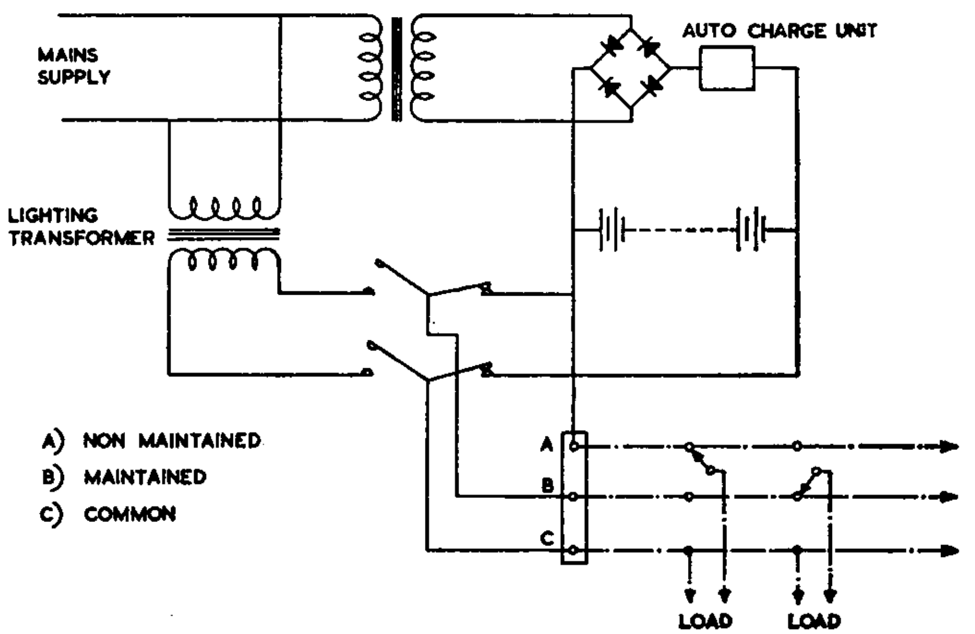

Fig. 4 Maintained/non maintained circuit for night and emergency lighting

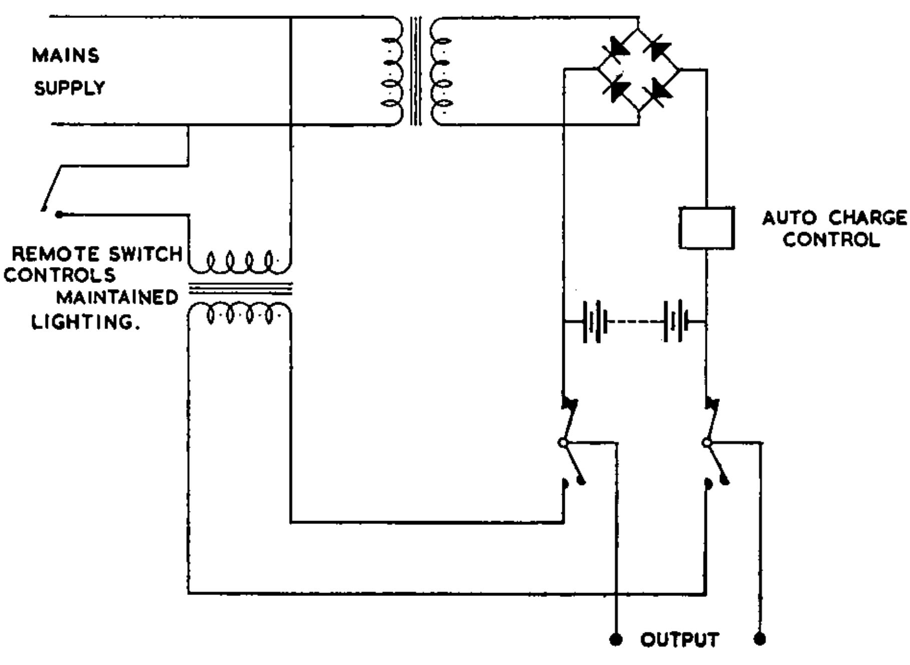

Fig. 5 Maintained circuit with switch in lighting-transformer primary

cost of the unit. For fluorescent lighting loads, considerable distortion of the waveform output is acceptable, but for valve applications etc. the harmonic distortion is best kept to 10% or less.

Standby sets are now readily available in a standard range from 500 VA to 20 kVA, with lead–acid batteries housed either within the invertor cubicle in the smaller-capacity range, or on separate wooden stands, in trays, or in matching sheet-steel cubicles for the larger sets.

No-break type

This type is used when the 100–250 ms break in supply is intolerable. The no-break invertor set is continuously operating from a battery-charger/battery-float arrangement. Failure of the supply allows the battery to discharge to the invertor. In most no-break circuits it is possible, by means of static switches, to provide back-up protection against invertor failure by reverting to a second paralleled invertor or to the normal mains supply. No-break sets are available for 1–20 kVA ratings with batteries to give from 30 min to 3 h or even longer protection against mains failure.

Invertor sets have now been in use in hospitals for some years, giving successful protection for essential equipment such as lung and kidney machines, incubators etc. They are normally found to be competitive with rotating machinery well into the 20 kVA range, and even above that where close tolerances of output are required. In particular, the frequency can be held to within 0·01% with a static invertor, but this would be extremely difficult and costly to achieve with a rotating standby set. In addition, the static invertor requires no separate building, is reliable and quiet in operation, and needs very little maintenance when compared with rotating sets.

Useful adaptations of standard equipment

Fig. 4 shows a standard combined maintained/nonmaintained a.c./d.c. emergency-lighting equipment, wired, using a three-wire system, to separate lighting points controlled by two-way switches. This system has been used successfully in old people's homes, convalescent homes and other geriatric units to provide switched night lighting combined with emergency lighting. The light points are used to provide night lighting in corridors, staircases etc. They are operated by the normal switch, which, when in the 'on' position, actually switches the light to the maintained circuit. To switch the lights off, the switch is placed in the second position which in fact connects the nonmaintained or emergency circuit. If the battery charger is detecting a healthy mains-supply condition, then the light fittings are not illuminated. If, however, the mains supply should fail, the changeover contactor in the emergency lighting equipment is de-energised, and the battery is connected to the nonmaintained circuit, thus lighting the corridor. The use of this equipment eliminates duplication of the safety-lighting circuit with a night-lighting circuit, and allows local switching of light points while retaining the emergency feature.

A simpler alternative with a maintained lighting circuit has a switch in the primary circuit of the lighting transformer (Fig. 5) which again will allow control of the corridor or night-lighting circuit, but this time from a single switch, which could be a time switch. It can be seen that even if this switch is in the 'off' position, the unit will operate as a nonmaintained equipment in the event of mains failure, and the battery will be connected to the lighting load. This arrangement is preferable to having a switch in the output circuit which could inadvertantly be left in the 'off' position, thus preventing operation of the safety-lighting circuit in the event of mains failure.

Fire-alarm supplies

The provision of a reliable source of supply for the operation of fire-alarm systems would appear to be an often overlooked item. Far too often an otherwise first-rate system is supplied by primary cells which are not renewed regularly, or by an automotive-type battery with a single-rate trickle charger. This arrangement can never be regarded as satisfactory. The alarm system should preferably comply with Technical Memorandum 16, but in any case should incorporate a stationary battery and automatic charger, so as to ensure complete availability at all times.

Standby generators

Although standby generating plant is not within the scope of this article, it is worth considering the starting arrangements of such plant. All too often an otherwise reliable and costly piece of equipment relies on an automotive starter battery with a trickle charger. Apart from requiring regular adjustment and supervision of the trickle charge, it is characteristic of an automotive battery, owing to the high antimonal content of the lead alloy used in manufacture, that trickle charging results in very rapid deterioration of the battery, usually within a matter of months.

The most reliable, and ultimately the most economical system, is a special diesel-starting battery with an automatic pulse-charging system. Tubular batteries which have been specifically designed for this work are available, and used in conjunction with a good-quality automatic charger these will give absolute reliability over a considerable time, and will also require less maintenance, thus recovering in a short time the higher cost of the system. In any case, the cost would only be a fraction of the cost of the standby generator itself, and any false economy could nullify the provision of the standby set itself.

Future developments in battery chargers are proceeding apace, and static invertors are now moving into the 3-phase no-break 30 kVA range. Automatic charging is now becoming a standard item, reducing the maintenance requirement and providing long life expectancy from the cells.

Tubular batteries now have a well-proven life and reliability and have reduced space and capital requirements, and are accepted for safety applications. Steady improvement in the lead–acid battery will continue to improve performance and reduce costs. The battery remains the most reliable form of standby supply available.

* Market News *

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Series 5 boilers

Beeston Series 5 packaged boiler units are the latest product to be manufactured by the Beeston Boiler Company. These boilers do not require special bases or refractory combustion chambers, with consequent savings in maintenance and replacement costs. The development of a patent intersection joint has made it possible to operate the boilers with positive pressure in the combustion chamber, and full advantage has been taken of the resultant high heat-transfer rate. This requires that the water flow within the boiler should be positive and controlled, and integral pumps are provided.

The Beeston Boiler Company Limited, PO Box 2, Beeston, Nottingham **HE 80**

Badge reader

A patient's identity, condition, blood group and date of admission, drugs to which he may be allergic and other pertinent information vital to his treatment can be coded and recorded on the model SCR 1010 badge reader. As a result, a complete up-to-date record of any patient can be obtained quickly at any time of the day or night. The fully automatic unit, whose contacts will function

effectively for more than 2 million cycles, features a redundant circuit which provides maximum reliability in sensing badge information. A flashing light indicates a wrongly or improperly inserted badge, and the units are of modular construction for easier servicing.

Sealectro Limited, Walton Road, Farlington, Portsmouth **HE 81**

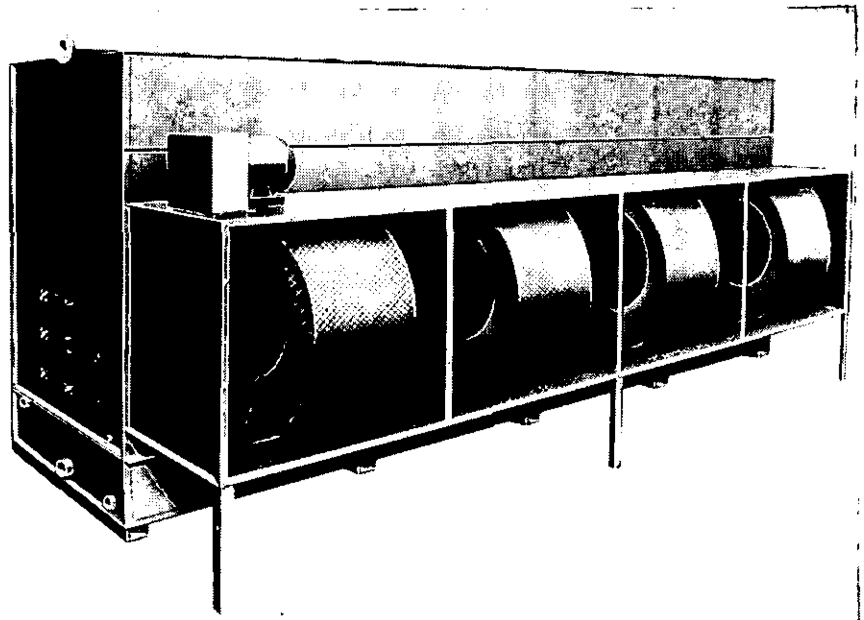
Cooling tower

The new cooling tower, the 'S' type, from Carter Thermal Engineering, is a forced-draught contraflow cooling tower fitted with multi-impeller centrifugal fans, and is produced in 12 sizes. The tower is compact and quiet, and the weight has been kept to the minimum consistent with strength and long working life.

All sizes are equipped with non-clogging overspill weir, V-trough distribution systems and western-red-cedar mist eliminators.

The cooling tower can be delivered in one piece, or with separate fan section, and is also available completely knocked down.

Carter Thermal Engineering Limited, Redhill Road, Hay Mills, Birmingham 25 **HE 82**



Plumbing fittings

The Starlite, a new nonrising-headwork tap, is a patented design with fewer moving parts in the headwork mechanism. A shrouded, nonrotating washer closes off against a standard seating on a precise alignment, and always in the same position. Washer wear is reduced to an absolute minimum. The precision-made working parts are lubricant-sealed against water corrosion and scaling, and the primary gland seal can be replaced without special tools and without turning off the mains supply.

Armitage Ware Limited, Armitage, Staffs. **HE 83**

Super-Flex

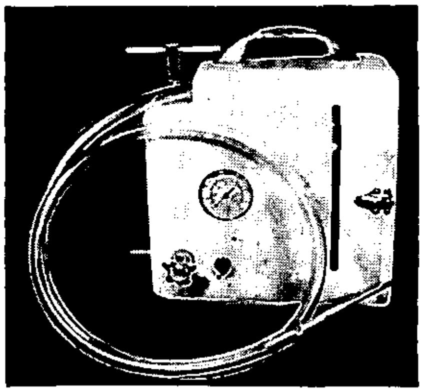
'Super-Flex' comprises multi-stranded copper wires embedded in silicon rubber. It provides a strong flexible electrical link which is resistant to chemical and acid attack and is capable of withstanding wide temperature variations.

Characteristics include 70 000 000 flexures through 90°, up to 10 A per conductor and a working-temperature range of +270°C to −150°C.

Trident Engineering Limited, Wokingham, Berks. **HE 84**

Aspirator

A portable aspirator which does not depend on the flow of oxygen or a battery for its operation, but can be worked by hand or automatically from the manifold of a car or ambulance, has been announced by Respirex Ltd. It takes only 10 s to build



up a suction of up to 500 mm (20 in) Hg, the vacuum being controlled by valves. The rate of flow is 10 l/min of water, and the fluid level is clearly visible in the bottle, which can be quickly removed for emptying and cleaning. The aspirator weighs 8½ lb.

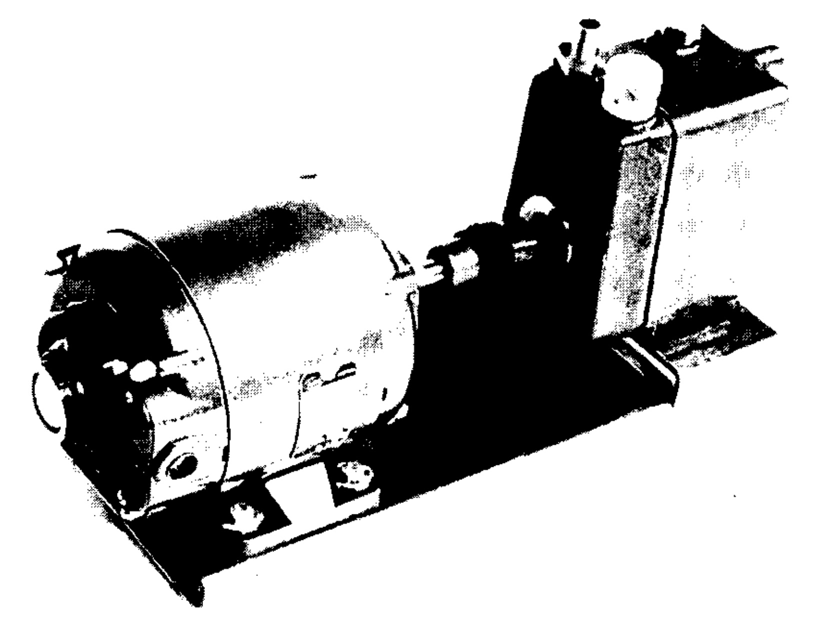
Respirex Limited, 26 Portland Drive, Merstham, Surrey **HE 85**

Hard-vacuum pumps

A new range of six vacuum pumps comprising three single-stage and three two-stage pumps, with free-air displacement capacities from 2 to 20 ft^3/min, has been introduced by Titan Vacuum Engineering.

The design features a patented valve unit, which prevents significant loss of vacuum and protects the system should the pump be stopped. Gas-purging facilities are provided as standard, a special exhaust valve eliminating hydraulic 'knocking', and an oil-suppression device which prevents oil spray from the exhaust vent, are also provided.

The Hoffmann Manufacturing Company Limited, PO Box 7, Chelmsford, Essex **HE 87**



Automatic microscope camera

The 'Autolynx' microscope camera has automatic light assessment, single-action focusing and automatic film wind on, all in one photo unit,' and ensures that whatever can be seen by eye in the microscope can be photographed. The automatic light assessment works for any light level from bright-field to fluorescence, and the unit gives good colour compensation over the visual range.

The photo head uses either 20- or 36-exposure cassettes, and wind-on time is approximately 6 s. Optional accessories include a splitter head for viewing at the instant of taking, and a reflex head to change the binocular image to the camera, to ensure passing the maximum possible light to the film.

Gillett & Sibert Limited, 417 Battersea Park Road, London SW11 **HE 86**

Literature available

Nuclear Enterprises catalogue
128 pages of nucleonic equipment, including health-physics monitors and process-control instrumentation. *Nuclear Enterprises Limited, Bath Road, Beenham, Reading, Berks.* **HE 88**

Instant pictures
Two leaflets on the use of Polaroid cameras, for example in the preparation of reports. They cover monochrome transparencies, and the CU5 closeup camera, which is becoming widely used in both the engineering and medical fields. *Polaroid (UK) Limited, Welwyn Garden City, Herts.* **HE 89**

Clean compressed air
12 pp. booklet intended for engineers in occasional contact with compressed-air systems. It covers, particularly, contamination and the levels acceptable in various applications. *C. A. Norgren Limited, Shipston on Stour, War.* **HE 90**

Integrated lighting
Describes the use of special lighting fixtures in total-environment systems; *i.e.* where the lighting is designed as part of an overall air-conditioning complex. *Osram (GEC) Limited, PO Box 17, East Lane, Wembley, Middx.* **HE 91**

Cable installation
8 pp. pamphlet illustrating the activities of the BICC Mains Cabling Division. *British Insulated Callender's Construction Company Limited, 7 Mayday Road, Thornton Heath, Surrey* **HE 92**

Emergency lighting
Illustrated folder and price list giving details of the Bardic range of self-contained emergency-lighting units. *Bardic Systems Limited, William Street, Southampton* **HE 93**

MODERN HEAT EXCHANGERS

by F. Hicks

Technical Sales Manager, The British Steam Specialties Ltd.

The title of this paper gives great scope for discussion, but as the main interest at this conference is the use of heat exchangers in hospitals, I shall restrict myself to the areas of domestic hot-water generators and calorifiers, nonstorage calorifiers, and heat exchangers for heating purposes.

We are all familiar with the conventional type of non-storage calorifier as used to transfer heat from the high-pressure primary source, whether it be steam or pressurised hot water, to the low-temperature secondary water as used in the radiators and heater batteries of a heating system. This type of exchanger fits into the wider range of heat exchangers, known as shell and tube exchangers, and is generally supplied in the UK with the high-pressure primary in the tubes which form the heating surface, and the secondary or heated fluid in the shell. Exactly the opposite procedure is used in the US and in some parts of the Continent, where the low-temperature secondary is inside the tubes, and the primary is in the shell. The reasons for this will be discussed later in this paper.

The sizing of this type of exchanger is quite a straightforward procedure. The very complicated calculations used in the design of process exchangers are not considered worth the time spent, as the heating surfaces are generally small. The calculation to determine heating surface is

$$A = \frac{Q}{UT_a}$$

where A = heating surface, ft^2

Q = heating load, Btu/h

U = coefficient of heat transfer, Btu/ft^2 per deg F/h

T_a = mean temperature difference between the average primary and secondary temperatures, deg F.

The heating load is easily calculated by taking the calculated heat loss of the building to be heated, adding any margins required for heat up plus the number of air changes expected in the building. The arithmetic mean temperature difference is a rough method of determining the temperature difference within a heat exchanger, and for this type of exchanger it is usually quite acceptable. In the more complicated process heat exchangers, the logarithmic mean temperature difference is used for a more accurate determination. The overall coefficient of heat transfer, however, does create some calculation problems, and acknowledged experts throughout the world have widely differing ideas on what the figure should be for any given set of conditions; for example, a heat exchanger with steam in the coils and water in the shell could be allocated a coefficient of 150–600 Btu/ft^2 per deg F/h. It is the generally accepted method in this country, however, to make an approximate calculation, which could give a result between 150 and 250, unless some method of forced circulation or baffling in the exchanger is used.

A number of changes in the design of heating surfaces have been made over the past few years, the indented-tube heating surface being the first step in this direction. Since then extended-surface or low-finned tubes have been used in nonstorage calorifiers, thus reducing greatly the shell size for any given output. The criticism levelled against the use of this type of heating surface is that the fins are quickly coated with scale and silt. This criticism is not valid in this particular use of the exchanger, as the raw-water input to the system is very low, and once one set of solids has been separated from the liquid no further precipitation will take place.

Some manufacturers have attempted to make non-storage calorifiers even smaller than current trends by close baffling of secondary-water flow and high circulation rates. This increases the overall coefficient of heat transfer with respect to the increased flow rate, and has the advantages of the cross-flow-type heater with the increased baffling. Some problems have been experienced because the high flow rates create wear, and higher pumping powers are required on the secondary side to overcome the pressure drops within the system. It must be realised that using high velocities and high heat-transfer coefficients in exchangers with fluctuating loads creates control problems, and in many cases the cost of control equipment and sensing devices to overcome the fluctuations of heat input in relation to the load fluctuations, coupled with the high pumping costs, can outweigh the overall cost in savings in the exchanger.

The normal type of storage calorifier used in hospitals over many years is at the moment going through a great number of design changes. The compact hot-water generator from the USA (Fig. 1) has created a competitive situation in the storage-calorifier market that has not been felt before. This has encouraged storage-calorifier manufacturers to look to alternative types of design to enable the new competition to be met. This, coupled with a new thinking throughout the world on the supply of domestic hot water, has greatly changed the type and size of storage calorifier offered in any given size of hospital.

In the UK it was the practice to establish the number of people in a hospital of a given type, and to apply the storage volume and a recovery or heat-up period based on the type of hospital. The American practice of allocating the storage volume to the calculated hot-water demand is beginning to be accepted in this country, owing to research carried out by the Hospital Engineering Research Unit in Glasgow. Modern thinking based on these experiments shows that the storage should have some relation to the maximum draw-off required in a given type of hospital. This draw-off is obviously related to the number and types of fixtures within the building.

Over the past ten years a lot of new thinking has gone into determining the quantity of water required in a given building at the peak-load period. If a calculation were done to determine the maximum simultaneous demand in a building, using the heating and ventilating

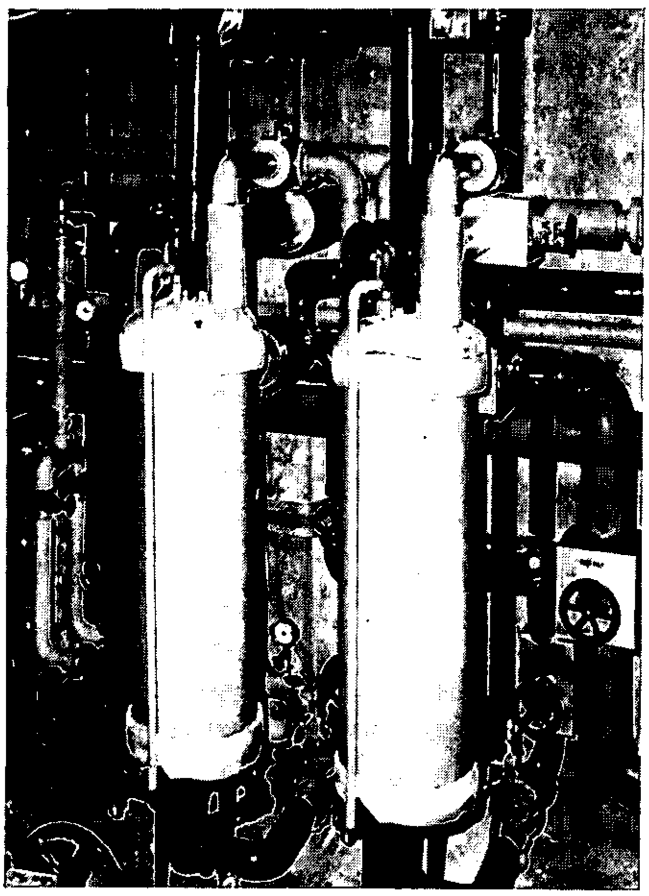


Fig. 1 Two 'Angelery' hot-water generators, each capable of supplying 72 gal/min at 50-160°F. Primary temperature 190-310°F

engineers' guide to current practice of ten years ago, the answer may well have been 100 gal/min. However, if the current IHVE guide were used to calculate the demand on the same building, the answer would probably be in the region of 70 gal/min, and if the American ASHRAE guide were used we would probably find that it gave us an answer of 60 gal/min.

Even though there are great differences in the calculated figures over the last ten years, it is still found that the calculated figures grossly over-size the pipework and heat exchangers on such installations. It is expected that during the coming year both the UK IHVE and the ASHRAE committee will again be reducing the fixture figures to bring down the calculated demand. As the calculated and actual maximum simultaneous demands are very similar, more economical sizing of pipework and heat exchangers will be possible.

The calculation for the overall coefficient of heat transfer in a storage calorifier has been accepted in the UK to be, with steam in the coil and water in the shell, using copper as the heating-surface material, in the region of 150 Btu/ft^2 per deg F/h. However, the accepted figure in the USA is, under the same conditions, 250 Btu/ft^2 per deg F/h. Tests currently being conducted in this country by the Ministries of Health and Public Building & Works, are showing that coefficients can, under certain circumstances, be in the region of 500 Btu/ft^2 per deg F/h.

This means that the storage calorifier performs in a very different way to the original concept; the storage capacity being allocated to meet the high peak load, which theoretically happens once or twice during a day, and the recovery, or heat-up period, being designed to cope with the average demand. This allows a smaller allocation of boiler power, because of the low even draw-off of heat from the boiler plant.

If, however, one considers how the heat exchanger is designed, and the positioning of the thermostat, it can be seen that in practice the heat input bears no relation to the theory. The heating surface is calculated from the standard formula, as before:

$$A = \frac{Q}{UT_a}$$

where Q Btu/h is the amount of heat required to be put into the vessel over a given time and U and T_a are as defined above.

Q is determined by multiplying the number of gallons stored by the temperature rise, and dividing by the time allowed for the storage to be heated. U is arbitrarily accepted as being somewhere between 100-150 in a steam/water exchanger. The arithmetic mean is calculated as being the difference between the mean primary temperature and the mean of the inlet and outlet secondary-water temperatures. It must be remembered, however, that the coil never, in fact, comes into contact with the hottest water in the storage vessel, as it is situated in the bottom third of the vessel. If a storage calorifier were set with an outlet temperature of 150°F, the coil would never come into contact with water over 100°F. When it is considered how the coil is opened for heat to flow into it, by a signal from the thermostat placed approximately a third of the way up the calorifier shell, it must be remembered that some considerable volume of water must be taken out of the shell before the thermostat opens the heat-control valve. Tests carried out over the past years show that approximately half of the water must be taken from the shell of a calorifier, with the thermostat placed a third of the way up, before the control valve is opened. While this is happening, water entering at the inlet temperature is completely surrounding the coil, thus making the heat output of a given heating surface far higher than calculated by the above method.

The idea of the heat being put into the water during periods of low draw-off is defeated by this method of design. If we take the load in a hospital as commencing at 6.00 a.m. we have a very low load, but the storage vessel is up to the required temperature in the top third of the tank, and half of the volume must be drawn off before the thermostat gives the signal to put heat in. This, of course, comes at the time of the maximum demand, as water is being taken off until approximately 9.30 a.m. when the demand is greatly increased. No heat will have been put in from 6.00 a.m. to this time, so that the heat will have to be introduced at the time of the maximum water demand. Therefore the coil must support the draw-off of hot water at at least the rate of draw-off, so that the outlet temperature does not fall, or at a greater rate than the water flow to close the thermostatic valve.

Many engineers, when this is pointed out, say that the system can be greatly improved by positioning extra thermostats throughout the system. This is true to some degree, but it must be agreed that the biggest proportion of storage calorifiers used in hospitals are designed as above, with a single thermostat placed within the shell, usually a third of the way up from the bottom. These would, in fact, operate in the way described.

The introduction of the hot-water generator from the US has induced storage-calorifier designers to bring in a more competitive design and to have a second look at their existing designs and original thoughts on methods of operation.

Such modifications as separate non-storage-type exchangers supplying hot water to a storage vessel are now being put forward, and in some cases operate satisfactorily. Again, care must be taken in the placing of the thermostats, otherwise uncontrolled heat transfer takes place within the actual heat exchanger. This is usually not noticed in operation, owing to the large volume of water absorbing the excessively high temperature of the secondary water from the exchanger shell. Another problem encountered by using this method is that unless a nonferrous shell is used in the exchanger water con-

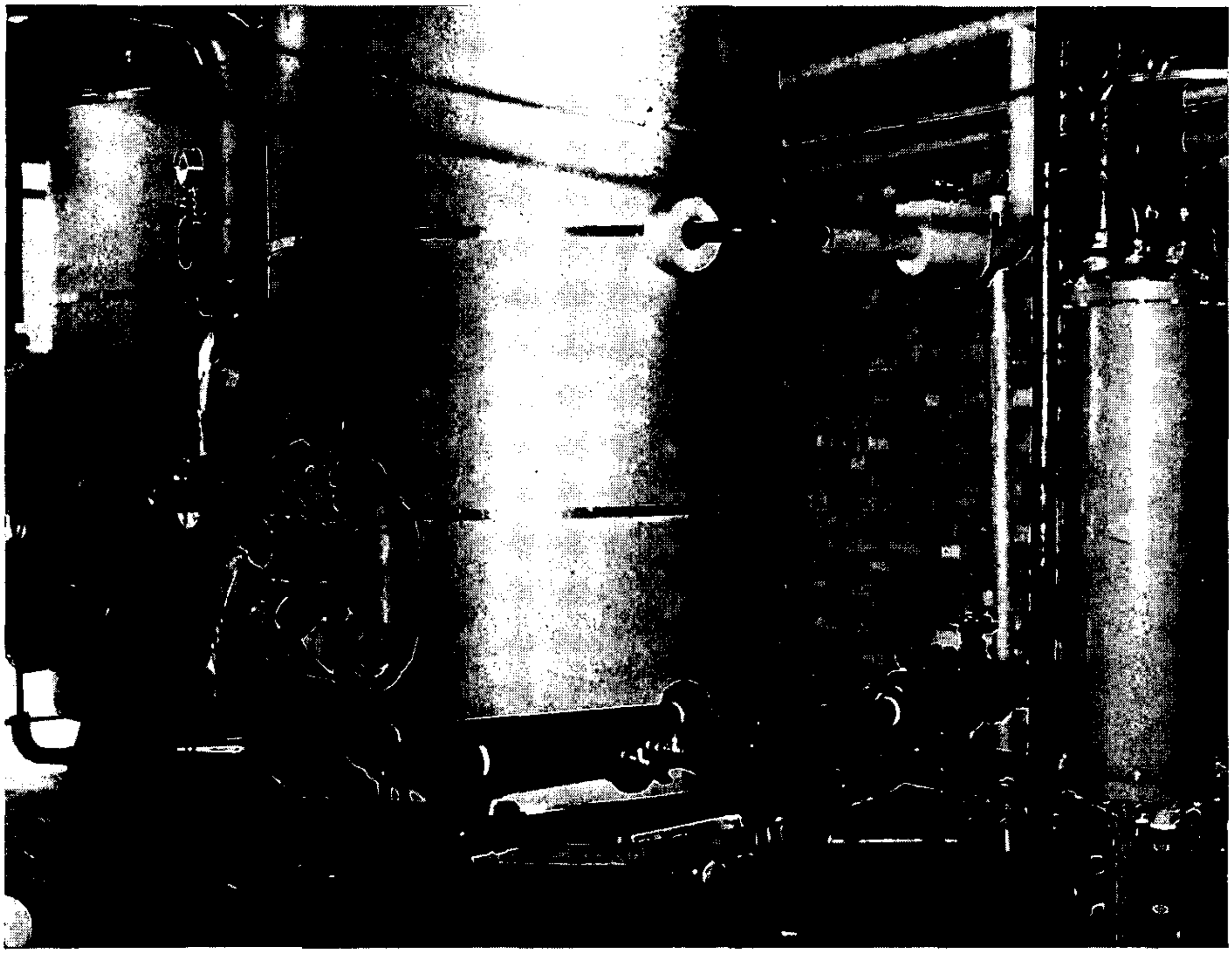


Fig. 2 Two 1000 gal storage calorifiers, which have been completely replaced by the 'Angelery' hot-water generator on the right

tamination can take place; a number of units have been installed in hospitals in which the secondary water flows through the tubes, and the steam or primary is in the shell. This increases the pressure drop on the secondary side throughout the system, calling for larger secondary-circulation pumps. The main problem, however, is in areas where the domestic water carries a high proportion of carbonates; scale can form on the inside of the tubes which, in U-tube or indented-tube batteries, can be difficult to clean. With the source of water supply in many areas changing, the scaling problem in calorifiers is on the increase. In fact, a recent test carried out in London using town's water has shown that in six months a storage calorifier formed a deposit of scale over ¾ in thick on the heating surface. This problem must be investigated before installing this type of equipment in certain areas.

A compact combined storage and high-heat-recovery battery is now being manufactured in this country and allows a smaller storage capacity to be used than is normal with conventional storage calorifiers. A smaller tube bundle is usually fitted to this type of storage vessel, the heat gain being made by close baffling and by operating at high velocities. Some manufacturers use an overall coefficient of 900 Btu/ft^2 per deg F within the battery area; this is achieved by high velocities across the heating surface. These high velocities create a number of problems of control and erosion, and in most cases tube batteries, tube plates and baffles of copper-silicon must be specified to eliminate the very high wear within the battery.

The compact hot-water generator, introduced into the UK approximately three years ago from the US, is making very great inroads into the domestic calorifier market. The greatest users are the hospital boards, the next greatest being firms having sophisticated process-water requirements with fluctuating loads and a requirement for very close temperature control. The ability to descale automatically has given the hot-water generator advantages over other compact exchangers in hard-water areas. This, coupled with the free flow of secondary water through the shell, the coils being unbaffled, gives a true cross-flow exchange with close control of outlet temperatures. These advantages are enabling it to far outstrip the other compact exchangers on the market (Fig. 2).

The greatest number of hot-water generators operating in the UK are steam/water exchangers. To give some indication of the close control of heat input against the secondary-water demand, not one of these exchangers is operating with a steam trap on the condensate side. If the exchanger is accurately signalling the control valve to inject the correct amount of heat to the heating surface, condensate will be flowing only from the exchanger. It is only when the signal is coarse, giving a virtual on/off control-valve operation that the steam must be held back until it has given up its latent heat to form condensate.

Again, some problems can be caused by high-temperature condensate and flash. With the hot-water generator it is usual to have condensate leaving at approximately 120°F even with saturated steam at 100 lbf/in^2 at the inlet to the control valve. This gives an equipment saving for flash condensing and a heat saving owing to the sensible amount of heat taken from the condensate.

The automatic anaesthetist

American researchers have developed an automatic system for administering anaesthetics. It is operated by an automatic programmer to continuously provide the patient with a scheduled amount of anaesthetic tailored to his individual needs. The automatic anaesthetist resulted from research initiated five years ago by Dr. H. J. Lowe at the University of Chicago.

Working with two other researchers, Dr. Lowe measured the solubility of several anaesthetic agents in human tissues, and then calculated the anaesthetic requirement for an average man or woman. This requirement is modified according to individual factors, such as a patient's weight, and the final data are transferred to the programmer.

The programmer injects anaesthetic into a closed-circuit breathing system minute by minute to meet the patient's needs, and records the amount given. Ideally, the system maintains an optimum blood concentration of anaesthetic. Exhaled oxygen, carbon dioxide and anaesthetic return to the breathing circuit.

Dr. Lowe and his assistants have tested the system on more than 100 patients. He says that the results are very encouraging, but adds that the system must still be monitored by a physician.

The automated system is not an attempt to replace the anaesthesiologist in the operating room, but a research project to investigate methods of determining individual anaesthetic requirements, Dr. Lowe emphasises. He adds:

'We are trying to establish distinct guidelines for predicting the anaesthetic requirements of the individual. Up to now, most anaesthesiologists administer an initial large dose of anaesthetic to put the patient to sleep, then decrease this amount as indicated by minute-to-minute evaluation of the patient's response. Our automated system enables a more even, controlled administration.'

Clippings

An electronic 'building superintendent' that monitors more than 1000 check points, keeps a weather eye on outdoor conditions, and even turns out lights to save on the electricity bill, is being installed by Honeywell in the 100-storey all-electric John Hancock Centre in Chicago. The Honeywell Data Centre will also take the temperature of the swimming pool on the 44th floor, and control the use of heat from people, machines and lighting to help warm the building in winter.

From the top of the building, information about wind direction and speed is fed continuously to the data centre, so as to calculate the effect of wind cooling on the building's air-conditioning system.

It is intended that from the central console one man will be able to control the entire system.

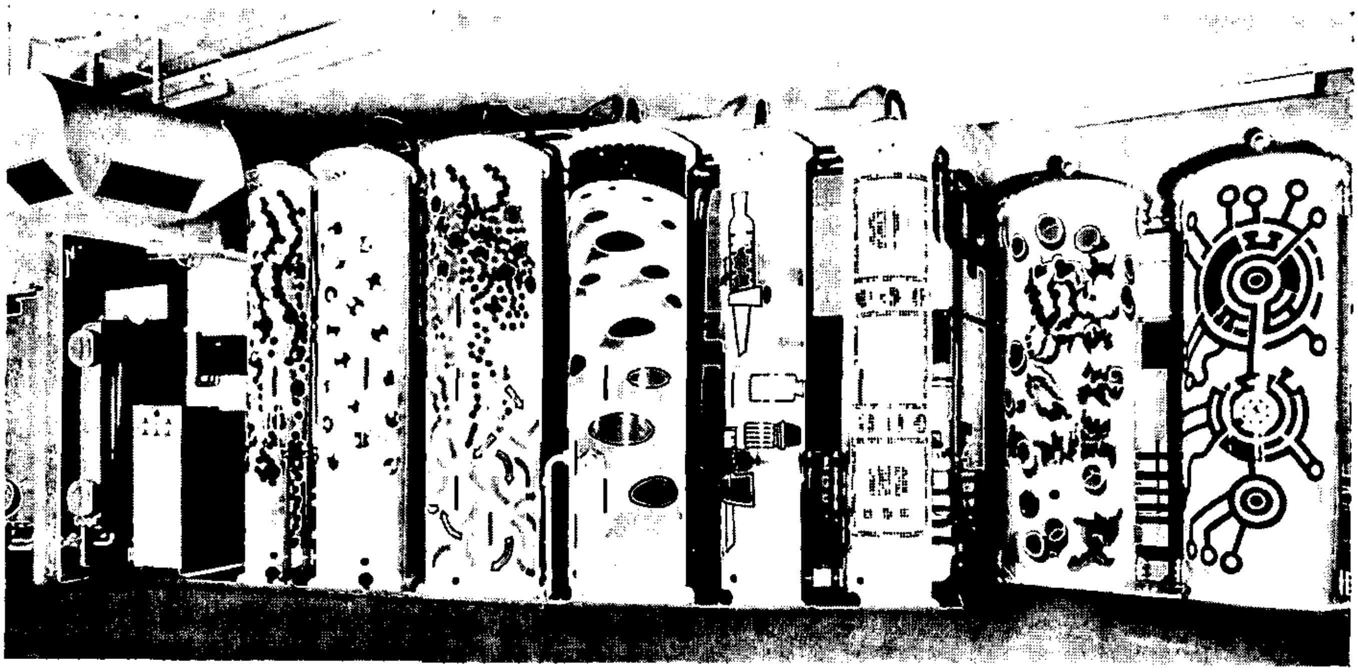
Simple 999 calls, and the use of two-way radios, might be adequate over here, but in the US the volume of emergency calls, and the extent of the services involved, seem to be proving too much for them. The City Council of Los Angeles has just called in the Hughes Aircraft Company, makers of the Early Bird and Surveyor spacecraft, to advise them on how to handle their emergency communications systems, which are apparently fast becoming obsolete and inadequate.

A Hughes vice-president has said that the survey will cover the city's requirements for the next 10 years, and will include consideration of, for example, automatic tracking of emergency-service vehicles and computerised information files.

Potterton International has signed a long-term agreement with one of the world's leading air-conditioning-equipment manufacturers, Daikin Kogyo, of Japan, giving the company exclusive rights for the import, and later the manufacture under licence in the UK, of Daikin's extensive range of equipment. This is a logical step in Potterton's policy of expansion from central heating into the complete field of environmental control in domestic, commercial and industrial premises.

The Potterton Daikin range will be officially launched at the HEVAC exhibition in April 1970.

Art and technology combine at the Elga Group of Companies' new ion-exchange-resin regeneration plant (ion-exchange is the process whereby ultrapure water is produced). The eight 5 m columns have been used as a canvas for an artist's impression of the theory of ion exchange and of the group's philosophy. The plant is fully automated, and will be controlled by just two operators; a call for volunteers has already been issued and antidazzle glasses will apparently be provided.



∗ Members Diary ∗

1970 ANNUAL CONFERENCE

As previously announced, the Institute's annual conference is to be held in May at the University of Aston in Birmingham. Five papers will be given, and the subjects to be covered are as follows:

6th May Development and research in medical engineering
Management services in the hospital service
7th May Some aspects of medical electronics
Laboratory automation
8th May Total energy.

The conference will be opened by the Chief Engineer, Department of Health & Social Security, and at the Conference Dinner on the Thursday evening the principal guest and speaker will be the Right Honourable R. H. S. Crossman, O.B.E., P.C., M.P., Secretary of State for the Social Services.

A leaflet giving full details of the Conference will be circulated shortly.

THE PRESIDENCY

The Council of the Institute are most pleased to be able to announce that Mr. G. A. Rooley, C.Eng., M.I.C.E., F.I.Mech.E., F.Inst.F., P.P.I.H.V.E., M.I.Cons.E., M.I.Hosp.E., has consented to continue as President for a further twelve months. Mr. Rooley will thus hold the office until the Annual General Meeting to be held in April 1971.

The Institute is indeed fortunate to have Mr. Rooley presiding over its affairs for a further term.

SKIN DEEP?

This month the Institute has a new platform; the title of the Journal has changed from *The Hospital Engineer* to *Hospital Engineering*, as was announced in the October issue. The reasons for this are clearly the same as those that prompted the Institute to change its name—to recognise and encourage the expansion of the scope of hospital engineering, to welcome contributions from a wider field than in the past because of the greater role played by specialist consultants from outside the hospital service, and to represent all Members, from the most experienced and most highly qualified to the youngest enthusiastic beginner.

However, the Journal is more than a front cover. Its title is of no real importance, it will be judged solely on its content. So what has been done to improve the inside pages?

Various new sections have been incorporated, and the 'look' of the Journal changed, and to us these are improvements. But the Journal is not for the editor or the publications committee—it is for the members. And the members are keeping very quiet.

In an attempt to raise the technical level of the Journal and to make it more interesting, the first President, L. G. Northcroft, presented the Institute with a medal, the Northcroft Silver Medal, to be awarded to the author of the best paper published in any particular year. All papers that appear in the Journal are automatically considered for the award, provided that the author is a corporate or noncorporate member of the Institute. However, over the past year only four papers by members have been published. Competition is apparently scarce.

It was hoped that Mr. Northcroft's gesture would provide sufficient incentive to members, if any incentive were needed, for them to take some interest in contributing to the Journal. It takes time for such measures to take effect; two years should be enough.

This year, therefore, both the Institute and the publishers look forward to receiving more contributions, as well as suggestions and comments, from all grades of member. Then in 1970 *Hospital Engineering* will become the true voice of the membership, as it is intended to be.

∗ Among the Branches ∗

WELSH BRANCH

At their meeting on the 20th September 1969, at Nevill Hall Hospital, Abergavenny, the Welsh branch held a Brains Trust, which proved to be most interesting to the good number present. The Trust covered a wide range of subjects, including the possible economy to be gained from onsite generation, the problems of disposable items, various methods of convenience catering, the importance of the engineer at the hospital-design stage, and the possibility of exchanges occurring between RHB and HMC engineering staff.

YORKSHIRE BRANCH

There was a very good attendance at the annual dinner dance of the Yorkshire branch, which was held at the Astoria Hotel, Leeds. The principal guests were Mr. Walter Harrison, J.P., M.P. for Wakefield, and Mrs. Harrison. Mr. Harrison proposed the toast of 'The Institute of Hospital Engineering', and the Chairman of the Yorkshire branch, Councillor J. Deen, replied. The toast of 'The Ladies' was proposed by the Institute Secretary, Mr. J. E. Furness, and a number of bouquets were presented.

On the 13th December 1969 the branch held a meeting devoted to the preparation of their 1970 programme. After a lively discussion a varied list of events was drawn up, which included a number of visits to industrial establishments, as well as talks on a range of subjects of interest to members. It is hoped that some of the latter might be suitable for publication in the Journal.

EAST ANGLIAN BRANCH

The history, present state and future of SI units were described by Mr. A. C. Appleyard, of Cambridgeshire College of Arts and Technology, in his talk entitled 'Metrication'. The branch was meeting at Addenbrooke's Hospital, Cambridge, on the 1st November 1969. Mr. Appleyard covered many of the unexpected stumbling blocks confronting engineers, such as the differentiation between °C for temperature and deg C for temperature interval, the use of spaces instead of commas to separate thousand groups, and the fact that the specific heat of water was not to be unity, but 4187J/kg deg C. However, he also mentioned the advantages to be expected, and pointed out that the UK was to be the first country in the world to complete the adoption of SI units.

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OFFICIAL APPOINTMENTS
SITUATIONS VACANT
MISCELLANEOUS

APPOINTMENTS AND SITUATIONS VACANT

WHITTINGHAM HOSPITAL MANAGEMENT COMMITTEE
Whittingham Hospital
(2231 beds; PSYCHIATRIC)

ASSISTANT ENGINEER

Applications are invited for the above post at this hospital.

Salary scale: £1077 × £39 (4) × £38 (1) × £44 (3) to £1403

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 qualifications.

This post offers experience for an engineer wishing to advance in the hospital service.

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

Single accommodation available, married accommodation may be made available if required.

Further details, including full details of qualifications required, and application forms available from the Group Secretary, Whittingham Hospital, nr. Preston, Lancashire, to be returned not later than 26th January 1970

SOUTH WESTERN REGIONAL HOSPITAL BOARD

ENGINEERING TRAINING CENTRE FOR THE NATIONAL HEALTH SERVICE

Eastwood Park,
Falfield, Gloucestershire

Instructional staff are needed at this newly acquired residential centre, accommodating 60 trainees, situated between Bristol and Gloucester. The centre will provide short-term instruction in a wide range of hospital-installation subjects, for hospital staff including design engineers, maintenance engineers and craftsmen in England, Wales and Scotland. Installation of hospital plant later will assist practical demonstrations.

For one post applicants should be chartered mechanical or electrical engineers, or equivalent. Salary scale £1812–£2542. For other posts candidates should preferably be qualified to HNC standard (salary scale £1680–£2066). All applicants should have practical hospital or similar experience. National Health Service conditions of service will apply. Some housing accommodation is available.

Further details and application forms from the Secretary to the Board, 27 Tyndalls Park Road, Bristol BS8 1PJ. Closing date for applications: 30th January 1970

SHEFFIELD NUMBER 3 GROUP OF HOSPITALS

HOSPITAL ENGINEER

required for a subgroup of three hospitals totalling 358 beds. Practical experience of oil-fired and coke-fired boiler plant and wide experience of electrical apparatus in hospitals essential. Applicants must hold City & Guilds mechanical engineering technicians certificate (Part II) including plant maintenance and works service; or City & Guilds certificate in plant engineering; or MOT first-class certificate of competency, which includes ONC or OND.

Salary £1403-£1658 with other terms and conditions of service as agreed by the appropriate Whitley Council.

Application forms and job description from Group Administrator and Secretary, Sheffield Number 3 Hospital Management Committee, Lodge Moor Hospital, Sheffield, S10 4LH
Closing date: 21st January 1970

UNIVERSITY OF WARWICK
MECHANICAL SERVICES
CLERK OF WORKS

Salary range £1600–£1700

Applications are invited for this post on the staff of the Estates Office. Applicants should have wide experience of the co-ordination, supervision, testing and commissioning of installations in the following services:

- plennum heating and ventilating systems
- air-conditioning plant
- high-pressure hot-water boiler plant and distribution systems
- low-pressure hot-water heating plant.

Employment will be initially for the current capital construction programme including an arts building, computer centre, sports centre and other works totalling about £2m.

Capital allocations of over £1m for the immediately following years have been announced.

Applications, stating age, training, experience and the names of two referees to the Registrar, University of Warwick, Coventry, by the 2nd February 1970

Edgware General Hospital
Edgware, Middlesex

ASSISTANT ENGINEER

This is an excellent opportunity for a young man, preferably with ONC in engineering. He will be responsible to the hospital engineer for the operation and maintenance of engineering services which include a new oil-fired central steam-raising boiler house. Opportunities for day release for further study will be given.

Salary scale £1077 per annum rising by eight increments to £1403, plus £90 London weighting.

Applications to Group Personnel Officer, Edgware General Hospital, Edgware, Middlesex. Telephone 01-952 2381

HOSPITAL ENGINEER
for
SUMMERFIELD HOSPITAL
Birmingham 18

Salary scale £1514–£1774 per annum plus £75 per annum responsibility allowance. House available at reasonable rent.

Applications are invited from suitably qualified Engineers.

A person with a keen, enquiring turn of mind, as well as independence and initiative, is sought.

Application forms and job description are available from:
Group Engineer,
DUDLEY ROAD (BIRMINGHAM) HOSPITAL MANAGEMENT COMMITTEE,
Dudley Road Hospital, Birmingham 18
Quote Reference HD/2

STRATFORD UPON AVON HOSPITAL
(Arden Street: 153 beds)

ASSISTANT ENGINEER required.

Salary £1077-£1403. Responsible for assisting hospital engineer in operation and maintenance of all engineering services, including laundry, kitchen, boiler house, extensive heating and hot-water installations and building at the above hospital, and also at the other hospitals in the Stratford and Shipston on Stour areas. Applicants must have completed an apprenticeship in mechanical or electrical engineering, or otherwise acquired a thorough practical training appropriate to the duties and responsibilities of the post. Ordinary National Certificate in engineering or equivalent approved qualification necessary.

Applications, naming two referees, to The Group Engineer, 50 Holly Walk, Leamington Spa

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BOARD OF MANAGEMENT FOR GLASGOW WESTERN AND GARTNAVEL HOSPITALS
GARTNAVEL DISTRICT GENERAL HOSPITAL

HOSPITAL ENGINEER

Applications are invited for the above new post. The successful candidate will be responsible to the Group Engineer for the operation and maintenance of all engineering services in this new General Hospital of 576 beds. Initial duties and responsibilities will be in connection with commissioning the engineering services, the preparation of operational and maintenance schedules and the training of staff. Applicants must have completed an apprenticeship in Mechanical or Electrical Engineering and must hold one of the following qualifications or an approved equivalent:—

(i) H.N.C. or H.N.D. in (a) Mechanical Engineering with Endorsements in Industrial Organisation and Management and Principles of Electricity or Electro-Technology, or (b) in Electrical Engineering with endorsements in Industrial Organisation and Management, and including (at S.III or 02 level) endorsements in Applied Heat and Applied Mechanics, or

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

Salary scale £1514–£1774 per annum with an additional £50 responsibility payment on the issue of the final taking-over certificate.

Applications stating age, qualifications and experience, with names and addresses of two referees, should be sent to the Secretary, Board of Management for Glasgow Western & Gartnavel Hospitals, 10 Park Circus, Glasgow, C.3, not later than 17th January 1970

CHICHESTER AND GRAYLINGWELL GROUP HOSPITAL MANAGEMENT COMMITTEE

Applications are invited for
ENGINEER—GRAYLINGWELL HOSPITAL

Applicants must possess a qualification recognised by the Department of Health & Social Security (preferably OND) and have thorough knowledge and experience of economic steam boilers and steam distribution, mechanical and electrical plant and equipment, and planned maintenance. Salary of £1403-£1658 plus £50 special-responsibility allowance. Applicants who do not hold the requisite qualifications will be considered, but the salary will be reduced by £150. A hospital bungalow may be rented.

Full details of the post, together with application form, available from Hospital Secretary, Graylingwell Hospital, Chichester. Completed applications must be returned within 14 days of appearance of the advertisement.

HOSPITALS FOR DISEASES OF THE CHEST

Hospital Engineer

required to be based at the Brompton Hospital and responsible to the Group Engineer to assist with the introduction of incentive bonus schemes and planned maintenance within the Group (including hospitals at Bethnal Green and Frimley) and to prepare contract specifications and drawings.

This is a challenging new appointment and offers a wide range of interesting work in the above fields. Previous hospital experience an advantage. Further details of responsibilities and necessary qualifications will be sent on request. Salary £1518–£1773. Applications to House Governor, Brompton Hospital, Fulham Road, London, SW3, giving names and address of two referees.

BURY AND ROSSENDALE
HOSPITAL MANAGEMENT COMMITTEE
HOSPITAL ENGINEER

Applications are invited for the post of Hospital Engineer at Bury General Hospital with responsibility for four smaller units within the Group.

Practical experience is essential and preference will be given to applicants who possess one of the following:

(a) City and Guilds Mechanical Engineering Technicians Certificate (Part I) which must include Plant Maintenance and Works service, *or*

(b) City and Guilds Certificate in Plant Engineering, *or*

(c) M.O.Y. First Class Certificate of Competency which includes an Ordinary National Diploma or Certificate.

Salary will be on the scale—up to 24 points—£1403–£1658 p.a. plus a special responsibility allowance of £75 p.a. Conditions of service will be in accordance with the Whitley Council recommendations.

Applications, together with the names of two referees should be made to the Group Secretary, Bury General Hospital, Walmersley Road, Bury, BL9 6PG, by the 26th January, 1970.

WYVERN HOSPITAL MANAGEMENT COMMITTEE
HOSPITAL ENGINEER

Bradwell Grove Hospital, Burford, and Cotshill Hospital, Chipping Norton, Oxfordshire
This vacancy occurs owing to promotion of the present holder.

These two hospitals have a combined bed complement of approximately 500 beds for the care and treatment of mentally subnormal patients.

Applicants must have a sound knowledge of the principles and practice of the efficient operation of solid-fuel and oil-fired boiler plants, have a wide experience of mechanical and electrical-engineering services, and should hold one of the following qualifications, or an equivalent qualification approved by the Department of Health & Social Security:

(1) City & Guilds mechanical-engineering technicians Certificate (Part II) which must include plant maintenance and works service

(2) City & Guilds Certificate in plant engineering

(3) Ministry of Transport first-class Certificate of competency, if it includes an Ordinary National Diploma or Ordinary National Certificate.

Salary (qualified applicants) £1270, rising by annual increments to a maximum of £1500 per annum. The salary scale for candidates not so qualified will be abated by £150 per annum.

A modern three-bedroomed house, situated within a reasonable distance from Bradwell Grove Hospital, will be made available if required.

Applications, giving age, qualifications and experience, together with names of two referees, to the Secretary, Burderop Hospital, Wroughton, Swindon, Wilts., by the 5th February, 1970

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE

DEPUTY GROUP ENGINEER

The Group comprises eight units with 1757 beds, with an additional 60 beds to be opened in 1970. A new District Hospital with 800–1000 beds is planned for the mid 1970s.

The salary range applicable to this post is £1370–£1605 per annum, plus £200 special-allowance for responsibility units. NOTE.—plus 10½% awarded in recent salary increase.

Applicants must possess one of the following qualifications, or an equivalent qualification approved by the Department of Health:

(i) Higher National Certificate or Higher National Diploma in mechanical engineering, with endorsements in industrial organisation and management and principles of electricity or electrotechnology, if this was not taken as a subject of the course

(ii) Higher National Certificate or Higher National Diploma 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

(iii) City & Guilds mechanical engineering technicians full technological certificate (Part III), which must include plant maintenance and works service.

Application forms, job description and other details of the post can be obtained from the Group Engineer, The Guest Hospital, Dudley, Worcs. Completed forms should be returned by Monday, 26th January, 1970

WHITTINGHAM HOSPITAL MANAGEMENT COMMITTEE
Whittingham Hospital
(2231 beds; PSYCHIATRIC)

HOSPITAL ENGINEER

required at the above hospital, responsible to the group engineer for the mechanical and electrical maintenance services. Applicants should have completed an apprenticeship in mechanical or electrical engineering and must possess HNC or HND in either electrical or mechanical engineering with appropriate mechanical or electrical endorsements.

Salary at present over 24½ points is £1514–£1774 per annum, plus £75 responsibility allowance.

Single accommodation available, married accommodation may be made available if required.

Further details, including full details of qualifications required, and application forms available from the Group Secretary, Whittingham Hospital, nr. Preston, Lancashire, to be returned not later than 26th January, 1970

CHIEF ENGINEER

required for sizeable Nottingham Laundry (linen hire).

Able to select, organise and control engineering maintenance staff and ensure continuous high level of performance of all plant and equipment. Age 35/55. Salary about £1750. Pension. Reply in guaranteed confidence giving full details of training and experience to Box HE 500.

WORKSOP and RETFORD
Hospital Management Committee

GROUP ENGINEER
vacant immediately

Salary £1713–£1995 per annum plus a responsibility allowance of £75 per annum.

Applicants must be thoroughly experienced and hold at least one of the following qualifications, or an approved equivalent:

(i) HNC or HND in mechanical engineering with endorsements

(ii) HNC or HND in electrical engineering with endorsements.

A house may be available for the successful candidate.

Further particulars and application form from The Group Secretary, Victoria Hospital, Worksop, Notts.

MISCELLANEOUS

CIRCULATING PUMPS and Steam Turbines, Complete units, electric and steam, spares and service. TURNEY TURBINES Ltd., 67 Station Road, Harrow.
Tel.: 01-427 1355 and 01-427 3649.

TENDERS

WILTSHIRE COUNTY COUNCIL—SUPPLIES IN PRINTING DEPARTMENT
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TENDERS are invited for:

One Frazer & Frazer water tube steam boiler, duty 4,200 lbs. per hour.

Two Brockhouse ML20 modulating oil burners (35 secs.)

One Oil storage tank 10′ 0″ × 10′ 0″ × 10′ 0″.

One Ruston Hornsby vertical Thermopak 30 water tube boiler, working pressure 120 p.s.i.

Tender forms obtainable from County Supplies Officer, County Hall, Trowbridge, Wilts., returnable by 5 p.m. Tuesday, 20th January.

CLASSIFIED ADVERTISEMENTS

continued from previous page

APPOINTMENTS and SITUATIONS VACANT

THE UNITED NEWCASTLE UPON TYNE HOSPITALS

Royal Victoria Infirmary

Newcastle upon Tyne

Group Engineer

This post will become vacant on 12th May, 1970, upon the retirement of the present holder.
Applicants must be corporate members of the Institution of Mechanical or Electrical Engineers and should possess wide experience in the operation of modern heating and ventilating systems, pressure steam sterilisers, steam boilers and other mechanical and electrical services and equipment associated with a major hospital or large industrial establishment.
Salary scale £2,319-£2,809 per annum, plus a special responsibility allowance of £200 per annum. This scale is currently under review.
Further particulars and job description available from the House Governor and Secretary.

Applications giving full details and names and addresses of three referees should be submitted by 24th January, 1970.

Encircle HE 10 on reply-paid card for further information

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HE2	HE22	HE42	HE62	HE82
HE3	HE23	HE43	HE63	HE83
HE4	HE24	HE44	HE64	HE84
HE5	HE25	HE45	HE65	HE85
HE6	HE26	HE46	HE66	HE86
HE7	HE27	HE47	HE67	HE87
HE8	HE28	HE48	HE68	HE88
HE9	HE29	HE49	HE69	HE89
HE10	HE30	HE50	HE70	HE90
HE11	HE31	HE51	HE71	HE91
HE12	HE32	HE52	HE72	HE92
HE13	HE33	HE53	HE73	HE93
HE14	HE34	HE54	HE74	HE94
HE15	HE35	HE55	HE75	HE95
HE16	HE36	HE56	HE76	HE96
HE17	HE37	HE57	HE77	HE97
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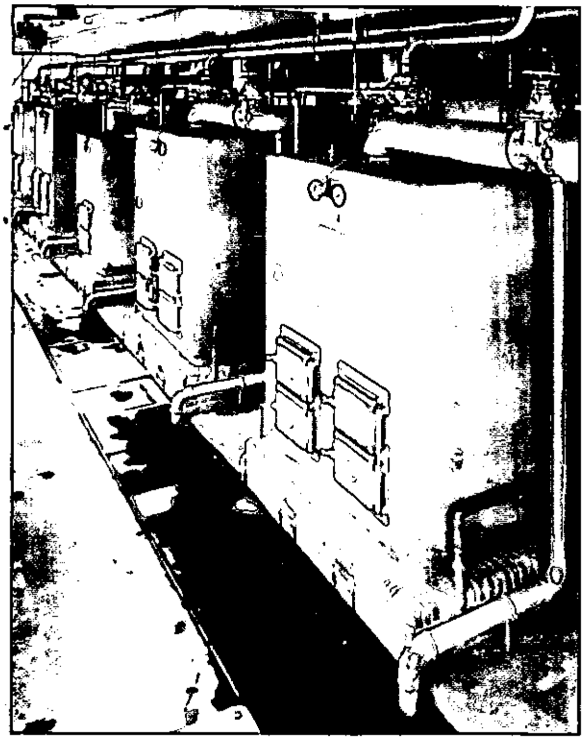


Five Centrax boilers are accommodated in one compact boilerhouse as a result of their unique shape and design.

Centrax boilers – a happy marriage between Swedish design and British engineering.

Some years ago, A. B. Gustavsbergs Fabriker of Stockholm developed a boiler design offering substantially greater thermal efficiency and fuel economy than the conventional boilers then being produced. The Gustavsberg principle depends upon high fan pressures and large pressure drops in the gas passages, which make possible unusually high flue gas velocities and, therefore, greater heat transfer rates. This, in turn, produces an unusually compact and efficient boiler of a convenient rectangular shape.

There are substantial differences between the original Gustavsberg boiler and the Centrax design, this latter taking into account the stringent requirements of British insurance companies, and conforming to the appropriate British Standards. But the essential principles are maintained, and the resulting operating efficiency of 80% over the full range of output.

Underfeed stokers can conveniently be installed to feed from front, back, or sides of the boiler, and ash can be removed manually or mechanically. Alternatively, chain-grate or coking stokers can be as easily installed. High-speed gas flow minimises soot deposits, and cleaning and maintenance become easy and, therefore, economical.

When the doctor is seen taking his own medicine, you know it must work. The National Coal Board has installed Centrax solid-fuel boilers in several of its premises.

The J. Samuel White Pneumatic Conveying System for greater efficiency and even greater economy.

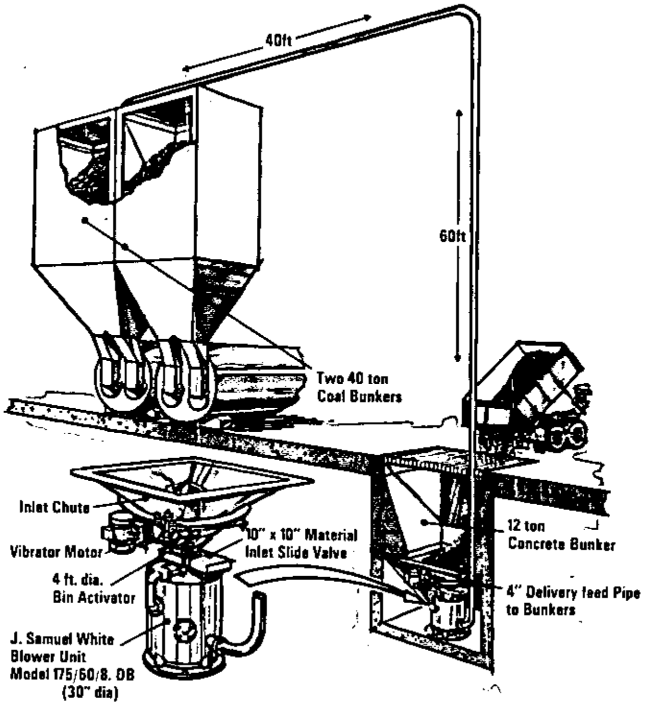
The man with a shovel is very far from obsolete, but needless, back-breaking toil is a very poor use of human resources – and a costly one, too.

Today, it is possible to have a solid-fuel installation without paying either the price of a shovel or the wages of a single man to wield it. Automatic conveying systems can handle the whole job – from the lorry that brings the fuel, to the lorry that takes away the ash.

One such system is that of J. Samuel White. In a typical installation (for the Midland Brick Company, of Desford, Leicestershire), washed coal ranging in size from 1" to $\frac{1}{16}$" is delivered in 12-ton loads to a concrete bunker situated over the Blower Unit.

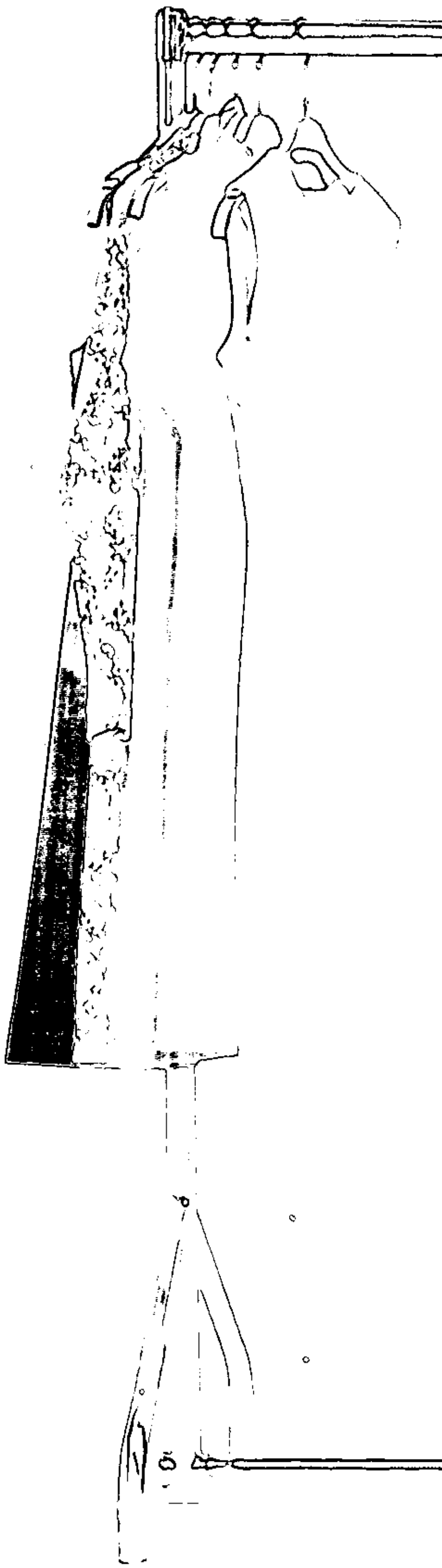
When coal is required in the overhead bunkers feeding mechanical stokers on the two boilers, the operator sets a single control to time the period the Blower Unit will operate. This governs the amount of coal delivered through 100 feet of pipeline. Then he moves a switch to set the Blower in action. The moist coal is agitated by a Bin Activator. This enables it to flow into the Material Chamber through an Inlet Valve which opens and closes in ten seconds, allowing nearly 1½ cwt to pass. The Blower Unit is charged with air and then blows the coal to the bunker. This cycle is repeated about once a minute.

In about 3¼ hours a 12-ton load can be transferred to the bunkers, and all the operator has done is to set the timer and press a button – better than a shovel.



The White Pneumatic Conveying Application in use at the Midland Brick Co., Desford, Leicestershire.

Coal saves Berkerte



Berkertex make dresses by the million. In the notoriously hazardous world of fashion, success on that scale is an astonishing phenomenon – and rare as well. Vision and enterprise between them have made Berkertex the largest dress manufacturer in Europe, and, almost certainly, largest in the whole world.

The same vision and enterprise led to the idea of the 'shop-within-stores' and, so energetically did Berkertex pursue this idea that they now have no fewer than 102 'shops-within-stores' up and down the country with many more to open in the future. And, as you might expect of such a company, they are making a notable contribution to the country's balance of payments, exporting their dresses all over the world.

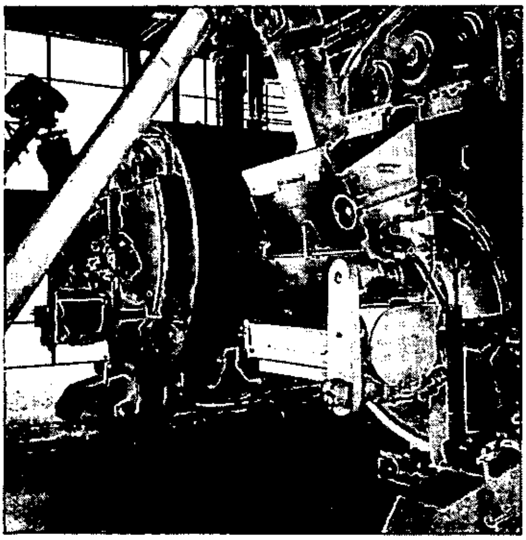
It is interesting that a company so vigorous and forward-looking should choose coal for the fuel at their 9½-acre factory at Plymouth. With two Danks 'Economic' boilers (each rated at 4500 lb/hr) and Danks chain-grate stokers and grit arresters, the soundness of their judgement is confirmed by an annual saving of £1,200 in fuel and labour costs.

With economy on that scale, it is no wonder that coal is in fashion.

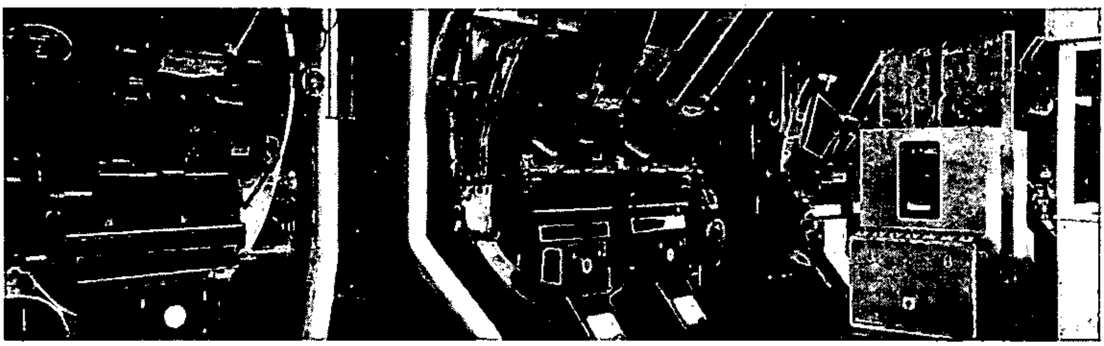
ıey for Britain's Hospitals.

AT DUNFERMLINE:
up-to-date hospital installs up-to-date heating

The Lynebank Hospital, Halbeath Road, Dunfermline is the first totally new, purpose-built mental hospital to be built in the United Kingdom for a full thirty years. As might be expected, it is up-to-date in its whole concept of treatment of mental disorders and up-to-date in the facilities it offers. It is a whole world in miniature, with its own school for the children, its sports, its film and drama shows, its church services, its workshop block.



Such a building must be equally up-to-date in its mechanical equipment – as, for example, the fully automatic coal-fired boiler plant which supplies all hot water and heating services. There is a mixed heating system (comprising warm air units, radiant panels, underfloor heating, together with domestic hot water from a number of calorifiers), and the boilder plant itself consists of three John Marshall low-pressure hot-water boilers, each rated at 10,000,000 BThU/hr, and fired by Hodgkinson Bennis chain grate stokers.
Coal is delivered into three low-level glass-lined bunkers by a tipper. From here, it is transmitted into the stoker hoppers by Hodgkinson Bennis 6in. screw elevators, fitted with Redler 'Tidal' level controls. Ash is automatically discharged by a Riley 'Convator', the multi-directional conveyer-elevator system. This discharges the ash into a 7½ton overhead hopper for collection by lorry.
Each boiler is fitted with Unitherm automatic combustion control equipment, and the whole plant is fully instrumented by Cambridge Instrument Company indicators and control panels. Lea coal meters and recorders are fitted to each boiler.
Lynebank Hospital provides an excellent example of combining low-cost fuel with the advantages of sophisticated control equipment.



AT HULL:
hospital chooses coal for high efficiency, low cost

Many hospitals prefer a solid fuel installation for its efficiency and low running costs. And the recently opened Hull Royal Infirmary also chose coal. The boiler plant consists of five Ruston Thermax boilers, each rated at 13,000lb/hr equipped with coking type stokers. The coal is tipped from the lorry into a ground bunker and then taken on by bucket elevator to twin cross conveyers. These deliver the coal into overhead bunkers. Ashes are removed by Thompson plough-type ash extractors to a submerged conveyer, then to a skip hoist and overhead bunker for vehicle loading.
Hull Royal Infirmary are well pleased with their choice of a coal-fired system and its economical highly efficient results.

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These facts prove it, Coal saves mon

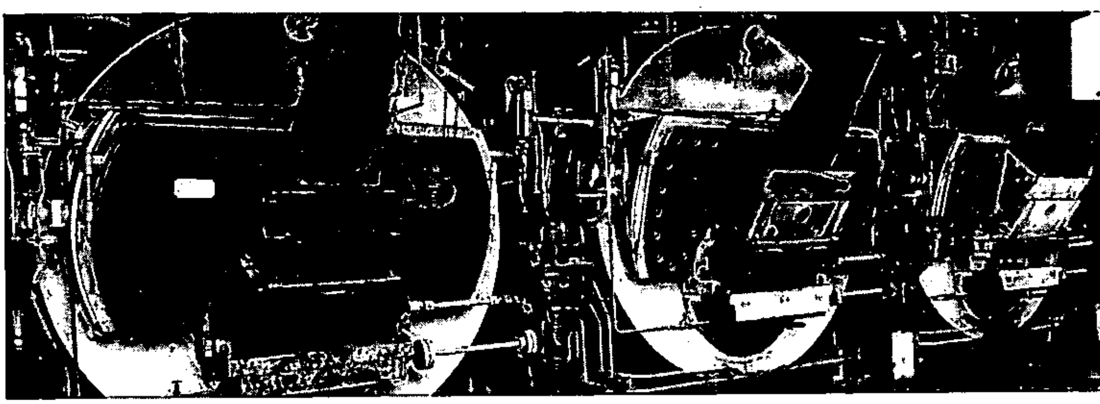
AT MANSFIELD: coal is chosen for the go-ahead Health Centre

The Health Service of the future can be seen in full swing today – at Mansfield Health Centre, in Nottinghamshire. In a modern purpose-built clinic of outstandingly skilful design, local authority health services are integrated with three busy general practices. Medical health, chiropody, school dentistry, midwifery, and the home help service all have their place in this remarkable building. It is the health centre for about 35,000 fortunate citizens of Mansfield.

As might be expected, the heating installation (by Andrews-Weatherfoil) is as up-to-date as the rest of the building. It comprises warm-air convectors, natural convectors, hospital radiators, and perimeter heaters; it is fired by a single Beeston 7MN sectional boiler (792,000 BThU/hr) side-fired with Thoresby Washed Singles by an Ashwell and Nesbit RL80 bunker-to-boiler underfeed stoker.

There is a sophisticated control system, by Satchwell, to ensure that the building is warm for the start of the working day and that there is protection against frost during unoccupied periods.

In such an important project, and one on which so much skill, ingenuity, and sophistication has been exercised, it is significant that the chosen fuel turned out to be coal



AT SHEFFIELD: another hospital operates on coal

A great number of British hospitals choose solid fuel for the highly important task of maintaining suitable temperatures throughout a complex of buildings that – in many cases – has grown up haphazard and piecemeal over the years.

Nether Edge Hospital, at Sheffield, is no exception on any count. It was built over 125 years ago at a cost of £9,000. From time to time extensions have been made, new buildings added, old buildings adapted to new uses – until now it is efficiently modernised and able to take almost 200 maternity and gynaecological cases, and almost 400 medical cases.

The biggest improvements have been made during the last three years – at a cost of about £1,300,000. New lifts, new kitchens, new staff restaurant, new nurses' flats, new ante-natal ward, new maternity unit, new medical ward block have all been added.

And, as important as any of these, there is a new central boilerhouse. And, as in so many British hospitals, solid fuel provides the ideal combination of low cost and automatic control.

el and labour costs.