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# HOSPITAL ENGINEERING



The Journal of The Institute of Hospital Engineering

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May 1984

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## **Institute News**

No news is bad news as far as Hospital Engineering is concerned. We are sure that branches across the country will be interested in what their colleagues are doing – professionally and socially – and we shall welcome any accounts and pictures of their happenings.

Several branches are reporting this month. Let us have news of faces, places, and any matters of interest from everywhere – preferably by the beginning of the preceding month if you want it published next month!

#### BRANCH NEWS Highland Section formed

In January this year the Highland Section of the North East Scotland Branch of the IHospE was formed. Members of the Institute who may be visiting the Highlands, and who require assistance regarding information etcl, should get in touch with local Institute members through the Secretary M J Shand, Engineering Department, Raigmore Hospital, Inverness. Tel: (0463) 234151 ext 422/ 460.

#### Officers of the North East Branch for 1984/85

Chairman: W N Bewick Press' Officer: J Sherry Secretary/treasurer: G Baxter, 11 The Resolution, Nunthorpe, Middlesbrough, Cleveland TS7 0HZ.

#### Lucas Scholarship Fund Awards

Two Awards have been agreed for 1984 under the Lucas Scholarship Fund, established by Dr B G B Lucas, a Past President of the Institute.

The Award winners are:

B L Ashdown – Tunbridge Wells Health Authority

R M Mason – West Glamorgan Health Authority

They will attend the Annual Conference of the Institute to be held at the Dragonara Hotel, Bristol from the 16th-18th May, all expenses paid.

The Award scheme is restricted to members under the age of 28.

We are very pleased with the response and trust that this enthusiasm will continue in future years.



B L Ashdown

#### FORTHCOMING BRANCH MEETINGS

Southern Branch: Hon Sec R P Boyce TN Chichester (0243) 7814119th MayTimber Preservation By RentokilCommittee Room, Centre Block<br/>Southampton General Hospital

Thursday 7th June Oxford Spring Lectures John Radcliffe Hospital (organised by the 6 Branches)

Yorkshire Branch: Hon Sec J Bate, Wakefield (0924) 890111 ext 210

11th May Works visit to Hartley and Sugden Boiler Works, Halifax. (Lunchtime refreshments provided.)

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

#### **Ruby wedding**

Many congratulations to London Branch Secretary Philip and Patricia Vedast on the occasion of their Ruby Wedding, commemorated in this happy snapshot. Forty years of marriage has not dimmed Patricia's memory of their war-time wedding, which took place on the 17th May, 1944, at Preston St Mary Suffolk, with the bride's father, the Rev J B Hall, officiating.

It was war-time and the bridal party was necessarily small,' recalls Patricia. In fact, because it was East Anglia there were no relations from Phil's side present. My bouquet was lilac ('How unlucky' said the village folk) gathered from the garden just before we set out. We did everything wrong, from having breakfast together (you should never see the groom before you meet him at the altar steps), to me having peacocks' feathers in my bridal hat. I had never heard that they foretold gloom and doom. Not that it would have made any difference if I had as I liked them and they set off the french navy well.'

Philip Vedast has not only been Secretary to the Institute's London Branch for over 20 years, but he is a member of both the ลโรก Publications Membership and Committees. Not only does the Institute offer its best wishes, but would like to thank Philip and invaluable their Patricia for contribution to the work of the London Branch.



## TALKING POINT What's in a name?

#### J B PACKER CEng FIMechE FCIBS FIHospE

The author is a member of Council, and also is on The Institute's Education Committee

During recent months considerable discussion has taken place and views have been expressed on the topic of Estate Management. These discussions have encouraged comments from both within and outside the Institute and has raised the question as to whether the Institute should widen its role to encompass other skills engaged in the development and management of the health service estate. Indeed, even titles have been challenged - should Works Officers be called Estates Officers. It may be prudent therefore to pause to reflect on the common understanding of Estate Management.

Estate Management is a broad based profession - the educational route for which is through the estate or land management courses at degree level, and a close examination of the courses available will indicate they are structured towards the requirements of the General Practice Division of the Royal Institution of Chartered Surveyors. This however is of limited value in meeting the major demands of the Works Organisation or any of the disciplines wishing to contribute to the design, construction, operation and maintenance of health care buildings and support facilities. A lot of work has been done in improving the management and techniques of maintenance within the service and no doubt this will continue to improve but it is also incumbent upon everyone to define clearly the priorities and demands of Estate Management, as applied to the requirements of the Health Service.

The report 'Underused and Surplus Property in the National Health Service' under the chairmanship of Ceri Davies identified the important need for professional advice on land and property matters including valuation, and recommended the establishment of a new division at Regional level to be responsible for estate matters of a non-design nature. The new division to be headed by a corporate member of RICS and registered in the General Practice Division. The introduction of such a division could have considerable impact, particularly in respect to the professional advice available on land transactions, valuation, lease and rent agreements, and it is important to note that the report is precise in specifying the qualifications for the post. This still leaves the multidisciplinary skills associated with the design, supervision, operation and maintenance of health buildings, associated engineering services and other support facilities, and at this stage it is worth considering the contribution made by the Institute of Hospital Engineering.

The Institute has an international reputation with increasing numbers of members engaged in private practice or overseas. It has been a cornerstone of the International Federation of Hospital Engineering and in the UK has been in the forefront of meeting the needs of education and training within the field of hospital engineering.

The main stream of the Institute's involvement has been in the promotion of technical meetings and symposia, and a review of the subjects covered by these symposia will indicate not only engineering matters of a high technical level but subjects sharing common interest and substantial support from medical, nursing and other technical skills within the health care field. However, not withstanding this, it may be that the Institute can do more for promoting the interest of specialist groups within the NHS, and if the support is available then perhaps the setting up of groups or sections within the Institute could provide such a vehicle for organising discussions and meetings of a more specialist nature.

In the October 1983 issue of the

Journal, Mr S Ratcliffe made reference to the fact that the Institute many years ago recognised that as an engineering institution its future lay within the Council of Engineering Institutions, and this wisdom has never been in doubt. We now have the new Engineering Council and The Institute has recently been informed of the groupings for affiliated bodies. The success of the new Engineering Council is important for the future of engineering and the prosperity of the

country and it is hoped that the Institute of Hospital Engineering can participate within the framework and discipline of the new Council. Certainly any suggestions for a change in direction which would take the Institute outside the Engineering Council would need to be considered with extreme caution.

It may be well to remember an old adage of the Estates Surveyor - It is better to own a modest house in the best road, than the best house in a modest road. As an Institute we may be modest but within the Engineering Council are we not in the best road?

#### Nuclear energy – a professional assessment

The arguments for and against the civil use of nuclear power in the United Kingdom are examined factually from the viewpoint of professional people concerned with energy in the thirteenth report of the Watt Committee on Energy, and independent body that brings together representatives of a broad spectrum of professional institutions and learned societies.

Those who require a more easily digestible account of the subject, well informed but not obscured by technicalities, will find it in Watt Committee Report No. 13: Nuclear Energy – a Professional Assessment. £25.00 net.

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Orders with remittance to: The Watts Committee on Energy Ltd, 18 Adam Street, London WC2N 6AH.

## **Resources for engineering** education

The Engineering Council is determined to ensure that the engineering discipline obtains its fair share of national resources for education. April's Talking Point column featured a summary of the Council's discussion document on the funding of engineering training. As a follow-up we give a summary of a document entitled Policy Statement on Resources for Engineering Education.

The Engineering Council, established to promote the best practice of engineering and to encourage the development of engineering education and training, believes it is vitally important that the United Kindgdom maintains high standards to produce adequate engineers. It must achieve this aim if the country is to support industrial expansion in the face of fierce international competition.

The policy statement sets out views on what should be done to achieve those education standards necessary to provide the country with qualified engineers so vital to the wealth creation in industry in general and to manufacturing, construction and process industry in particular.

The Engineering Council believes that present methods of funding engineering courses in universities and polytechnics do not always ensure that sufficient resources arrive at departmental or faculty level to enable the required educational standards to be fully met. Indeed recent history suggests that unintentional depradations to engineering departments can result from a continuation of present funding policies.

Accordingly The Engineering Coun-



Mr W. J Leek receives his award from the Prime Minister, marking his EITB Fellowship in Manufacturing Management

cil, conscious of the wishes of the Secretary of State for Education and Science that there should be a further shift towards technology, advocates an accelerated switch of resources and the adoption of a policy of 5-year earmarking of funds linked to The Engineering Council's system of accreditation of engineering courses.

The proposals include student/staff ratios for accredited degree courses ranging from 8:1 to 11:1, depending upon the money 'earned' hv departments for research, development, design and consultancy work; a ratio of support staff to academic staff of unity and an equipment grant based upon student numbers. Similar provisions are outlined for Business & **Technician Education Council Courses** of Higher Certificate standard or above in a manner calculated to encourage the development of Technician Engineer courses.

A new scheme of 'industrial secondment' for academic staff is proposed with the aim of encouraging the rapid development of a two-way exchange programme to promote academic and industrial collaboration and bring more industrial relevance into engineering courses. Each year some 500 staff should spend up to 12 months in industry.

Emphasis is placed upon the reciprocal obligations of departments benefiting from earmarked funds by actively promoting collaborative efforts and ensuring that resources are used to maximum advantage.

In the longer term, The Engineering Council recommends a target of a 10% national swing in the ratio of 'arts based' to 'science based' student places with the majority of the extra science based placed being allocated to engineering students. It is recognised that this implies a larger switch in funding due to the greater expense of engineering courses.

Copies of the document in full may be obtained from:

Director – Professional Institutions The Engineering Council, Canberra House, 10-16 Maltravers Street, London WC2R 3ER. The author is a Design Engineer with the Tunbridge Wells Health Authority. He believes that this paper will be of interest to other engineers involved in energy conservation and plant monitoring.

## Plant performance and energy budget control

#### **R D POTTINGER T Eng MIHospE**

About two years ago the writer was given the task of Energy Conservation within the Tunbridge Wells Health Authority. Part of the brief was to provide means of plant performance monitoring and energy budget predictions. The reason for the latter was an agreement that savings on energy can be transferred to other works budgets and spent elsewhere. The earlier that any savings are known the easier it is to spend the money on other projects. In addition, it was necessary to have a method which the Treasurer's would convince Department that, having transferred money, the energy budget would not then be overspent. An acceptable method was devised. This necessitated the design and construction of an instrument to measure and record Degree-days. A description of the instrument appears at the end of this paper.

It was felt that the results obtained would be of interest to other engineers and could be readily adapted to suit the circumstances of other districts. Indeed, the Degree-day Monitor could have wide applications and be easily within the financial scope of small districts.

The problem of performance monitoring was examined using the standard method of linear regression analysis. This method was found not to conform to plant performance and a modified version was adopted. The energy budget prediction was more complex and the solution is applicable only to this District. However, it is possible to modify this solution to suit the needs of other districts.

The Degree-day Monitor, with its local sensing, instant information and excellent accuracy, provides the means by which the methods outlined below can be refined and used with confidence.

#### **Regression analysis**

The method generally recommended is to take the twelve monthly records of space heating fuels and the DHSS Degree-days and calculate the 'best fit' line by linear regression analysis. The assumption is that the energy used should follow this calculated line and cross the vertical axis at the base load point. There is often discussion as to whether or not the summer months should be included. Some advocate the omission of all four summer months (south of the country), and some advocate just two months. There are some engineers who omit any summer months which will distort the graph. This could mean different months each year.

At the Tunbridge Wells Health Authority, graphs were drawn of data from different types of hospital for





each of several years. From observing the plotted points it was clear that the 'best fit' was never a straight line.

The result was as shown in Fig. 1. This two-stage regression line shows a better correllation and describes more closely what actually happens. A description of the line is as follows.

The heating is not turned on or off at a predetermined date (i.e. 1st October and 31st April), but when the engineer on site deems it to be necessary. This, of course, varies with weather. Most of our engineers appear to consider the on/off point to be about 190 degree-days per month. The height of the vertical line, wherever it occurs, is directly proportional to the distribution losses of the hospitals' heating system.

There are two vertical lines, one for on and one for off, but with only twelve monthly statistics it is not possible to locate them. The change is therefore shown as one line. Using the Degree-Day Monitor it will now be possible to have numerous readings at any change points and thus determine the precise plant performance.

Either side of this line are two regression lines; one for winter months and one for summer months. The winter regression line needs no explanation. The slope of the summer regression line is dependent upon the amount of summer heating. For example, an acute hospital is liable to have a more noticeable slope than a mental hospital.

The ends of the graph are not extrapolations always of the regression lines. In Fig 2 the lower end of the line is shown horizontal from about 50 degree-days/month. This is arbitrary as there are no figures as low as this. The reason that it is shown horizontal is that the graph is for total energy not boiler output. Thus for an acute hospital the boiler output will reduce with a reduction in degree-days/month but the energy consumed on refrigeration plant etc. will increase. Furthermore, due to distribution losses to theatre ventilation plant etc. the energy cannot follow the regression line to zero degree-days. With a mental hospital, the summer regression line is almost horizontal and is likely to remain so until it reaches the vertical axis.

The upper limit of the winter



AUG SEPT OCT 1982/83



regression line does not continue straight but curves towards a horizontal line. See Figs 1 and 2. The value of degree-days/month at which the deviation occurs varies from hospital to hospital. Generally the reason for this inability to follow the regression line is because the plant has reached its capacity. Usually the capacity of the heating surfaces is reached before that of the distribution pipework or boilers.

APR MAY

JUN JUL

If an installation is designed on an outside temperature of  $-1^{\circ}$ C without any 'allowances', the curve at the top of the winter regression line will start at 585 degree-days per month. This value would be lower if intermittant heating is also used.

This kind of analysis worked using boiler output or total energy. It also worked when considering one hospital or the whole District. In the majority of cases, an extrapolation of both the winter and summer regression lines gave an intersection at or near the vertical axis. However, the base load of total energy is slightly higher than this for the reasons given above.

FEB MAR

## H & V plant monitoring

NOV DEC JAN

The object of monitoring the plant was to be able to predict boiler load at any particular time. Using this prediction, standby boiler(s) can be left off until the last possible moment and remain off at night etc. when they are sometimes put on as a precaution.

In order to achieve this objective it was necessary to monitor, on a daily basis, boiler fuel, boiler output and degree-days. The first two are always recorded but the degree-days required a new approach which is described later. Using the Degree-Day Monitor, it is possible to record degree-days accurately on a daily, hourly or even minute basis and work can now begin on establishing a boiler output profile for all times and conditions. This will be a long process but when complete it will be possible to provide energy only when it is required. The ideal situation would be to plot fuel, output and degree-days continuously on the same time-based graph.

#### **Budget predictions**

Statistical analysis of the previous 15 consecutive years (avoiding the 1962/ 63 winter) provided average degreedays per month and two standard deviations. Using these figures it was possible to plot the limits of degreedays across the year, the error being  $2\frac{1}{2}\%$  at both limits.

Many of the smaller properties within the District receive quarterly charges for energy and will not therefore give a reasonable regression analysis using 12 monthly points. Consequently values of total energy consumed at the 4 hospitals with steam-raising plant were converted into District totals. From the previous six years' records and allowing for work in progress, it was found that the 4 main hospitals would constitute 72.5% of the total District expenditure on energy.

A two-stage regression line graph was drawn for the 4 main hospitals, Fig. 2. Using the previously calculated maximum and minimum degree days, the estimated maximum and minimum energy consumptions were found. These figures were reduced by 1% to allow for the effects of energy conservation schemes which were in hand. The costs of the various energies were reduced to a single figure (£ per Btu x 10<sup>6</sup>) by using weighted averages and allowing for proposed boiler conversions etc.

Finally, these maximum and minimum monthly expenditures were multiplied by 1.38 (72.5%) to give the projected District energy expenditure. Nil inflation was allowed from the start of the predictions. This was because an actual figure could not be known and the HPSI Index should raise the budget in line with costs.

From April to September this method was used retrospectively (using actual DHSS degree-day figures) to check against the actual expenditure figures given by the



Top, The housing of the two external sensors, as this picture clearly indicates, is set away and above the roof to limit the amount of radiant energy received from the building.

Finance Department. It was considered that before September it would be unwise to remove money from the energy budget. In October predictions were made and Fig 3 shows the limits from October. It also shows the actual expenditure to September. At this stage £15,000 were transferred from the energy budget. In January, another £25,000 were transferred. Fig. 4 shows the prediction graph updated in February with both sums transferred as one by Finance Department.

The remainder of the predicted underspending on energy was left in the budget to compensate for overspending elsewhere. At the end of the year the difference between total expenditure and total Works Budget was 0.1%.

#### Degree day monitor

The degree-day values, as issued by the DHSS, reach the user about three weeks after the month to which they relate. Furthermore, due to their measurement and calculation they were, and still are, of adequate accuracy only if taken as a monthly total.

In order to progress along the lines given previously, it was necessary to measure degree days accurately over short periods. A suitable device was designed and built by Granville and West of Wilmslow from a brief provided by the writer.

The monitor has two external temperature sensors, main and standby, with the cables taking separate routes to the microprocessor based monitor. The temperature is updated every 2 seconds and a reading taken every minute. The assumption is made that the temperature taken has been constant for one minute. Using a datum of 18.5°C the machine calculates the degree-minutes and converts them to degree-days. The accuracy is 0.1°C over range of -20°C to +50°C.

Once set the clock and calendar are automatic including leap years. The information stored is monthly totals on a rolling programme and the daily totals for the current month, also on a rolling programme.

The information that can be displayed is:

Date

Time

Datum Temperature

Sensor Temperature (main or standby sensor)

Current Day Total

**Current Month Total** 

Date/Time/Reason, last data loss

Total for any day this month up to and including current day

Total for any day of previous month not overwritten by current month

Total for any month of previous 11 months

Total for any consecutive months up to and including any day of current month

The output from this particular monitor is LED display but it can be provided with an output for connection to a printer or computer. The cost would be of the order of £450 now that the prototype has been developed and built.

The writer is no longer directly responsible for energy conservation but still retains a strong interest. Consequently, he would be very interested to hear of the results of statistics from other districts that are analysed as described in this paper. Furthermore, if anyone wishes to discuss any points the writer would be pleased to talk to them. This paper was given at the One-Day Updating Seminar at Kensington Town Hall in March 1984. Mr White is Advisor to the Water Research Centre and Chairman of the Water Bye-laws Advisory Committee

# Developments in the water industry

#### S F WHITE CEng FICE

I have selected two topics out of several concerning developments which are currently of great interest to the water industry at the present time. The first dealing with organisational changes in England and Wales is for general information and is dealt with only in outline. The other concerns the proposed new water byelaws, is of more direct interest to hospital engineers and is discussed in some detail. Mention is made of changes likely to take place in service pipe material.

#### Organisational changes

Although the independent ten statutory water Authorities in England and Wales have the same functions and powers and their boundaries are unaltered, the 1983 Water Act has made fundamental changes to their nature. Previously each had a majority of members, in some cases substantial, appointed by local authorities on an electoral college basis and a minority of members appointed by government, having regard to their special interests. There are no local government appointments and the boards are very much smaller. The ostensible effect has been to strengthen the direct influence of government although in practice this may be more apparent than real.

A further change has been the removal of the distinction between the boards and in some cases other directors to the boards. In some cases there are 3 full time executives as well as a paid chairman. In one case the chairman has taken on the functions of the chief executive himself. The authorities have therefore become much more akin to the gas and electricity utilities and indeed to major public companies. The resemblance to other public utilities is made even closer by the formation of district consumer consultative councils within each authority.

Apart from the water authorities the 29 water companies in England and Wales and the organisation in Scotland and Northern Ireland remains unchanged as is the Water Research Centre.

At the centre the National Water Council has been abolished. This was a statutory body with prescribed functions and some (limited) powers. It has been replaced by a number of voluntary bodies set up by the water authorities, sometimes in co-operation with the water companies and the water industry in Scotland and Northern Ireland. These bodies depend entirely on the member organisations and Government has no role to play in them. Basically they are as follows:

1. The Water Authorities Association (WAA). The sole members are the water authorities and the Association has the aim of discussing matters of mutual concern between authorities and with members of government and of co-ordinating any necessary joint action. In addition it provides a national press and public relations service for water authorities.

2. The Water Industry Training Association. This provides common training facilities and advice on inhouse training on behalf of all the water industry in the UK.

3. The National Joint Industrial Council. This is serviced by WAA and includes representation from the water companies. It is responsible for conditions of service and wage negotiations in England and Wales.

4. The UK Water Fittings Byelaws Scheme (The Fittings Scheme). This tests and lists as acceptable for byelaws purposes water fittings voluntarily submitted to it by manufacturers. It replaces the NWC Fittings Scheme and is now serviced by the Water Research Centre (WRC). It is controlled by a management board representative of the UK water industry. It is therefore in effect a separate body in its own right.

5. British Water International Ltd. This company has been formed to take on board the NWC International Advisory Service and promotes coordination and undertakes consulting work overseas in partnership with water authorities and WRC and in co-operation with the private sector of the UK water industry.

It can be seen that the nett effect of these changes as far as the hospital services are concerned is slight. It is hoped, however, that the Fittings Scheme will be improved in efficiency by finding a much cheaper and more convenient way of publicising its findings in the future.

#### The proposed new model water byelaws Principles

To understand the underlying principles of some of the changes that have been made it is necessary to examine briefly their vires and problems that have arisen with the current 1966 byelaws.

The 1945 Water Act gave water undertakers powers to make byelaws but limited those powers to matters thought to be of direct concern to them but not necessarily to the consumer. These purposes are prevention of waste and contamination of water supplied by the undertaker. Quite clearly it is in the national interest to prevent waste of water even if it has been metered and it is in the general consumer's interests to prevent someone from contaminating either his own or other peoples water supply. But Parliament did not go further and allow water undertakings to make byelaws for the fitness for purpose of consumers installations and fittings, neither did it consider it desirable to give undertakers powers to ensure consumer's safety or for that matter the safety of their own staff.

The recent thorough review of existing byelaws by the NWC/DoE Standing Technical Commitee on Water Regulations (now the DoE Water Byelaws Advisory Committee – WBAC) has been carried out with this legal basis always in mind and has led to some major changes being proposed.

Byelaws are made by individual water undertakers but have to be approved by the Secretary of State for the Environment who publishes a model on the advice of WBAC and he expects this to be closely followed. Once he has approved he has no further role to play except to permit water undertakers to make relaxations of their byelaws where they feel they may be too onerous in specific circumstances. Should the owner of an installation not comply he can be prosecuted and the courts have to enforce. In the case of a new installation the undertaker can refuse to connect until the contravention has been corrected. There is, therefore, a major role of interpretation that the courts have to fulfil in the ultimate.

The current byelaws have a number of unsatisfactory features:

1. They directly prescribe a considerable number of British Standards. This misleads British manufacturers in that the 'small print' of the byelaws state that any fitting which 'is not less efficient and suitable in relation to the purposes of the byelaws' will be accepted. Thus for example water undertakers might have to accept a tap that gave an inadequate flow providing its materials did not contaminate water and it did not waste by leakage.

2. Many of the standards quoted are not satisfactory in relation to byelaw purposes.

3. The byelaws do not require any form of marking and inspectors have difficulty in determining when a fitting is acceptable. In addition even if a fitting is marked with a BS number there is no guarantee that the fitting is in conformity with that BS. 4. There is no prohibition on the sale of "illegal" fittings.

To overcome the first two problems, the format of the byelaws is being changed and a review of the suitability of relevant British Standards for inclusion has been undertaken.

The future Model Byelaws will be expressed only in performance terms and they will not contain any reference to standards, codes or other documents. Instead the Model will be accompanied by a Guidance document setting out in "deemed to satisfy" terms those specifications etc which in the view of the Committee meet the byelaw requirements. Quite clearly such listed specifications would not be exclusive of others and from time to time would be amended or added to. This will remove any possibility of misunderstanding by manufacturers concerning the non-mandatory nature of particular British Standards.

As far as marking is concerned, the Fittings Scheme has under consideration, the registration of a mark of its own whereby fittings tested and accepted by the Scheme can be identified. There is also hope that there will be wide extension of the BSI Kite marking schemes because Kite marked products are automatically accepted by water undertakers. Unfortunately there appears to be no prospect that the Government will look favourably on the statutory prevention of the sale of non-listed fittings although much can be done through the voluntary co-operation of builders merchants and of the major do-it-yourself outlets.

### Details of proposed changes in byelaws

With very few exceptions, the new draft Model follows the principles of the Backsiphonage Report and of a report on Waste of Water published with the draft Model contained in Report 36. The former report recommended that three classes of protection should match three classes of risk of contamination. A clear over-rim type air gap (Cat A) or equivalent protection would be required wherever there was a frequent risk of contamination by a substance likely to be harmful to health (Class I). At least an "under-rim" air gap (Cat B), a pipe interrupter, or a combined check and anti-vacuum valve would be

required where the risk of contamination was from a substance which might be harmful to health but was not frequently present (Class 2). For other cases of contamination (taste or odour problems Class 3) a check valve or an anti-vacuum value would be adequate. These devices are prescribed both in the draft Model Byelaws and in the guidance document. New British Standards have been prepared to meet the future needs.

At some future date the draft model would require additional protection (whole installation protection) to all installations other than in single dwelling units. In effect this would addition require the of each installation, a check valve at the entry of the service pipe and upstands at every draw off point. This would implement one of the least understood recommendations of the Backsiphonage Committee.

The following are particular points where changes have been made. In some instances the draft Model and Guidance documents have been taken together:

#### 1. Hot water systems

In line with the re-examination of the vires of the byelaws the prohibition (on safety grounds) of the connection of the supply pipe to secondary circuits of hot water systems would be removed. This would have the effect of permitting mains pressurised unvented hot water systems, much used abroad, and single out-let mixer taps in kitchens, providing a check valve was installed in the feed pipe or in the mixer unit itself.

The restriction on the lengths of pipe feeding hot water taps would be removed. Whether or not such a restriction significantly reduces water consumption is debatable.

#### 2. Drinking water taps

The requirement for the provision of a drinking water tap has been omitted from the draft as being a public helath measure.

#### 3. Cisterns

(a) The requirements for the protection of the quality of drinking water in cisterns would be tightened up.

(b) Where there was a risk of backsiphonage of taste or odour contaminated water from a cistern the float valve would have to comply with BS 1212 Parts 2 or 3 or a suitable anti-backsiphonage device must be incorporated at the inlet.

(c) At a date yet to be prescribed a servicing valve would be required as near as practicable upstream of every float valve in a dwelling.

#### 4. Bidets

Notwithstanding the Backsiphonage Committee's recommendation, bidets with ascending sprays would be permitted if supplied from storage. The Guidance document will include sketches to show arrangements that would meet the byelaw.

#### 5. Clothes and Dishwashing Machines

Other than in individual dwellings these would continue to have to be fed from storage.

## 6. Hose taps and shower hoses

These would have to be protected by a Class 2 device (eg a combined check and anti-vacuum valve) as would a tap to which a hose could readily be connected.

#### 7. Flushing cisterns

At some future date the permitted capacity of flushing cisterns serving WC pans would be reduced to 6.5 litres. In the meantime dual flush systems for washdown pans and single 9 litre flush for other types of pan would continue to be permitted.

#### 8. Accessibility

There would be some relaxation in permitting tiling or screeding over pipes above ground but this would be accompanied by more detailed requirements particularly in respect of pipes below ground. This is in line with the philosophy of the Waste of Water Report mentioned above that providing leaks above ground become evident and cause nuisance they will be repaired by the consumer.

### 9. Haemodialysis in the home

There has been a major relaxation in the requirements for home dialysis.

Following authoritative advice from DHSS, membrane washing would be considered a Class 2 risk for which a combined check and anti vacuum valve would be suitable protection. Preparation of dialysing fluid would be considered to be a Class 3 risk for which a check valve would be sufficient. An air gap would no longer be required.

## 10. Special requirements in hospitals

The guidance document sets out ways of preventing contamination by backflow or contamination in hospitals. It recommends that all water should first be taken into storage cisterns and such cisterns should have appropriate devices at the inlet (usually Type A or Type B air gaps). Such protection should additionally be afforded at particularly hazardous points within the hospital. This would be in addition to the whole installation protection mentioned above guarding the hospital or parts thereof.

An exception would be made for ordinary domestic use in offices, canteens, etc., where supplies could be taken off service pipes and where appropriate precautions related to domestic situations taken at each point of use.

#### Materials for pipes and joints

WBAC placed special emphasis on the , need to improve the quality of pipes buried underground and where leaks could be undetected for decades. On the other hand pipes above ground where leaks would be detected and repaired need not be of such high quality. The Guidance document will therefore distinguish between the materials permissible for the two purposes and will separately list them as suitable for below or above ground use.

The WBAC's deliberations coincided with the development of new plastic pipes specially developed for service pipe use by the water industry. This development of blue medium density polyethylene to a high specification (WRC 4-32-02) will be designated for underground use. Other polyethylene pipes will either be withdrawn or will be designated for above ground use. The new blue pipe is tough and flexible and tests include impact resistance. Its stress/rupture characteristics will give it a much longer design life than other polyethylene pipes and its colour will make future identification simple and certain. Its other advantages is that it is to a single class (12 bar in the smaller sizes) and the number of sizes is restricted so that stocking problems are reduced. The full changeover will take place during 1985.

The effect will be that for all practical purposes, in the service pipe sizes only the blue polyethylene or copper (BS 2871 Table Y) will be permitted below ground. In some areas the copper will have to be polyethylene sleeved. In the larger sizes (say above 63 mm) uPVC pipes, ductile iron or steel pipes and fittings with suitable protection or asbestos cement pipes will continue to be used. Copper and Copper alloy fittings buried underground will be required to be dezincification resistant or immune and where necessary adequately protected against external corrosion.

#### Enforcement

Water undertakers in the UK have only limited manpower resources for byelaw enforcement and these are diminishing. They have therefore to direct these resources where they can effect. The have greatest Backsiphonage Committee and WBAC both felt that in most cases hospital installations are under the supervision of competent people and the observance of good practice and of the byelaws would best be left to them. For this reason the WBAC recommended:

"Undertakers should consider seeking understanding with Regional and District Health Authorities concerning routine inspection of NHS buildings. This work is best left to specialist NHS staff, excepting only those parts of services which are connected directly with supply pipes".

The problem facing water undertakers is that there is such a plethora of establishments in the medical field, both publicly and privately owned, that without guidance from the Health Authorities, byelaw enforcement would become at best inefficient and at worst impossible.

## Welcome to the 40th Annual Conference of The Institute of Hospital Engineering

#### DRAGONARA HOTEL, BRISTOL Opening Wednesday May 16 - 10.30 am Ending Friday May 18 - 12 noon

Conference time comes with summer, and each time it is just a little different. The rewards and pleasures for delegates found in the exchange of knowledge, information, news, views and ideas are familiar as they are valuable. The difference this year lies in the fact that IHEX '84, a hospital engineering exhibition, is being held in association with the Conference. And the other factor, that gives each Conference its special character, is the yearly change of venue – this year Bristol, a historic city with a lively modern image.

The Institute's Secretary John Furness explains that Bristol is more than an attractive location for the Conference. Subjects of the papers to be read are chosen as having a particular relevance to the locality,

#### Welcome to Bristol

We are indeed fortunate this year to be holding our annual conference in the delightful and historic city of Bristol.

The organising committee have prepared a number of interesting technical sessions with a visit to Falfield. Our new publishers and T. Jarvis Exhibitions have organised the IHEX '84 Exhibition and there is a varied social programme for the ladies.

Do please come along – if not for the full period then for as many days as you can. You will be most welcome and my wife Doris and I look forward to welcoming you all.

L G HADLEY CEng FIMechE FInstE FCIBS MConsE-FIHospE President of The Institute of Hospital Engineering



View across the docks to new developments that are rapidly becoming the hub of Bristol's social and cultural life.

he comments. 'From projects in this area, particular aspects have been drawn – for example there is a paper on the Torbay solar energy project. There is of course a wide range of subjects chosen by the speakers. Variety is the spice not only of life, but conferences too.'

#### Bristol – city of contrasts

The City of Bristol is well-chosen to play host to visitors to the Conference. A city of contrasts, in Bristol history, culture and recreation are brought happily and harmoniously together. It is a city of historical buildings and associations – but in Bristol history lives. There is a fresh and lively approach to the modern visitor's needs.

Bristol's dockland serves as a fine example of the City's spirited attitude. Bristol has always been a thriving port with a prosperous trading community. The docks have been the City's heart ever since (and probably before) Cabot sailed in 1497 to discover the North American continent. Since his day, through the years, Merchant Venturers and traders of all kinds, have brought wealth to the City – most memorably trading in wines (commemorated in Bristol Sherry) and slaves.

Today the riverside and quays have been developed to become attractive places where the past can be explored (not to be missed SS Great Britain), and where the visitor can also enjoy the hospitality of a wide range of restaraunts, speciality shopping, and the entertainment offered by cinemas, art galleries and studios.

For a sweeping overall view of the City, the best vantage point is Cabot's Tower on Brandon Hill. And for those with a head for heights, Brunel's famous Suspension Bridge spanning the Avon Gorge offers a spectacular perspective on the City and its achievements.

## The publishers in person

The publishers of Hospital Engineering will of course be attending the Conference. David Goad and John Tully, together with editor Jenny Campbell, hope to meet as many members of The Institute as possible. The Conference gives an ideal opportunity for readers to make suggestions, ask questions and put forward ideas.



Impressive view of Bristol from the Clifton suspension bridge.



Bristol Cathedral from the docks.

## **IHEX '84**

#### DRAGONARA HOTEL, BRISTOL Wednesday May 16 - 9.00 am to 5.30 pm Thursday May 17 - 8.30 am to 2.00 pm

#### **Admission free**

A completely new dimension has been added to this year's Conference – IHEX '84, a hospital engineering exhibition is being run in association. Intended to provide an ideal opportunity for delegates and manufacturers to come together in an informal and friendly atmosphere, it will cover all aspects of hospital engineering.

Arrangements have been made for delegates to take afternoon tea on Wednesday 16 May and morning coffee on Thursday 17 May with the exhibitors. This gives Institute members two specific opportunities to view the exhibition, in addition to casual viewing.

While the delegates are involved with Conference matters other visitors will be viewing IHEX '84. These are invited guests, chiefly other officials engaged in hospital engineering work.

Tom Jarvis, Exhibition Organiser, will be present and looks forward to meeting delegates, exhibitors and visitors.

(Copies of the catalogue will be available to visitors to IHEX '84 @ 50p each)

#### List of exhibitors

36	ana no.	ret
Arjo Hospital Equipment Ltd.	29	Ma
N. G. Bailey & Co. Ltd.	7	Mee
BOC Medishield Pipelines	16 & 17	Mee
Calenge-Watkins Ltd.	18	Me
Calomax (Engineers) Ltd.	25	MI
Dearborn Chemicals Ltd.	1	Nat
Dowson & Mason Ltd.	3	R. 1
The Electricity Council	22	L
Electrolux (Commercial		Scot
Equipment) Ltd.	28	Sur
Feedwater Treatment Services	i	Sta
Ltd.	12	Sou
Furmanite International Ltd.	27	Tra
<b>Grundy Controlled Environme</b>	nts	Ultı
Ltd. (GCE)	5	Ver
The Haigh Engineering Co. Ltd	d 11	Wal

	Heat Transfer Ltd.	19	
).	Kerry Ultrasonics Ltd.	24	
9	Marley Extrusions Ltd.	13	
7	Medical Gas Installations Ltd.	30	
7	Mediplan Engineering Ltd.	6	
8	Meynell Valves Ltd.	4	
5	M I M Ltd.	23	
1	National Coal Board 98	£ 10	
3	R. M. Protec Fire Detection (Nelson	1)	
2	Ltd.	20	
	Scott-Western Ltd.	14	
8	Surgical Equipment Supplies Ltd.	15	
	Static Systems Group Limited	21	
2	South West Gas	31	1
7	Transmitton Limited	26	1
	Ultrasonics Ltd.	8	
5	Vernon & Co. (Pulp Products) Ltd.	31	1
1	Walker Crosweller & Co. Ltd.	2	1
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The author is the District Works Officer to the Coventry Health Authority. This paper was given at the One Day Symposium – Works Supplies in the NHS – at the Kensington Town Hall on 23rd November 1983

# Supply needs of the works organisation

#### F J WILLIAMS MBE CEng MIMechE FInstE FIHospE

If one considers this in some detail the supply needs of the Works Organisation, it is not just Works needs that we are talking about. It is the needs of a District Health Authority in providing efficient and economical Estate Management. At the present time it is even more important that the Works organisation and the estate is managed on the basis of being competitive with the private sector. This means that managers must be given full responsibility and the facilities to enable them to do this in the best possible way. The extent of the need to purchase supplies in the NHS for the estate in terms of materials, equipment and services depends to some degree on whether departments are labour intensive or not. That is what percentage of work is carried out by direct labour or by contract. Most departments have a mixture of both because there are many advantages in using direct labour for health service activities but their efficient utilisation depends on a number of factors one of which is the procurement of supplies. The main principles that the Works Manager has to take into consideration are that the procuring of materials, equipment and services required for a business organisation whether in the private or public sector is essentially a service function, the main object being to purchase at "The minimum overall cost consistent with suitable quality and availability". Over the last number of years the chief problems have been the acute basic material shortages caused by nationally induced fluctuations. inactivity and the general inability of the material and equipment manufacturers to conform to the policy of fixed prices for an appreciable period ahead.

Since the material content of costs can be significant the procurement of supplies must be part of management arrangements and control because it can have a direct bearing on labour utilisation and competitiveness. The theme that I am trying to develop is that the procurement of supplies cannot be looked at in isolation but is an integral part of estate management. The Works Manager having responsibility for providing an efficient and satisfactory service must, therefore, be involved in the control of any of the factors that affect the provision of that service. The main needs of Works can be divided into three main areas of procurement and these are as follows:

- 1. Materials
- 2. Equipment
- 3. Contract Services.

I would now like to consider the effect that these three areas of procurement have on estate management and what needs to be taken into consideration. These activities are listed as follows:

- 1. Works Information and Management system
- 2. Central Works Stores
- 3. Service and Maintenance contracts
- 4. Purchase of Equipment
- 5. Quality Controls
- 6. Standardisation
- 7. Procurement Policy and Relationships.

#### Works information and management system

Let us look at what I consider one of the most important aspects and that is the "Works Information and Management System". Satisfactory Works management ensures that resources are used efficiently in relation to the results achieved. This is in accordance with the general philosophy that Health Authorities are required to adopt. For example,

(a) A system of control in which performance is monitored against plans and budgets.

(b) Effective budgetary control will, therefore, depend on the clear assignment of responsibilities to specific management units and officers and the allocation to them of budgets for the expenditure under their control, together with the responsibility for controlling expenditure against their budgets.
(c) Efficient utilisation of labour.

In order to do this it is necessary to have a comprehensive system of management control covering many aspects of Works management which will enable continual monitoring in order to maintain a satisfactory performance. The system needs to cover the following areas of activity and most of these include relevant information on the procurement of supplies for Estate Management.

1. Forward Planning and Budget Forecasting.

2. Monitoring and controlling performance against plans and budgets.

- 3. Budgetary control.
- 4. Commitment expenditure record.

5. Individual job identification and classification.

6. The recording and breakdown of expenditure under main classifications (Estmancode).

7. Recording of labour and materials to each specific job and work classification.

8. Record plant and equipment purchase to specific jobs.

9. Record service contract expenditure. 10. System of stores stock control and stores accounting.

11. Plant and equipment inventory and history.

Each of these areas are an integral part of Estate management and cannot be looked at in isolation. There is a need to have an appreciation why the procurement of supplies and stores accounting is not just a case of the Treasurer providing total cost information to Works on the purchase of supplies and the issue of materials and spares from stores. It is necessary for each job to be identified and classified and labour and materials recorded against a specific job. It is necessary for these records to be obtained and kept by the Works Department because if they are to be of any use in controlling the operation of the Department the information should be available immediately without any delay which can happen if this information is collated and analysed in other departments. This also enables the paperwork to be kept to a minimum without any duplication of effort and records. The most important point being that it is only possible to obtain accurate information if this originates at Unit or Hospital level by the appropriate technical officers correctly coding all requisitions etc. This system would be fully computerised by using, for example, the National Works Information Management System (WIMS).

#### Works stores

In any District Health Authority where work is carried out by in-house Works Staff it is absolutely necessary for the Works Department to be supported by adequate stores facilities. This should be on the basis of a centralised Works Stores in each Health Authority. The stores should be fully comprehensive. It has been suggested that it is only necessary to hold day to day stock items. This was found to be entirely unsuccessful, the only satisfactory way is to have a store which covers all items of materials, plant and equipment spares in the mechanical, electrical, electronic and building fields. Any attempt to separate the Works Stores function would be economically unoperationally sound and unsatisfactory. There are many

important reasons for management of the estate to be supported by adequate stores facilities. Firstly it will minimise plant and equipment downtime in important clinical areas. This will also apply to all of the other support services that can have a direct affect on patient facilities.

Secondly it will assist in the efficient utilisation and its general competitiveness. If planned preventive maintenance and incentive bonus schemes are to be successful they must be backed up with adequate and immediate supply of plant and equipment spares and materials. It has been determined by feasibility studies that waiting time for materials and spares can be considerable and plays a large part in contributing to inefficiency in direct labour departments. Performance can be as low as 35 under non incentive conditions and without a detailed programme and works stores.

In the past stores have been located in various hospitals and now under the present restructuring could be on a unit basis under the control of an individual Unit Works Officer. It is considered that this method is totally unsatisfactory for a number of reasons. It is not economically justified in employing a storeman in each hospital works stores when by centralising the works stores facilities an adequate service could be provided with reduction in stores personnel and administrative costs. It has also beenfound in small stores that difficulties are experienced in controlling the issue of materials. Also full advantage cannot be taken of joint contracting bulk purchase of materials and because of the divided and limited stores facilities which can prevent the procurement of materials in the most economical market. The centralised works store could be based on the site of a large hospital or where a large proportion of direct labour staff are based. It has been said that it is not necessary for the stores personnel to have any technical knowledge of the materials and spares that they are dealing with. My own experience in industry and with the Health Service has shown that it is essential for storemen not only to have specialist technical knowledge of materials but also to have an appreciation of their application.

The control of the stores should be completely divorced from the day to day maintenance and operational management and come under a specific works officer. This is the only way to ensure adequate accountability for stock control at this level. The most important point being that the stores accounting and control must be an integral part of the Works Information and Management System. In practice it has been found that when operating with centralised Works Stores it is only necessary to hold at hospital level a small quantity of stock items and spares to deal with emergencies and for each item there would be a maximum holding imprest level and these would be replenished at regular intervals on a top up basis. These items would still be booked out to a specific job. The store would also stock under the control of the storeman specialised plant equipment and tools together with protective clothing required under safety procedures. As a matter of interest, there is now a national vocabulary for Works Stores items and this should be used wherever possible and will assist in drawing up a comprehensive Stores catalogue for normal stock items.

An important point that needs to be borne in mind is that when managing a direct labour force efficiently and competitively it has to be done on the basis of a trading account which will include all of the incurred overheads, one of which will be the cost of providing the Works Stores and Stores Accounting.

#### Control of maintenance and Service contracts

Another important area in the procurement and control category is that of maintenance and service contracts which cover all types of mechanical, electrical plant and equipment found in health care premises together with electronic and bio-medical equipment. An average size district health authority can spend approximately £338,000 per annum on service contracts of this nature. As maintenance is part of the normal works responsibility this expenditure should be contained within the Estate management budget. It is essential that there is adequate control over these to see that the authority obtains full value for the large expenditure incurred. This also needs to be carried out as economically and competitively as possible. In the past this has caused concern because due to lack of control departments appeared to be in the hands of outside manufacturers or their agents who dictated the standard of work carried out. It is our responsibility to ensure that service contractors are maintaining equipment not only from an operational point of view but also from a safety aspect. This is extremely important in the case of equipment that comes into close contact with the patient or used by staff. It is, therefore, necessary to have management arrangements for the implementation and monitoring of service contracts. The technical officer within the Works Department responsible for the maintenance of equipment needs to liaise with the user department to determine if servicing should be carried out by in house staff or by service contractors. If it is agreed to do this by contract a specification has to be produced giving an adequate description of the maintenance requirements. For example:-

(a) Routine calibration and functional checks together with

(b) Specific tests designed to ensure the safe operation of the equipment.

Clear reference should also be made where compliance is specifically required to approved Codes of Practice. e.g. British Standards IEE Regulations, PRS 80 and Health and Safety at Work Act. This should also include details of any "permit to work" systems currently in use within the Authority e.g.:

- Anaesthetic and Ventilatory Equipment
- Piped Medical Gas Installations
- Contaminated Equipment
- Mechanical Installation

High Voltage Distribution Systems

An essential clause in the specification is that the contractor should accept full responsibility for any accident or injury that is due to faulty servicing. In other words, they are required to issue a certificate to say the equipment is in a satisfactory condition after each visit. A contracts register should be compiled and maintained by the Works Department, which contains a permanent record of all current contracts. This will include as follows:—

(i) costs

(ii) number of visits with dates when carried out

(iii) variation orders issued under the contract

(iv) any other information thought necessary.

The work involved must be subject to intermittent spot checking by the technical officer at hospital or unit level and they would submit a monthly return listing the number of service visits during the month for all equipment and whether these have been carried out satisfactorily. This information is then entered in the contracts register. If this is left to individual departments and without overall control there can be many anomalies and from my own experience I have found

1. service visits have not been carried out although paid for.

2. additional call out to equipment were being charged for though covered by existing contracts.

3. most important work was not being carried out in accordance to the standards laid down.

4. safety checks were not being carried out.

It is, therefore, important if the Authority is to obtain value for money that the technical officer must be involved fully in the management of all .service contracts.

## Purchase of equipment

The selection of equipment must under normal circumstances, be that of the user department but it is very important that Works are involved at the initial stages. The system for the procurement of equipment should automatically involve the Works Department and any requests for new equipment should contain as much information as possible after consultation between the user and Works The information technical officer would normally include the following:-

1. The required performance of the equipment should be defined precisely and the need to conform to the relevant Codes of Practice, British Standards and Electrical Safety. A detailed specification of the requirements is the ideal aim.

2. Details of revenue consequences such as (a) whether replacement or new equipment (b) installation, and energy consumption costs. (c) servicing requirements, is it to be carried out by in-house staff or service contractor and the cost incurred.

3. If necessary option appraisal should be considered. In assessing the cost of equipment the whole life cost should be considered rather than the initial capital expediture. The recurring revenue cost over the life of the equipment can be more than the initial purchase price. This can decide what equipment should be purchased.

4. Compatibility is also desirable for new equipment with that already in use and can it be connected to existing services.

5. Assurances need to be obtained from suppliers that they have adequate technical support facilities in the UK and that spares will be available. This is even more important with imported equipment. When using in-house staff for maintenance the availability of spares is also very important.

6. When equipment is received and before being put into use the system should ensure that the equipment is checked to see that it conforms to the specification and at least the electrical safety aspect should be tested by a competent person.

#### Quality control

You will recall that earlier in my paper I said that our objectives should be to purchase supplies at the minimum overall cost consistent with suitable quality and availability. There is no advantage in purchasing materials on the basis of minimum cost alone if the quality is unsatisfactory. In the case of a Works Department this is extremely important and has direct bearing on the operating costs of the department. Poor materials mean unreliablity of plant and equipment which in turn will cause breakdown followed by expensive repairs particularly if due to an urgent need. It is, therefore, important to be sure that there is an adequate degree of quality control in the procurement of works supplies. In the past various

ways of doing this have been considered. It has been suggested that all products should be independently inspected before use, this is not feasible with a large number of items purchased by the NHS. The considerable cost incurred would not be justified. Many large purchasers, for example, The Ministry of Defence and Marks and Spencers have had similar problems of quality and have changed from inspecting products themselves to checking that their manufacturers are using property quality assurance techniques.

In the case of Works supplies there is a balance to be maintained between both methods. Firstly in the case of National and Regionally arranged contracts, the supplies board could secure quality control at the point of manufacture and by the registering of manufacturers whose standards conform to the guides of good manufacturing practice. Secondly, at **Regional and District Authority level**, where smaller contracts are concerned there should be a quality assurance advisory group set up consisting of Supplies and Works Officers who could set quality standards and carry out spot checks at District level. Works technical officers at District level also need to check and inform Supplies if there is any apparent deviation in the quality of materials.

#### Standardisation

One of the most difficult things to establish in the NHS appears to be the standardisation of equipment. If this could be achieved to any degree it would have enormous benefits, particularly as far as Works Departments are concerned, and would contribute towards reduced expenditure, because of the affect it would have on the Works Department particular in relation to the following:

- Reduce the type and number of stock items.
- Reduce the type and number of spare parts held in stock.
- In-house staff would be able to deal more easily with the service requirements of equipment.
- A reduction in the number and type of service contractors.
- Reduced administrative costs and generally avoid the dissipation of technical resources.

In order to overcome this problem it may be advantageous to have a specific standardisation policy at District level to enable consultations to take place between user departments, Works and Supply staff in order to establish a reasonable level of standardisation of equipment. This would not only enable user requirements to be identified in a technically satisfactory way but would also ensure standard items are more readily acceptable by the user departconcerned. Standard ments specifications produced in this way could then be reviewed regularly and revised to take account of new techniques of materials which become available and changes in user requirements.

#### Procurement policy and relationships

There is a need generally for authorities to look at the procurement policy and relationships in terms of Works supplies. This may be an ideal time to do this because of the present restructuring taking place within the Supplies organisation. Purchasing must be closely co-ordinated with the other activities of Works management. There is no doubt that the Supplies Department can provide a most useful service to the Works Officer in assisting him to obtain efficient and competitive estate management. It has now become necessary to consider the demarcation line between that of Supplies and Works and who is responsible for what, bearing in mind that we are both providing a particular service. It should not be difficult to define this quite clearly and with this in mind it is suggested that a possible solution would be as follows:

#### Supplies

• Advise on the procurement of Works supplies generally in particular on quality and availability.

It would be the "buying" department on similar lines to that found in industry. They would arrange for the procurement of supplies and place purchase orders on suppliers on the basis of Works specified requirements.
 Arrange for bulk purchase of day to day stock items and administer

central regional and district contracts for materials.

• The disposal of waste material and surplus or obsolete equipment.

In addition to the above broad brush policies and on the basis that supplies is essentially a service function, there are a number of other activities that will assist the Works Department in its general management and these include the following: (a) Departmental performance and productivity will depend on being kept advised of the current delivery position and of new materials which may be of interest. For this reason it is necessary to keep supplies records and a good catalogue library.

(b) Estimating which is an essential part of Works management involving programming and budgeting depends on quotations for materials. The supply of technical data and use of price trends and material shortages.

(c) Progressing, since productivity also depends on the right quantity of components being in store or being delivered at the right time it is essential that supplies organise prompt receipt by follow up procedures for progressing orders. In present conditions it is difficult to strike a right balance between seeing that everything is available on time and the desirability of avoiding double handling.

#### Works

Since the Works manager is responsible for the estate management budget and maintenance expenditure and since materials frequently account for a considerable amount of this expenditure it is essential that steps are taken to ensure that he has overall management control over all of the department's activities including the procurement of supplies which involves the following:

(a) A comprehensive management and information system is an integral part of which stores control and stores accounting would be included. This would be contained within the department using the National Works Computerised System, WIMS.

(b) Requisitioning and specifying the type of quantity and quality of materials and equipment. This would include stores, stock and non stock items, spare and replacement parts and source of supply.

(c) Overall management control for Works centralised and comprehensive store, together with small hospital imprest stores where necessary.

(d) The management control of service and maintenance contracts in consultation with heads of departments and Supplies.

(e) The involvement in the purchase of equipment and produce detailed performance specifications and advise on Codes of Practice, Safety, Installation and maintenance requirements.

(f) Produce detailed technical specifications for the whole range of Works supplies including materials, equipment and contract services. These would cover Codes of Practice, quality and safety aspects.

#### Conclusions

This paper had endeavoured to show that the procurement of Works supplies is an integral part of Works management and therefore, must involve the Works Officer in the control of this activity if he is to be held responsible for maintaining an efficient and competitive service. There are many advantages in having centralised and comprehensive Works store under the control of the Works Department. It is essential that the identification, classification and cost

analysis of Works materials is included in a computerised Management and Information Service (WIMS). This will provide adequate control, audit and public accountability in accordance with good management practice laid down by Authorities in the public sector but at the same time giving the Manager the responsibility that he needs. There must also be close liaison between of Supplies, Treasurers, Heads Departments and Works to enable a satisfactory service to be provided and to meet the demands of effective management expected of all of us in restructured National Health the Service.

## **Belinda Hatton**

Continuing our series on women in engineering, this month we focus on a Grade Three Technician with the North West Regional Health Authority. Totally committed, rising fast, we need more engineers like Belinda Hatton.



It never occured to anyone either at home or at her convent school that Belinda Hatton could grow up to beecome an engineer. She never thought of it either despite the fact that her father was a Linotype engineer and engineering was, so to speak, in her blood. She left school at 16 with nine 'O' levels wondering what to do.

What she did in fact was to answer an advertisement for a trainee building services technician. I didn't really know what that was,' she recalls. However aptitude tests and her ability at maths proved that she was

Belinda Hatton receives the Brian Donegani Award, 1983, for obtaining the highest marks on the Building Services course at Salford College of Technology.

the right stuff and she began work for the North West Regional Health Authority as a trainee building services technician in the Regional Engineer's Department.

Belinda's first year was spent on a full-time Engineering Industry Training Board (EITB) course at Wythenshawe College of Further Education. This involved learning basic engineering skills such as fitting, turning, milling and welding. After that she was back in the Regional Engineer's Department and was given experience in many aspects of building services, including design and draughtsmanship and a spell in the electrical services section.

During the next five years Belinda worked hard to gain further qualifications ... all of them as a part time student. 'I'll be a better engineer,' she says, 'because while I'm studying the theory I'm doing the practical work as well.' At the Salford College of Technology she gained both an Ordinary Technical Certifiate and a Higher Technical Certificate in Building Engineering Services. She also has the Salford College's Building Services Diploma. In 1981 she won the College's Governor's Prize for Building Services Technician and the Brian Donegani award for the student with the highest marks on Building Services courses at Salford (see picture).

She enrolled as a trainee with the Heating and Ventilating Contractors Association and followed a Construction Industry Training Board scheme. (The first year of this was the fulltime course at Wythenshawe College.) This is so constructed as to give trainees a full appreciation and basic knowledge of all aspects of the buildings services industry. During Belinda's training she worked for several commercial companies. For one she did costing and estimating, for another she worked from the contractor's side and gained commissioning experience. (It was with this firm that she had to carry a tool bag for her boss. He was always asking her to pop up and down ladders to fetch it for him.) She had some contracting experience and also worked in different hospitals in maintenance departments and with site engineers on new hospital developments.

When Belinda had completed her five year training scheme she became a grade three technician in the Central Services Mechanical Section of the Regional Engineer's Department. She is currently involved in a major scheme for Fairfield General Hospital in Bury. Working as part of the design team, she has been coordinating services in the hospital streets and designing heating systems. Most recently she has been compiling cost estimates to form part of the pre-tender estimate for the engineering scheme.

Belinda (now a member of The Institute of Hospital Engineering) has also been working with various computers in the Works Department and has been trained in the use of Computer Aided Design. She is now in her first year of study for a degree in Mechanical Engineering at Stockport College of Technology.

Her commitment to her work and career is what brings her complete job satisfaction. Perhaps the fact that she is one of the tiny number of women in a male dominated profession is a trivial matter. Belinda brushes it aside cheerfully, 'I don't mind having my leg pulled. I'm still treated like a girl.' She is determined, able, hardworking - employers should be searching out more women like Belinda Hatton.

#### Small-scale hydro-power

The generation of electricity on a small scale by means of hydro-electric schemes with an output below 50 kW will be considered as an alternative energy source by the Watt Committee on Energy at a one-day meeting on Tuesday, 5th June 1984 in London.

It will be held at the City Conference Centre (Institute of Marine Engineers), commencing at 10.30 am. Coffee will be served at 10.00 am, and luncheon will be at the City Conference Centre.

Enquiries should be addressed to: The Secretary, The Watt Committee on Energy, 18 Adam Street, London WC2N 6AH. Tel: 01-930 7637.

#### Steam loss calculator

A steam loss calculator, enabling you to estimate the cost of steam leaks, is available free from Furmanite Engineering Limited, Furman House, Shap Road, Kendal, Cumbria LA9 6RU. Tel No: (0539) 29009, Telex No: 65262 Furmte G.



## A taste of IHEX '84

#### News from some of the 30 IHEX exhibitors

#### Laundry for BUPA hospital, Norwich

When the hospital opened last year, it became the most recent in a long line of BUPA hospitals to install an Electrolux on-premises-laundry.

The 56-bed Norwich hospital has a laundry consisting of card-operated washer extractors, capacity tumble dryers, ironer, capacity hydro extractor and steam press.

Further details from: Electrolux (Commercial Equipment) Limited, PO Box 18, Oakley Road, Luton, Beds LU4 90E. Tel: 0582 53255.

## Simple automation for surgical instrument cleaning and drying

A major advance, to remove the manual involvement in cleaning and drying surgical instruments and other hospital theatre equipment, has been developed by Kerry Ultrasonics Limited as part of their on-going programme to extend the application for automated liquid processing.

The new Kerry system is basically an in-line, four-stage process providing: aqueous ultrasonic cleaning; water rinsing and, to extend the proven advantages of ultrasonic cleaning, two stages of solvent drying.

Further details from: Kerry Ultrasonics Ltd, Hunting Gate, Wilbury Way, Hitchin, Herts SG4 OTQ. Tel: Hitchin 50761.

### New water treatment service

A Merseyside company has developed a safe, non-acid and easy to handle water treatment chemical, which can give Heating Systems a new, more energy efficient, lease of life. Feedwater Treatment Services Limited of Wallasey has produced Corrosperse 84 to absorb iron oxide sludge and deposits, which frequently clog closed hot water heating systems and greatly impair circulation.

Further details from: Feedwater Treatment Services Limited, Arrowebrook House, Poulton Road, Wallasey, Merseyside L44 4BQ. Tel: 051 630 3373.

#### Cost-saving fire-monitoring system, compact VTS fire alarm range and warden call system

Three new fire and security developments – a new version of The Statiscan TDM (time division multiplexing) fire monitoring system, a compact, VTS fire alarm range, and a wardens call system from the Static Systems Group.



Three Electrolux washer extractors installed recently at Norwich.

The new Statiscan system, known as TDM 4, represents an opportunity to save costs and maintain high reliability when electronically monitoring and controlling fire.

The new, compact VTS fire alarm range of self contained units comply with both all relevant British Standards and codes of practice and also latest DHSS technical memorandum 82.

The new wardens' call system can be coupled to a sophisticated pocket paging system which will give the location of any alarm, the type of alarm and emergency instructions.

Further details from: Static Systems Group, Heath Mill Road, Wombourne, Wolverhampton WV5 8AN. Tel: (0902) 895551. Telex: 339796.

## Programmes that eliminate bio-fouling problems

Dearborn Chemicals Limited announce the introduction of their Biomate programmes to control all microbiological fouling problems in cooling water systems.

These programmes feature microbiocides with improved activity against bacteria; effective control over algae; the ability to penetrate and loosen existing organic slimes; specific action against sulphate reducing bacteria; low environmental toxicity.

They are easy to handle and present none of the usual odour problems.

Further details from: Dearborn Chemicals Ltd, Widnes, Cheshire WA8 8UD. Tel: 051 4245351. Telex: 627341.



When Sister Frances Kent, at Stoke Mandeville hospital's spinal injuries unit took delivery of a new nurse call system last year, it was the latest in nurse call development from pioneers, Static Systems Group. The company will demonstrate prototypes of a new microprocessor-based nurse-call hand unit at IHEX '84.

#### **HOSPITAL ENGINEERING MAY 1984**



#### **New literature**

The depth of involvement that Medical Gas Installations Limited have in the continuing improvements in health care is explained in their new colour brochure.

Entitled 'Vital Patient Health Care Systems' the brochure illustrates the comprehensive service offered by the MGI group, explaining in detail the operating functions of each of the member companies.

Further details from: Monmer Close, Stringes Lane, Willenhall, West Midlands WV13 1JR. Tel: 0902 631225. Telex: 334482 MEDGAS.

### Condensate pump & receiver sets

The recent entry of Heat Transfer Limited into the condensate pump and receiver market has been welcomed by both designer and user. The compact nature of the condensate receiver set will combine with their well known range of heating calorifiers to form convenient energy conscious packages. The potential saviungs are considerable:

Energy – up to 15% of energy in a steam system if condensate is not collected.

Water - by returning condensate you use less water, less water treatment, less loss of heat with blowdown. Space - so compact it will package with calorifiers and condensate coolers using no more floor space than the calorifier/coolers themselves.

Further details from: Heat Transfer Ltd, 3/4 Bath Street, Cheltenham. (02429 582777).

#### New microprocessor multiplexing system

Multiplexing techniques are being offered by R M Protec Limited for controlling and centrally monitoring, via a pair of wires of the following remote systems; this using a new compact and modular control station – fire alarms, gas detection, extinguishing gas, sprinklers, plant alarms, heating and ventilation, medical gas alarms, blood bank alarms, nurse call, cell call, security alarms, energy control, close circuit television.

Further details from: R M Protec Fire Detection (Nelson) Ltd, Protec House, Waterford Street, Nelson, Lancashire BB9 8AQ. Tel: 0282 692621. Telex: 635661 Protec G.

### New energy management system

Savings of £75,000 have been achieved resulting in a one year payback for New Cross Hospital, Wolverhampton following the installation of a BICC Transmitton Micropower 100 Energy Management System.

The original contract was for a central station and fourteen outstations. The system was installed in five months and commissioned in May, 1983. Since then inhouse extensions have taken the system to a 19 outstation capability at a total cost to date of £85,000.

Further details from: Transmitton Ltd, Smisby Road, Ashby de la Zouch, Leicestershire. Tel: (0530) 415941.

Clive Sheridan, Marketing Director of Heat Transfer Limited discussing condensate recovery with Lord Avon, Parliamentary Under Secretary of State for Energy at a recent London exhibition.





George Reynolds, Energy Conservation Officer, New Cross Hospital, Wolverhampton, pictured at the Central Control Unit of the Transmitton MP 100 Energy Management System.

#### British Standards Institution Powered lifting platforms for the disabled

The British Standards Institution has just published BS 6440 *Powered lifting platforms for use by disabled persons*, a new code of practice which should help to improve the safety of these devices. It sets out recommendations for the design, selection, construction, installation and maintenance of fixed powered lifting platforms having either a partially or totally enclosed platform and which are designed for use inside or about private houses, and public buildings

Copies of BS 6440 may be obtained from the Sales Department, British Standards Institution, Linford Wood, Milton Keynes MK14 6LE. Price: £11.20 (£5.60 to BSI subscribing members).

#### Fire safety signs, notices and graphic symbols Revised British Standard

An extension of the basic framework concerning safety colours and safety signs with regard to fire (as laid down in BS 5378) is the purpose of BS 5499 Part 1 Specification for fire safety signs, just published by BSI.

The 1978 edition of this standard has now been withdrawn.

Available from the Sales Department, British Standards Institution, Linford Wood, Milton Keynes MK14 6LE. Price: £11.20 (£5.60 to BSI subscribing members).



Besam are specialists and leaders in door automation for all types of hospital doors including toilets, wards, corridors, operating theatres and entrances.

Why not consult our full technical and advisory service?



### let besam ease the way

## Some hospital and handicapped persons' projects completed by Besam:



Besam Limited, Unit H, Holder Road, Aldershot, Hants GU12 4RH Telephone (0252) 313831 Telex 858724





### PAPWORTH HOSPITAL HEART TRANSPLANT UNIT

When it came to choosing the best possible equipment for a life support system — then SAFEMIX Thermostatic Controllers were chosen to maintain the hot water temperature at the most demanding time.

SAFEMIX does not lime up in hard water or dezincify in soft water. A maximum temperature can be preset for complete safety.

SAFEMIX has a highly thermostatic capsule which is indestructible and does not fail or fatigue and which has been proven over 100,000 successful installations in 15 years.

Unsurpassed technical superiority is backed by Top Star Pedigree..

•		
LINERS		QE2, SS Countess and SS Princess.
SHIPS	_	Royal Navy, Brazilian Navy, Peruvian Navy.
YACHTS		Royal Yacht Britannia.
PALACES	-	Sultan of Oman and others we are precluded from mentioning.
HOSPITALS	-	Papworth Open Heart Surgical Unit and Nucleus Hospitals and hundreds of hospitals worldwide.
TENNIS	_	Wimbledon All England Tennis Club.
CRICKET	-	Lords Cricket Ground.
FOOTBALL	_	Numerous Football League Clubs.
EXPORTS	-	New Faculty of Medicine, Riyadh, Saudi Arabia.
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SAFEMIX has pioneered a new standard of Thermostatic safety and reliability worldwide from Adelaide Hospitals to South African upgrading of Bantu ablutions and is successfully operating throughout the USA and most of the Western World.



Meynell Valves Ltd. Bushbury, Wolverhampton WV10 9LB. Telephone: 0902-28621 Telex: 338352.

SUBSCRIPTION ORDER FORM	APRIL 1984 One year payback
HOSPITAL ENGINEERING (The journal of the Institute of Hospital Engineering is published ten times a year. In January and July, the Hospital Engineering Newsletter is circulated to Institute Members only).	NEW CROSS HOSPITAL WOLVERHAMPTON
Please enter my subscription to HOSPITAL ENGINEERING for one year at the following annual subscription rates:         United Kingdom £28.50         Overseas £35.00         Interserver work as Armonewer         My cheque, made out to TULLY GOAD VINALL, is enclosed for £         Name (BLOCK CAPTULS PLEASE)	IS PLEASED TO ANNOUNCE Savings of £75,000 As a result of installing A transmitton energy management system
Position Address	FULL DETAILS AVAILABLE ON STAND NO. 26
Post Code           Telephone         Date           Signature         Date           Please cut out this order form and post in an envelope to:         Subscriptions Dept., HOSPITAL ENGINEERING, Tully Goad Vinall, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, Blackheath, London SE3 9RJ, England, St Agnes House, Cresswell Park, St Agnes House, Cresswell Park	Energy Control Division Transmitton Limited Smisby Road Ashby de la Zouch Leicestershire Tel No (0530) 415941



### **CLASSIFIED ADVERTISEMENTS Appointments & Situations Vacant**

To place your classified advertisement, please contact Michael Birch on (0793) 45311 or write to him at HOSPITAL ENGINEERING Tully Goad Vinall St Agnes House Cresswell Park Blackheath SE3 9RJ.

> HOSPITAL PROJECTS FAR EAST+ SAUDI ARABIA

#### HOSPITAL EQUIPMENT DESIGN

Our client, a Far Eastern contracting firm requires an Engineer/ Technician to assist with the design and specification of equipment. The post will be based in the Far East for 3 months then 9 months in Saudi Arabia. £25,000 pa

#### MUSLIM HOSPITAL EQUIPMENT **TECHNICIAN**

Required by consulting firm in Saudi Arabia to supervise installation of biomedical equipment, X-ray machines, sterilizers etc. Candidates must hold British passports, be qualified to ONC and have at least 8 years experience of such equipment. £24,000 pa

MUSLIM RESIDENT ENGINEER To supervise construction of a 500 bed Hospital in Mecca. Candidates must be degree qualified and aged over 35 years and have relevant experience. £30,000 pa

ATS INTERNATIONAL RECRUITMENT 73 Surbiton Road, Kingston Upon Thames

Surrey KT1 2HG. Tel: 01-541 1211

## **STERILIZER** TECHNICIAN

required to join a team specialising in the performance testing, commissioning and monitoring of all types of sterilizers installed in the East Anglian Regional Hospitals with DHSS requirements. Salary Scale: £7788-£9187 per annum.

The post will be based in Cambridge although it is anticipated that a large part of the working time may be spent out in the Region. Applicants should have an ONC in mechanical or electrical engineering or a recognised equivalent qualification but credit will be given to candidates having a higher qualification and who can demonstrate his/her competence.

Standard NHS benefits will apply including membership of pension scheme.

Car ownership is essential for which the appropriate NHS allowances are payable.

Application form and job description from the Regional Personnel Officer, East Anglian Regional Health Authority, Union Lane, Cambridge CB4 1RF (Tel: 0223 61212 ext 325). Closing date: 25 May 1984.

RATES: £11 per single column centimetre (minimum depth 3 cm) 4 columns per page. Lineage £3.25 per line (minimum 8 lines) Box number £5.

### South East Thames Regional Health Authority **REGIONAL ENGINEER'S DIVISION** ASSISTANT REGIONAL ENGINEER

SALARY: £12,949-£15,400 p.a. (Ref 435)

### PRINCIPAL ASSISTANT ENGINEER

#### SALARY: £11,515-£13,920 p.a. (ref 436)

The South East Thames Regional Health Authority are moving their headquarters to Bexhill-on-Sea in June/July 1984. The Regional Engineer is seeking enthusiastic applicants for these posts to work in this new location.

The Regional Engineer has a current programme of capital works which include many types of mechanical and electrical engineering installations in developments ranging from multimillion pound hospitals to improvement schemes in existing buildings.

Applicants, male or female, must be Chartered Engineers and hold Corporate Membership of one of the Institutions of Civic, Mechanical or Electrical Engineers or Electronic and Radio Engineers, or the Chartered Institution of Building Services, and have considerable experience in mechanical and electrical engineering for buildings, including hospitals, in most of the following aspects: design, specifications, cost control, contracts, commissioning, operations and maintenance.

Should you wish to discuss the posts informally with the Regional Engineer before submitting an application, please contact Mr Menniss on extension 329.

Further details and application form from the Personnet Division, SETRHA, Randolph House, 46-48 Wellesley Road, Croydon CR9 3QA, telephone number 01-686 8877 Ext 57. Please quote the relevant reference number. Closing date for receipt of applications: 14.5.84.



#### June International issue

Queen Victoria Hospital, Melbourne

Training in the NHS

#### WEST GLAMORGAN HEALTH AUTHORITY

\*NORTH HOSPITALS UNIT, MORRISTON HOSPITAL, SWANSEA

## ENGINEER

#### £7,292-£8,225 per annum plus 15% bonus

Applicants should be young, enthusiastic Engineers with qualifications to HNC/HTEC level and knowledge of computer applications. Some hospital or industrial experience would be an advantage but newly qualified graduates are also encouraged to apply.

Further information may be obtained from Mr R. A. Richards, Unit Works Officer, Morriston Hospital, tel. Swansea 783232. Application form and job description available from the Personnel

Application form and job description available from the Personnel Department, Morriston Hospital, Swansea SA6 6NL, to be returned by 18th May, 1984.



### ENGINEERING OFFICER (Scale 6 - £13,048 - £15,531 pa)

An experienced Engineer is required to join a highly motivated team of Works Professionals involved in the maintenance and development of the Health Authority's Estate.

The District Engineer is the Chief Technical Advisor on all engineering matters and will ensure that agreed standards are met and that engineering design standards are in line with National, Regional and District requirements.

Applicants must hold suitable recognised qualifications and have a sound knowledge of engineering maintenance and design preferably within the NHS.

Application form/job description from District Personnel Department, District Office, Union Lane, Rochford, Essex. Southend on Sea (0702) 546354 Ext 287. Closing date for receipt of completed application forms: 29th May 1984.



#### NORTHERN REGIONAL HEALTH AUTHORITY REGIONAL WORKS DEPARTMENT

#### ASSISTANT REGIONAL ENGINEER (OPERATIONS & MAINTENANCE) SALARY SCALE: £12,949pa-£15,400pa

(New entrants to the N.H.S. commence at the minimum)

Applicants for this post within the Regional Engineer's Division should be Chartered Engineers or Corporate Members of one of the Institutions of Civil, Mechanical, Electrical, or Electronic and Radio Engineers or the Chartered Institution of Building Services.

Experience in the National Health Service on Operations and Maintenance and/or Design activities would be an advantage.

The successful candidate will be responsible for the efficient management of his/her Section and will assist the Regional Engineer on all aspects of engineering maintenance and operation including estate management.

Application form and further details available from Regional Personnel Officer, Northern Regional Health Authority, Benfield Road, Newcastle upon Tyne NE6 4PY.

Closing date: 18 May 1984.

#### WELLINGTON HOSPITAL BOARD Wellington, New Zealand

### ENGINEERING TECHNICIANS

The Wellington Hospital Board operates three general hospitals, a psychiatric hospital and a number of smaller hospitals and health centres.

Vacancies exist for both Mechanical and Electrical Technicians whose function is to carry out investigations into engineering problems, boiler plant efficiency tests and other technical work in support of the Board's Engineers.

Applicants must possess HNC or equivalent qualification in Mechanical and Electrical Engineering and have had formal engineering training, preferably by apprenticeship.

Salary up to NZ\$19,394 a year. Conditions of Appointment and application forms are available from the Migration Branch, New Zealand High

Commission, Haymarket, London SW1Y 4TQ. Please quote reference Imm 2/5/23.



DRAGONARA HOTEL BRISTOL











# N.G. BAILEY & CO. LTD. PIPED MEDICAL GAS DIVISION

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# **Piped Medical Gas Services...**

## N. G. BAILEY & CO. LTD.

N. G. Bailey has the capacity to fulfil the requirements in hospitals and clinics for P.M.G. & V. (Piped Medical Gases and Vacuum) installations. Teams are available to carry out this work.

The Company has undertaken:-

- a. contracts in excess of £100,000
- b. the provision of in-house facilities for all P.M.G. personnel
- c. the acquisition of approved specialised testing and installation equipment
- d. access to the extensive equipment available from N. G. Bailey Plant Division for all sizes of site establishment

The team structure is such that contracts ranging from a few hundred up to several hundred thousand pounds can be managed with equal efficiency. All aspects of piped medical gas installations can be incorporated including:-

- new hospitals
- hospital upgrading
- ward upgrading, extensions and modifications
- plant modifications

Training courses are held in the Leeds Training School to ensure that operatives are fully informed of current developments and techniques.

In addition, the well established N. G. Bailey electrical contracting services are available for the electrical work associated with medical gas installations.

A network of strategically placed operating branches ensures that the P.M.G. service is available nationwide.





### COMPLIANCE WITH D.O.H. & S.S. REQUIREMENTS

The installation of P.M.G. & V. systems demands highly specialised knowledge and skills on the part of the contractor.

Compliance with D.O.H.& S.S. requirements contained in Health Technical Memorandum 22 and the Permit to Work System safeguards the integrity of the systems installed.

Material and equipment comply with the relevant sections of H.T.M. 22 or appropriate British Standards.

All installations are fully tested for soundness and performance in accordance with H.T.M. 22 to ensure that the patient is provided with an adequate, safe and reliable service.

# The Systems...

### Anti-pollution systems for waste anaesthetic gases

To achieve a significant reduction in the level of waste anaesthetic gas discharged into operating theatres and other areas where anaesthetics are used, to the detriment of the hospital staff, antipollution systems have been introduced. The systems fall into two main categories **Passive and Active** 

## Passive System

The Passive System relies on the patient's expiratory effort and is simple and low cost. Running costs are also nil. The system has limitations and may not cope with flows above 30 litres per minute. In addition it may also be affected by climatic conditions.

#### Pipework

Copper to BS 2871 - 35mm O/D Max. length 25m (including allowance for bends)

#### Papworth Safety Block

Fitted either on the anaesthesia trolley or on the wall adjacent to it. The safety block incorporates:-

- 1) Connecting points for 1 or 2 hoses from the breathing circuit and one hose to the wall point.
- Reservoir which smooths out peak flows, gives 2) visual indication of the passage of expired gases and has a plug allowing periodic draining of condensate.
- 3) Permanently open safety expiratory valve.

#### Wall Point

The wall point is surface mounted and includes the following features:-

30mm standard I.S.O. female taper inlet cone. A negative and a positive relief valve. Removable moisture drain bottle.





#### **Pipeline Discharge Point**

The H shaped terminal should be mounted outside the building and away from walls that can cause turbulence or back pressure on the discharge point. Each discharge point has a stainless steel mesh to prevent the ingress of foreign bodies.

Active system An active system incorporates a mechanical means of moving the gases along the pipe system.

- Two systems are available.
- 1) Single Theatre Suite Installation
- 2) Multi-Theatre Suite Installation

#### Electrical

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The electrical installation fully complies with IEE regulations and incorporates:-

- 1) On/off switches sited in the theatre/anaesthetic room/recovery room with the switching circuits so arranged that the exhauster/blower unit is not shut down until all switches are off.
- Green indicator lights show when the system is functioning.
- 3) Red indicator lights show when the power is on but the exhauster/blower unit fails to operate.

#### Single Theatre Suite Installation

The system comprises:-

- Breathing circuit. a
- Reservoir/Airbreak. b)
- Fixed pipework incorporating air mover. c)

#### Reservoir

Interposed between the apparatus/face mask and the wall outlet is a stainless steel reservoir/air break which may be mounted on or near to the anaesthetic table or adjacent to the wall outlet point.

The reservoir is provided with a self sealing inlet point of 30mm female taper and one outlet point of 30mm male taper.

A flow indicator shows flow conditions.

A non occludable vent point to atmosphere is incorporated in the top of the vessel.

#### Wall Point

The wall point is non interchangeable with medical gas terminal units and is self sealing. Each point incorporates an adjustable orifice for flow regulation.

#### **Piping General**

Copper or ABS pipe from each outlet point connects to the exhauster/blower unit inlet via a collecting box. The pipe diameter will vary depending upon length of run and flow.

A flow sensing point is incorporated in each pipeline adjacent to the collecting box.

Moisture traps are included at low points and incorporate removable drain bottles.

## N.G. BAILEY & CO. LTD.

Denton Hall, Ilkley, West Yorkshire LS29 0HH. Telephone: 0943 601933. Telex: 517230 ELECTRICAL & INSTRUMENTATION ENGINEERS & CONTRACTORS, PIPED MEDICAL GAS CONTRACTORS

REGISTERED OFFICE Heathcote, Ilkley, West Yorkshire LS29 9AS Tel: 0943 601234

LONDON OFFICE 137/139 Euston Road, London N.W.1 Tel: 01-388 0768 Telex: 297322

#### N. G. BAILEY & CO. LTD. ELECTRICAL CONTRACTING OFFICES

ABERDEEN The Parkway, Bridge of Don, Aberdeen Tel: 0224 823404 Telex: 739845

BIRMINGHAM Etna House, Grosvenor Street, Birmingham B5 5LD Tel: 021-236 8301

BRADFORD Cutler Heights Lane, Bradford BD4 9JF Tel: 0274 682856 Telex: 517293

BRISTOL Causeway House, Lodge Causeway, Fishponds, Bristol BS16 3HD Tel: 0272 655271

EDINBURGH Turnhouse Road, Edinburgh EH12 OAL Tel: 031 339 6161

GLASGOW 5, Fitzroy Place, Glasgow G3 7RH Tel: 041 204 0041

LEEDS 7 Brown Lane West, Leeds LS12 6EH Tel: 0532 439921 Telex: 55268

MANCHESTER Derby Street, Cheetham, Manchester M8 8HX Tel: 061 831 7641

MIDDLESBROUGH Sotherby Road, Middlesbrough TS3 8BS Tel: 0642 240231 Telex: 587869

**READING** 138-140 City Road, Tilehurst Reading RG3 5EW Tel: 0734 417911

SHEFFIELD Rutland Road, Sheffield S3 9PS Tel: 0742 754678 Telex: 547751

LEEDS Woolman Ltd. 7 Brown Lane West, Leeds LS12 6EH Tel: 0532 439921 Telex: 55268 DOUGLAS, ISLE OF MAN Woolman Electrical Ltd. Woodbourne Lane, Douglas, Isle of Man Tel: 0624 21089

#### **INSTRUMENTATION ENGINEERS**

N. G. Bailey (Instrumentation) Ltd. Control House, Caledonia Street, Bradford BD4 7AW Tel: 0274 735641 Telex: 51142

Cutler Heights Lane, Bradford BD4 9JF Tel: 0274 682856 Telex: 517293

Sotherby Road, Middlesbrough TS3 8BS Tel: 0642 240231 Telex: 587869

#### **EXHIBITION CONTRACTORS**

McCarthy Bailey Ltd. Etna House, Grosvenor Street, Birmingham B5 5LD Tel: 021-236 8301

#### FIRE CONTROL ENGINEERS

Studsvik-Bailey Ltd. School House, Denton, Ilkley, West Yorkshire LS29 OHF Tel: 0943 601933 Telex: 517230

#### **PLANT HIRE**

**Cutler Plant Hire** 98 Cutler Heights Lane, Bradford BD4 9JF Tel: 0274 686271

PIPED MEDICAL GAS SERVICES ARE AVAILABLE FROM:-BIRMINGHAM BRISTOL DOUGLAS EDINBURGH GLASGOW LEEDS READING SHEFFIELD

**:** 

PMG/6M/4/84.

N. G. BAILEY & CO. LTD.



#### **Piping Exhaust**

The exhaust piping from the exhauster/blower unit terminates in a stainless steel mesh bubble over the down turned end of the pipe. The discharge point is sited in a position that will be least affected by weather conditions or turbulence.

The length of the exhaust pipe is calculated to ensure that the back pressure generated on the exhauster/blower unit is not sufficient to affect the unit performance therefore, the pipe length should be kept to a minimum.

#### **Exhauster/Blower Unit**

The preferred location for this unit is outside the theatre as near as practicable to the discharge point.

When a unit has to be mounted within the theatre it is encased for sound proofing and appearance.

#### Multi-Theatre Suite Installation

- The system comprises:-
- a) Breathing circuit outlet.
- b) Reservoir/Airbreak.

 c) Fixed pipework incorporating duplex pumps. The breathing circuit reservoir and terminal wall

points are the same as those used in the single theatre suite system.

#### **Piping General**

Copper or ABS pipes are sized to suit individual installations. Isolating valves are installed in each theatre suite branch and a staged unloader is fitted in the main pipeline to ensure system balance when theatres are not in simultaneous use.



Drain bottles are fitted at the low points to collect moisture from the pipework. In addition, sterilisation points are also fitted so that the pipework can be flushed internally.

#### **Piping Exhaust**

Exhaust pipe may be either copper or plastic. Separate exhaust pipes for each pump unit terminate in a stainless steel mesh bubble over the down turned end of the pipe. The discharge point is sited in a position that will be least affected by weather conditions or turbulence.

#### **Exhauster/Blower**

The exhauster/blower set is a duplex unit comprised of side channel pumps mounted on a common base frame which also includes the control panel.

The pumps may be used as duty or standby units.



### Planned Preventative Maintenance

Continuous reliability and serviceability of medical gas installations is vital and is ensured by a planned maintenance schedule operated on behalf of each hospital.

To cover all installations the Company is able to offer a comprehensive planned preventative maintenance service, carried out by competent operatives.

In planning this service, the hospital routine must have priority whilst the comfort of the patients and the avoidance of disruption and inconvenience to the nursing and medical staff are essential factors in its integration.





# Pathology Laboratory requirements

These vary widely in accordance with the range of tests undertaken and each installation must be designed and installed to meet these needs.

Installation must comply with H.T.M. 22 and Home Office requirements for explosive gases and therefore demands the same specialist knowledge and skills as medical gas installations. Our operatives are fully trained to install the whole range of copper, mild steel or stainless steel piping which is essential in pathology installations.

The quality assurance procedures adopted by N. G. Bailey ensure that the pathology systems are completely segregated from P.M.G.

## **Plant and Equipment**

All plant and equipment selected for installation fully complies with the requirements of H.T.M. 22 and British Standards, and is sized to meet specific demands.

- Typical examples are:-
- a) Terminal units to B.S. 5682
- b) Manifolds
- c) Compressed air medical and pathology
- d) Vacuum medical, dental and pathology
- e) Alarm systems to H.T.M. 22
- f) Mini Alarms for local indication

## Pipelines

Medically degreased pipelines are installed to H.T.M. 22 Code of Practice using copper tube to B.S. 2871 table X or Y and copper end feed fittings in accordance with B.S. 864.

Jointing of the pipeline is in accordance with the D.O.H. & S.S. instruction WKO (82)1 which involves the use of a carbon dioxide atmosphere within the pipeline and non-fluxed capillary joints.

