The Journal of the Institute of Hospital Engineering September 1982

HOSPITAL ENGINEERING

International Federation Issue

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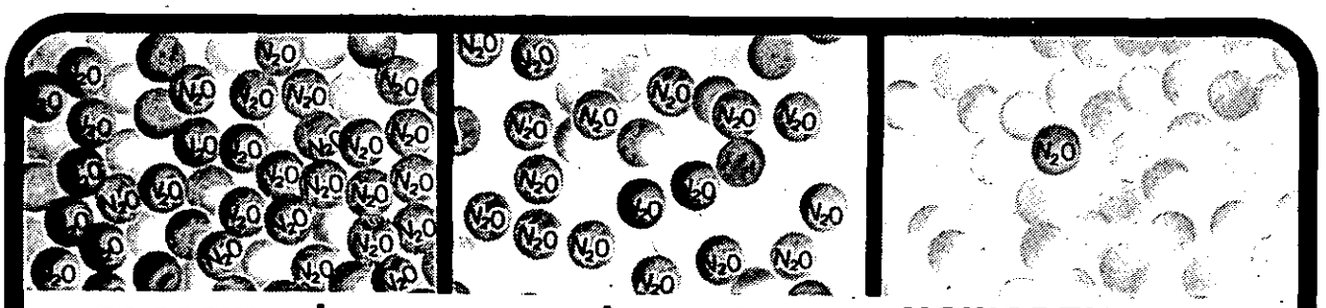

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HOSPITAL ENGINEERING

The Journal of the Institute of Hospital Engineering
and of
The International Federation of Hospital Engineering
I.F.H.E.

Contents

Volume 36 No. 7 **September 1982**
International Issue No. 43

Front Cover: Testing a washing machine at Salisbury Hospital. *Photo Courtesy of Electrolux-Wascator.*

News

Falfield Course a success

The recent International Seminar for Senior Hospital Engineers held at the Hospital Engineering Training Centre at Falfield in Gloucestershire was a great success.

The Institute has received two messages from enthusiastic participants, which are reproduced below — the second, from Mr Khadair, was on a Postcard from Paris!

I write to express my thanks as a delegate on the recently concluded International Seminar for Senior Hospital Engineers. The seminar was a most useful one. A tremendous volume of work was done in the relatively short time of three weeks. I have emerged with a wealth of new ideas, of which many will be of definite value in improving the health care service in my country. A very useful and interesting feature was the up-dating sessions. The laboratories are well equipped and well laid out.

I wish also to compliment your office and domestic staff for the excellent job of making my short stay at this complex most enjoyable and memorable. The facilities available were of a high standard. Please convey my sincere thanks to your staff.

It was also a fine opportunity to meet and make friends with some of your fellow people and also the delegates from other parts of the world. My profound thanks goes to Messrs. R Body, K Eatwell, D Chaplin and the several other contributors whose sessions were most interesting. I would therefore like to wish all success to your future seminars.

From Kissoon Manod, Engineering Department, Ministry of Health & Environment, Trinidad.

Best regards to all the staff who made so much effort into making our stay at Falfield one of the best I have ever spent in Great Britain.

From Osama Abu Khadair, Riyadh, Saudi Arabia.

Leslie Davies retires

Leslie Davies who retired recently was born in Pontardawe, South Wales in 1918. He was educated at Dynevor School, Swansea and Swansea Technical College and served his apprenticeship with Richard Thomas and Baldwins at Grovesend Steelworks, Gorseinon.

After a short period of service with Royal Engineers in 1939/40, he worked with the Armaments Research Department until 1945.

He was elected a member of the Institute of Mechanical Engineers 1944.

After the war he joined United Steel Companies, Sheffield, as an Engineer in the Development Department. He subsequently returned to South Wales as Assistant Chief Engineer, Panteg Steelworks and later became Services Engineer at Trostre Works, Llanelly, from 1952/57.

He entered the Hospital Service in 1957 as Chief Engineer at The London Hospital and was elected a Fellow of the Institute of Mechanical Engineers in 1962.

He moved to Westminster Board of Governors as Group Engineer in 1967, where he stayed until his appointment as Area Works Officer for Hillingdon in 1975 from which post he retired recently.

He served on the Council of the Institute Hospital Engineering, and has been Chairman of the London Branch since 1978.

No News is Good News?

We are sorry not to be including any reports from member Countries of the IFHE in this quarter's International issue, but it is for the good reason that we have not in fact received any this time — perhaps because earlier International issues this year contained quite a high number.

Whether regular or occasional, reports are always welcome, and should be sent to the Editor to arrive at least one month before the date of the issue — for example, by the end of October for the December issue.

Welsh Branch Activities 1981/82

During 1981/82 the Welsh Branch saw the completion of a successful programme of meetings and visits, under the active chairmanship of Mr Brian V Williams. There was a gratifying increase in attendances perhaps due in some part to the interest aroused by the programme content.

A good start was made on 16th September, 1981, when Mr John Kenward, Hon Secretary, South Wales Group, Great Western Society, gave a talk and slide presentation entitled "Return to Steam on British Rail". The authority of the speaker on his subject and the excellence of his photographic slides ensured a most enjoyable evening. Mr Kenward is well known not only for his active interest in steam locomotives and railways in general but also as a member of the Branch and as Assistant Area Engineer, East Dyfed Health Authority. The venue for the meeting was the Ambulance Training School, Bridgend, kindly made available by the Mid Glamorgan Health Authority.

An afternoon meeting held at the University Hospital of Wales, Cardiff, on 15th October was well attended. The subject "Air Filtration in air conditioning" was ably presented by Mr Brian Huthwaite of AAF Ltd. In thanking the speaker for this informative talk and demonstration the Chairman, Mr Brian Williams, referred to the attendance which confirmed the Branch Committee's view that afternoon meetings had a place as a regular feature of the annual programme.

On the evening of 18th November a strong contingent of members made a visit to the new Crown Buildings, Cathays Park, Cardiff. This interesting building complex was commissioned comparatively recently and houses our friends of the Welsh Office. The visit, which was arranged thorough the Property Services Agency, Department of the Environment, commenced with an introductory presentation given by the engineering consultants, McCann and Partners, responsible for the project and who continue to be involved in the early years of running the engineering services. Space does not allow us here to elaborate on the content of the building but it must be said that members were impressed by the inovation and quality of the engineering plant and installation contained within the imposing architecture. The Branch is indeed grateful to all concerned with making this enlightening visit possible.

After the cancellation of a meeting in January due to the great snows which hit us in early 1982, the programme was resumed on 4th March at Nevill Hall Hospital,

Abergavenny. A panel consisting of Mr Peter Jackson, Area Engineer, South Glamorgan Health Authority, and Mr R R Morgan, Principal Assistant Engineer WHTSO, as Chairman, spoke on the subject "The use of Microcomputers in the Hospital Works Department". Unfortunately attendance at this meeting was a little disappointing. However all those present contributed to an enjoyable discussion and many will have missed an informative and realistic view of the use and pitfalls of investment in computers within the works organisation.

Although held on April 1st the meeting at Cefu Coed Hospital, Swansea, on that date was highly successful. Mr K K Williams spoke on the subject "The Design and commissioning of air conditioning plant in hospitals". Mr Kelvin Williams who is well known as the Principal Assistant Engineer (Commissioning), WHTSO, has gained extensive experience of the problems associated with the design and setting to work of such engineering services. It was also clear that considerable time and effort had been put into his well presented talk. He also dealt in an informative manner with a series of questions. Clearly this meeting had aroused substantial interest and it was good to see a worthy number of Swansea and West Wales members in attendance.

On April 19th the Branch made an afternoon visit to the Ely, Cardiff, paper mill of Wiggins Teape (UK) PLC. After an enjoyable buffet lunch and introductory talk members were conducted around the plant where the main production is carbonless paper. Although papermaking has continued on the site for over a hundred years the present plant is modern and incorporates a great deal of new technology. Members expressed their appreciation of both the hospitality provided and the insight into the production process.

Forthcoming Branch Meetings

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

11th September, 3 pm	Natural Gas Production & Distribution	Southampton General Hospital.
25th November, 1.30 pm	Visit to Fawley Refinery	

East Anglian Branch: *Hon Sec: M. Brooke Great Yarmouth (0493) 50411*

25th September	Energy Mangement Systems Presentation by Transmitton	Kings Lynn District General Hospital
12th October	Visit to Linby Colliery, Nottingham	

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

28th September	Energy System by Transmitton	East Birmingham Hospital
19th October	"Design Parameters and Application of Air to Air Heat Pumps" E.G.A. Godall Esq. Trace Heat Pumps Ltd.	West Midlands RHA

London Branch: *Hon. Sec: P. C. Vedast London (01) 807 7340*

14th September 6.30 for 7 pm	Computer Aided Design	Wolfson Lecture Theatre The National Hospital
23rd November 6.30 for 7 pm	Optimum Energy Usage	Wolfson Lecture Theatre The National Hospital

North Western Branch: *Hon. Sec. E. A. Hateley Manchester (061) 236 9456 ext 452*

19th October	Visit to the Greater Manchester Fire Service Headquarters. Tour of the new Control Room and talk by the Fire Officer.	

Yorkshire Branch: *Hon. Sec: J. Bate Wakefield (0924) 89011 Ext 293*

27th September 7.30 pm	Heat Pumps — Principles and Benefits. A presentation by the Yorkshire Elec- Electricity Board. This is a joint meeting at the invitation of the Institution of Plant Engineers.	Holdsworth School of Science, Clarendon Rd, Leeds University.

Scottish Branches Conference: *Hon. Sec: T. M. Sinclair Glasgow (041) 332 9696*

3 Morven Way, Kirkintilloch, G66 3QL

28th, 29th and 30th October	Information Technology Year 1982	Walton Conference Centre Southern General Hospital Glasgow.

Those wishing to attend any of the above meetings please contact the relevant Local Secretary.

A full agenda was dealt with at the Annual General Meeting held on 22nd April at University Hospital of Wales, Cardiff. The meeting was less well attended than usual nevertheless active discussion ensued on a number of topics.

The officers elected for 1982/83 are:

Branch Chairman: Mr David Hackett
Vice Chairman: Mr Peter Jackson
Hon Secretary: Mr Tom Roche
Hon Treasurer: Mr John Burton

The following members were elected to the Committee
Messrs. R R Morgan, J Jackson, M Back, R Long, B V Williams, D Griffiths, F Beavan, T Gleeson, P Stockford, R Parsons.
Mr E A Johnson retains office as Area Member of Council.

The Branch is grateful to Mr Brian Williams for his leadership as Chairman over the past year and he continues to serve as a member of the Committee. The Chairman for the ensuing year is Mr David Hackett CEng FIMechE MCIBS, (Fellow) who is well known generally as the Regional Associate (Cardiff) of W S Atkins and Partners and, to Branch Members, as an active member of the Committee over recent years.

The Branch is also grateful for the work undertaken by Mr Delme Griffiths who relinquishes the role of Scribe after five years. Mr Griffiths will continue to serve as assistant to Mr Tom Roche who takes over as Hon. Secretary.

The new Secretary

As will be seen within the Report of the activities of the Welsh Branch, Mr. Thomas Roche has now taken over the duties of Honorary Branch Secretary. His address is: 1 Forest Close, Cymdda Sarn, Nr. Bridgend, Mid Glam. his office telephone number being Cardiff (0222) 755944 ext 2247/8.

We must take the opportunity to record appreciation for the efforts of Mr. Delme Griffiths, who has acted in this capacity over the past five years.

Ken Eatwell

Our apologies to Ken Eatwell, wrongly described in the August issue (page 4) as having retired from the Council.

Ken did of course retire earlier this year from his post of Regional Engineer to the South-West Thames RHA, but is still very much a Council member, having indeed been re-elected at the AGM held in May.

Book Review

Tecnologia de Unidade de Internamento Hospitalar

The Technology of the Hospital Nursing Unit

Eduardo Caetano

Eduardo Caetano, former President of the International Federation of Hospital Engineering, has recently published his book "The Technology of the Hospital Nursing Unit". The following is a brief summary of the main chapters. Professor Caetano is currently working on a study of the problems of centralisation in hospitals.

The book is published in Portuguese, but there is a useful summary at the end of each chapter in English (reproduced here by kind permission of Professor Caetano), French and German.

Chapter 1—The Hospital Nursing Unit. A patient's attitude towards the hospital in general and the Nursing Unit in particular is dealt with briefly. For example, how a patient faces the hospital as a whole and his behaviour inside the Nursing Unit where he lives for a while. The ideas are either convergent or divergent and sometimes lead to a controversy, showing that this matter is full of vitality.

A brief terminology of the Nursing Unit in Portuguese, Spanish, French, Italian and English is indicated.

Different approaches to a definition of the Nursing Unit by several authors although showing their professional training have two basic aspects in common — the installations needed and the role of the nursing staff.

Chapter 2—Fundamental aspects of the Nursing Unit. Some basic aspects concerning the Nursing Unit technology are dealt with in this chapter. Such as: the Nursing Unit as a part of a hospital; its dimension; the open ward; single rooms and wards; the organization of care in a Nursing Unit; the problem concerning the outpatient department — teaching — research and the Nursing Unit; supplying the Nursing Unit; centralizations at the Nursing Unit level; and its personnel.

These are fundamental aspects to the study of the following chapters. In fact some options taken will constitute parameters upon which the study of the composition, programme and project of Nursing Units can be developed.

Many authors are cited in order to offer a wide spectrum of opinions on the matters studied and as a pool of information.

Chapter 3—The Nursing Unit components. The composition of the Nursing Unit is determined by its daily activity, its aim being to take good care of patients and to achieve greater efficiency in the work done there.

The design of the Nursing Unit must allow the greatest functional flexibility, because this is one of its main features nowadays.

Since the structure of the Nursing Unit is based upon its principal sectors, their relative position is most important in order to achieve functional efficiency.

The components of an 'ideal' Nursing Unit, as well as those of minimal

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composition (less expensive but adequately functional) are indicated in a systematized form.

Some special cases such as that of a hospital where teaching and research have strong implications in the composition of the Nursing Unit are dealt with.

Several examples of Nursing Unit compositions from different countries will enable a comparison in order to find an adequate solution, both functionally and economically.

Chapter 4—Detailed study of Nursing Unit components. The different components that integrate a 30 bed Nursing Unit are studied in detail regarding both functional aspects and dimensions, site, equipment and engineering services.

The components are: single rooms; wards; patient toilets; nurses' station — utility room — nurses' office; assisted patient bath — personnel toilet; dirty room; examination and treatment room; special examination room; clean linen; day-visitors room; dining room; pantry; pharmaceuticals and sterilized bandages room; doctors' offices; secretariat store for materials; other components (plaster room, family room, meeting room, etc.) stores and general toilets.

The text is accompanied by a large number of drawings.

Chapter 5—Special Nursing Unit programmes. This chapter studies the programmes of Nursing Units concerned with intern medicine in district and teaching hospitals; paediatrics and obstectrics in a district hospital; contagious diseases in a central hospital; acute psychiatry in a general hospital; burns and renal dialysis in a central hospital; and district intensive care unit.

These programmes correspond to theoretical compositions able to satisfy the normal functional requirements, although within tight economic constraints. The temptation to make the programmes too large was avoided.

Several examples of programmes from other countries, as well as different ideas from other authors contribute to the better understanding of the subject.

Chapter 6—The Nursing Unit Project. Detailed knowledge of its function is necessary to design an adequate Nursing Unit project. The everyday running of a Nursing Unit involves the locations, using equipment and using goods, with the help of personnel and following an established procedure. The following matters related to Nursing Unit projects are dealt with: location; structure; the standardization of a Nursing Unit; architectural design; Nursing Units and in-patient services; localization in the hospital; circulation and communications; orientation and environment.

Chapter 7—Building elements for Nursing Units. Some of the most relevant aspects concerning hospital building, specially related to Nursing Units, are dealt with. Environment and building (natural illumination and ventilation, temperature, noise, floors, ceilings, and walls). Decoration (colours, curtains, carpets, furniture, paintings, etc.). On a broader scope, reference is made to building concepts and methods due to their direct implications on Nursing Unit technology.

Chapter 8—Equipment. Only basic and particularly relevant equipment in a general Nursing Unit such as beds, trolleys and the bed-pan washer are taken into consideration.

A system integrating five groups of equipment (electro-mechanic or industrial, sanitary, hotel, medical and miscellaneous equipment) is considered.

Maintenance of equipment is also discussed.

Chapter 9—Engineering services. Over the years the importance of the engineering services has been increasing continuously and particularly so lately. Engineering services have to supply an ever greater number of more complex and sophisticated equipment, to produce better, more comfortable environment for patients and personnel, to perform tasks and to help personnel to make work more easier.

Some reference is made to electrical supply and distribution, lighting, emergency supply, socket outlets, telephones, patient/nurse call systems, TV, radio, electric clocks, fire alarms, centralized control, ventilation, heating, air conditioning, compressed air, vacuum, oxygen; steam supply, hot and cold water, and sewerage.

Some remarks are made concerning the fundamental role of maintenance of the engineering services.

Chapter 10—Comfort in the Nursing Unit. Comfort in the Nursing Unit, mainly of the patients, but also of personnel, has become a matter of great concern lately.

Some thinking is dedicated to the meaning of comfort and its evolution; physical and spiritual comfort; the human environment (patients, personnel and visitors); how the building and equipment affects patients; the hotel side (concerning food and linen) of a hospital and the patient; and the hygiene in the Nursing Unit as a source of comfort to patients.

Chapter 11—Safety in the Nursing Unit. Lately greater attention has been paid to safety in hospital. Although other parts of a hospital are more liable to safety problems, such as the boiler house or the laboratories, nevertheless it is important to consider them at the Nursing Unit level for the protection of the patient.

The following causes of accidents are examined: fires, earthquakes, electricity, medical gases, causes of burns, poor design, cross infection, ionising radiation and errors in medication. Adequate information is very important both for patients and personnel.

Chapter 12—The evolution of the Nursing Unit in Portugal. The evolution of the Nursing Unit in Portugal followed the contemporary European pattern. In Renaissance times, strong ties linked Portugal to other countries, especially to England, France, Italy and the Netherlands, mostly via maritime connections, allowing the country to follow their progress closely.

In ancient times it was difficult to separate the infirmary (or ward or Nursing Unit) from the hospital itself. Later the ward (or hospital) included a few auxillary rooms. The hospital then integrated several wards and a number of complementary installations. Following the Renaissance, hospitals started diversified programmes, although big wards were still there.

In the 19th century some small wards appeared in hospitals although Florence Nightingale favoured big (28 to 32 patients) open wards.

Early in the 20th century new hospitals were designed accordingly to a concept of 'autonomous' Nursing Units.

It is impossible to predict how Nursing Units will be in the future, although they won't be substantially different from the existing pattern.

This article first appeared as a paper given at the Institute of Hospital Engineering Symposium on Hospital Linen Services. The author is from the Directorate of Works Operations at the DHSS.

Planning Laundry Services

R R SPOONER MIWM AMBIM AECC

In planning laundry services it is essential to establish as accurately as possible the current and future demands, ie the workload, to consider this against available resources, and if a shortfall exists, to examine the alternative ways of satisfying the demands at the most economic cost. As Engineers, you will without doubt be involved in a planning exercise considering the building of a new hospital laundry, upgrading an existing laundry, or adopting alternative methods of providing the service.

The planning and building of a new hospital laundry must fit into the overall NHS planning framework, viz 'Capricode', which is the sequential system covering the planning and processing of individual health projects from concept to evaluation in a series of inter-connected stages.

The stages in order, are as follows; Outline Project Intentions, Planning, Design, Contract and Construction, Commissioning and Evaluation. All Health Authorities are required by statutory direction to follow the Capricode sequential system, and the cost control procedures laid down as part of Capricode.

Briefly in stages 1 and 2, 'the functional content' is settled in the light of the service need to form a budget cost from the sum of the Departmental Cost Allowances for the specific function, professional fees etc, plus the 'on costs', ie the cost of putting the building on a specific site.

The Departmental Cost Allowances are laid down by DHSS; and as the basic principle is that 'design should follow cost', authorities are charged with designing and building within specified limits.

Capricode procedures although based on a solid professional foundation were felt to be in some respects cumbersome, particularly in the time taken to process submissions. Following a joint NHS/DHSS review, it was felt that early Capricode decisions should be more closely integrated with strategic planning, and that the Capricode 1G submission should be replaced by a formal requirement to seek approval to a development in principle, before detailed design work was commenced.

The "Review of Health Capital", published by the DHSS in 1979, expressed the need to appraise investments in the NHS more thoroughly and systematically. These new arrangements for the 'Approval and Control of Building Arrangements' are laid down in HN(81)30 dated October 1981, and are supplemented by details on the appraisal of options in HN(82)19, dated May 1982, and

Sommaire en Français

La planification des services de blanchisserie

R R SPOONER

Dans son article, M. Spooner s'adresse aux ingénieurs entreprenant un exercice de planification portant sur la mise en place d'un système de blanchisserie d'hôpital. Au Royaume-Uni, toutes les directions de santé sont contraintes par des directives statutaires à suivre le système séquentiel Capricode, mais d'aucuns pensent que cette procédure prend trop de temps et l'on suggère qu'il conviendrait qu'elle soit plus intégrée avec une planification stratégique.

Une fois que l'on a établi la nécessité de développer un service de blanchisserie, il faut déterminer la quantité de travail aussi précisément que possible. Les ingénieurs doivent alors examiner les diverses options qui les confrontent et M. Spooner suggère qu'une simple démarche consiste à séparer les possibilités offertes par le traitement à l'hôpital même et les options commerciales.

L'élément crucial dans l'évaluation des options offertes par le traitement à l'hôpital même consiste à examiner aussi précisément que possible la capacité potentielle des blanchisseries actuelles de l'hôpital en utilisant les critères des normes connues de productivité dont on dispose. Là où l'on pense qu'il est nécessaire d'améliorer les facilités existantes, il faut non seulement examiner la capacité potentielle mais aussi évaluer les possibilités de développement exploitables. Si l'on décide de construire un système de blanchisserie entièrement nouveau, il faut estimer les frais d'exploitation de l'installation en tenant compte de la politique opérationnelle.

L'option commerciale implique la fourniture des services de blanchisserie en s'adressant à des organisations en dehors du Service de Santé. Il est indispensable dans ce cas que la viabilité de l'option commerciale soit considérée sur la base des coûts avant d'entreprendre des dépenses d'équipement majeures pour la construction d'une nouvelle blanchisserie ou une amélioration majeure de facilités existantes. Les coûts des options commerciales s'obtiennent au moyen des procédures habituelles d'appels d'offres et l'on doit fournir le maximum de renseignements possibles en ce qui concerne les conditions du marché. Il convient de comparer les offres commerciales sur pied d'égalité avec l'option des services à l'intérieur même de l'hôpital. Il faut référer tous les coûts pertinents et connexes de chacune des options à une base de temps commune en calculant un coût annuel équivalent.

D'une manière générale, l'auteur suggère qu'il convient de choisir l'option donnant le coût le plus bas possible mais il est possible qu l'on doive considérer des factuers autres que le coût. La continuité d'un service de blanchisserie/lingierie adéquat est d'une importane vitale pour le bon fonctionnement de n'importe quel hôpital.

M. Spooner termine son article en suggérant que l'on a besoin manifestement d'un nouveau document de politique opérationnelle concis pour les arrangements de travail dans la blanchisserie. Ce document s'avèrera également utile durant les phases de mise en service et d'évaluation de la nouvelle blanchisserie.

titled "Health Service Management, i. Appraisal of options in the NHS, and ii. Contributions in lieu of Rates."

Some of the changed arrangements which vitally affect the initial planning stages of a proposed capital investment in providing laundry facilities are as follows:

1. Approval in principle for building developments should be sought at an early point of planning once enough information has been assembled to allow the responsible Authority or Board to decide that it prefers one option above all others.
2. The choice between options should be made as explicit as possible and public.
3. The quantifiable benefits of each option should be set down, and to ensure comparability of options the costs should be converted to an equivalent constant annual sum. The most convenient way of doing this is to use the Present Worth discounting technique, taking into account the capital and revenue costs of each option to produce an equivalent annual charge.

A prerequisite to the planning process is to establish the need for the development of the laundry service. This could arise from an increased demand, eg generated by a new DGH; an approach to rationalisation, ie the closure of some small uneconomic laundries and their replacement by a larger laundry of modern design with reduced operating costs; the need for high capital expenditure to replace machinery or repair buildings, in an existing laundry. In some cases an appraisal of alternatives may be needed to see whether the existing laundry service can be provided at a lower cost. Having established the need, the workload must be determined as accurately as possible. If local statistics are available these should be used, bearing in mind that if the current laundry service is inadequate due to insufficient provision of present laundry facilities, an increased demand will result.

If accurate local information is not available, recourse to Health Building Note 25. Laundries may be helpful, and the guidance therein on laundry articles per type of bed used.

The need having been established, and quantified, the relative merits of the various options, or alternative ways of filling the need, must be examined. A simple approach is to separate the options into In House Options, and the Commercial Laundry Option.

In House Options

1. Maximum utilisation of present facilities.
2. Upgrading existing facilities.
3. Building a new laundry.

1. The first choice of the in house options should always be the maximum utilisation of the present available laundry facilities. A parochial attitude should be avoided as this may lead to an expensive duplication of resources. Spare capacity in other hospital laundries within an economic distribution/transport area should be utilised whenever possible, and the project should fit into the Region's strategic Laundry Policy, which RHAs were asked to decide, in concert with AHAs, in HC(76)51 — "Health Services Management — The Laundry and Linen Service", dated December 1976.

The key to this exercise is to assess accurately the potential capacity of the existing hospital laundries under consideration, using available criteria and known norms of productivity, and not to accept blindly the present output of those laundries as representing the potential capacity.

Useful guidance material is contained in DS 157/74 — "Regional Plans", and the "First Report of the Advisory Committee on Laundries — Technical Guidelines for the Planning of NHS Linen Services and Laundries." The specialist advice available from the Linen Service Manager member of the project team, or subgroup will be invaluable.

2. Upgrading Existing Facilities. This involves not only assessing the potential capacity of the existing resources of a laundry, but also assessing its exploitable development potential. The upgrading of an existing laundry is very often a viable option, particularly where the existing building and services are adequate for the increased throughput. As a generalisation, the departmental costs of building a new laundry can be split into about 60% engineering plant and services, and about 40% building costs, to which must be added the oncosts associated with the project. For a laundry these are usually about 20%.

Upgrading an existing laundry without excessive building, or major extensions to services, can result in spending only about 50% of the cost of building a new laundry to handle the same volume of work.

The revenue consequences of upgrading the present production facilities should be taken into account in the cost appraisal of this option.

The replacement of obsolete low productivity machinery with modern high output plant, coincident with improving the production floor layout and flow lines, can result in higher output per unit floor area, and increased operator output, with resultant lower laundering cost per article.

The replacement of older type plant with its associated high services consumption, with modern plant incorporating energy conservation features can result in decreased services costs, as well as decreased labour requirement.

3. Building a new laundry — capital expenditure. For initial appraisal of options once the required capacity has been established, and the working pattern of the laundry agreed and set down in an operational policy document, a budget cost can be calculated.

Guidance is available in Health Building Note 25 — Laundries, Hospital Equipment Note 25 — Laundries, and in conjunction with the Departmental Cost Allowance Guide, the cost limits for the project can be calculated, to which must be added the estimated oncosts attributable to the chosen site.

The revenue consequences ie the running costs of the new laundry must be estimated taking into account the operational policy, and this is another aspect in which the expertise of an experienced Linen Service Manager should prove invaluable to the planning engineer.

The Commercial Option

The Commercial Option is the provision of the laundry service from outside the Health Services; either commercial laundries or prison laundries. It is absolutely essential that the viability of the commercial option be considered on a cost basis before major expenditure of capital on building a new laundry, or a major upgrading of an existing facililty.

Policy was clearly expressed in a letter from the Minister for Health to Health Authority Chairmen, dated August 1981, which "urged any Authority contemplating large scale expenditure on a laundry to consider the commercial alternative before deciding". In the past, new hospital laundry schemes were monitored by the DHSS under casework procedures

at Capricode stage 2, but with the revision of the delegated capital expenditure limits, the mantle of responsibility for ensuring that all available options, including the commercial option, are considered and subjected to the appropriate financial appraisal, has fallen onto the shoulders of the RHA.

Tendering Action

The cost of the commercial option are obtained through normal tendering procedures. The names of commercial launderers willing to service the particular volume of work can be obtained from the Laundry Industries Trade Association, although it must be noted that not all commercial launderers are members of the Trade Association. An alternative is to advertise in the relevant trade journal for companies willing to tender.

It is extremely important that the tenderer be given the fullest information concerning the contract requirements; the volume of work by classification for each delivery address and the turn round time for each category; theatre linen, ward linen etc. The DHSS is consulting with the commercial launderers trade association to obtain agreement on a model laundry tender document, which it is hoped to send in the near future to Health Authorities for guidance, and as the basis of documentation for tender submissions, suitably amended where necessary to meet local variations in requirements or practices. The timing of tender action is very important, particularly when seeking tenders for the commercial option as an alternative to building a new hospital laundry, which may not be operational until two or three years hence.

The tenderer must be informed of the possible starting date, and should not be left in the dark for an excessively long time regarding the results of tender action. One RHA desiring to notify tenderers within about six weeks of the tender closure date, is seeking whenever possible to go out to tender a month or so before the costs of the 'inhouse' options are ready, so that the appraisal of options can take place reasonably quickly, and timely decisions reached on the choice of option.

Commercial tenders should be sought and compared on an equal basis with the in-house service option. The commercial launderers must be willing to undertake the processing of foul and infected linen in the manner recommended by DHSS in HM(71)49 — "Hospital Laundry Arrangements", and the turn round times should preferably be the same as the hospital laundry service for the particular classification. Extended turn round times may involve the Authority in expenditure on the injection of extra linen circulation stocks. The criterion should be, "Equal Basis" — no more — no less.

The Cost Appraisal of Options

All the relevant and related costs of each option must be quantified, and the comparison should be on the basis of equal service, or if not the difference in service must be clearly identified and the cost benefit, or penalty, costed. All option costs must be brought to a common time base by calculating an equivalent annual cost for each option.

Some points to be noted in the costing of the various options are as follows.

Upgrading

The capital expenditure involved is known, but whereas the capital expenditure for machinery and services is normally costed on the basis of a 60 year life for the laundry when building as new, the present worth calculation on an upgrading must be based on the remaining life of the building. The revenue consequences, ie the operational costs of the present laundry are known and can be obtained from the Laundry Cost Form 16, but the changed revenue consequences following upgrading must be forecast taking into account any labour and energy cost savings resulting from the upgrading.

It should be borne in mind that Cost Form 16 covers the basic operational costs only as regards salaries, wages, bonus payments, materials, engineering maintenance, and water, steam, gas and electricity services, and if the total future costs of operating the laundry service are required, there are further costs which also need to be taken into account. For example; Building Maintenance, Rent, Rates, Administration Charges, Transport and Depreciation of the remaining plant and equipment.

Building a new Laundry

As engineers involved in laundry planning and design, you will be familiar with the Present Worth calculations necessary to form the Equivalent Annual Cost of the capital expenditure involved in building new, and the accuracy of the final cost calculation should be in the order of plus or minus three to five per cent.

Forecasting the revenue consequences is much more difficult, and the expertise of the other professional members of the project team is necessary to formulate as accurate a cost as possible based on the agreed operational policy for the new laundry.

It is essential that the future work load of the laundry must have been estimated as accurately as possible as any shortfall in the planned output will result in increased unit costs, since many overhead costs cannot be reduced pro rata with volume throughput.

Estimating future revenue consequences can be something of a "crystal ball" exercise unless extremely careful consideration is given, and the resulting accuracy may well be in the order of plus or minus 10%. The importance of accurate forecasting is highlighted by the realisation that during the sixty year life of the building, the revenue consequences may be up to 15 times greater than the capital investment involved.

The Commercial Laundry Option

The consequential costs of a commercial contract must be considered and added to the contract charge for laundering in order to calculate the real cost of this option.

A commercial contract has to be managed, administered and monitored, and these costs must be estimated and added to the laundering charge. Usually the commercial contractor will collect from and deliver in bulk to the hospital site, and the distribution to the wards and departments together with the control of the linen stocks and the condemnation, repair and replacement of linen, will be operated from a linen room and sewing room.

These functions are included in the design and allowable cost limits for a new hospital laundry, and the supervision and some staffing costs plus heating and lighting included in the laundry revenue costs. If these facilities have to be provided for the commercial option, the capital and revenue consequences must be calculated and added to the commercial contract cost. The provision and

replacement of soiled linen containers, and in some cases, containers for clean linen, may be the responsibility of the Authority and if this is the arrangement then this revenue cost must be included. VAT can be excluded from the commercial option costing as this is now recoverable by the Authority. The consequential effects of changing an existing option, or the costs of discontinuing the present operations, must be assessed and these costs included in the option appraisal. For example, if the closure of an existing laundry is being considered, possible staff redundancy costs (which can be extremely high if long service staff are involved), and any subsidised travel expenses of transferred staff, must be included in the option costing.

The true effect upon the total costs of elements which the Authority cannot shed if the contract option is adopted, must be evaluated. For example, if laundry work is contracted out but an existing boiler plant serving both the laundry and hospital must continue in operation to serve the hospital, only the fuel element out of the total steam costs will be saved and the other elements will remain to be borne by the Authority.

Generally the lowest cost option should be chosen, but factors other than cost may have to be considered by the Authority as a policy decision. The continuity of an adequate linen/laundry service is vital to the operation of a hospital. The Authority must be convinced of adequate laundry service within the terms of the agreed contract, and in the event of the contractor defaulting an alternative laundry service at around the same price level will be available.

It must be remembered that if an Authority is forced to plan the provision of its own in-house facility in the future, the lead time from planning inception to commissioning could be in the order of 2 to 3 years.

Also the financial effects of an outside contract upon the revenue budgets of an Authority, may have to be considered against the reduced revenue consequences resulting from the expenditure of capital (if available) on an in-house option.

The Laundry—Operational Policy

I have mentioned the need for drawing up a clear and concise operational policy document for the working arrangements of a new laundry. This must be done in the initial planning stages to form 'the client's brief for communicating his requirements to the designer'. Planning is a multi-disciplinary exercise, and nowhere is this more evident than in the formulation of the Laundry Operational Policy where the expertise of all the professionals on the project team or sub-groups must be utilised. To design and plan the equipment needed in a new laundry not only must the required capacity be known, but also the breakdown of the types of work and the operating pattern, finishing methods, etc.

The operational policy document will also be useful during the commissioning and evaluation stages of the new laundry. Any failure to achieve the planned output can be assessed against shortcomings in the original brief and design intent, failure of items of equipment to perform to the specified levels, inability of the management to exploit fully the potential, or to changes in the amount, type or character of the workload since the original brief was prepared.

Laundry Operational Policy

Some of the points which should be covered in a Laundry Operational Policy are as follows.

Part A General

1. Introduction.
2. Siting of Laundry.
3. General Administration.
4. Management and Supervision structure.
5. Clerical Support.
6. Staff breaks, meals etc.
7. Staff establishment.
8. Working hours.
9. Laundry records.
10. Maintenance, cleaning of laundry building and plant etc.
11. Control of Infection procedures.
12. Categories of linen and linen handling arrangements including turn round frequency.
13. Ward and departmental linen stocks.
14. Staff residence linen.
15. Staff uniforms and clothing. Method of changing, issues, etc.
16. Patients' personal clothing.
17. Security marking of linen.
18. Repair, sewing services, uniform alteration, condemnation and replacement of linen.
19. Linen handling, distribution and transport.
20. Ancilliary services.

Part B Laundry Operational Procedures — Plant and Processes

(To include methods and standards of finishing)

1. Introduction.
2. Reception.
3. Sorting and marking.
4. Washing and moisture extraction (including CDA).
5. Conditioning.
6. Tumbler drying.
7. Flatwork ironing.
8. Garment finishing and pressing.
9. Assembling, packing and despatch.

Hospital Linen Services Symposium Paper

The author is the Joint District Linen Services Manager, South East and Mid Staffordshire Health District.

Laundry Distribution

H W TAYLOR MBIM

Introduction

The distribution of linen does not consist merely of packing it into containers and sending it out. It embraces the need to service and repair every item of textile construction used except actual furniture and mattresses. To condemn and replace as necessary, to monitor use, to maintain in circu-

lation adequate stocks and in many cases to make articles which are of a specialised nature. All this has to be done with two major objectives. First, that those staff who are engaged in the actual task of Patient Care shall have adequate supplies of linen and clothing to enable them to do that. Secondly, that this be done at the lowest possible Capital and Revenue cost. Therefore, the objective of Linen Distribution is to have the right thing in the right place at the right time, in the right condition and at the right price. If the service is to be acceptable, nothing less will do.

Really, the Distribution function begins in the finishing rooms of the Laundries, because it is there that clean articles are examined and where any need to repair or condemn them becomes apparent. You may wonder how the repair or condemnation of an article affects distribution. The principle effect is that any item which is out of circulation for any reason whatsoever is one less available to the user. All distribution systems are related to an overall stock-holding which is designed to meet a given level service. Articles out of circulation reduce the capacity to provide that service. The speed with which we recognise their absence and take action is a contributory factor to it.

Distribution Methods

In the Health Service we have five methods of distribution, which have been researched and evaluated by the DHSS. From time to time there has been a recommendation that one or another is a 'best buy', but it has been my experience that it is necessary to examine each of the systems to see how it fits the needs of a particular Hospital or group of users. The consideration of which system to use is probably the most important part of the operation since what is done will set the standard of the service and to a large extent determine the cost of providing it. In general there is likely to be a combination of one or more types of service, according to need. The services we have available to use are:

Exchange Trolley
This, as the name implies, consists of the provision of a trolley to each user area and periodic exchange for a fresh one. It requires that the linen need for the period is known and that there is a continued monitoring of the amount actually used to avoid over or under stocking.

Topping-up
This method provides for the filling of a cupboard or trolley at point of use and replenishment as necessary on a regular basis.

Daily Requisition
Using this system it is necessary for the user to submit in advance an estimate of need for each day and presupposes that there will be an adjustment to avoid over-stocking on each occasion. Work is despatched in packs from the Laundry.

Daily Allocation
This method requires that there shall be an agreed quantity of linen issued to each user, either every day or on a given number of occasions each week. The total volume in one week must be sufficient to provide for the whole seven-day period.

Return-to-Sender
As the name implies, every article sent by a user area must be returned to that sender.

Whatever system is used there will be some application for engineering services and perhaps for our building colleagues as well. No matter which one we adopt, there will be containers, whether they be trolleys, palletts, boxes or bags. The size, shape and weight of the containers when filled must be related in some way to the vehicles which are to carry them. It is

Sommaire en Français

Distribution du linge

H W TAYLOR

M. Taylor commence son article en spécifiant quels sont les deux principaux objectifs de la distribution du linge à l'intérieur des hôpitaux: Tout d'abord que les membres du personnel qui sont chargés de s'occuper des patients disposent de quantité adéquate de linge et de vêtements. Deuxièmement que ceci soit assuré moyennant les frais d'équipement et d'exploitation les plus bas possibles. Tous les systèmes de distribution dépendent des quantités totales stockées, celles-ci visant à assurer un niveau de service donné.

Dans le Service National de Santé britannique (NHS), il existe cinq méthodes de distribution et M. Taylor évalue alors leurs divers avantages et inconvénients.

Le chariot d'échange
Ce système impliquant la fourniture d'un chariot pour chaque secteur utilisateur et l'échange périodique de linge suppose pour commencer que l'on dispose d'une surface de sol considérable, ce qui n'est pas toujours le cas.

Faire l'appoint
Il est nécessaire d'avoir une lingerie sur place pour faire l'appoint des stocks chaque jour au point d'utilisation. Il faut que cette lingerie ait du personnel de sorte que ce système est un peu plus onéreux. Cependant comme on utilise moins de chariots, les frais d'équipement sont à peu près le quart de ceux d'un système avec chariots d'échange.

Demande quotidienne
Il faut évaluer les besoins chaque jour et selon toutes les probabilités, les demandes deviennent tout simplement des répétitions. Ce système nécessite l'intervention du personnel infirmier dont la formation coûte cher. Ce système peut aussi aboutir à l'amassage.

Allocation quotidienne
Les inconvénients de ce système sont le manque de souplesse et le fait qu'il n'est pas possible de tenir compte des changements de besoins. Là aussi, l'amassage est un problème.

Retour à l'envoyeur
La plupart des vêtements sont traités de cette manière. L'un des avantages de ce système, c'est que l'utilisateur adopte une attitude de propriétaire et qu'il est probable qu'il s'intéressera à la maintenance des stocks. Pour mettre en place ce système, il faut contrôler l'entrée de chaque article dans la blanchisserie sur une liste contrôlée qui risque de ne pas toujours être exacte. Il faut beaucoup d'employés pour contrôler le contenu des conteneurs qui arrivent. Il n'est ni économique ni possible en pratique d'assurer la maintenance de la majeure partie du linge sur la base du retour à l'envoyeur.

En conclusion, M. Taylor déclare qu'il est probablement préférable selon les besoins de combiner un ou plusieurs types de systèmes. De plus, le système de distribution s'avère un outil précieux pour l'ingénieur car il montre le mode d'utilisation de chaque article textile à l'intérieur d'un hôpital.

not much help if the Linen Services Manager decides to use a trolley which will not fit economically into the vehicles used to transport it. Similarly, the size of trolley wheel and the load-weight per wheel has to be acceptable to the flooring to the van. Trolleys may also need securing during transit so that they do not move about and damage side walls or each other. As Engineers charged with the maintenance of both vehicles and trolleys you should expect to be consulted about this.

In the same way, the wear and tear on floors will be of concern to the Building Department, as will the potential damage to doors and walls by the inevitable collision with them by the trolleys. We have all seen the effect of a trolley being pushed against a newly painted wall. In the same way a door which has a damaged hinge or check-stay following a collision is another nuisance to both Engineering and Building Officers.

Many of us in the Health Service are included to live within the cosy little box of our own discipline. This includes Linen Services Managers and Engineers. The service provided by Laundries and Linen Services is very dependent upon the help we get from the Engineering Department. We cannot give our service without receiving adequate support. There is room for an understanding of each other's problems, and a need to work closely with each other.

I would like to go on to discuss the mechanics of the five systems we use, but first I would make the point that with the exception of a Return-to-Sender system all methods of distribution are based upon the Pooling of Linen, either in total or where the size and needs of a Hospital merits it, at Hospital level.

Exchange Trolley

Using this system there must be first of all be sufficient space at Ward or user level to accommodate a trolley or trolleys big enough to hold all the linen required. There must be, also, some covered storage space where the delivery van can put full trolleys waiting delivery to point of use and also collect empty and part-empty ones. This pre-supposes a considerable floor space. For instance if the trolley is 4 ft. x 2 ft. there must be at least that floor space to hold it. A Hospital with 300 beds may use 20 trolleys, full or empty for one day, we need around 240 sq. ft. of space, with access for vans. In fact the need is generally much more since the trolleys will be shunted around from time to time. If one relates that to a week-end need, one has either 7-day working at the Laundry or at least 4 days supply of trolleys to cover week-ends and Bank Holidays. In that context the space needed is nearer 1,000 sq. ft. Something like 90/100 sq. metres at around £25/30 per square metre, plus the cost of maintaining it. If there is no storage at Hospital level there must be some at the Laundry, and unless the Laundry has been designed to handle an exchange trolley system that is very unlikely. So far as Hospitals are concerned the older ones were designed in the days when the volume of linen used was much less than modern Clinical and Nursing Care requires. New Hospitals if anything are often no better off. Cost restrictions usually result in inadequate space for all the needs anyway and areas originally designated as linen stores do not often end up holding that commodity. In terms of cost, the first need is that unless the trolleys when loaded are stored in a secure area, they must of necessity be lockable. If one thinks of the cost of 30 trolleys per day for four days, at a probable price of £200 each we have a Capital outlay of £24,000 for them. Some trolleys can cost up to £350 each. Maintenance of a fleet that size is also costly.

If one takes into account the fact that it is not uncommon for a Linen Services Organisation to deal with ten or more Hospitals with a total bed content of 3,500 it is likely that the Capital cost will be nearer £120,000 for trolleys and storage but it also requires that there is no transfer of linen left on the trolley in one ward to another, to obviate any risk of cross-infection.

Topping-up

To operate a topping-up service it is necessary to have a linen room on site from which operators re-fill the stocks at point-of-use each day. This system may be a little more costly in Revenue implications as there is a need to staff the linen room. It has far less need for space, since a properly equipped room will hold stock for two or three days in far less floor area than is required to store trolleys for an Exchange System using the same volume of linen. Similarly, there is no need for more than three or four trolleys for delivery purposes. At each Hospital, the Capital cost therefore, is likely to be about one quarter of that for an exchange trolley system, both in Building and Equipment. There is also some advantage in having a linen room on site, since it can hold a buffer stock for emergency and week-end/Bank Holiday use. The presence in the overall user area of Linen Services Staff is also helpful when there is a sudden need for additional supply. They have stocks on site — a laundry holding the buffer stock could be several miles away and will not necessarily have transport available immediately.

Daily Requisition

In essence this system places upon the *User* the need to assess requirements daily and submit in writing or by telephone an order for that quantity each day in advance. Human nature is such that there may be a tendency to fail to meet the dead-line for submission. Similarly when ward and other staff are very busy, as is usually the case, there is a real probability that the Requisition becomes repetitous and the actual needs do not necessarily relate to what is on it. On receipt of the Requisition the Linen Services will pack against it and despatch the work in containers. The containers must be unpacked and the contents checked and put away by the users. Such a system usually involves Nursing Staff who are costly to train or Domestic Staff. If the latter are used it is arguable as to whether there is any saving in using their time or that of a Linen Services Operator. The main disadvantage is that two Managers are involved with separate areas of responsibility and the unpacking of work by Nurses or Domestics is an extra chore. Where Linen Services Staff are used one Manager only is responsible, using staff trained in that operation and for whom it is a main task. The use of Nurses to unpack and put away linen is wasteful when one thinks of the cost of training them, the higher rates of pay and their value in their main task — that of caring for the sick. It can cost £20,000 to train an S.R.N.

Daily Requisition can also lead to hoarding unless somebody is checking the contents of user stores regularly. I have known cases where for want of

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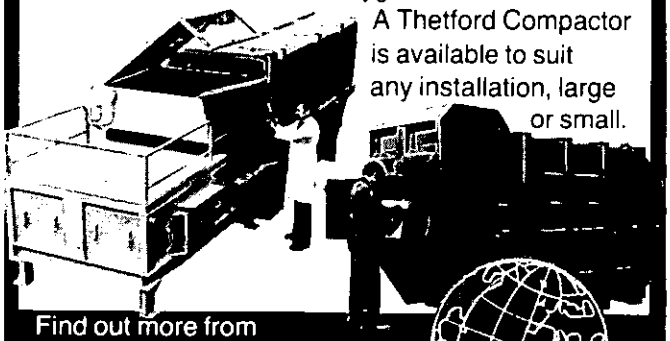

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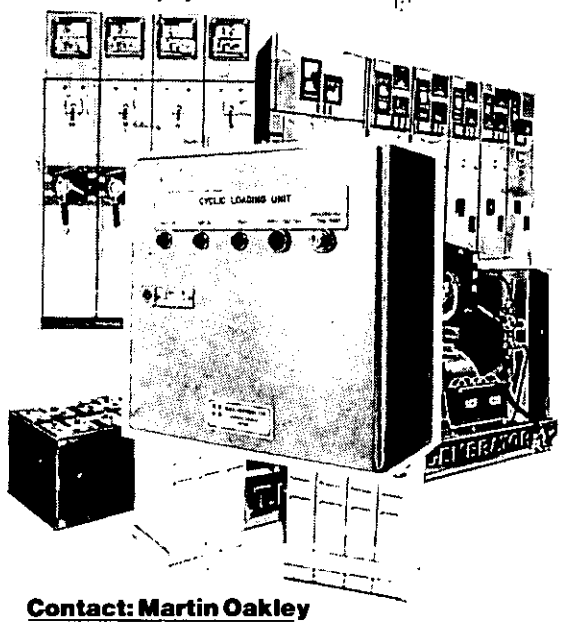

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adequate staffing a Linen Services Manager has been unable to carry out regular checks and his first intimation of hoarding has been what the Laundry could not meet requisitions. In many cases there is inadequate provision of Management for Linen Services.

Daily Allocation

When this system is used it is necessary to agree with each user area what should be issued to it. Generally, the need for a full week is established and is then issued over five days so that a stock builds up ready for the week-end. The chief difficulties are similar to those of the Daily Requisition System — lack of flexibility and frequently inability to pick up changes of need quickly. Staff at Packing Room Level are usually quite happy to go on issuing the same amount each day and Management in consequence must have a very frequent liaison with users. Again, Daily Allocation lends itself to hoarding. When one thinks that a blanket costs around £8 and a sheet £4, it does not require much in the way of over stocking to remove from circulation £10,000 worth of stock.

Return-to-Sender

It is almost certain that some items of linen and most articles of clothing will be dealt with by this method. There are specialist items for Theatres, Maternity and Staff use which are unlikely to be pooled. Most Theatre Drapes will be sent to a CSSD or HSSU, but in a situation where a Laundry serves more than one General Hospital there is little opportunity to pool then, particularly as it is not uncommon for those Hosptals to be managed by different Health Authorities. Frequently, Theatre Clothing is likely to be personalised and may need to be despatched in individually named bundles.

Staff uniforms are still personalised in many Hospitals and of course the linen for Residences and Nurses Homes may be a Return-to-Sender basis. There are distinct advantages in using a Return-to-Sender system, since the user has a proprietorial attitude and is more likely to take an interest in stock maintenance. In such cases, however, the user is the stock-holder and almost invariably will blame the Laundry for any shortages or reduction in supply. To operate such a system satisfactorily, it is really necessary to check each item into the Laundry and to pack against a checked list. My own experience in both Commercial and Hospital Laundries is that lists are not always accurate and arguments arise when the Laundry count differs from the senders list. At least it does when our count is lower than theirs. This is understandable from two points of view — if there is a stock reduction they have a responsibility and if they are short of linen they still have patients to care for.

From the Laundry point of view, these are the major implications of a total Return-to-Sender system:

a) The need to employ a considerable number of staff to open and count the contents of incoming containers. My recollection of commercial work is that on an Incentive Scheme we could get about 250 pieces per or one operator for every 9,000 pieces. That is eleven WTE as against the present need for five or six in a Laundry processing 100,000 pieces per week.

b) There could be no accurate check without opening and examining the contents of fouled linen bags. The terms of HM71(49) expressly preclude such a practice.

c) Linen arriving at a Laundry needs to be segregated into Hospital and Ward piles so that there is some proportion of process time allocated to each user area. Even when that is done the mix of articles in each Linen Bag is unknown until it is opened. In consequence it becomes a matter of chance as to whether any given batch sorted or processed will contain all or any of the articles actually needed in time for them to meet that need. Therefore, to maintain the bulk of linen on a Return-to-Sender basis is neither economical or practicable. There is likely to be however, a permanent need for such a service in the areas of patient clothing, staff uniforms and protective clothing, Theatres etc., and of course for curtains and drapes which are usually individually measured and fitted to the decor of the area of use.

All that has been said so far relates to actual Distribution. There is, of course, a need to mark *every* item with some form of identification so that it is known to be Health Service property. This is usually carried out in the Sewing Room as is the repairing and/or condemnation of work. In a recent tour of New Zealand and Australia I saw one laundry where a Seamstress actually worked in the finishing area the the Manager said that this had a salutary effect on both groups of staff. It is a thought.

Suitability

The Distribution systems referred to have to be considered very carefully in the light of need and suitability. One of the major tasks of the Linen Services Manager and his staff is to relate the one to the other. This involves examination of the buildings and the type and numbers of Patients served. The Psychiatric Patient has a totally different need to the to the Acute Medical or Surgical or Geriatric long-stay patient. Once we have assessed the need we have to design the system and determine the levels of stock to be held at each point of use. Subsequently, we monitor actual use and adjust the issue figures accordingly and from this operation we can also assess changes in overall stock need.

One hears from time to time of considerable loss of Hospital Linen. I am not saying that losses do not occur — of course they do. By and large we as a Nation have suffered a general deterioration in the ability to recognise what is ours and what is somebody elses — particularly in the realms of Public ownership. However, many of the larger losses recorded can be attributed to a failure to monitor and control the use of linen. This results in a sudden injection of what should have been supplied progressively over several years. Much of it is likely to result from changes of need which have not been recognised early enough and are not losses at all, merely improvements to stock to facilitate better service. That is not to say that we should not be concerned to eliminate loss by theft or through carelessness wherever possible. We should, but Distribution systems must be monitored carefully to distinguish between additional need and actual loss of stock. Wherever possible linen stores, whether in cupboards, trolleys or linen rooms, should be kept locked when not actually in use or closely attended.

Distribution as an aid to the Engineer

As will be seen, the Distribution system by reason of its records is a most valuable tool for the Engineer. It can show the actual pattern of use of every article of textile manufacture

handled by a Laundry or Dry Cleaning plant. It can relate that use to types of bed and therefore to the planning or improvement of Laundries. You will be aware of the content of Building Note 25, which is based upon the information available to the Department. A comparison of the recommended equipment levels with the actual throughput of your Laundry is always worthwhile. The Building Note gives certain weights per piece. Yours might be different and in that case you have to be able to argue for changes in provision. No two Hospitals are totally alike and no two Laundries identical in their throughput. There is room for far more consultation between Linen Services Managers and Hospital Engineering Staff than often takes place. There are other sources of information about plant needs and likely usage of Linen and Clothing. The only one likely to be reasonably accurate is that which can be provided by a properly monitored and controlled Linen Distribution Service.

If you talk to your Linen Services Manager you may be quite surprised by the variety of services he is providing and the amount of information he can give you. You will probably find that he will welcome the benefit of your knowledge and experience. Whatever results from your discussions I am confident that they will not be a waste of your time or his.

Conclusion

Perhaps in conclusion, I should mention one or two more points indicating the future developments in Linen Services. We are now becoming involved in schemes to provide service to Patients in the Community who are bed-fast. These usually require a weekly collection and delivery service using a one clean for one dirty exchange system. They require the development of re-equipment of vehicles so that they are suitable to hold soiled work separately from clean. Additionally, the use of computers to produce and record identification marks, Stock records, Incentive Scheme and Plant Utilisation information and staff attendance records will present some challenge to Engineering colleagues. They must inevitably, have an interest because no doubt we shall ask for their assistance when the pretty light goes out! Engineer support to the Hospital Linen Services is certain to increase, and without it we cannot exist. In the past we have heard frightening tales, true or otherwise of lack of consultation and co-operation on both sides. They can have arisen only from lack of understanding of each others problems. There seems to be a real need for frequent exchange of ideas and that can lead only one way — towards a better service for our patients. People seem to think that patients 'belong' to the Medical and Nursing Professions. They do *not*, and you and we are just as important to their welfare because without us it is impossible to give the best possible care.

Hospital Linen Services Symposium Paper

The author is the District Works Officer with Leicestershire Health Authority.

Maintenance of Laundry Processing Plant

G. F. PIDCOCK TEng (CEI) FIHospE MIPlantE MBIM

This paper deals with the maintenance of heavy laundry plant with particular emphasis upon the needs of the large Area Laundry processing in excess of 200,000 articles a week (100 tonnes). The maintenance heading has been extrapolated to include the provision of services, ie steam, water, etc., and an input to the point where maintenance begins, ie the design process. All information given in the paper relates to Leicestershire Health Authority laundry. The existing laundry building was developed onto the existing previous hospital laundry and is an industrial type building of frame type construction. The laundry is constructed on a single floor with a first floor area on the high side of the site which serves as the receiving and sorting area. The floor area amounts to 5,000 sq. metres.

Services

Steam. Steam is supplied from the main hosptial boiler house at a pressure of 10+ bar. The steam supply to the laundry is controlled by a motorised valve station which is in turn controlled by the plant computer (Transmitton Micro-Power).

The Senior Engineer obtains a production schedule from the linen services management on a weekly basis and enters the required programme to the computer. The programme "soft ware" incorporates an optimum start and stop feature to determine the correct opening time for the steam main. The laundry maintenance staff play no part in the maintenance of the steam services outside the laundry building.

Water. The laundry is supplied with a raw water main and a soft water service via an automatically regenera ting base-exchange softener. The softened water is stored in a Braithewaite sectional tank.

Electricity. Electrical supply to the laundry is supplied from a dedicated 500 KvA transformer at 11Kv, the laundry supply being of medium voltage at 415Kv, the laundry supply being of medium voltage at 415Kv. A standby diesel alternator is provided, also rated at 400KvA. The machine is manually controlled and switched.

Compressed Air. Compressed air is supplied from 3 Hydrovane rotary compressors. The machines are direct on line, no storage is available.

Fire Alarms. An automatic fire alarm is installed. No sprinkler system is available. Maintained emergency lighting is provided at key points.

Equipment

Receipt and Storage Area. This area is equipped with a monorail system designed to hold returned soiled work in bags at high level, with space below for soiled work on stillages. From the rail storage system and the stillages the soiled work is sorted from conveyors back onto a further monorail system which allows categories of work to be stored on dedicated rails, in 30Kg loads.

Wash House. The wash house comprises 3 generations of washing systems. The foul wash comprises 3 x 50 Kilo barrier washing machines, with a hydro-extractor supported by a 350 kilo modern washer extractor and a 100 Kilo modern washer extractor.

The main wash house comprises 4 x 200 Kilo washer extractors which were initially supported by a continuous washing machine. The continuous washing machine was removed in 1977 and replaced by a modern batch tunnel wash system comprising a 17 stage single skin multi-drive washing machine, feeding a 70 Kilo (double load) hydrostatic, membrane press.

A wash house specifically used for personal items (separate from the main plant) is installed and comprises 3 x 100 lb washer extractors together with their own tumbling facilities.

Tumble Driers. Five 50 kg tumble driers are provided to service the foul wash. Three automatic loading 70 kilo tumble driers are provided for the washer extractors and four automatic 70 kg driers are provided to the batch tunnel line, these driers are fitted with regenerative heat wheels.

Finishing Equipment. Three ironing machines are provided, one being dedicated to large flat work and including a feeding machine and folding machine.
folding machine. A second ironing machine is provided with a complex 1-4 lane folder and the third ironing machine is also provided with a simple folder.

Finishing equipment for nurses' dresses and personal items, of the steam former type, are installed and a steam/air finishing tunnel is also installed (Polyester coats, dresses, etc.). A curtain finishing machine is installed.

A dry cleaning section is provided comprising 2 dry cleaning machines together with appropriate finishing equipment.

Transport

The fleet comprises 5 7.5 tonne box vans each equipped with a 1 ton tail lift, and all diesel driven. The fleet is of mixed manufacturers and includes British Leyland, Ford, M.A.N. and Dodge.

The vehicle maintenance is scheduled as part of the District fleet and is monitored and controlled by the technical officer employed at District for this specific function. The vehicles are maintained by a local contractor to the manufacturers schedule and the maintenance is independently monitored by the Contracts Division of the Royal Electrician and Mechanical Engineers.

Maintenance Policy

The policy applied to the maintenance of the laundry was designed to provide cost effective service whilst optimising equipment usage.

The present laundry is at an interim stage and its full capacity is required (over 60 hours) to produce the linen requirement. Commercial laundries are used fairly regularly when the load exceeds the plant capacity.

Since it is generally impossible to take plant out of service for maintenance, the maintenance has to be largely self-sufficient. We cannot, for example, wait for a manufacturer's service department to attend to correct a fault. A brief examination of the items of installed plant will reveal that certain items are "key" equipment. This category includes the tunnel washer system (with its load conveyor, controls, membrane press, and transfer conveyor, and to a lesser extent its tumblers), the ironing machines (particularly the high speed sheet line), and the compressed air plant. The requirement to hold stocks of all specialised spares is established and currently the value of such stocks amounts to around £20,000 in value. A special budget allocation is made to replace all items consumed (heavy spares).

Maintenance personnel comprise a team dedicated to the laundry (supported from District resources as required). This arrangement was made since it had become apparent that the increasing complexity of the equipment allied to the rapid growth of electronics meant that specialised training and on-the-job experience were essential to produce a viable maintenance effort.

I had further rresolved to use sophisticated methods of inspection of plant since the current situation does not allow use of "time-based" PPM. We have moved towards a performance measurement system of maintenance utilising sophisticated vibration analysis equipment which has proved useful in predicting failures, enabling pre-planning of the essential maintenance.

Staff receive training at Manufacturer's works before delivery of major equipment and local and national training facilities are utilised to develop the effectiveness of the maintenance force.

A history of the performance of the plant items is established and a current development is the use of a micro-comuter to store and process operational data. This plant history is invaluable in performance comparison when new equipment is selected.

Cleaning Policy

There are four main areas of cleaning to be undertaken, firstly work room

Sommaire en Français

Maintenance de l'installation de traitement du linge

G F PIDCOCK

Ce communiqué traite de la maintenance des installations de blanchisserie de type lourd en mettant l'accent particulier sur les besoins de la blanchisserie à grande surface traitant plus de 200,000 articles par semaine (100 tonnes).

M. Pidcock divise son article selon les sections suivantes: bâtiment de la blanchisserie; services; équipement; transport; politique en matière de maintenance; politique en matière de nettoyage; ressources humaines; financement et plans et étude préliminaires.

floors, toilets, canteen and offices. Secondly, high level — walls, ceilings, pipe work, ducting, structural steel work. Thirdly, machinery, and finally, mobile equipment, eg trucks, trolleys, bins, stillages.

The resources available for laundry cleaning are, domestic cleaning staff and specialist contract cleaners. Works and laundry staff.

The recommended policy will be to use domestic cleaning personnel to carry out the cleaning of all areas such as work rooms, floors, toilets and offices, to utilise either directly employed works staff or outside specialist contract cleaners to carry out all high level cleaning. This task is generally required to be undertaken at least twice yearly and should ideally include cleaning of light fittings.

In respect of cleaning of machinery, because of the difficulty of access, eg underneath calenders, moving machinery, creating unacceptable safety risks, the recommended cleaning system will be to utilise works department staff, possibly supervising laundry staff or domestic staff. The cleaning of equipment should be the responsibility of laundry operatives, works staff may be required to contribute to the care and lubrication of wheeled equipment.

Staff

The works management to the Area Laundry comprises a PTB officer (Senior Engineer grade), devoting approximately 80% of his time to laundry management. The maintenance team comprises a foreman, one grade 5 mechanical craftsman, and one grade 4 electrical craftsman.

The working pattern for the laundry is normally 60 hours over a 5 day week which necessitates four evening half shifts. These shifts are currently covered by overtime working but the planned expansion of the laundry will offer the possibility of alternating shift working for the maintenance crew.

Finance

The current cost of operation of the Area Laundry amounts to a little less than £1 million per annum and a breakdown of costs would indicate an engineering cost of:-

	Per article
Maintenance	.83P
Water	.13p
Steam	1.22p
Gas and electricity	.21p

(See Appendices A and B).

A total engineering cost of 2.4p per article, and at the current throughput this is equal to an annual sum of approximately £¼ million.

A unit engineering cost of 2.4p is below the mean cost in the Trent Region. It is also the second lowest engineering cost for comparably sized laundries in the Trent Region (1980-1981).

The improvement from third lowest in 1979/80 to second lowest in 1980/81 is due to the increasing impact of energy saving measures, the batch tunnel line being the major factor in this area.

a) Linen Services Management
b) Operational administration
c) District Finance representative
d) District Works representative

The creation of such a team in addition to the designers either in-house (by Region or District) or by consultancy, should ensure that the commission of the completed project should proceed with as little trauma as possible, and much more desirable that the project is maintainable and cost effect in revenue terms.

The Future

We are currently in the early stages of development to take the productive capacity of the plant to 340,000 articles/week (around 170 tonnes/week).

The additional load is the result of additional provision of beds and facilities in the Leicester Area and the need to increase linen usage norms in the existing health care provision.

It is interesting to note that the original development of an Area Laundry (from the original hospital laundry) cost approximately £750,000 (in 1971), and that the increase from 100 tonnes/week to 170 tonnes/week will cost around £2,700,000 (in 1982).

The maintenance problems of the completed project will be somewhat different from the present situation for the following reasons.

1. Major items of plant will become less critical (because there will be more of them).
2. The economies of scale that will ensure from the expansion of the maintenance team will allow the possibility of shift working.
3. The plant will have a "built-in" surplus enabling plant maintenance to be planned and carried out during operating hours.

The decision to concentrate the whole of the County of Leicester resources in Health Care Linen Services provision, in a single plant, is a matter of fact, the experience in most continental plants (excepting Scandinavia) is to stop at about 100 tonnes/week (50 tonnes being more common). There are however no technical obstructions to the larger plant and criticisms are generally related to management problems of such large labour intensive plants, which must be politically sensitive.

Appendix A

LAUNDRY ENGINEERING COSTS

1979/1980

	EXPENDITURE						UNIT COSTS (PER 100 ARTICLES)				
	Cost Units	Maint.	Water	Steam	Gas, Elect.	Total	Maint.	Water	Steam	Gas, Elect.	Total
	113953	90548	20379	85779	30752	227458	79	18	75	27	199
Groby Road	88607	60730	13843	94694	13988	183255	68	16	107	16	208
	54107	16230	10615	48898	8760	84503	30	20	90	16	156
	47739	23789	8488	145998	6602	184877	50	18	306	14	388
	836	3288	4567	16231	974	25060	38	53	188	11	290

Appendix B

LAUNDRY ENGINEERING COSTS

1980/1981

	EXPENDITURE						UNIT COSTS (PER 100 ARTICLES)				
	Cost Units.	Maint.	Water	Steam	Gas, Elect.	Total	Maint.	Water	Steam	Gas, Elect.	Total
	122570	122185	27967	117574	39292	307018	99	22	95	32	250
Groby Road	96288	80055	13042	118089	20733	231919	83	13	122	21	240
	54993	18168	11514	58515	9964	98161	33	20	106	18	178
	50632	29165	7372	151021	6761	194319	57	14	298	13	383
	50388	114203	15686	101727	21543	253159	226	31	201	42	502

The author is a Director of Midland Cryogenics Limited.

Pipe Freezing — a Useful Tool for the Engineer

D G BROCKLESBY

Pipe freezing is a method of isolating a section of a pipeline so that work may be carried out on it. One or more plugs are formed by freezing the contents of the pipeline. It is now a well-accepted process used in many industries, but is still unknown to many engineers who could make use of it.

Typical reasons for wishing to break into a pipeline are to insert or remove a valve, to repair a faulty joint, or to insert a junction or T-piece. There is an obvious attraction in being able to do this without having to drain the whole system.

The Method

A bath containing liquid nitrogen or other cooling media is built around the pipe, just above and just below the section to be isolated. Gradually the liquid in the pipe freezes to form plugs. The plugs are then maintained while the work proceeds. As soon as it is completed the liquid nitrogen is allowed to disperse and the plugs melt, restoring the flow in the line, and causing no damage.

Speed

Liquid nitrogen freezes a 3 in. water main (containing water at ambient temperature) down to -20°c in fifteen minutes and down to -196°c in thirty minutes. It is possible to freeze pipes ranging from $^1/_2$ in. up to and including 30 in. diameter.

Pressured Lines

Pressured lines may be frozen successfully and calculations are made prior to the commencement of a freeze. The strength of the plug is directly proportional to its length and in all cases a 100% safety margin is allowed for. In some cases it is necessary to install two ice plugs for additional safety.

In general terms a plug with length equal to its diameter will withstand a pressure of 260 psi (or 130 psi allowing a 100% safety margin). Heavy oils will withstand pressures up to 100 psi for the same ratio, whereas light diesel oil plugs have been known to fail at 20 psi.

Liquids that can be frozen

Most liquids will freeze. By using liquid nitrogen, which goes down to -196°c, a rapid freeze results.

Some of the types of liquids which are regularly frozen are sea water, effluents, glycol and hydraulic oils.

Advantages

The most obvious savings to be made are in large buildings, where drain-down and re-venting times are very lengthy. Because freezing gives considerably reduced down times, heat can be retained in most of the building.

Where toxic fluids are concerned, draining can be a problem, particularly if it necessitates the removal or storage on site of the liquids till the time of replenishment. This can be eliminated by the freezing method in many cases, ensuring that loss of fluids is reduced to a minimum.

Suppliers

A Midlands-based company, Midland Cryogenics Ltd. of Stafford, is now able to offer this service and advise on all aspects of Cryogenic applications. The Company specialises in low temperature applications, and in the supply of liquid nitrogen. They are equipped to meet the needs of engineers in all spheres of Industry.

International Congress Paper

The author is a member of the Foundation for Safety in Medical Instrumentation in New York State, USA. The paper was first presented in Amsterdam at the 7th International Congress of Hospital Engineering in May.

Safety in Medical Instrumentation

IRWIN M. KANE

There are those among us who would have us believe that 'Safety in Medical Instrumentation' is attained through periodic routine checks of equipment for electrical leakage, catastrophic failure and calibration drift, culminated by placing a sticker on a device, indicating that it is safe. There are organisations, that under a contract to an institution, will dispatch a team of technicians to a Health Care facility, three or four times a year, ostensibly to conduct preventive maintenance inspections and calibrations. Actually, in many cases, a hurried, perfunctory check of the instrumentation is made, and a sticker affixed. They have been known to go through a hospital in a span of three to five days.

It is our opinion that any sincere, qualified clinical engineer would seriously question the suitability of this methodology. Safety is not attained by a quick check and a brightly coloured sticker via a fast moving, and sometimes inexperienced technician who must meet a quota, set up by an administrative engineer. It is because of this that we feel an in-house biomedical capability is superior to the central service organisation. However, rather than no preventive maintenance programme at all, an institution should consider taking on the services of a reliable 'central service' organisation.

The term 'preventive maintenance', or 'pm', is used by many groups that do not actually supply such service in the true sense. True pm, as we understand it, cannot exist without honest inspections performed at set frequencies and accompanied by meaningful documentation. A very important facet of pm is data retrieval and analysis which should supply information that justifies the programme and indicates progress made in the reduction of 'downtime' and emergency repairs.

A viable pm programme requires strict adherence to the rules and methods selected. There are several tried and proven systems which can assure a highly successful endeavour, but the following points must be considered:

1. Test data sheets indicating specific data and method of obtaining it. (Excessive data can be a burden)
2. Each piece of equipment in the programme should be given an index number on a metal tag permanently affixed to it.
3. Either a master card or a computer record of the device should be established containing the index number, description, serial number, manufacturer, date of purchase, price, repair dates with work order numbers, etc.
4. Regular computer runoffs or master cards that are keysort, to permit checking the file to obtain a list of instruments due for pm inspection or calibration. This is done by index number and is often referred to as a tickler list.
5. The master card or computer programme should contain not only the dates of all repairs but, through the work order number, which corresponds to a WO form filed numerically, labour and material costs will be available for the repairs.

In a programme that we initiated a while back, the foregoing information was utilised in preparing a graphical analysis, comparing the quantity of instrument repairs and the effects of the preventative maintenance programme. The resulting graph indicated that as the quantity of instrumentation brought into the pm programme increased the amount of repairs decreased. In this particular case a crossover point was reached after approximately two-thirds of the total instrumentation involved was entered into the pm programme. This of course can and will vary depending on the types and quantities of devices included in the evaluation.

A simple, logical record system for a good pm programme should cover

Sommaire en Français

La sûreté de l'instrumentation médicale et des facilités de traitement médical.

Un Communiqué du 7é Congrès International du Génie Hospitalier

IRWIN M. KANE

Dans ce communiqué, on explique ce qu l'on appelle le plan Kingpin. Ce plan a pour objectif d'accroître la sûreté des patients, de réduire les frais d'entretien préventil de l'équipement et des instruments hospitaliers et d'éviter les incidents dangereux et périlleux. En recommandant la mise sur pied d'équipes de maintenance à l'intérieur même de l'organisation/de l'hôpital, l'auteur critique les équipes de maintenance des entreprises du dehors, à la fois sur le plan des frais et de l'efficacité générale.

Le programme que l'on suggère a été introduit pour la première fois il y a dix ans et l'on peut considérer qu'il a fait ses preuves.

L'auteur est membre de la Fondation pour le sûreté de l'instrumentation médicale dans les Etats-Unis.

repairs by assigning a work order number to each repair request on an instrument. All instruments sent to the biomedical laboratory requiring repair should have a request form attached which indicates the date, the symptom of the failure or malfunction, the department it is from, the name of the individual sending it in and the telephone extension they can be reached at. A work order form with this assigned number, dated, later to be filed in numerical order, should have a detailed description of the diagnosis of the problem, the repair that was made, the parts used, the cost of material and the labour hours to the nearest $^1/_4$ hour. The master card should refer to the work order number with an extremely brief description of the problem and the date. An instrument that has had several repairs during a relatively short time span should have the work order forms checked for repetitive failures of the same or similar kind. If this is found to exist it could indicate to the clinical engineer that the device may have inherent design defects or a problem that is not revealed at pm inspection. As an example, a cardiac monitor in one hospital had a repair record of several fuses being blown during a two week period. Although different technicians handled the repair calls and replaced the blown fuses, the master card indicated by frequency of work order numbers and dates, that the problem was repetitive. The unit was brought to the biomedical laboratory and after a thorough going over was found to have a bare spot on a d.c. supply wire to a p.c. board that was intermittantly shorting to ground. The wire was replaced and the problem ended.

There are beneficial legal aspects to honest, technically sound inspections of equipment plus suitable documentation. If it can be shown that instrumentation is regularly checked, as exhibited by records and documented procedures, then should there occur any malpractice litigation involving instrumentation, it can be proven that there was no negligence on the part of the institution. I might add that any equipment brought into an institution, owned by a physician, a salesperson or anyone else, to be used upon a patient in that facility, should be placed under the jurisdiction and procedures of the biomedical technicians and clinical engineer affiliated with the institution. Should the device fail their tests and specifications its use should be prohibited.

I would like to relate some incidents that took place in various health care facilities. Thankfully these things are not a daily occurrence in all institutions, especially those that have a scientific and medical instrumentation laboratory capability.

A patient with a cardiac problem was undergoing stress tests. While on the electronically controlled treadmill the machine stopped, abruptly throwing him forward causing him to be injured. This was attributed to lack of proper periodic inspections and maintenance.

A patient being operated on for a subcutaneous tumour on his cheek had the operation aborted because the surgeon could not locate regional nerves, using a Codman Neuro-Stimulator. The device was found to be perfectly operative at a later date. The surgeon claimed that it wasn't and since the hospital had no biomedical capability or even oscilloscope to check it, the surgeon was within his rights to refuse to go on. The patient had to undergo the pain and suffering of a second operation.

A patient, who incidentally was a physician himself, was undergoing colonoscopy for electrosurgical removal of polyps in the ascending colon when the colon was perforated. The incident was attributed to a defective footswitch that failed in the 'on' position.

A patient suffered severe burns on the calf of her leg upon awakening from anaesthesia following an operation on the lower portion of her body. The burns were of the typical radio frequency type and attributed to the electrosurgical dispersive electrode. The electrode was the old plate used with the bovie and improperly placed despite the warning of the clinical engineer to the head nurse of the operating rooms.

In the emergency room of one hospital, a portable, battery operated defibrillator failed to function when applied to a patient in fibrillation. This was attributed to negligence on the part of the charge nurse in not testing the machine at the start of her shift, the technician who did not perform his preventative maintenance at the prescribed time, and lastly the manufacturer who would not design his battery charger power supply with a large enough capacity to operate the machine with a defective battery and an emergency a.c. operation switch.

During ultrasound therapy, a patient suffered severe periostial burning. This was attributed to the fact that the machine was improperly calibrated with regard to power output and the output meter.

A premature infant was burned while in an infant warmer which warms by radiant heat. This was traced to a faulty temperature servo control unit in which a triac failed in the 'on' mode.

A patient with a spinal problem rolled off a stretcher and fell to the floor when the wheel caught between the elevator and the landing. This occurred while she was being transported to the physical therapy department of the hospital. This was attributed to negligence on the part of the transporter for failure to use the safety straps provided.

These are but a few of the examples of safety hazards that occur in hospitals. How can incidents like these be prevented?

First, we must aim for a biomedical capability in every hospital and health care facility regardless of its size. This can be accomplished in the smaller institutions by a shared plan such as that incorporated in the 'Kingpin Hospital' shared system or a modified version of it. In fact the Executive Vice-President of a Central Service Organisation recently admitted to me that they were considering changing their structure to one of a consulting biomedical engineering group fashioned after the 'Kingpin Plan' wherein the bmets would be in-house for the hospitals they serviced and they would be the guiding and controlling CCE's — certified clinical engineers. They had reached this decision based on the inability to operate properly, keeping the service costs down within the necessary quantity of qualified technicians compared to an in-house capability.

Next, we must be assured of qualified technicians who possess a minimum of an associate's degree from a community college with experience in a hospital or some course or courses in Biomedical Engineering Technology and/or Basic Physics. Can you visualise a technician checking out anaesthesia machines who doesn't even know of Boyles Gas Law? These qualified technicians should be guided and directed by CCE's whether as in a large medical centre, the CCE is on the staff or, as in the case of a smaller institution, he is shared as in a 'Kingpin Plan'.

Last, but far from least, are educational programmes, lectures, classes and seminars for nurses, physicians and other hospital personnel in under-

standing simply but well the basic principles of operation and the safe use of medical instrumentation, the the surgeon who utilises electrosurgery should not be expected to calibrate or repair the device — but he *should* thoroughly understand the basic theory of operation, the modes of operation and the various hazards that are lurking when used improperly. He should also be aware of the fact that simply because an electrode is called the return or dispersive electrode, definitely does not eliminate the possibility of it acting as the active electrode when only a small portion of it contacts the body surface. He should understand that it is the concentration of the current either leaving or entering the body that causes the cautery effect. and when the current sheet density is spread or dispersed over a relatively large area the current per unit surface area is reduced to a safe level. One surgeon that I explained this to in this way, was amazed to learn this, in view of the fact that he had used electrosurgery for years.

The emergency room physician who uses a defibrillator, probably more than other doctors in the hospital, should be aware of the fact that a bank of capacitors, devices used for storing energy, are the source of energy for defibrillation, that these capacitors are charged to a desired level which remains potential energy until the flick of a switch makes it kinetic energy into the patient.

He should also be aware that depending upon the type of defibrillator being used, and under certain grounding conditions some of this kinetic energy can inadvertantly be transferred to medical personnel assisting in the life support effort. This usually comes as a shock!

One is reminded of the little four year old girl whose mother, working for 'Meals on Wheels', took her along to the various elderly people to whom she was delivering lunches, the child was obviously intrigued by the various appliances of old age, but was found staring, stupefied at a pair of false teeth soaking in a glass of water, the mother braced herself for a barrage of questions when she whispered *'The tooth fairy will never believe this!'*

Product News

New Bardic fire alarm panels

Chloride Standby has introduced a new range of Bardic fire alarm panels that will simplify the installation and testing of detection and alarm systems to the new BS5839 part 1 code of practice.

They incorporate a number of advanced monitoring and indication facilities, covering zone, sounder and battery circuits. Two features implemented to conform with the requirements of BS5839 are the provision of two monitored sounder circuits, and an 'evacuate switch' to enable the sounders to be activated or re-activated without an alarm.

All zone, sounder and battery circuits are continuously monitored for open or short circuit faults, and for earth faults, which gives advance warning of wiring failures which could ultimately disable the system. LED indicator lamps on the front panel show which fault exists and whether the positive or negative lead is shorted. The battery and charger are both monitored, with indication of charger failure, battery disconnection, or high or low voltage. A visual indicator shows when the alarm sounders are silenced.

The Bardic CA-B fire alarm panels are available as a four, eight or 18-zone chassis, with plug-in zone cards. As well as simplifying installation, this facility means for example that as requirements change in the future, extra zone cards can be added up to the maximum number for the particular chassis. Matching blank plates cover vacant zone card slots. Another design feature which simplifies installation is a removable main gear sub-chassis.

The unit contains an internal battery pack of rechargeable nickel cadmium cells.

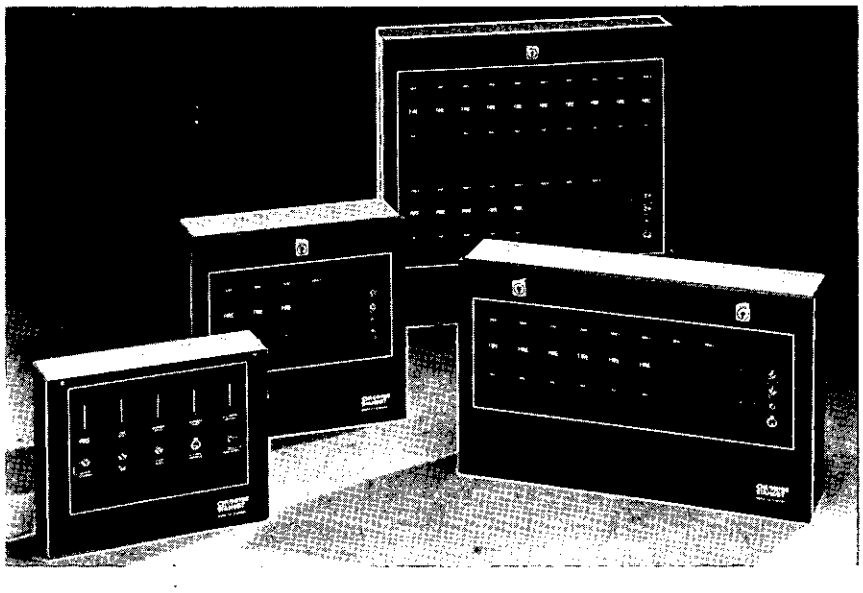
Two voltage-free auxiliary relay contacts are available, and can be used for switching on emergency lighting equipment, for switching off air conditioning fans, or for activating magnetic door releases.

Access to the interior of the equipment is by means of a lift-off front panel, retained by keylocks. Cable entry is via 20 mm knockouts on the top of the case, and the case is wall mounted with four-point fixing.

The CA-B fire alarm panels are suitable for use with ionisation and optical smoke detectors, heat detectors and break glass call points.

For small installations, a low cost single zone panel, the CA-1OB, is available.

Further information from Chloride Standby Systems Limited, William Street, Southampton, SO9 1XN. Tel: 0703 30611.



Flood Warning System

Around £2 million is paid out by each of the major insurance companies every year on claims for water damage excluding burst pipes. Many of the emergency jobs undertaken by Dyno-Rod involve flooding caused through blockages in pipework and drainage systems, particularly on commercial and industrial premises. To counter this problem and reduce the risk of water damage occuring from blockages, Dyno-Rod has developed the 'Drainwatcher' early warning system.

'Drainwatcher' is a small, unobtrusive unit which is bracket-mounted just above the drain ingress in a manhole. It is completely watertight, battery-operated and contains a powerful siren. If the manhole becomes flooded, the alarm is triggered giving the signal for Dyno-Rod to be called in immediately. The siren is capable of penetrating water and the thickest manhole cover and has three sound settings so that when units are placed in adjacent manholes, the problem can be pinpointed straightaway. The alarm will ring continuously for up to four days even if totally submerged in water, until the problem has been resolved.

Each service centre throughout the country has an engineer on-call, 24-hours a day to speed to the assistance of 'Drainwatcher customers. The quicker Dyno-Rod is called in, the sooner the enginer will be able to find and remedy the problem, thus preventing a flood.

'Drainwatcher' retails at £99.50. Companies wishing to purchase more than one unit to cover large factory premises or multiple outlet stores will receive a discount.

Further information from Dyno-Rod Ltd., Zockoll House, 143 Maple Road, Surbiton, Surrey KT6 4BJ. Tel: 01-549 9711.

Chiltern Introduce Packaged Cascade Heaters

Chiltern Water Treatment Co., Ltd., part of the Dewplan group, has introduced a range of cascade heaters for boiler feedwater heating and de-aeration designed to maximise the thermal efficiency of boiler plant. The Chiltern cascade heater is available in four standard sizes designed to meet most duties ranging from steam and water inflow rates of 350 kg/hr and 2.3 m^3/hr to 2,500 kg/hr and 16.5 m^3/hr respectively. Larger units can be custom-built to meet specific requirements.

Savings in operating costs resulting from reduced chemical consumption and improved thermal efficiency will usually result in the recovery within three years of the capital outlay on a Chiltern cascade heater. Maintenance costs will also be reduced.

The Chiltern cascade heater has been specially designed for low and medium pressure boiler installations, and provides a low cost method of treating the feedwater as it enters the hotwell whilst, at the same time removing much of the dissolved oxygen and carbon dioxide which are major causes of boiler corrosion.

The cylindrical units are robustly constructed from welded steel with a flanged and bolted flat plate top closure incorporating the vent outlet pipe and a spray elimination shroud. Internally, the unit contains a carbon steel water pipe connected to a Dewplan spring loaded stainless steel spray valve, an inlet spray shroud, disc and doughnut distributor baffles and a steam inlet diffuser box. All are of carbon steel construction. The units are supplied with a double seated cast iron control valve with temperature controller and valve positioner, a handwheel operated cast iron isolating valve, a water inlet control valve with ball float actuator and mechanical linkage and a hand wheel operated cast iron water isolating valve.

Further information is available from Chiltern Water Treatment Co. Ltd., Beechwood Hall, Kingsmead Rd, High Wycombe, Bucks. HP11 1LA. Tel: 0494 446622. Telex: 837139.

New Concrete Repair Formulation

The product, a new formulation of Rapid Epocrete, colour matches concrete, sets to withstand heavy trucking within 2 hours, is not subject to shrinkage, can be used from any depth to a feather edge, is waterproof and can be painted over. Rapid Epocrete is non-toxic therefore completely safe to use and is simple for non-tradesmen to apply.

Beyond its use as floor repair and floor leveller, Rapid Epocrete is also used in the vertical and overhead without slump and without need for shuttering. It can be shaped to contours or to a sharp edge.

Rapid Epocrete uses, therefore, include not only the repair of holes, cracks and depressions in floors, paths, concrete aprons and slabs, pavements and kerbs, but also includes repairs to door surrounds, pillars, bridge and building faces, concrete gutters, beams, lintels, window sills and balustrades, pools, pits and even

Rapid Epocrete has two constituents, a free flowing liquid and a fine powder both packed in one single resealable 8kg pail with handle. This pack allows for ease of handling and mixing on scaffolding or cradle.

Rapid Epocrete does not require mixing in exact quantities and sufficient liquid and powder are trowel mixed together to produce a thick, smooth paste consistency. This is then applied to holes/cracks/depressions which have been swept clean of debris. Unmixed remainder of packs can be resealed and they then have a shelf life in excess of one year. Waste is therefore cut to a minimum. The only equipment necessary for repairs with this product — a wire brush, trowel and a pair of hands.

Further details from Emcol International Limited, Royal London Buildings, 42 Baldwin Street, Bristol BS1 1PN. Tel: 0272-290161/291741.

Acrovyn Bumper Guards

Every hospital needs a wall protection system to avoid the damage inflicted by laundry and food trolleys, wheelchairs and stretchers. Corridor areas are especially vulnerable.

Acrovyn Bumper Guards and Handrails have been introduced to help solve the problem. They are of similar design and in some cases Handrails can perform the dual function. Cost is substantially less than wood, anodised aluminium or stainless steel. Acrovyn requires no maintenance so further economies follow the initial saving. Installation is simple, in either new or existing premises. Acrovyn is a rugged acrylic/vinyl alloy with a quite extraordinary resistance to scuffs, abrasions, marring stains and chemicals. The fashionable styling of the Bumper Guards conceals a practical engineering function which is to cushion and contain all blows so that adjacent walls do not suffer unsightly damage.

A brochure on C/S Acrovyn Handrails and Bumper Guards, also Bed Bumper Locators, is available. It is illustrated in colour, with photographs and plan views, and gives plenty of useful data. It can be obtained from Construction Specialties (UK) Limited, The Vale, Chalfont St. Peter, Gerrards Cross, Bucks, SL9 9SU. Tel: 02813 8627.

Leak Detection Spray

LDS offers a convenient, clean, economical, quick and effective method of bringing the hazardous and costly problem of gas and compressed air leaks under control. Its use will encourage early inspection and thus help prevent unnecessary financial loss as a result of additional energy consumption and/or leakage of expensive gases. At the same time, it will raise safety standards considerably.

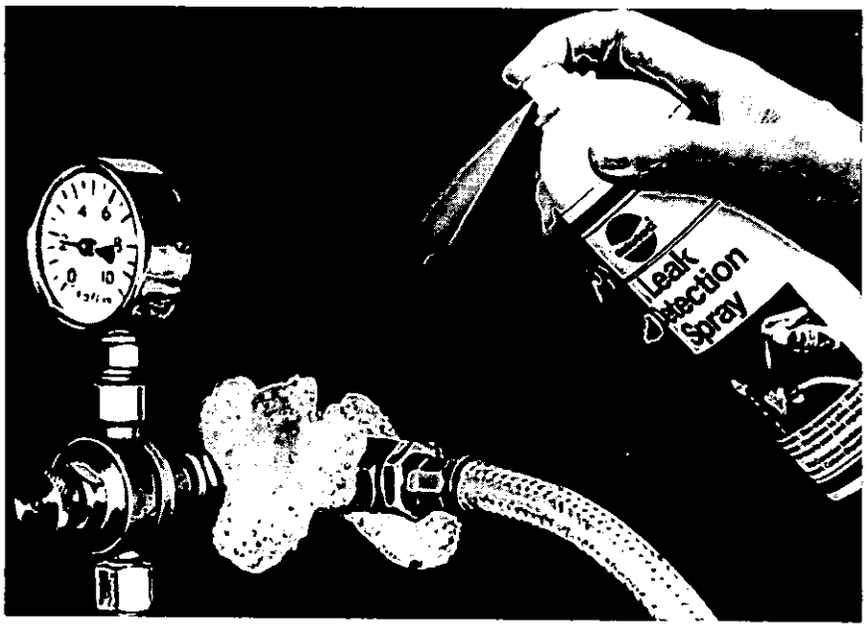
At the press of a button, Galutec LDS is immediately ready for use and will locate the smallest leak from gas or pressurised air storage vessels, cylinders, pipe lines, screwed connections, control panels, fittings, valves etc. Its closely controlled formulation never varies which means that all tests are performed with the identical fluid from one can to the next, thus allowing true comparison of results. Even at pressures as low as 5 mbar, Galutec LDS will not fail to reveal the smallest leak instantly, producing a foam of good micro porosity and stability.

Galutec LDS scores over complex and costly electronic devices which often cover only one or, at best, a limited range of gases, by its simplicity of application and its ability to pinpoint the source of a leak. With Galutec LDS, there is no need for highly trained personnel nor is great skill needed to interpret the results.

Galutec LDS is a highly developed product, meeting important European quality and safety standards. The active ingredients consists of a pure aqueous solution, is water soluble, non-inflammable, non-corrosive (a corrosion inhibitor is built into its chemical formulation), non-toxic, harmless to skin, fully biodegradable (both the active ingredient and the corrosion inhibitor) and can be safely used with all types of gas. The propellant gas is Carbon Dioxide (CO_2 — as safely used in the food industry), it contains no oils, solvents or alcohols of any kind (therefore no risk of forming combustible mixtures with other gases), will not damage paintwork or other materials, will not cause stress corrosion in plastics and will maintain its full operational efficiency even over extended storage periods. The contents of one can will be sufficient for approximately 1,000 applications.

Galutec LDS is supplied in monobloc aluminium aerosol safety cans, nett contents 400ml, and packed in cartons of 10. The can will withstand a test pressure of 18 bars and has a burst pressure of 27 bar.

Supplies and further details obtainable direct from Gotec Trading Limited, 2a Bedford Road, London N2 9DE. Tel: 01-444 4441.



Classified Advertisements

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A vacancy exists within the Regional Engineers' Central Services Section. The Regional Sterilizer Monitoring Service employs technical staff to physically check the performances of all types of hospital sterilizers in accordance with DHSS requirements.

The job will be based in either Taunton or Bristol and will require the testing of sterilizers in hospitals situated primarily in Somerset and North Devon, but may also include work being carried out in other Districts in the Region from time to time, or visits to manufacturers' premises when required. This may necessitate a limited number of overnight stays away from the normal work base.

Application forms and job descriptions available from: Regional Personnel Officer, UTF House, 26 King Square, Bristol BS2 8HY. Tel: Bristol 423271 Ext. 278.

Closing date: 17 September 1982.

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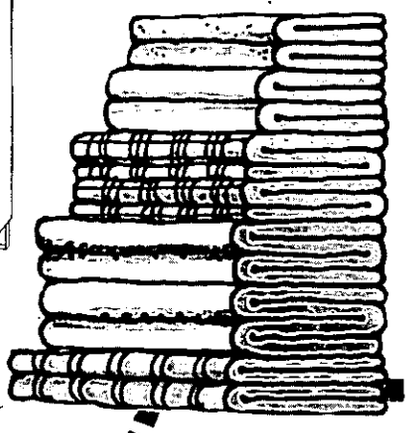

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