The Journal of The Institute of Hospital Engineering March 1984

HOSPITAL ENGINEERING

International Federation Issue

■ Food poisoning in hospitals ■ Temporary theatre accommodation
■ Prevention of Legionnaires' disease ■ International conference

HOSPITAL ENGINEERING

The Journal of The Institute of Hospital Engineering and of The International Federation of Hospital Engineering

I.F.H.E.

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Front cover: Essentials for hygiene in hospital kitchens – adequate space, lighting and ventilation – are found in the good working environment at the new Maidstone District hospital. (Pictures by Jim Vinall/TGV.)

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New members of IFHE

The new Statute of the IFHE includes membership from health authorities and from industry, to be known as C and D members respectively. A brochure describing the new structure was launched in 1983 and applications for membership are being received. It is intended to introduce the new members to the readers of Hospital Engineering from time to time. We invited the first three firms to apply for D membership to tell us more about themselves, and are happy to welcome them to the IFHE.

AP Controls Systems Ltd

AP Controls Systems – part of the APS Group Limited specialise in the design and production of plant and equipment for piped medical gas systems for hospitals and laboratories both in the UK and overseas.

A wide range of vacuum and compressed air plants are available in both fully packaged and modular kit form.

Standard plants are designed to meet fully the UK Dept of Health's Technical Memorandum HTM.22 but more basic plants are available for less demanding markets.

These plants are marketed under the name of MediAir and MediVac and are available through international piped medical gas installers such as BOC Medishield Pipelines Ltd and MGI Ltd as well as direct from AP Control Systems Ltd. A large number of the MediAir and MediVac plants are installed in overseas countries, one such example is the installation at Medical City – Baghdad where the central compressor and vacuum system is the largest in the world.

In addition AP control systems have a modern and well proven range of alarm systems for monitoring the pressure state of piped medical gases and the plant conditions. These are marketed under the name of Mediplex – Micralarm (a recently introduced low budget system).

BOC Medishield Pipelines

The BOC Group, Health Care Division has three business units devoted to the design, supply, installation, commissioning and maintenance of piped medical and laboratory gas distribution systems. These three business units are:
BOC Medishield Pipelines, based at Staveley in the UK.
CIG Medishield Pipelines, based at Sydney in Australia.
Ohio Architectural Products, based at Madison in the USA.

Together all three are probably the world's largest supplier in this specialised field. All operate independently in their own domestic markets, but have joint marketing and selling activities in the international market place, coupled with installation and maintenance facilities provided by BOC's 50 or so overseas associated companies.

Common development programmes stress patient safety and high quality of product and systems.

BOC Medishield Pipelines has the most highly developed international business, with installation and maintenance currently operating in Oman, Saudi Arabia, UAE, Qatar and Bahrain.

The BOC Group's capacity in this business sector we believe serves the customer well in terms of being able to offer American, Australian and British products and systems.

Govan Kaminker Keenleyside Wilson Milne Praetorius Slauenwhite Stevenson, architects/planners

Initially founded as Govan Ferguson in 1922 the firm has grown over the years with additions to the partnership of architects who have maintained the ideals and reputation of the firm. The special emphasis of the firm has been on the design and construction of hospitals: paediatric hospitals, chronic care facilities for young and old, secondary care institutions, psychiatric hospitals, teaching hospitals, etc.

The firm has completed numerous projects in Canada, the United States and the Middle East and are currently active in all these areas. They also frequently act as medical design consultants in conjunction with local architects from the area. The Canadian Department of National Defence often employs expertise for the design of Military Health Facilities and rehabilitation centres. In addition, the main focus of the firm's work at the present time is the design and construction supervision of major renovations to large teaching hospitals.

International News

Really international . . .

Four times a year, as readers will know, we publish International Federation issues of Hospital Engineering. These quarterly numbers of the journal should we believe, be more truely international, and in order to achieve this, we invite overseas readers and members of the Institute to submit contributions that might be considered for publication.

So, where there are new hospital developments across the world – write about it. Send us accounts and information of problems met with and overcome. Tell the journal about the role of a hospital engineer in whatever part of the world you work. Note too, that technical papers written by Institute members may be considered for the Annual Award of the Northcroft Silver Medal. We would also be interested in items of a more personal nature such as appointments and other single happenings in members' lives.

All contributions (other than news items) are considered by an editoral board before acceptance. It is worth remembering too, that as English and French are the offical languages of the IFHE.

We look forward to receiving contributions, and to producing IFHE issues of the journal that are really international.

Japan to join the IFHE

The Hospital Engineering Association of Japan has decided to make a formal application to join the IFHE as an A member. It is hoped that their application will be considered by Council in time to welcome members of the HEAJ to the Melbourne Congress as members of the IFHE.

IHF Special Study Visit
A health service system – first and second levels of care Mexico, 22 July – 1 August 1984

This visit is being organised by the Mexican Hospital Association, in collaboration with the Secretariat of Health and Welfare, the General Directorate for Medical Care and Social Welfare Standards, and the Department of Coordinated Public Health Services in the State of Mexico and Hidalgo. It will be similar in some ways to the highly successful study visit organised in Mexico in 1981 and its aim will be to study the planning and administration of a health system accessible to all. A strategy of decentralisation has been applied to this system, which is organised on a regional basis with first and second levels of care.

Enquiries to: Mr Miles Hardie, International Hospital Federation, 126 Albert Street, London NW1 7NX, England.

IHF study tour of hospitals in Portugal May 13-26, 1984

On the invitation of the Minstry of Health, Lisbon, and with the cooperation of the Regional Health Authorites, the Municipal Authorities and Tourism Office, the eighteenth Study Tour of the International Hospital Federation will take place in Portugal in May 1984.

Participants will be able to gain an overall picture of the range of health services available to Portugal. Visits will be made to hospitals and related institutions, including teaching and non-teaching, general and specialised hospitals – such as paediatrics, maternity, psychiatric, health centres, community hospitals, rehabilitation centres, units for the care of the elderly, etc. Each day the Tour will have a cultural component related to the hospital component.

Hospitals and other health services have chosen to illustrate the past and present situation of Portuguese hospitals and other health care units, showing the main characteristics of the various periods, but many will be listed in the programme as being of particular historic or architectural interest. On most days, there will be a choice of visits, allowing time for participants to tour the hospitals in small groups.

Enquiries to: Miss D Maitland, Assistant Director, International Hospital Federation, 126 Albert Street, London NW1 7NX, England.

IHEX '84

Sold out – or nearly! At the time of going to press, and well in advance of the event, 27 out of the available 30 stands at IHEX 84 have been booked. Exhibitors consist of a wide and interesting range of companies, from the small specialist to the international. The exhibition has been specifically designed for the delegates' convenience and enjoyment as an integrated part of the Conference. They will be able to view the stands – hosted by the exhibitors – in an informal and friendly atmosphere while they enjoy their tea and coffee breaks. There will be other specially invited visitors to IHEX. Although this is the first exhibition to be run in conjunction with the Annual Conference, the enthusiasm of the exhibitors convinces the organisers that there will be a lively and profitable exchange of information and opinion. IHEX '84 should prove an exciting new dimension to the Annual Conference.

The membership structure of The Institute

From the content of the letter from Mr D W Hanson (February Issue) it would appear that he is unaware of the real history of the formation and development of the Insitute of Hospital Engineering. Mr Hanson may not be alone in this respect. Accordingly, it seems necessary to 'put the record straight' and to re-iterate the Insitute's Aims and Objects.

The Insitute was formed in 1943, and was known as 'The Institution of Hospital Engineers'. The original Rules laid down its objects as being;

(a) To promote a feeling of mutual confidence between hospital authorities and their senior engineering staff generally, by ensuring that persons admitted to membership are persons fully qualified to discharge efficiently and economically the duties of their particular appointment in both the technical and administrative sense.

(b) To set up an examining body within the framework of the Institution for the purpose of holding entrance examinations for prospective members, and thus establish and maintain the highest standard of efficiency among members of the engineering profession employed in the control of the engineering services in hospitals.

After prolonged discussion and negotiations lasting over a very considerable time a Grant of Incorporation was approved by the then Board of Trade dated 1st January 1967.

As a condition of the Grant of Incorporation the Institute was obliged to forego participation in matters relating to 'Conditions of Service' and hierachical status within the NHS. In other words, it could not participate in any negotiations of a trades union nature. It became a professional body dealing with the science of hospital engineering, in all its aspects and whether the members practised their profession within or without the NHS. This is common with say the Civils, Mechanicals, Electricals etcetera the status of the individual is left to the unions whilst the status of the science is the responsibility of the Institute.

At that time the title was changed to The Institute of Hospital Engineering. This was done quite deliberately to emphasise the Institute's devotion to the good practice of 'Hospital Engineering'.

The first Clause in the objects of the Institute, as laid down in the Memorandum of Association reads:
To promote the science of Hospital Engineering which science involves the design, construction, employment and maintenance of plant, equipment, machinery and apparatus used in the engineering and associated services of hospitals, clinics and laboratories.'

Membership of the old Institution was confined virtually exclusively to suitably qualified engineers employed by the old Hospital Management Committees, ranging from Group Engineer to Assistant Engineer.

At the time of Incorporation and the introduction of the Memorandum and Articles of Association the Rules governing membership were widened so as to admit all those suitably qualified engineers who had a permanent involvement in some aspect of 'hospital engineering', whether within or without the NHS. Thus, Consulting Engineers and their staffs and, indeed, engineers from industry could be admitted to membership as long as they matched the technical qualifications and could give evidence of involvement in 'hospital engineering'. The purpose, of course, was to bring together the widest possible range of knowledge and experience to the mutual benefit of all.

It cannot be overemphasised that the Institute's devotion is to the promotion and practice of good 'hospital engineering', gathering together all those engineers who are engaged in its practice. In this context it might seem retrograde to consider reverting to an 'In House NHS Association'.

Indeed such a move might benefit the relative few but be to the detriment of the great majority.

It would hazard the Institutional status, hazard pursuance of achieving an Affiliate relationship with the Institution of Civil Engineers, which is currently under negotiation, and, most importantly lead to the Institute being obliged to sever its valued connection with the newly established Engineering Council.

All these things have to be considered in relation to the question of the Institute's membership structure.

TALKING POINT
Happy families . . .

AMOS MILLINGTON TEng FIHospE

The argument for and against disciplines other than engineers being eligible for corporate membership of the Institute still kindles. One strong, and perhaps logical case, put forward in favour of the former is that a person who is not an engineer, but who is charged with the responsibility for engineering aspects of Works, should be admitted to corporate membership. Falling into this category within the Health Service are those District and Regional Works Officers who are architects or surveyors. This of course raises the question as to whether or not there will eventually be reciprocal arrangements for those works officers, who are engineers to be admitted as corporate members to the non-engineering institutions.

One might argue then that, as a learned body, we should limit our technical papers to pure engineering and not venture into such 'alien'

continued on page 22

The author was the Senior Hospital Engineer at Kingston District General Hospital when the outbreak of Legionnaire's Disease occurred. The article is a brief outline of the steps taken to control any further outbreak of Legionella pneumophila at the Hospital. At this point the maintenance staff at the hospital must be thanked for the hard work and long hours put in, to putting the medical control requirements into Engineering practice and the now proved conclusions. Any correspondence should be addressed to: Mr D Harper, 53 Bonner Hill Road, Kingston Upon Thames KT1 3EU

Minimising the spread of Legionnaires' Disease – a programme designed to prevent incubation of LP in hospital water and air conditioning systems

DAVID HARPER Eng Tech MASEE MIHospE MIWSoc

Objectives

The main objective of this document is to lay down clear decisive guidelines for engineers, to the extent of their permanent duties at each site in connection with Legionnaires' disease. It is expected that this document will be issued to the appropriate personnel to ensure that work carried out by engineers is fully understood and also the requirements of any multi-professional group engaged in this operation. It has been determined by the medical profession that the strict control and inspection details in this document will be limited to those buildings occupied by staff.

Dangerous conditions

The medical profession has stated that the most dangerous conditions regarding this disease are as follows:—

a. colonisation of *Legionella pneumophila* is most likely to occur in water systems which are stagnant and have a temperature between 20°C and 45°C. The most critical temperature is 36°C. Every effort should be made to avoid stagnant water conditions and to store and supply water outside these critical temperatures.

b. predominant routes of infection have been proved to be inhalation of contaminated aerosols produced from cooling towers, shower heads, taps and similar apparatus. Special care shall be taken in the maintenance of this equipment, in its cleaning, sterilisation, temperature control, and testing. In the health service guidelines are set down for this, which also include specific precautions regarding humidifiers.

Duties of maintenance department

The permanent duties of the maintenance department needed to eliminate the recurrence of Legionnaires' disease in buildings are summarised as follows:—

a. all cold water supplied (other than drinking water) and water storage should be chlorinated to ensure that water delivery to every cold water outlet in the building contains a constant chlorine density of between 1-2 ppm free residual chlorine.

b. all cold water storage tanks should be regularly inspected, maintained and sterilised in the manner specified in this document.

c. all hot water supplies and hot water storage cylinders (calorifiers) should have *all* the water controlled within the temperature limits of between 55-60°C.

d. all apparatus likely to produce contaminated aerosols such as humidifiers, cooling towers, etc., should be scheduled and a detailed system of cleaning and disinfecting by chlorination carried out at regular intervals.

e. engineers should carry out regular

SOMMAIRE FRANCAIS

Prévention permanente de la maladie du légionnaire.

Cet article a pour objet principal de donner des directives claires aux techniciens quant à la portée de leurs occupations permanentes sur les chantiers en ce qui concerne la maladie du légionnaire. L'auteur résume ces mesures sous les titres indiqués au paragraphe suivant:

Objectifs, conditions dangereuses, tâches du service d'entretien, réservoirs et systèmes de stockage d'eau fraîche, installations de chloration en cotinu, contrôle approfondi de toutes les sorties, systèmes d'adoucissement de l'eau et de stockage de l'eau chaude, postes d'eau stagnante – surveillés ou non, tours de refroidissement, calorifères d'eau chaude, et humidificateurs.

testing and inspection of hot and cold water outlets to standards set out above. All such testing should be recorded in an agreed manner (appendix attached).

f. in conjunction with other staff, such as administrators, production personnel, senior officers, cleaners, etc., a system should be initiated which ensures that any department, rooms and areas in the building if left unoccupied for a week or more, should be thoroughly tested before bringing back into service.

g. special attention to items e. and f. should be observed concerning shower equipment and spray taps. For drinking water – all drinking outlets in the building should have been checked that they are connected to the drinking water mains and have been clearly labelled. All drinking water mains in the building must be connected directly to the mains water to ensure that they are not fed through any storage or tank system. It has been determined that no chlorination or form of sterilisation is required for existing drinking water mains or outlets except for the initial sterilisation in the commissioning of a new building or pipework. It is important that when requests for additional drinking water outlets are received, the maintenance staff should check that connections are in fact made to drinking water mains, and that the outlets are labelled as such. All new pipework should be sterilised before being put into use. (In the health service this is recommended in HTM.27.)

Cold water storage systems and tanks

It is intended that when necessary, modifications to pipe and storage systems should take place, which would then require only one unit for continuous chlorination for all buildings concerned.

Wherever possible the cold water storage system and storage tanks should store water at below 20°C. Engineers should eliminate the possibility of any conditions which produce abnormally high temperature rises. This can be done by painting the top of the tanks with reflective paint or spraying the top of the tank with cold water from the mains course; lagging around the tank or a roof on top of the tank. A daily record should be kept of the temperature of the water nearest to the top of the tank. It is essential that cold water storage systems and all storage tanks should be thoroughly cleaned out at least once per year. Cleaning should take place in the first week of April to preceed the birds' nesting season and during this period all covers and fittings should be checked and renewed as necessary, to include making arrangements to prevent birds, etc., entering the overflow pipe. This means installing wire netting or a wire balloon over the outlet to the overflow to the tank.

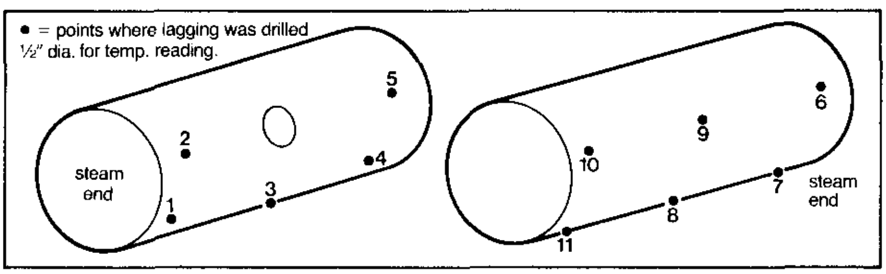


Figure 1

The cold water storage system is sometimes associated with pressurised vessels and storage tanks, which should be heavily chlorinated to 20 ppm and held in this state for a minimum period of two hours. All equipment should then be drained to waste and the system refilled. A continuous system of chlorine injection can be constantly maintained (sequel 6), which shall provide a pure density of between 1 and 2 ppm at every cold water outlet. An official log book shall be maintained by plant engineers and the reading of chlorine presence in the cold water storage system tested and recorded daily. At least once per week the engineer should examine and sign the log book, and in the event of the chlorine level falling below 1 ppm on three consecutive days, the system should be inspected and the fault rectified.

Testing should be carried out using a comparator tester (Lovibond) and the engineer should ensure that all members of his staff are trained to carry out the test efficiently.

In addition to testing for chlorine presence a test should be made of free ammonia in the mains supply water prior to site chlorination. These tests

1	2	3	4	5	6	7	8	9	10	11	Cal o/c gauge temp.	Time	Drain temp.
27·5	66·0	28·5	25·5	62·0	67·0	28·5	25·5	63·0	66·5	30·0	73·9	1045	
26·5	71·0	31·5	32·0	73·0	73.0	30·0	28·0	68·0	67·5	28·5	79·2	1115	
42·0	60·5	46·0	48·0	56·5	56·5	52·5	47·0	54·5	53·5	49·5	79·2	1200	62·5
64·5	72·5	64·0	60·0	77·0	76.0	66·0	60·5	77·5	77·5	62·0		1245	73·0
65·0		67·0	63·5			66·5	64.5			64·5		1335	74·5
65·0	75·0	69·0	67·0	79·0	80·0	67·5	66.5	80·5	77·5	64·0	87·8	1525	73·5
65·0						70·0		82·5	83·0	67·5		1630	74·0
66·0						70·0				72·0		1645	
					90·0	75·0			87·5	72·0		1730	
						75·0					93·3	1830	

Cal Frid – 93·3%
temp. Sat – 87·8%
Gauge Sun – 79.4%
Mon – 71·1%

At 1135 drain cock opened to waste.

Figure 2a Temperature measuring points should be carried out daily, using a Hessler test instrument, on the mains tap water, and if a colour change to brown is recorded, the engineer will then contact the local water authority and request a lower density of free ammonia be inserted into the water system.

Continuous chlorination plant

The continuous chlorination plant should be located in a suitable position and this should be its permanent position. Additional plant should instal hot water outlets so that between 1-2 ppm is achieved. The engineer should arrange for the inclusion in his Planned Preventative Maintenance scheme of daily inspections of the chlorination plant. The engineer should also order and obtain all spare parts, chemicals, etc, necessary to ensure that the equipment can be rapidly returned to service in the event of a breakdown.

NB It should be noted that chlorine will lose its strength if stored for a long time.

Thorough testing of all outlets

It is recommended that during the first week of April in each year, a thorough test of every hot and cold water outlet, including all thermostatic mixing valves, etc, shall take place and a suitable log retained. In the case of cold water outlets these should indicate between 1-2 ppm chlorine strength within one or two minutes of running to waste. In the case of hot water outlets, these should indicate temperatures of between 55°C-60°C within one or two minutes of running to waste, and if connected to a dosing pump, 1-2 ppm chlorine strength should be achieved. All thermostatic mixing valves, shower heads and blended spray tops, etc, should be tested by first running hot water to waste without recording temperatures for a minimum of one minute, and then running cold to waste, when a chlorine strength of between 1-2 ppm should be obtained. Recording of test results shall be carried out by the supervising engineer to the approved schedule. Any outlet which fails these test conditions should be recorded and details submitted to the engineer who will rectify the fault.

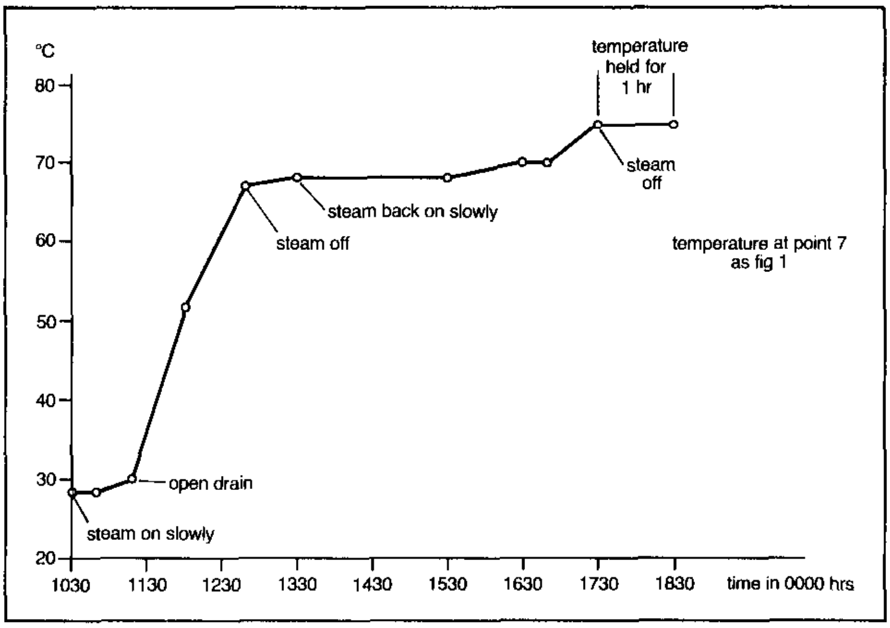


Figure 2b

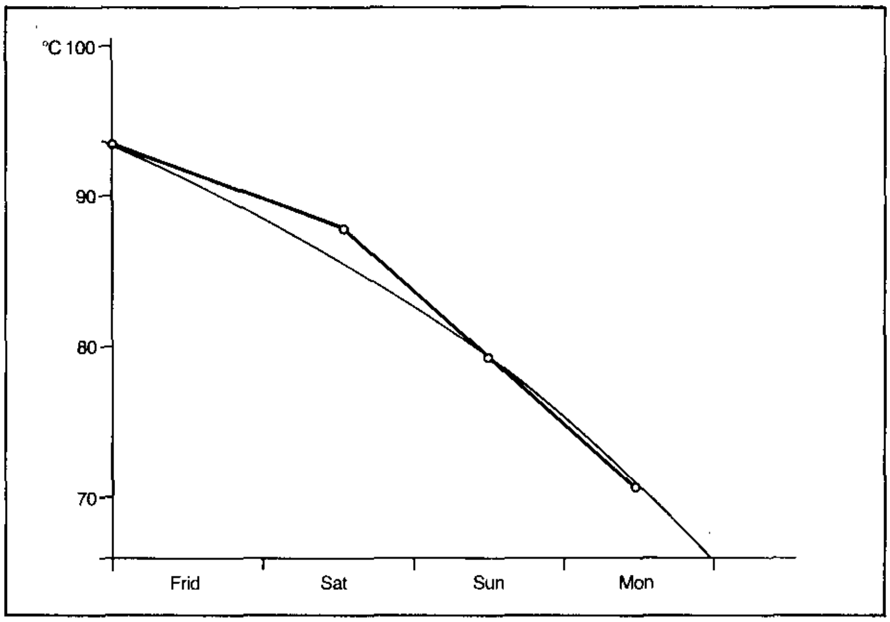


Figure 2c Temperature drop after being heated to 100°C throughout. Readings were taken from the calorifier temperature gauge.

BEWARE

VERY HOT WATER COMING FROM THE TAP

Figure 3 PVC sticky backed type, red letters on white background.

It is intended that in addition to the testing proposed above, more frequent testing of selected outlets, both hot and cold, shall be carried out in a similar manner. Chlorine levels and hot water temperatures should be tested once weekly to maintain observation on the current situation.

Recording of test results shall be carried out by the supervising engineer to an approved schedule of outlets, which will be determined by a responsible body of people, and any outlets which fail the test conditions shall be recorded and brought to the attention of the engineer.

Water softening and hot water storage systems

If the site has a main central storage cistern, this should be modified so that one compartment, if possible, is allocated to contain soft water only for the hot water supply system.

Existing pipework should be altered so that mains water is connected direct to the water softening plant, and then to the continuous chlorine injection unit to provide the softened water with chlorine to approximately 1-2 ppm at the outlets. The softened/ chlorinated water should be delivered to the appropriate compartment of the central storage cistern. Softened water should be pressurised from storage and distributed to the various calorifiers located in buildings on site, where it is heated to serve the local hot water outlets.

The softened water storage compartment shall be cleaned and heavily chlorinated to 20 ppm every year in the first week of April in a similar manner to that specified for the raw water compartments. In addition, all associated pipework, pumps and equipment which can be segregated from hot water calorifiers, etc, shall also be heavily chlorinated each year.

At each of the calorifiers the water shall be stored at 60°C and suitable thermometers installed in flow and return pipework to indicate a maximum temperature deviation of 5°C.

Where these conditions cannot be obtained, a schedule of calorifiers shall be prepared, clearly indicating the diversities and their effect on hot water outlet temperatures.

Stagnant water positions – occupied

An inspection should be carried out to determine which shower positions controlled by thermostatic mixing valves, hot and cold taps, etc, are infrequently used. A decision should then be taken as to which of these showers, hot and cold taps, etc, can be dismantled and removed, either temporarily or permanently.

All shower positions in the building should be regularly run to waste weekly, whether used frequently or not.

Each shower fitting should be run for five minutes, during which in the first two minutes hot should be passed, and for the remaining time, cold chlorinated water.

This would be under the supervision of a nominated person in each department, and a list of the staff nominated kept by the Administrator.

Stagnant water positions – unoccupied

From time to time cases arise where departments or individual rooms in the building are left unoccupied for various reasons. This may be the result of staff shortages, changes in management policy or for general upgrading purposes. It is essential that a policy be devised so that such accommodation cannot be returned to general use until a full test of hot and cold water outlets has been carried out by the engineering staff.

It is proposed that the administrator will organise a 'Permit for Re-occupation' to the accommodation which will be based on a clearance certificate signed by the various officers concerned, and the engineer will be required to certify that all hot and cold water outlets, including thermostatic outlets, have been tested in the manner previously specified.

Cooling towers

If it is proposed to disconnect or take out of service, either temporarily or permanently, the air conditioning cooling towers, the following procedure should be followed:

(a) a sample of water and 150 ml sludge shall be taken from the cooling tower under the supervision of the engineer, with staff taking full safety precautions.

(b) Add chlorine to cooling tower water to provide a density of at least 15 ppm, depending on the size of the tower and amount of sludge.

(c) Circulate cooling tower water for a minimum of two hours.

(d) Extract a further sample at the end of this period.

(e) Drain off water. Refill, recirculate and drain off.

(f) Clean inner surface of cooling tower by hosing down and remove all internal scale, sludge and fitments for cleaning.

(g) Refill system and add chlorine to at least 4-10 ppm.

(h) Circulate for two hours.

(i) Drain off.

(j) Refill tank and put back into operation.

(k) Ensure chemical and injection pumps are working correctly to control scale and algae, etc.

Domestic hot water calorifiers

Where L. pneumophila has been identified, it is recommended that the calorifiers should be thorougly cleansed and the following guide-lines should be followed:

1. A 2.5 litre PVC sterilised container should be used to collect a sample of water from the draincock of the calorifier. The sample required is the first lot of water to come out, ie do not let the water run off first and then fill the container. Do not use any type of hosepipe unless previously sterilised.

2. Have the sample analysed at the Pathology Laboratory.

3. Isolate the calorifier from the system. If more than one is involved, select the one that is most affected.

4. Do not disturb the other calorifiers, ie putting them on or off line.

5. To make the calorifiers safe, two things should be done:

a) superchlorination with sodium hypochlorite.

b) pasteurisation.

6. a) To achieve 5(a) attach a clear PVC hosepipe to the draincock and make sure the end of the hose is right in the drain. (This is to prevent the inhalation of infected aerosol), and drain off as much water as is required to make room for the chlorine to be added. This should be measured according to the amount of water in the calorifier to achieve 20-30 ppm free residual chlorine in the calorifier. The chlorine should stand for a minimum of 24 hours or longer if possible, then let the water drain. Proceed as No. 7.

b) To achieve 5(b) make sure the domestic hot water flow valve is closed (DHWF) leave the remaining valves open, ie the domestic hot water return valve (DHWR) the cold water supply make up valve (CWS). The primary heating source, ie steam flow and return *must be closed.* Drill small holes (½ inch in dia.) into the lagging at points as Fig 1 so that a surface temperature probe can be inserted to the metal of the calorifier casing.

Remove or disconnect any 'over temperature control stats'. Raise the temperature of the water in the calorifier by turning on the steam so that a temperature of 70°C is reached all over the outer casing of the calorifiers. This is best done of a Friday because when this is achieved turn the steam off and let the calorifier stand for a minimum of 24 hours or longer if possible. This is to enable the heat to penetrate through the scale and sludge and kill of any legionellae. It will be noticed that the temperature will fall very slowly owing to the lagging (Fig 2). Drain to waste as before with the hosepipe inserted right into the drain.

7. Remove primary heating (coil(s) for insurance requirements and thoroughly mechanically clean out and give a sample of the scale to the Pathology Laboratory for analysis.

8. Reassemble all heating coils etc, in the calorifier and fill up with water. Make sure that the domestic hot water flow valve *REMAINS CLOSED.*

9. Reconnect the high limit stats and turn the heat back on control tempera-ture to be set at approximately 60°C.

10. Let the calorifier stand for a mini mum of 24 hours or longer with the heat on and the header valve still closed. This is to let the sediment in the calorifier settle to the bottom.

11. When the calorifier is to go 'on line' the heater valve should be opened very, very slowly. This is to reduce the amount of turbulence in the calorifier to stop any brown coloured water being stirred up and pumped through the system.

12. The hot water coming out of the tap outlets should be at a temperature between 55°-60°C at the furthest point from the calorifier which could mean that the hot water storage temperature could be higher than 60°C.

13. If it is proved that bacterial growth can still be found at the tap and shower outlets, the washers should be changed on the taps to the National Water Council approved type PROTUS 80 and the old ones should be sent to the Pathology Lab. Microbiology Department for analysis.

Humidifiers

There are a number of different types of humidifiers, ie steam, battery-spray, spinning disc, and simple 'pouring water' humidifiers. These are normally found in the heating and ventilation systems of big office blocks, Computer rooms, etc. Up until now legionella has not been found in any of these where direct water is used, ie spinning disc or battery-spray types. A survey is at present being carried out by the Public Health Laboratory Service into this.

To prevent any risk of L.pneumophilae being present in humidifier ponds, etc, the ideal arrangement is for steam humidifiers to be installed.

(N.B. There are other factors to be considered from an engineering point of view, such as tap washers, shower hoses, etc., but these will be dealt with in a later report).

The author, Amos Millington, District Works Officer with Trafford Health Authority and Chairman of The Institute's Publications Committee describes what proved an economical solution to providing temporary theatre/surgical procedures accommodation for short term use whilst the hospitals' main theatres were closed for minor alterations and maintenance.

Temporary theatre accommodation – a solution unfolded!

AMOS MILLINGTON TEng FIHospE

To afford individual thermostic control to each of four operating theatres within a theatre suite at Park Hospital, Davyhulme, Manchester, it was decided to install terminal heater batteries in the ductwork serving each operating theatre. This work, together with the installation of ancillary control equipment could not be done without the whole theatre complex being closed and, although a detailed programme of phased closure was proposed whereby the period of total closure was to be kept to a minimum, the adverse effect of the operating timetable was still unacceptable.

An alternative theatre, if available, would allow some of the lists to be carried out and it was agreed that, if such accommodation could be provided opportunity of the theatre suite closure could be taken to allow other minor maintenance work, to be carried out. This included patch repairs to plaster, repairs to terrazzo flooring, erection of wall protection rails and bringing forward by twelve months, complete internal decoration of the suite. Approaches were made to various companies specialising in the supply of temporary theatre accommodation but, because of the relatively short period of hire, eight weeks in total, this type of solution was obviously not cost effective in this case.

What was required was a 'ready made' unit which could be brought to site and 'plugged in'.

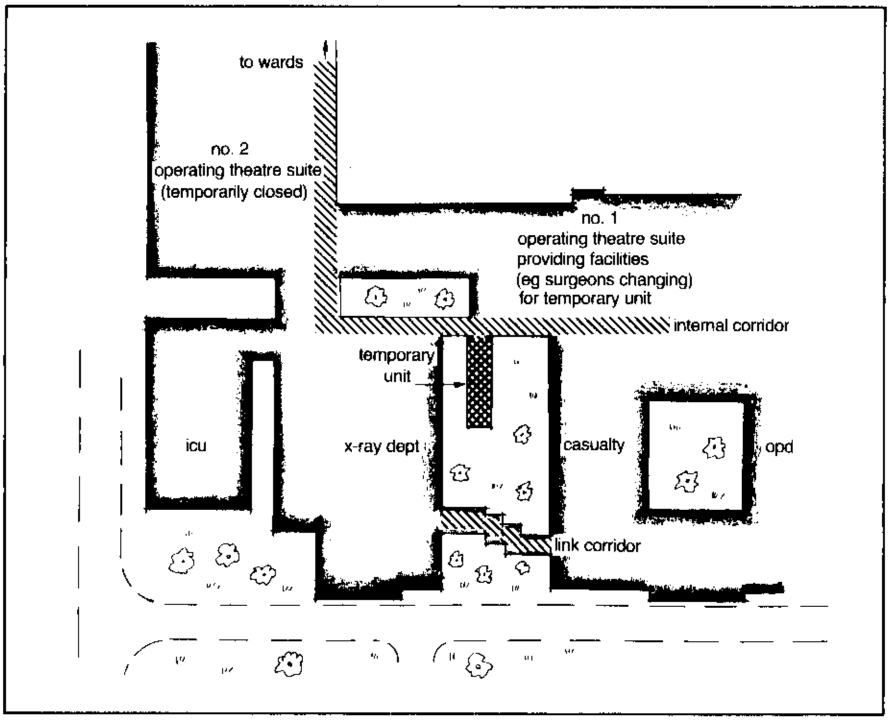
Beginning with the local Terratorial Army with a view to exploring the suitability of the Armed Forces type of field operating theatre, contact was eventually made with an army officer in London. He agreed that the units, as used in the field by the Armed Forces, would probably meet our requirements in terms of transportability and speedy erection, but would prove too large for our needs. Availability also presented a problem as some units were still overseas following the Falklands campaign.

Commercial companies with whom contact was made proved very helpful and, if they felt that their product could not meet our criteria, they suggested other potential suppliers. Trojan Construction Limited of Welwyn Garden City was suggested and contact with this company marked the end of the shopping expedition.

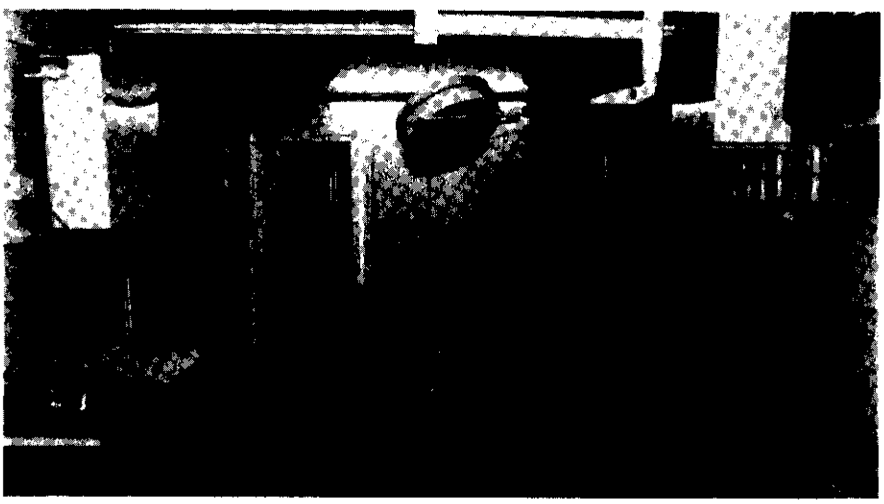
Trojan's Construction's product is designed for the export market, in particular, the Middle East. The size of each unit is 5.8m x 2.75m and designed to enable units to be joined together in any combination to suit the clients requirements. Because the prime marketing area is abroad and to keep shipping costs to a minimum, each unit leaves the factory in a box form, measuring 2.2m high, 3.0m long and 1.46m wide.

On site, Trojan Construction's staff literally 'unfold' the box and within a few hours achieve a watertight unit of accommodation requiring nothing more than connection of an electrical and cold water supply and drainage. Units are supplied pre-wired and complete with lighting, power, sanitary fittings, shelves, unit air conditioner etc and doors and windows. The operating theatre unit as hired to Trafford Health Authority was complete with a fixed and spare operating theatre lamp, emergency battery pack for power failure and some non-standard fittings as requested by the user, e.g. stainless steel bucket sink, extra shelves etc. To afford a patient reception and recovery area, a second unit was supplied and sealed to the operating room unit.

Because of its compact size in its



Plan showing location of temporary theatre



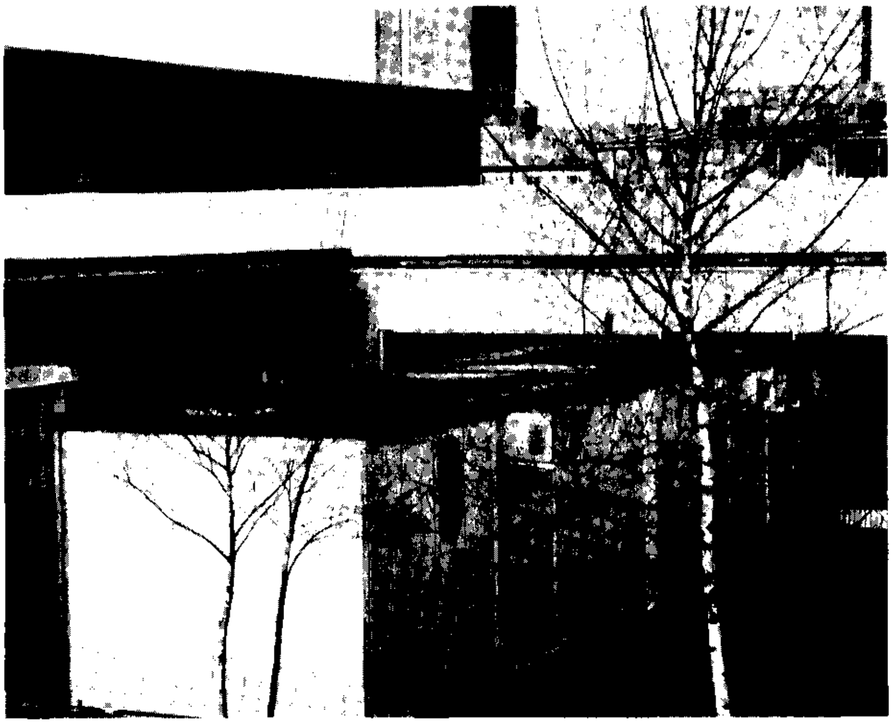
Interior of operating theatre

SOMMAIRE FRANÇAIS
Salle d' opération temporaire

Cet article décrit la façon dont une administration sanitaire locale, confrontée par huit semaines de fermeture de l'un des ses blocs opératoires, a trouvé une solution pratique et économique avec l'installation d'une salle d'opération provisoire. De nombreuses sociétés britanniques peuvent proposer le montage sur le terrain de blocs opératoires temporaires, mais ceuxci sont destinés à un emploi à long terme, une année ou davantage, et sont donc trop coûteux pour des périodes relativement courtes. L'une de ces entreprises, Trojan Construction de Welwyn Garden City, a fourni la solution recherchée en fournissant à l'administration deux unités raccordées sur le terrain de manière à former une salle de réception/d'opération et de réanimation n'exigeant que les connexions de l'électricité, de l'eau et du tout-à-l'égoût. Chaque unité est arrivée déjà munie des équipements appropriés. Ces unités essentiellement conçues pour les marchés du Moyen-Orient, sont expédiées sous forme 'aplatie' et ne mesurent que 2,2 x 3,0 x 1,46m pièce, chacune étant 'dépliée' sur le terrain pour donner une pièce mesurant 5,8 x 2,75m. Leurs dimensions d'expédition permettaient de la sorte une grande souplesse d'implantation et des coûts de grutage réduits.

transport mode, this affords great flexibility in the siting of the unit and craneage costs are kept to a minimum. At Park Hospital, the units were able to be lifted over a single story link corridor and sited within an enclosed quadrangle. A weatherproof seal was made around a doorway off one of the main hospital corridors. After 'unfolding' on site by Trojan Construction's staff, the hospital works staff made electrical, water and drainage connections and the unit was ready to receive equipment and an aseptic wash.

This temporary theatre accommodation was in use for eight weeks whilst works as described were carried out within the hospital's permanent theatre suite. Unlike the wooden horse which brought destruction to Troy, Trojan Construction's 'wooden box' brought a practical and economical solution to Park Hospital's problem of maintaining surgical lists during its theatre closure.



Temporary units assembled and installed in quadrangle

Maintenance at the lowest cost

Bruno Massara, former General Secretary of the IFHE, was asked by Spanish colleagues to present his ideas on the main topic of the 1983 annual meeting of the Spanish Association – Maintenance at the lowest cost. We give English and French summaries of his paper below. May we invite any reader wishing to have a copy of the paper in the original Spanish to contact the editor of Hospital Engineering.

Bruno Massara, former IFHE General Secretary

English summary

Bruno Massara points out that the cost of maintenance of hospitals is very different in the various countries, depending on different laws, rules and contracts with trade unions.

The various factors affecting the cost of hospital maintenance, as detailed by the author, are as follows:

1) Knowledge of the necessity of maintenance

2) Disposal of an adequate budget for maintenance

3) Programmed maintenance

4) The number and technical quality of maintenance staff

5) Contracts with firms.

The author points out that the presence of an engineer is necessary in the Hospital Administration Council.

Sommaire français

Bruno Massara, ex-Secrétaire Général de la FIEH, a été demandé d'exposer ses idées sur l'argument principal de la rèunion annuelle de 1983 de l'Association Espagnole: 'Entretien au prix minimum'.

Bruno Massara affirme que le coût d'entretien d'un Hôpital est beaucoup différent dans les divers Pays puisqu'il dépend des lois des règlements et aussi des contratc avec les synidcats.

En général il y a beaucoup de facteurs qui peuvent influencer les coûts d'entretion:

1) Connaissance de la nécéssité de l'entretien

2) Avoir à disposition un adéquat budget pour l'entretien

3) Programmes d'entretien

4) Le nombre et la qualité technique du personel d'entretien

5) Contrats avec des firmes.

Dans sa rélation Bruno Massara affirme que c'est nécessaire en tout cas la présence d'un ingénieur dans le Conseil d'Administration de l'Hôpital.

An Australian hospital engineer promotes the 8th International Congress in Europe and America

JIM TURNOUR Chief Engineer, Alfred Hospital, Melbourne

I would appreciate the opportunity of using the columns of the International Federation Issue of 'Hospital Engineering' to thank Hospital Engineers in Denmark, England and America for the warmth and hospitality shown to me during my visit to their countries in May and June 1983. I learnt that there are many advantages when travelling, in being a hospital engineer, one belongs to a very large club of very friendly people.

A visit to any hospital, seeking the director, or chief engineer, generally finds a busy man who is prepared to make you very welcome, takes time to show you his hospital, his city, and buy a lonely Australian a beer.

My main purpose in visiting these countries was to promote Australia, and the International Congress of Hospital Engineering, which the Australians are hosting in Melbourne in November 1984, and to which we extend a very warm welcome to all.

The various societies concerned assisted me with the promotion, and enabled me to show the Australian Tourist Commission's film 'Waltzing Matilda', and to hand out literature on Australia, which I believe interested many hospital engineers and their families considering such a tour. Some spoke of all kinds of devious plans to get assistance from their management, the taxation department, and of doing a little 'moonlighting' to help get the funds together. If they make it and enjoy travel half as much as I did they will have a wonderful time.

The annual conference of the English Institute of Hospital Engineering Limited, held in Greater Manchester, and the Annual Conference of the American Society of Hospital Engineering (ASHE), held in Hot Springs, Arkansas, were fascinating to me, when I compared them to the annual conferences of our Australian Institute. The English are most civilized and get through a steady stream of business each day between 9.00 am and 4.30 pm, with good debates taking place, and then have a very pleasant few hours in the evening socializing. Generally one is allowed to go to bed at a reasonable hour. At the end of the day you find you have a lot to consider and think about. The Americans by comparison get through a hell of a lot of business, working very hard, some starting as early as 7.00 am, and others finishing at 9.00 pm. Generally most sessions, which are valuable and interesting, are between 8.00 am and 5.00 pm,

SOMMAIRE FRANÇAIS

Un technicien médical australien s'attache à promouvoir le 8e Congrès international en Europe et aux USA.

L'objectif principal de l'auteur en allant en Angleterre, aux USA et au Danemark était de promouvoir le Congrès international des techniques hospitalières qui doit avoir lieu à Melbourne en Australie en novembre 1984.

Ayant assisté à des conférences dans ces trois pays, l'auteur décrit avec humour les différences de style entre ces trois pays lors de ces occasions. Les Anglais s'en tenaient à des heures civilisées pour le travail comme pour les distractions. Les Américains faisaient de longues journées de travail mais s'amusaient jusqu'au petit matin. Les Danois eux, quand il était question des bonnes choses de la vie, battaient les autres pays à plate couture.

L'auteur ne s'est pas contenté d'assister à des conférences, il a aussi visité les hôpitaux de ces différents pays. Il nous décrit les observations qu'il a faites sous trois en-têtes –

Normes de travaux de construction et de maintenance, bibliothèque de manuels et revues professionnels, outils de gestion d'énergie, hôpitaux du Danemark, service ascenseurs spécialisé, élimination des déchets, systèmes de gestion de construction, commande d'ambiance dans les hôpitaux, climatisation des salles d'opération.

Jim Turnour déclare en guise de conclusion que ses visites ont été aussi agréables qu'utiles pour son travail.

followed by a pleasant few hours of socializing with a lot of fellowship and good fun, this is then followed by more play until about 2.00 am, you really need the re-vitalizing, caressing effect of the Hot Spring baths to keep going. Hot Springs is in Arkansas, which is a very pretty State of America, it has a very famous pig, called the Arkansas Razorback. The Arkansas Chapter of the American Society of Hospital Engineering, who hosted the American Conference, presented everyone who attended the conference with a red plastic pig's head hat, and they taught everyone how to grunt when they were wearing it. I do not know what the idea was, however when I wore it in the office my 'friends' back in Melbourne thought that it suited me very well and was appropriate . . .

When it came to a good life, the Danish had us all beaten. I was very fortunate in being able to be allowed to attend the meeting of the International Federation of Hospital Engineering Council, held in Copenhagen at the end of May, and the hospitality and kindness of the Danes was excellent. Perhaps they hibernate in winter, but in summer people move around extensively and enjoy life, even singing as they move down the street. I overheard a character from another country remark that 'they must be on drugs!' I suspect it was 'Spring'. The Danes took us on tours to their beautiful museums, castles and Hospitals. Danish architecture is magnificant, and I saw many unique and interesting forms of this, and systems in use in hospitals also extremely interesting. In Copenhagen the Danish Hospital Engineering Institute organized a very pleasant evening at the Balalaika Restaurant in the Tivoli Gardens. The meal was enjoyed by representatives attending the meeting from the very many hospital engineering societies and institutes from around the world, and if international goodwill was left to hospital engineers, there would be no problem. It make one wonder where our politicians go wrong.

From all my remarks so far you will believe that hospital engineering and world travel can be a lot of fun, which both are. Over the years, when I was bringing up a family and had little spare cash, I was always intrigued by those people who were major international conference attenders, . . . I now know why and I hope many will find out by coming to the 8th Congress and having a wonderful time in Australia.

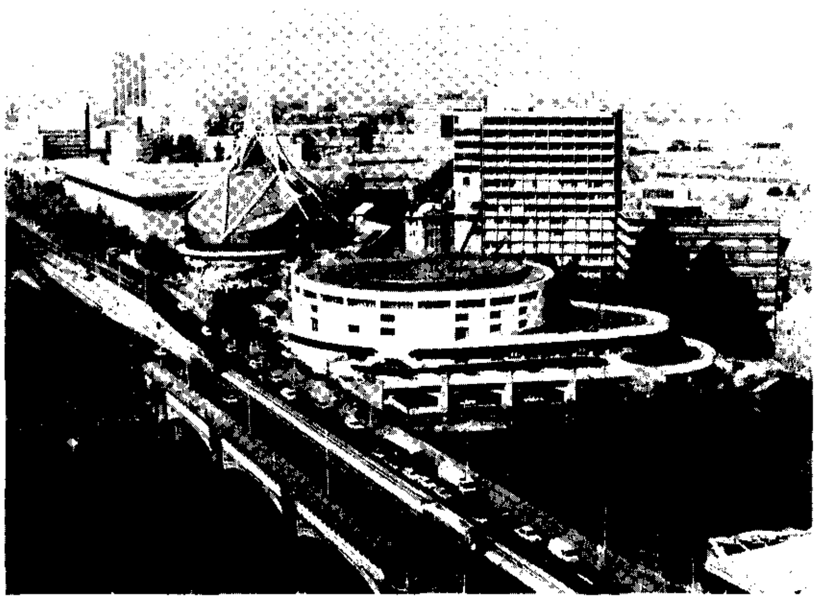
Besides attending the conferences I had an opportunity to tour several hospitals. I was fortunate in visiting two in Denmark, a city hospital of about 700 beds at Herlev, an outer suburb of Copenhagen, and a country Hospital at Helsingor. Also, while visiting the United States of America, the following Hospitals were visited:- Spartanburg General Hospital, Spartanburg, South Carolina; Sparks Regional Medical Center, Fort Smith, Arkansas; and St. Francis Hospital, Tulsa, Oklahoma. These three Hospitals each serve communities of around 100,000 people, they vary in size from 500 to 700 beds, and provide a wide range of community services. The hospitals serving inland cities in the United States of America are similar in size to the major inner-Melbourne City hospitals, which visitors to our country in September next year should be able to inspect. Now having discussed the countries and hospitality, perhaps I should report on some observations made and personal opinions formed.

8th Congress of the IFHE

The city of Melbourne, Australia, acts as host to the 8th IFHE Congress. The planning of the Congress is well advanced, and technical papers have been received dealing with the following subject – organisation and management, hospital planning and development, construction, cost control and EDP systems, environmental systems, incineration and waste disposal, clinical engineering, energy management, facilities operation and maintenance.

Besides the business of the Congress, many social functions are planned which will enable the delegates from many countries to meet and exchange ideas. Details of this, the Accompanying Persons' programme and Post Congress tours within Australia, are all listed in the registration Booklet, now available.

All enquiries to: *8th Congress Registration – IFHE, PO Box 235, North Balwyn, 3104, Australia.*



Melbourne has a rich cultural life. Pictured here is the Melbourne Arts Centre, with the Concert Hall in the foreground. Other buildings in the complex are the tower-topped Theatre Building, and in the background the National Gallery of Victoria. *The Australian Information Service, London.*

Standards of building and maintenance work

In all the hosptials visited the condition of buildings, furnishings and plant was excellent. It was apparent that the standard of building finish was very good and maintenance standards were very high. All this indicates that planned maintenance procedures were being followed in most Hospitals overseas and these pay off in providing very pleasant Hospital conditions. On this subject a very interesting paper was given at the English Conference on Safety in Hospital Kitchens, by a Ministry for Health Inspector, who demonstrated the need for a high standard of planned maintenance for kitchens, and that most of the accidents which occurred there were due to faulty maintenance.

Reference library of publications and journals

At the Copenhagen meeting of the International Federation of Hospital Engineering, a good deal of discussion occurred regarding the establishment of a computerised listing of hospital engineering publications. The Americans have offered to list all publications available in various countries of the world, and these would be computerised. I was able to point out that most books and journals are already catalogued into various world systems by National Libraries. There would be many advantages in having a world-wide reference library of training films, books and journals on hospital engineering matters, and I hope my Australian Institute supports this.

Energy management tools

The American Hospitals Association now produces a series of text books and video cassettes on energy management subjects. I examined two of these video tapes, one on a *'Steam Trap Programme'*, and another titled *'Little Things'*, which showed the very many different ways staff working in hospitals could save energy by simple actions. They were very good and cost approximately $150–00. I recommend that consideration be given to purchasing these video tapes and showing them at staff meetings, seminars, etc. They are available from The American Hospitals Association, 840 North Lake Shore Drive, Chicago, Illinois 60611. USA.

Danish hospitals

Danish hospital architecture is of a high standard and very modern. The arrangements in intensive care units appeared excellent in respect to ease of operation and safety of equipment. Taps and lights turned on with a touch or a wave of a hand. All hospitals appeared to have space and areas had very pleasant outlooks to courtyards or gardens. The corridors and doorways were very wide, in fact, space was generous. The doorways were of particular interest as all main rooms and corridor isolation was achieved by automatic doors, most of which were operated by a handle from the ceiling, some with closing beams, some with timers, others with another lever from the ceiling.

Dedicated lift service

In Denmark I saw the answer to providing a dedicated lift service for taking patients to operating theatres or other emergency services. A sensor which responds to a patient trolley or bed is placed under the floor covering adjacent to the lifts. This, together with a hand operated switch will bring a lift to the particular landing and clear the lift controls for one dedicated run.

Waste disposal

This is still a major problem everywhere and the main subject discussed at the English Conference, it was also discussed in America, and of course it comes up regularly at the Australian Conferences. Everyone has problems with rubbish, and really the answer still has not been found. No one yet has an answer to the sorting of rubbish and discussion still centres around pollution and safety factors of burning versus land-fill. However the opinion is held that burning is the only safe way if it can be pollution free. An interesting observation was made on my way to Manchester from London – while passing a big land-fill operation, which was proceeding in pouring rain, all the water was running off the land-fill pipe into channels which led to a river. I wondered which pretty English village this stream passed through! A good deal of discussion centred around waste heat recovery from incinerators. It is my opinion that no-one has yet built the right machine for this. It could well be a Digester which would shred and burn at a very high temperature, using excessive quantities of fuel to produce very acceptable pollution limits, but which would be capable of high efficiency heat recovery. This would ensure that most of the fuel energy added for efficient incineration is recovered as useable energy for use elsewhere in the Hospital. Where heat recovery was being obtained from incineration, there appeared to be very few problems of corrosion, and this only occurred where temperatures were allowed to get too low. In the USA the requirements for boiler attendants manning this type of boiler would not be as stringent as it is in Australia.

The building control systems

As was evident during my 1980 visit to the 6th IFHE Congress, in Washington, these systems are in many cases being planned and developed by the Hospital's Engineering Department in-house. This enables the hospitals to plan the best systems to suit the plant installed within the hospital, especially where it relates to the energy saving on each individual piece of equipment. At Sparks regional Medical Centre, at Fort Smith, Arkansas, Mr. Curt Belin, Director of Facilities, had planned the system over three years of study. Each section or piece of equipment requirements were listed and then a study made as to the best control and recording devices etc., to be selected. This hospital had both a medical electronics section and an industrial electronics section for the plant electronics, it was this group which installed the control equipment to match the critical path operation of the plant. Controls were electronic, with optic fibres being used for the link-up to the main control computer.

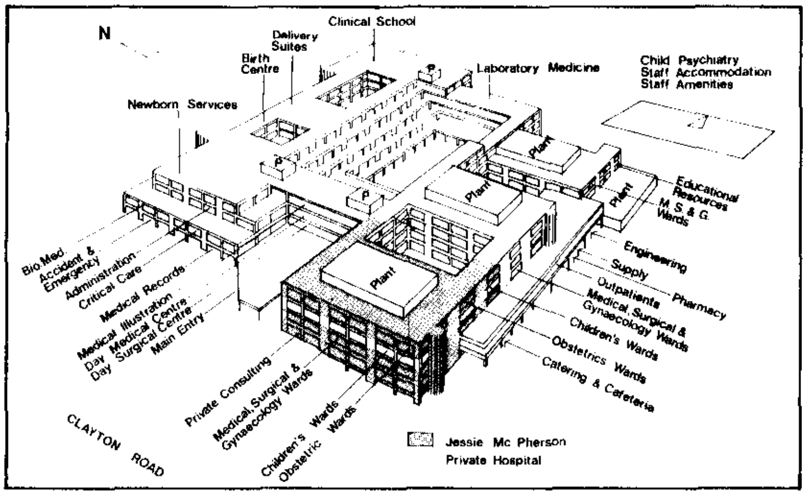
The control of climate in hospitals

The requirement for air conditioning and ventilaion is changing overseas, generally being brought about by the high cost of energy and a realization that in many cases the best air available for use is that which is already been filtered and pumped into the hospital. By re-filtering again it is improved, as in most cases the dirt added in the hospital, for instance by people, their apparel, and furnishing, is of a large size and is easily filtered out. The requirement varies from section to section within the hospital, but where air has to be exhausted, heat is being recovered by quick recovery systems. I was advised that one hospital, where recovery coils, or turn about coils, on the seventh floor, were transferring heat to air intake coils in the basement. Of course there are greater extremes of temperature in most places in the Northern Hemisphere that we experience in the Australian southern states, in the central American states the humidity and temperature are both excessive and very large quantities of cooling are required.

Building construction, the building envelope and its's importance to energy saving was discussed in an excellent paper presented at the English conference by Professor Burberry. He showed how building design and the use of materials, shading and illumination must always be considered when designing a building to suit a particular climatic condition, this can lead to very large savings of energy.

The energy savings schemes are changing the arguments regarding air conditioning and the thinking which we have used in the past. The subject which now seems to be mostly debated is how stuffy an area can become, instead of how many air changes per hour are required? In fact, it is now thought that the standards may best be written to say how much fresh air is required per person per hour. Fresh air flows in many hospitals in America have been reduced to 33% of the total air originally used in the hospital. The heat pump unit in each room is gaining more and more favour

New hospital development in Melbourne



Visitors attending the 8th International Congress of Hospital Engineering will be able to see a new hospital being developed at Clayton which is on the South East side of Melbourne. It is a project to relocate the Queen Victoria Medical Centre which is at present on a confined site in the centre of the city. The main consultant for the project is preparing an article for the June International Issue of 'Hospital Engineering' which will give a full description of the hospital. Meanwhile here is some preliminary information.

The services to be provided are a 336 bed public hospital, Queen Victoria Medical Centre, with a 100 bed private hospital, Jessie McPherson Hospital, with integrated services. The layout of the hospitals is shown in Figure 1.

Progress

Progress towards achievement of the Centre's long-standing objective of relocation to new premises has been rapid during 1982-83. The programme for completion of the Complex by November 1986 is being complied with and to date the project has been an outstanding example of what is achievable with total Government commitment supported by all involved groups.

An innovative master plan has been approved and schematic drawings (1:100 scale) are complete.

During 1984 it is anticipated that the building structure will rise to level 3 and substantial progress will be made with installation of mechanical and electrical services at level 1.

At the master planning stage, it became apparent that despite the site of 8.33 hectares initially appearing to be large, it was very tight for the envisaged development and that multi-storey car-parking would be necessary unless additional land could be obtained. As a result a further property in Browns Road, Clayton was purchased to ensure adequate parking space for day staff.

While many aspects of design are yet to be finalised the building has commenced using a fast-track technique. Earthworks were started in February 1983 and completed in May. The contract for footings commenced in May and other necessary preliminary works are well under way.

Concurrently an upper-limit budget for the project of $90.9 million in June 1982 terms has been approved and a Guarantee Bill for the estimated completion cost of $150 million has been passed by State Parliament.

As it is a joint project with private enterprise, it has also been necessary to enter into several corporate arrangements and these are now substantially complete.

Achievement to date, and future achievement at the same rate, is only possible as a result of massive effort and enormous additional demand on staff in all areas of the existing Centre who also have their ongoing services to patients to maintain. Nominated user groups were established at the start of the project in 1982 to act as expert consultants in the planning of each functional area. It will continue to be necessary for these groups to meet frequently with the consultants to the Project and the Planning Team as each stage of the project develops. The ready cooperation of staff despite the additional stress, is laudable. It is hoped that they will be amply rewarded when they relocate to new departments in which the design suits their needs far better than does the present premises.

Detailed information relating to the project is available from the Planning Office at the Queen Victoria Medical Centre, and copies of half-yearly progress report are available on request.

in America and I saw it in most new buildings I inspected. The refrigerated unit under the window, where the condensing coil is the heating coil and is connected to the condensating water system serving all units in the building, so that in one room the unit can be running for chilling the air, and the heat from this unit's compressor is used to heat another room on the other side of the building. Cooling towers take away heat on those days when excessive cooling is required and auxiliary heating is provided on those days when heating is required. Most of these systems allow for some fresh air to be added to the room, generally equal to the amount required for toilet and corridor exhaust systems, these systems are proving extremely efficient.

Operating theatre air conditioning

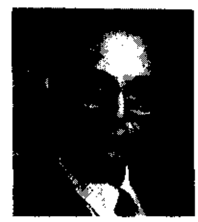
A very interesting forum on hospital ventilation was held one afternoon at the American Conference. Drafts of new standards being used and research which was being carried out into the requirements for standards was submitted. These all indicated the increased use of recirculated air within hospitals and a reduction in air flows generally. A good deal of research is still required to establish the basic requirements of all criteria regarding consideration in hospitals (eg airborne transmission of disease, attenuation of odours for patient comfort, etc.) Big changes are about to occur. A very interesting segment of the forum was a paper given by Mr. Joseph R. Luciano on New Concept in French Operating Rooms Heating Ventilation Air Conditioning System HVAC, which was developed by Professor Jack D. Joubert of the University of Lyon, in France. The system uses only 5-6 fresh air changes per hour in the theatre and treats very carefully the exhausted air and recycles it into the system.

Auxiliary systems are sometimes used to increase the air changes per hour to fit between 60 and 80 air changes, similar to that which is carried out in the Charnley Enclosure. All air handling equipment is generally at close proximity to the theatres. At the moment there are over 100 installations of the Joubert System in Western Europe and a number of hospitals who are equipped with the uni-directional systems are now removing the HEPA Filters and replacing them with HECFU filters. This allows the fans to be slowed down, thus saving energy, and the airborne bacterial levels have been found to be essentially the same.

Conclusion

The two weeks spent investigating hospital engineering facilities in Denmark, England and America, was well worthwhile and I believe will enable me to serve my hospital better.

WHO working group on hospital waste



COR SONIUS, IFHE President, reports

It was with great pleasure that I accepted an invitation from the World Health Organisation to participate in the working group on hospital waste management, as the official representative of the International Federation of Hospital Engineering. The purpose of the meeting held in Bergen in Norway from 28 June till 2 July 1983 was to review recent developments in the handling of hospital waste and to prepare a code of good practice that can serve as a guide to hospital and municipal administrations within highly industrial countries.

The draft final report has been circulated and is now subjected to the routine WHO final editing before publication. It has been agreed that the publication of this code should be done jointly by WHO and IFHE so that both WHO and the IFHE will benefit from each others experience and knowhow and be able to convey it to the widest possible group of authorities and experts concerned.

The recommendations given in paragraph 13 of the summary report has resulted in a very interesting new initiative. The American Hospital Association (AHA) with as principal co-sponsor the New York State Energy Research and Development Authority has started an extensive research programme to better define the use of incinerators as a containment energy conservation and environmental enhancement technique for health care institutes in the United States. The WHO and the IFHE have agreed in principle to an ongoing liaison with the AHA to transfer technology on an international basis.

As a start the organising committee of the Melbourne Congress of IFHE has placed the incinerator project in the programme. Mr Jim MacLarney Director of the American Society of Hospital Engineering (ASHE) appointed as manager of the incinerator project by AHA will be in attendance at our congress and we expect that he will give us more detailed information regarding the organisation of this project.

Mr John Bleckman chairman of the Environmental Safety Committee of ASHE and one of the principal researchers has already promised to present a paper. Speakers from other countries have also promised to present papers so that an international exchange of information regarding this subject can be expected.

It is our intention to make arrangements for further cooperation between different researchers so that more detailed reports can be presented at our next congress in Barcelona in 1986.

WHO working group on hospital waste management Bergen, 28 June – 1 July 1983

Summary report

Introduction

The meeting was attended by 34 participants, including medical specialists, scientists, engineers and administrators from 19 countries.

The purpose of the meeting was to review recent developments in the handling, transport, treatment and disposal of waste from hospitals and other health care faciliies and to prepare guidelines on the subject for use by administrators, engineers and others concerned in industrialised countries. The unique hazard of health care waste is its potential for transmitting infection. A small quanitity of flammable and toxic chemicals and some low-level radioactive waste is also generated. Nevertheless, more than half the waste, including that from food services, is no more hazardous than general municipal waste.

Discussion

The Group agreed that three principal aspects of the subject should be considered:

- the health of personnel and patients in health care facilities;
- the risks to the health of the public arising from the transport and disposal of infectious and hazardous waste;
- the environmental and economic effects of waste disposal methods.

The term 'waste ' should include any type of waste generated in health care facilities, including aqueous and other liquid wastes. Both the internal and external aspects of waste disposal should be considered, but the organisational and legislative arrangements of municipal and other environmental athorities concerning waste disposal were not within the scope of the Group's deliberations.

Although the original terms of reference of the group referred to 'hospital waste', it was considered that a more suitable term was 'health care facility waste', as infectious and other hazardous or obnoxious waste arises in several kinds of health care facility.

The working group considered specific aspects of its terms of reference as follows.

- Categories of waste
- Waste-generating facilities
- Radioactive waste
- Legislative, administrative and economic aspects
- Health care waste categorised by source
- Occupational hazards and risks to health
- Handling, storage and transport
- Treatment and disposal
- Regional planning and the planning of waste handling in new or renovated buildings
- Incineration and associated equipment
- Training and supervision
- The impact of health care facility waste on human health and the environment
- The outline of a proposed code of practice
- Handling, packaging and storage of chemical waste

Conclusions and recommendations

1. Waste from health care facilities should be classified into eight main categories:

- general waste
- pathological waste
- radioactive waste
- chemical waste
- infectious and potentially infectious waste
- sharps (any sharp waste item such as a syringe or broken glass that can cause a cut or puncture
- pharmaceutical products
- pressurised containers.

2. Low-level radioactive waste should be allowed to decay to a non-hazardous level and then disposed of by the method appropriate to the sort of waste it is then defined as (chemical, infectious or general).

3. Hospitals and other health care facilities should be legally accountable for their waste management practice.

4. People at risk from infectious and hazardous waste were categorised as:

- personnel and patients in health care facilities
- personnel employed by waste transport and disposal contractors
- the public.

5. Research and development should be instituted into automation and enclosure technology to protect these groups who should also be given appropriate information and training.

6. Waste should be aggregated according to the required handling methods and hazard characteristics and identified by colour-coded packaging and nationally accepted symbols. Efforts should be made to develop internationally accepted standards for colours and symbols.

7. Waste disposal policies and methods should be designed to minimize the pollution of air, water and land.

8. Policies on the location of waste treatment and disposal sites will vary with local circumstances. Treatment and disposal can be carried out on a hospital site for a single hospital or at a central location for a group of health care facilities. External treatment and disposal facilitiues may also be used, where appropriate.

9. Incineration is the most effective way of disposing of most non-recyclable waste.

10. All health care facilities should prepare written policies on their waste handling procedures. Training based on these policies should be given to the personnel involved.

11. Chemical waste should be minimised by reducing as far as practicable the use of chemicals in health care facilities and by substituting non-hazardous chemicals for hazardous ones whenever possible. Chemical waste should be recycled whenever feasible. Disposal should be by incineration or, alternatively, the waste may be handled and disposed of by an authorised professional waste management organisation.

12. It would be useful to draw up a code of practice on the management of health care waste, for which an outline has been prepared by the Group.

13. A follow-up activity should take place directed specifically at the use of incinerators on a regional, on-site or collective basis.

This paper was first given at the Institutes's Seminar on Hygiene in Kitchens in 1983. Mr Jacob is an Environmental Health Officer at the DHSS

Food poisoning in hospitals

M JACOB LLB FIEH

Hospital outbreaks of salmonella infection accounted for one-third to one-half of all general outbreaks reported in England and Wales between 1974 and 1977. Food borne infection however was considered the likely source of infection in only 12% of 197 outbreaks reported through the PHLS in this period. Information was not available for (61%) of the outbreaks and there could have been other food borne implications in these instances. The general picture is made difficult because of the extent of cross-infection on wards due to poor patient hygiene, particularly in the long-stay institutionalised type of establishments.

A more recent survey has been carried out by CDSC in 1980 to 1982 in order to assess the relevant importance of food borne and person-to-person spread. Out of 55 outbreaks during this period, 6 were outbreaks believed by hospital investigators to be food borne, mainly because of positive findings of salmonella when catering staff were screened.

The food most commonly incriminated in food borne outbreaks is cooked meat, either poultry (chicken or turkey) or carcass meat, usually pork or ham. Salmonella infections in hospital present a more serious problem than those in the community, and control measures that may include closure of wards and hospitals and restriction of visitors, disrupt the normal working of the hospital causing much adverse publicity. The number of salmonellas needed to cause illness may be less in infants and in hospital patients whose immunity is impaired by disease or its treatment, and such infections may be unusually severe. Not only are young babies more susceptible to infection but they are more likely to spread infection as a result of heavy environmental contamination from infected fluid stools.

Other infections of clostridium perfringens and staphylococcal food poisoning are reported in hospital investigations; caused usually by poor food handling practices of kitchen staff.

Although the most significant factor in reducing risks of food poisoning in hospitals relates more to the education of the kitchen staff than structure and design of the kitchen itself, design factors and the appropriate maintenance can play a part in the cause of outbreaks. Investigations have revealed that contamination of food by salmonellas has probably been assisted by poor working surfaces, old and worn equipment, utensils which cannot be properly cleaned, and badly maintained refrigeration equipment storing meat and meat products and other perishable foods at a much higher temperature than is desirable to resist bacterial growth.

DHSS Health Circular HC(77)24

Health Circular HC(77)24 'Health Services Management Food Hygiene' issued in July 1977, contains guidance on the need for officers of local authority environmental health departments to be given 'open access' to catering departments and food handling areas in health premises. The circular reminds health

SOMMAIRE FRANÇAIS

L'hygiene dans les cuisines

Sur 55 cas d'empoisonnement par salmonella dans les hôpitaux d'Angleterre et du Pays de Galles entre 1980 et 1982, 6 auraient été d'origine alimentaire, selon les chargés d'enquête dans les hôpitaux. Il se peut qu'il y ait en confusion entre les infections secondaires dans les salles d'hôpital dues à une mauvaise hygiène des malades, en particulier dans les éstablissements institutionalisés de séjour à long terme, et les toxi-infections d'origine alimentaire, bien que la source d'infection initiale puisse être les aliments consommés dans l'hôpital.

L'aliment le plus fréquemment incriminé dans les intoxications alimentaires multiples est la viande cuite, qu'il s'agisse de volaille (poulet ou dinde) ou de viande en carcasse, généralement porc ou jambon. Les problèmes de toxi-infection causée par les salmonella dans les hôpitaux peuvent être sérieux, notamment chez les malades dont le résistance à la maladie est atténuée par une autre maladie ou son traitement. Les paramètres conceptuels et l'entretien peuvent jouer un rôle dans ces cas multiples. Des niveaux de propreté de l'environnement insuffisants peuvent abaisser les niveaux d'hygiène chex ceux qui manipulent la nourriture. Le manque de place peut entraîner des risques de contamination secondaire, tandis qu'une bonne organisation du travail devrait assurer la séparation permanente des aliments cuits et des aliments non-cuits. Le choix d'un sol approprié, permettant un bon nettoyage, des hauteurs de plafond garantissant une ventilation efficace, un bon éclairage, les équipements voulos pour laver la vaisselle et disposer des déchets, tous ces éléments jouent un rôle extrêmement important sur le plan de l'hygiène aussi bien que de la sécurité de l'alimentation. La publication du DHSS 'Notes sur l'hygiène et la santé pour les services de restauration du Health Service' (sous forme de projet) feront beaucoup pour aider tous ceux qui sont concernés par la conception et la maintenance du point de vue de l'hygiène des cuisines dans les hôpitaux.

authorities that they should comply with the provisions of the Food Hygiene (General) Regulations 1970 and enforce good hygiene practice in hospitals and in other health care establishments where food is provided.

Clear practical guidance on hygiene in catering departments and food service areas is set out in the 'Health Service Catering Manual Hygiene' published by the DHSS Catering and Dietetic Branch. This advice may need to be adapted to take account of particular local circumstances, but no lower standards should be regarded as satisfactory.

Circular HC(77)24 states that health authorities are responsible for ensuring that the statutory requirements and codes of good practice relating to food hygiene and the health of staff are observed. The district management team should determine who is to provide necessary medical advice on food hygiene and the local environmental health department should be consulted where appropriate.

Individual catering managers are responsible for the standard of hygiene in their own catering departments and the treatment of food generally at their locations. General oversight of food hygiene standards in districts may be the responsibility of unit catering managers or administrators.

Day to day inspection should be carried out by catering managerial and supervisory staff. At least twice each year a thorough inspection should be undertaken by the officer responsible for catering at district level, a medical adviser nominated by the district management team and an appropriate member of the works department.

All health authorities should invite local authority environmental health departments to visit, inspect and report on all areas within their premises where food is stored, processed or consumed. Where environmental health departments wish to visit at any time without specific invitation or prior notice in connection with the 'open access' policy, DHSS places particular importance on the fact that no unreasonable restrictions should be placed on the timing or extent of the inspection.

Pipes should be enclosed and constructed with easy-to-clean surfaces to allow access for maintenance and repairs.

Regarding implementation of recommendations of environmental health officers following inspections, their reports should immediately be considered for appropriate action by the DMT. So far as possible, recommendations dealing with procedures or involving only minor expenditure should be implemented at once. Where major expenditure is required, priorities may have to be established, but where deferral or delay in implementing major recommendations is inevitable, the reasons should be explained to the environmental health department.

Additionally on planning and design, the circular states that environmental health departments should be invited to offer advice when new kitchen building or kitchen refurbishing projects are under consideration in order to avoid potential problems and benefit from their practical experience in matters associated with hygiene.

Basic requirements

Although hospital kitchens as Crown property are exempt from the requirements of the Food & Drugs Act 1955 and the Food Hygiene (General) Regulations 1970 it is Government policy that standards should match the legal requirements including aspects of design, structure, provision of equipment and the finish of surfaces. As far as the handling, preparation and servicing of food is concerned, this should be carried out to ensure that food is at all times provided in a state fit for human consumption and that during its preparation and handling stages it is not subject to the risk of any contamination. Articles and equipment with which food comes into contact should be so constructed and be of such materials and kept in such good order, repair and condition as to enable them to be thoroughly cleaned. Walls, floors, doors, windows, ceiling, woodwork and all other parts of the structure of every food room shall be kept clean and in such good order, repair and condition as to enable them to be effectively cleaned and prevent so far as is reasonably practicable any risk of infestation by rats, mice or insects.

The definition of a food room means any room (being, or being part of, any food premises), in which any person engages in the handling of food for the purposes of a food business.

This therefore means that the

Conveyor serving system at Maidstone provides fast service and keeps cooked meat at the necessary temperature.

essentials of the food hygiene legislation are applicable to all aspects of hospital catering – the kitchen, storage, servery and dining areas as if they were a commercially operated food premises.

Design and maintenance aspects in kitchens

The physical environment and the layout and design of kitchens can make an important contribution to the level of hygiene in food premises. Inadequacy of space is one of the underlying causes of poor hygiene in too many food premises. Incompatible food handling operations may be carried on side by side because there is insufficient space to arrange the work avoiding cross contamination risks. Food premises should be planned to allow sufficient space for current usage, with ideally some room for future expansion. There should be a smooth work flow design from the raw to the finished product, and it is essential to physically separate the handling of cooked and uncooked foods.

Construction

Choice of the correct flooring for a food premises is vital, as a considerable proportion of the cleaning time spent in catering establishments is spent cleaning the floor. Spillages and other accumulations must be removed without difficulty. If the floor is subject to impact, heavy loads and the erosive effect of moisture and chemicals it will quickly start to wear or even break up causing additional cleaning and maintenance problems. One further consideration that can make the choice of flooring material difficult is the frequent need to combine ease of cleaning with good non-slip properties. Where spillages frequently occur and large volumes of water are required for cleaning, floors must be properly drained.

Walls should be smooth, impervious and easy to clean. As with the flooring, the final choice of finish should depend on the particular situation of the wall. Where heavy contamination of wall surfaces is likely, then surfaces that can be frequently and easily washed should be chosen. Walls should be light coloured to show up dirt and coved at the junction with both wall and ceiling. Where trolleys are in use, plastic crash rails can be fitted to protect the wall finish and external angles be fitted with metal edging strips. Wherever possible, hollow partition walls should be avoided as they may provide harbourage for pests.

Easily cleaned wall and floor surfaces and adequate working space are found in the vegetable and salad preparation area at Maidstone.

Ceilings

Ceiling height is critical. If the ceiling is too low problems will be experienced with ventilation, if it is too high, the ceiling will be very difficult to clean. Because of the difficulty generally with cleaning ceilings, surfaces should be smooth to make the removal of adhering dirt more manageable. An absorbent plaster is normally the best surface and this can be emulsion painted when discolouration occurs. Gloss paint should not be used as it encourages codensation. Suspended ceilings can provide a potential harbour for pests and roof lights can make temperature control very difficult during the summer months.

Doors and windows

These should be of simple design to minimise the lodgement of dust. Finger-plates on doors will allow easy cleaning and kicking plates will prevent damage to the base of doors. Window-sills can be steeply sloped to prevent them being used as shelves.

Internal surfaces of goods lifts need to be easily cleaned. Access at the base of the lift is necessary as dirt and food debris can accumulate in this area and become a source of insect and rodent infestation.

Services–lighting and electrical supply

Good lighting aids efficiency and enables cleaning to be carried out thoroughly. The lighting layout should be carefully considered at the planning stage of any new food premises and light fittings placed in positions related to equipment working surfaces, etc. Electrical wiring should be in conduits properly chased into the wall. Where frequent wet cleaning is necessary the conduits should be water resistant or the wiring be in M.I.C.C. All switches should be flush fitting and easy to clean. Ideally, proximity switches that can be operated without touching should be fitted. The incorporation of a main switch to isolate all electrical equipment except refrigerated and frozen food storage plant allows for repairs to be carried out without the need to switch off refrigeration equipment.

Ventilation

Central dish washing installations can cause problems from steam and condensation. Adequate ventilation makes the working environment more comfortable and reduces the amount of cleaning necessary by preventing any build-up of steam, volatiles and heat. In kitchens some form of grease filter is necessary in the extraction system. Grease arrest is necessary to reduce the possibility of cooking odours causing a nuisance to nearby residents and filters also prevent the build-up of oils and fats in the ventilation truncking reducing fire risks and aiding cleaning. Extract ducting must have accessible cleaning apertures of not less than 15 x 15cm (6 x 6 inch) at 2 metre (6 foot) intervals. There should be locally agreed cleaning frequencies with personnel nominated for particular tasks.

Drainage

Where large quantities of greasy water are disposed of via the drainage system it is necessary to install a grease intercepter to prevent a build-up of congealed fat, which might eventually obstruct the drain.

Refuse storage and disposal

Dustbins or large refuse containers should be stored on a concrete or paved area which can be hosed down easily. Plastic or paper refuse sacks must be properly protected by wire guarded holders or a caged enclosure to prevent spillages or damage by animals. Refuse compactors must be properly sited adequate storage space for refuse both prior to and after compaction, otherwise the whole area can become unsightly and possibly cause nuisance. Proper and hygienic swill storage facilities, with regular container collection and cleaning, is important.

Equipment

All machinery used in kitchens should be easily dismantled to allow thorough cleaning and details of the cleaning stages should be shown on an instruction plaque. Wood is not a suitable material for surfaces that come into contact with open food. Where wood is used for table legs or as shelving it should be treated with polyurethane varnish.

Hard synthetic rubber pads used as cutting boards will not crack, split or swell nor will they absorb fat or moisture and after an extended period they can be re-surfaced by sanding, but they do warp in hot water. However polypropylene boards can be subject to hot water without warping and are therefore suitable for cleaning in a dishwasher or sterilising sink.

Stainless steel tables should be the first choice in food preparation areas. They should have tubular legs sealed at their feet. Work tops can be provided with 150-300mm upstands to the rear to reduce soiling of wall surfaces.

Fish frying takes place in the central cooking area at Maidstone. It is accessible and easily cleaned with plenty of extract ventilation.

For sinks and washhand basins, stainless steel is also preferable. Washhand basins should not be too large as they may be used as sinks or storage shelves. Spray taps are recommended and ideally these should be a foot or knee operated. Liquid soap and paper towels or hot-air hand dryers are preferable to automatic roller towels.

Refrigeration equipment

In hospital catering the use of chill, cold and frozen food storage facilities are essential for the effective and safe operation of food handling and service procedures. Too often on investigation, chill and cold storage temperatures have been found to be far in excess if what is desirable for the type of food being stored. This is usually due to the fact that the refrigeration equipment is not working correctly either because of the age and inefficiency of the equipment, door seals, cabinet joints etc not fitting correctly, or lack of regular defrosting and/or improper use of the equipment by overstocking and too frequent opening of doors. All refrigeration equipment should be regularly checked and the air temperatures taken at various levels, (top, middle and bottom) of the storage cabinets or rooms. Foods which have been placed in storage for 6 hours or more should also be checked to see the centre temperature readings. This particularly applies to foods such as cold meats, poultry meat, or foods cooked on the previous day and due to be

The pastry area at Maidstone has plenty of natural light, impervious work surfaces which promotes hygienic standards.

PLEASE NOTE DETAILS OF CHANGE OF PUBLISHER ON PAGE 1

served the next.

Where blast chillers, rapid cooling cabinets, blast freezers or cooked chill operations are installed, frequent inspection of the refrigeration equipment and checks on temperatures must be applied.

Other considerations

Other aspects requiring consideration under the heading of hygiene maintenance, involve the adequacy of water supply generally and for servicing all sinks, dishwashers, handwash basins and other equipment. Water softener for dishwashers, appropriate waste disposal units and the use of mechanical equipment for cleaning.

Cooking appliances either of convection, radiation, conduction, steam and pressure cooking, frying, or microwave type, all require routine examination and maintenance as well as frequent and effective cleaning. Bains-Marie and hot cupboards require checking also to ensure that they are capable of holding food above 70°C at the centre of the foods concerned.

There should be general local agreement on established temperatures at which refrigeration, and cooking appliances must operate, and in respect of the temperature of hot water in dish washing.

Draft Health Building Note

For some considerable time, DHSS has been actively concerned with the preparation of a Health Building Note for health service catering departments. This is intended for use in the briefing and design stages of projects to assist those concerned with the provision and design of new health buildings and the adaptation or extension of existig premises. The note contains information on relevant aspects of current policy, functional requirements and resultant design implications. They aim at encouraging economy in capital and revenue costs by consistency of provision, standards and equipment and the efficient use of space. The chapters 2 and 3 on design and functional requirements are essential reading for all those concerned with design and maintenance considerations of kitchen hygiene in hospitals.

References

1. DHSS Health Circular HC(77)24.

2. Journal of Hospital Infection (1980) 307-314 **Salmonella infections in hospital.** A report from the Public Health Laboratory Service Salmonella Sub committee.

3. **Investigations of Salmonella Outbreaks in Hospitals** S. R. Palmer, MA MB MFCM. B. Rowe MA MB FRCPath DTM&H Public Health Laboratory Service.

4. **Health Service Catering Hygiene** Catering and Dietetic Branch DHSS

5. **Food Hygiene in the Catering and Retail Trades.** John K. Davenport. H. K. Lewis & Co Ltd.

6. **Draft Health Building Note** Health Services Catering Department. February 1983.

TALKING POINT *continued*

subjects as drainage, contract management, building systems etc. Indeed, some members have criticised the Institute for daring to stray from pure engineering topics as subject matter for the journal and symposia. However, those members, who are in a minority, must appreciate that the Institute is also attempting to serve its members who have a multi-functional responsibility and recognise that every engineer, (as well as every builder) has the opportunity with the Health Service, to become the manager of not only his own discipline, but of the whole estate function.

Prior to the 1974 Health Service reorganisation, the waters were less muddy. The fact that a manager was an engineer, builder or architect was reflected in his title. It was the introduction of the works officer posts which began to cloud the issue, although the establishment of these new posts was a great advance forward for the works profession in the Service and the Service as a whole, unifying the various works disciplines into one coherent practice and changing the image of works from a fragmented and sometimes ill-co-ordinated aspect of the service. However, this advancement should not be destroyed or retarded from within by the 'masters', who, as well as 'having a chauffeur want to possess the advanced driving licence themselves'. He should be content in having the authority to dictate the route and accept responsibility for the road-worthiness of the vehicle, ensuring that the chauffeur follows the route and does the servicing.'

If one persists in the argument for corporate membership for non-engineers by reason of being ultimately responsible for that aspect of the service, then perhaps it is pertinent to consider the recommendations of the Griffiths report. The appointment of a general manager at district and unit level does raise the question as to whether or not they too will be seeking corporate status of the institute (unless of course we see some works officers, whose qualifications satisfy the Engineering Council, becoming general managers!)

Surely we must all agree that in the NHS Works, one discipline cannot operate satisfactorily in isolation. There must be interaction between engineers, architects, surveyors and builders, but for our everyday tasks this must take place at our desks, drawing boards or on site and should not need the umbrella of an Institute to foster this co-operation and understanding.

New award by The British Quality Association

The British Quality Association will make the first annual award of a trophy known as the 'British Quality Award' during 1984. The trophy will be awarded to the individual or group which is considered to have achieved the most notable success in improving the quality of a British product, service, process or technique. The object of the award is to encourage quality improvement in industry and commerce throughout the United Kingdom.

Further details obtainable from: The Secretary General, The British Quality Association, 54 Princes Gate, Exhibition Road, London SW7 2PG.

HOSPITAL ENGINEERING INDEX

Volume 37 1983

Bold figures in the reference shows the month, (eg '10' is October), the other figure after the stroke shows the page number.

The Institute of Hospital Engineering FORTHCOMING BRANCH MEETINGS

East Midlands Branch: *Hon Sec E A Hall TN Nottingham (0602) 475783*

6th March	Annual General Meeting followed by Management film with John Cleese related to engineering	Mapperley Hospital, Nottingham
11th April	Microprocessors	Rotherham College of Technology Computer Laboratory

Southern Branch: *Hon Sec R P Boyce TN Chichester (0243) 781411*

17th March	Visit to Spinal Unit and talk on Spinal Injury Treatment. Odstock Hospital	

North Western Branch: *Hon Sec E A Hateley TN Manchester (061) 236 9456 ext 266*

20th March	Annual General Meeting followed by talk on Energy Tariffs in the Regional Health Authority, at Bolton Medical Centre	
9th March	Annual Dinner Dance at Worsley Court House	

Midlands Branch: *Hon Sec W Turnbull TN Birmingham (021) 378 2211 ext 3590*

13th March	Annual General Meeting followed by The telecommunications revolution	Lecture Theatre, Post Graduate Medical Centre, Queen Elizabeth Hospital, Edgbaston.
Thursday 7th June	Oxford Spring Lectures (organised by the six branches)	John Radcliffe Hospital

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

PUBLICATIONS

British Standards Institution

Two new publications available

BSI has published a new code of practice **BS 5958 Control of undesirable static electricity Part 2 Recommendations for particular industrial situations.**
Also available :
BS 5724: Section 2.21:1983
Medical electrical equipment Part 2. Particular requirements for safety Section 2.21 Specification for transport incubators

Further details from Sales Department, BSI, Linfold Wood, Milton Keynes MK14 6LE.

NEXT MONTH
April issue

Estate management Dr Green
WISE – editor interviews women members of Inst HospE
Bristol venue for this year's Annual Conference – IHEX '84

CLASSIFIED ADVERTISEMENTS
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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.

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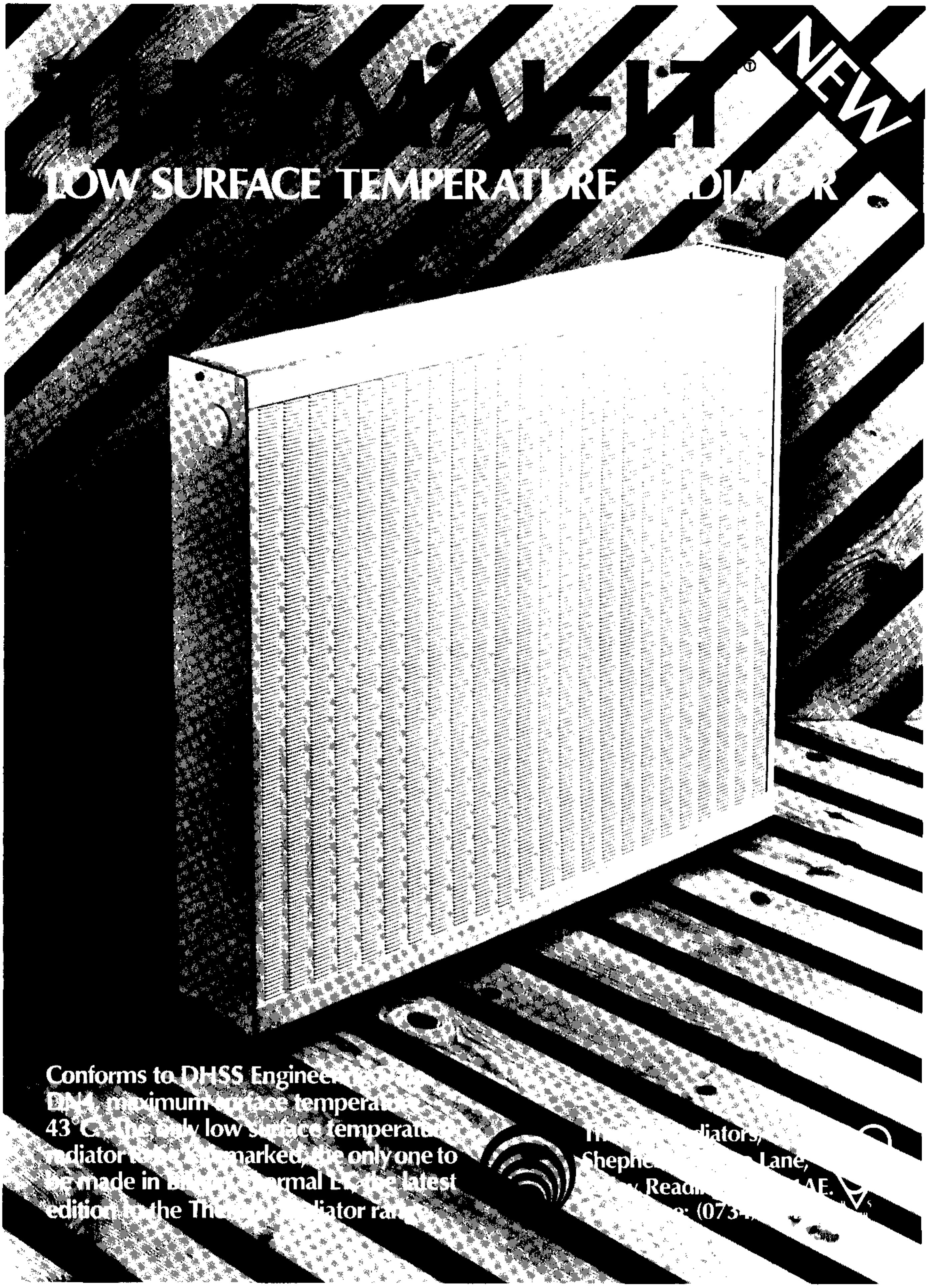
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BOC MCS 1

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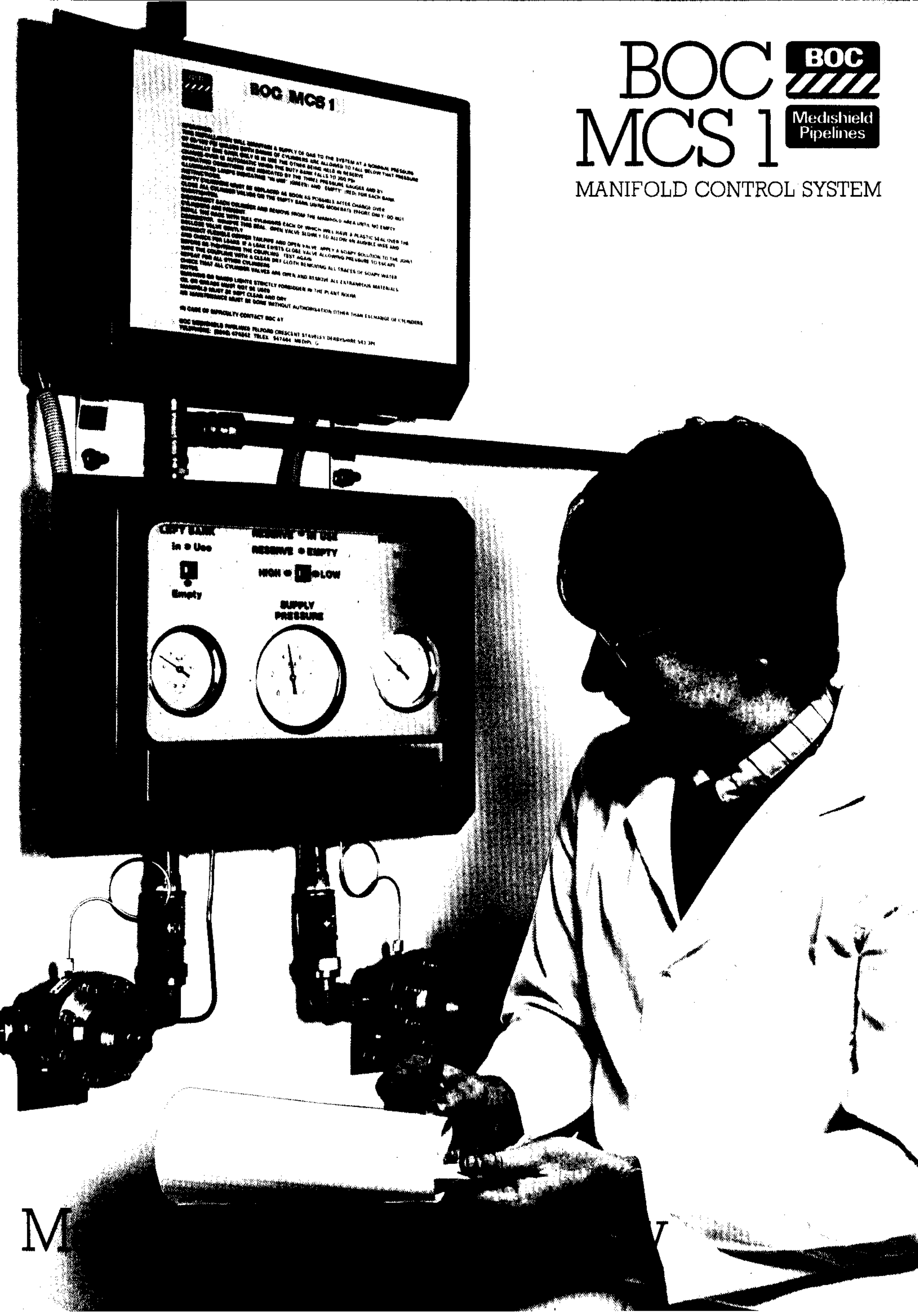
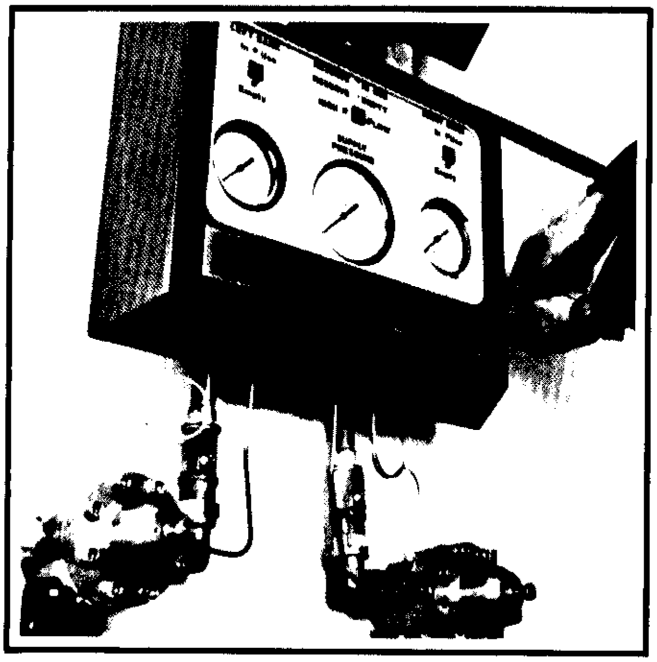
Medishield Pipelines

MANIFOLD CONTROL SYSTEM



BOC MCS.1



The MCS.1 can be used to provide mains distribution pressures in conjunction with gas cylinders, cylinder crates, and cylinder trailer packs.

The system gives the maximum security of supply, simple and safe maintenance, and accurate control of system pressure.

The MCS.1 is suitable for all medical gases, a variety of laboratory and pathology gases and gas mixtures.

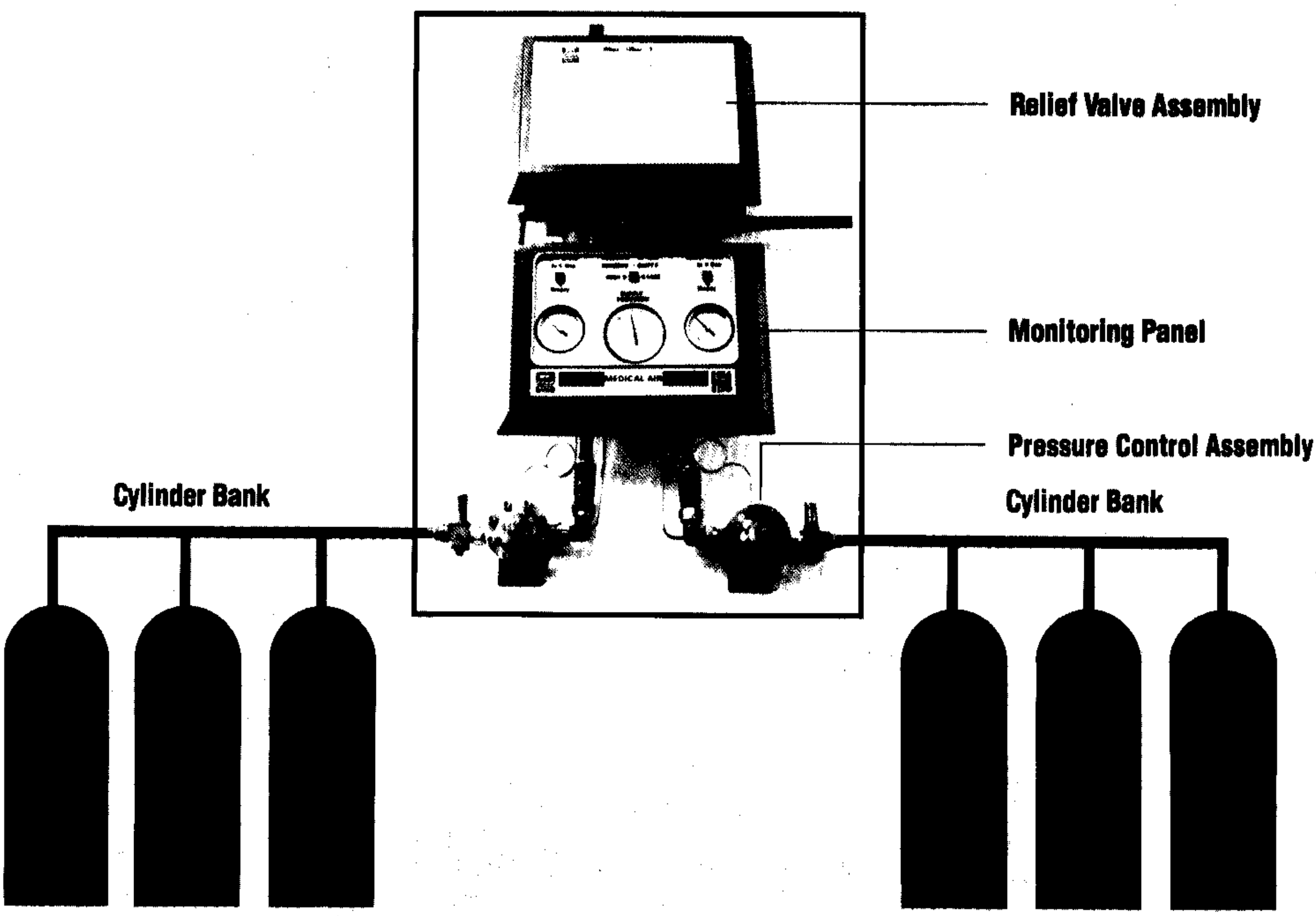
Designed to comply with the relevant British and International Standards and the recommendations of HTM and NFPA.

The MCS.1 consists of three basic elements

Monitoring Panel:
The monitoring panel senses the supply available from each manifold, and allocates the 'duty' and 'standby' functions accordingly.

Pressure Control Assembly:
This assembly connects to the ends of the manifold headers and each leg is complete with inlet filter pressure regulator, and Low pressure isolation valve.

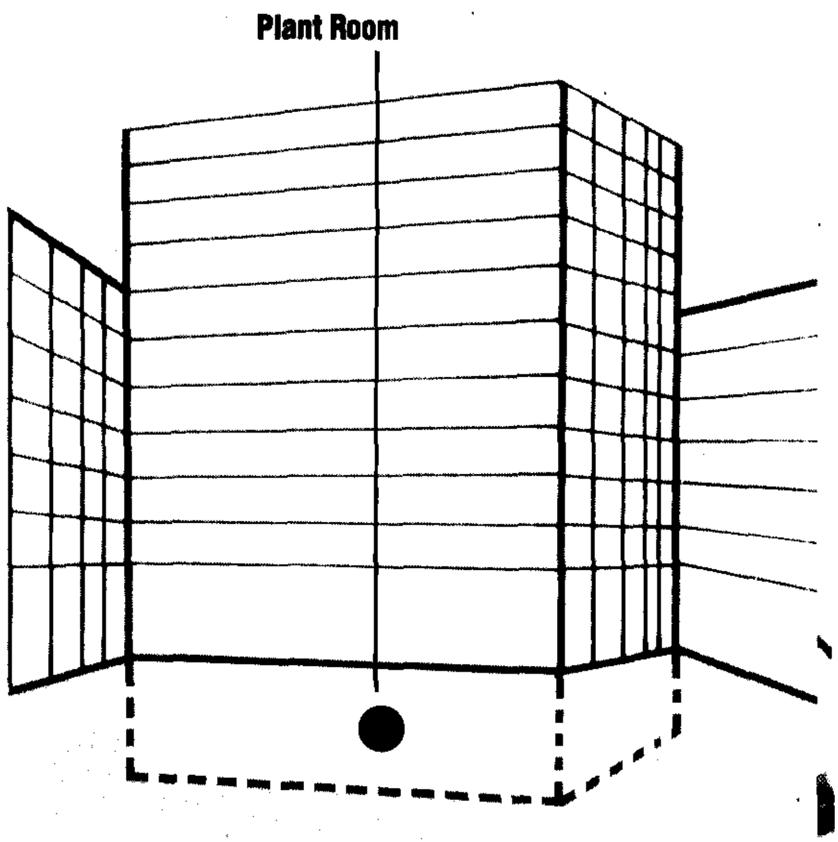
The Relief Valve Assembly:
This assembly is mounted on its own backplate and includes a three-way valve, two relief valves, a High/Low pressure switch and a transformer.



Features and Benefits

- **A TRULY FULLY AUTOMATIC CHANGEOVER**
  The system is a fully automatic changeover and does not require any further manual adjustment or calibration after replacement of an empty cylinder bank.
  The system is totally fail safe, in the event of a power failure gas supply and changeover still continues. The system fully reinstates on replenishment of full cylinders and power supply.
- **INCORPORATES IN-LINE FILTERS**
  Upstream of each of the regulators the MCS.1 incorporates an in-line filter, thus enhancing patient safety, regulator performance and reliability.
- **INCORPORATES IN-LINE VALVES**
  Downstream of each of the regulators the MCS.1 incorporates an in-line ball valve to facilitate maintenance/replacement of cylinder tailpipes, filter and regulator without interruption to the supply.
- **INCORPORATES A LINE PRESSURE HIGH/LOW ALARM**
  The MCS.1 incorporates an integral visual, high, normal and low line pressure alarm.
- **ELECTRICS ARE TOTALLY SEPARATE FROM THE GAS STREAM**
  A significant safety feature is that the MCS.1 has its electrics remote from both the cylinder and distribution gas streams and that the instrumentation electrics are at a safe 12 volts d.c.
- **STATE OF THE ART – ELECTRONICS**
  Electrical power input can be either 240 volts standard or other voltages, which is transformed down to 12 volt dc for panel operational purposes. The MCS.1 has only one single printed circuit board incorporating high intensity long life LED's, which altogether reduces running costs, enhances safety, simplifies maintenance and increases reliability.
- **EFFECTIVE PRESSURE RELIEF**
  The MCS.1 incorporates two pressure relief valves each capable of dealing with failure of both line regulators, to ensure that even the worst circumstances are adequately covered. Valving allows each relief valve to be accessible for maintenance/replacement whilst maintaining system protection via the other relief valve.
- **SIGNIFICANT MAINTENANCE FEATURES**
  Only two main line regulators both of which are identical.
  No change-over valves and associated piping.
  Only one Printed Circuit Board.
  Fewer major components.
  Maintainable without interruption to the main supply, even allowing complete removal of the control panel itself.
- **HIGH FLOW RATE CAPABILITY**
  When the regulators are set at minimum flow and a pressure drop allowance of ± 2 p.s.i. across the regulator, a flow rate delivery of 2000 litres per minute is easily achieved.
- **THE MCS.1 CAN BE REMOTELY SITED**
  Since the monitoring panel and relief valve panel are not part of the actual distribution system, they can be located elsewhere simply by running small bore copper impulse lines.
- **THE MONITORING PANEL IS SEPARATE FROM THE GAS STREAM**
  A significant maintenance and safety feature whereby the actual control system is not part of the main stream, giving benefits in economics, reliability, compactness, and is easy to maintain.
- **ALARM CONDITIONS AND CONNECTIONS**
  The MCS.1 incorporates visual indications of each cylinder bank condition, i.e. full or empty. The control panel mimics normal plant alarm requirements thereby eliminating the need for a separate plant room alarm. The control panel incorporates a volt free contact block for connection to remote alarms.

Recommended Location



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BOC Medishield Pipelines is just one of the group companies contributing to the world health care market and specialises in the business of product and systems design, supply, installation and maintenance of piped medical gas and vacuum distribution in hospitals, clinics and laboratories.

Note to specifiers

A cylinder manifold control panel shall have a totally automatic changeover from running to reserve and a flow rate capability of up to 2000 1/m at STP. The unit shall incorporate in-line filters, valves and twin pressure relief valves arranged to suit simple maintenance of all major components. Electrics shall be separate from the main gas stream and be a maximum of 12 volts dc for instrumentation. The unit shall incorporate visual alarm indications of the operating state of each cylinder bank. Volt free contacts shall be provided to permit connection of remote alarm signals, with indication provided on the panel itself. The panel shall usually indicate if an emergency is of either high or low line pressure.

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