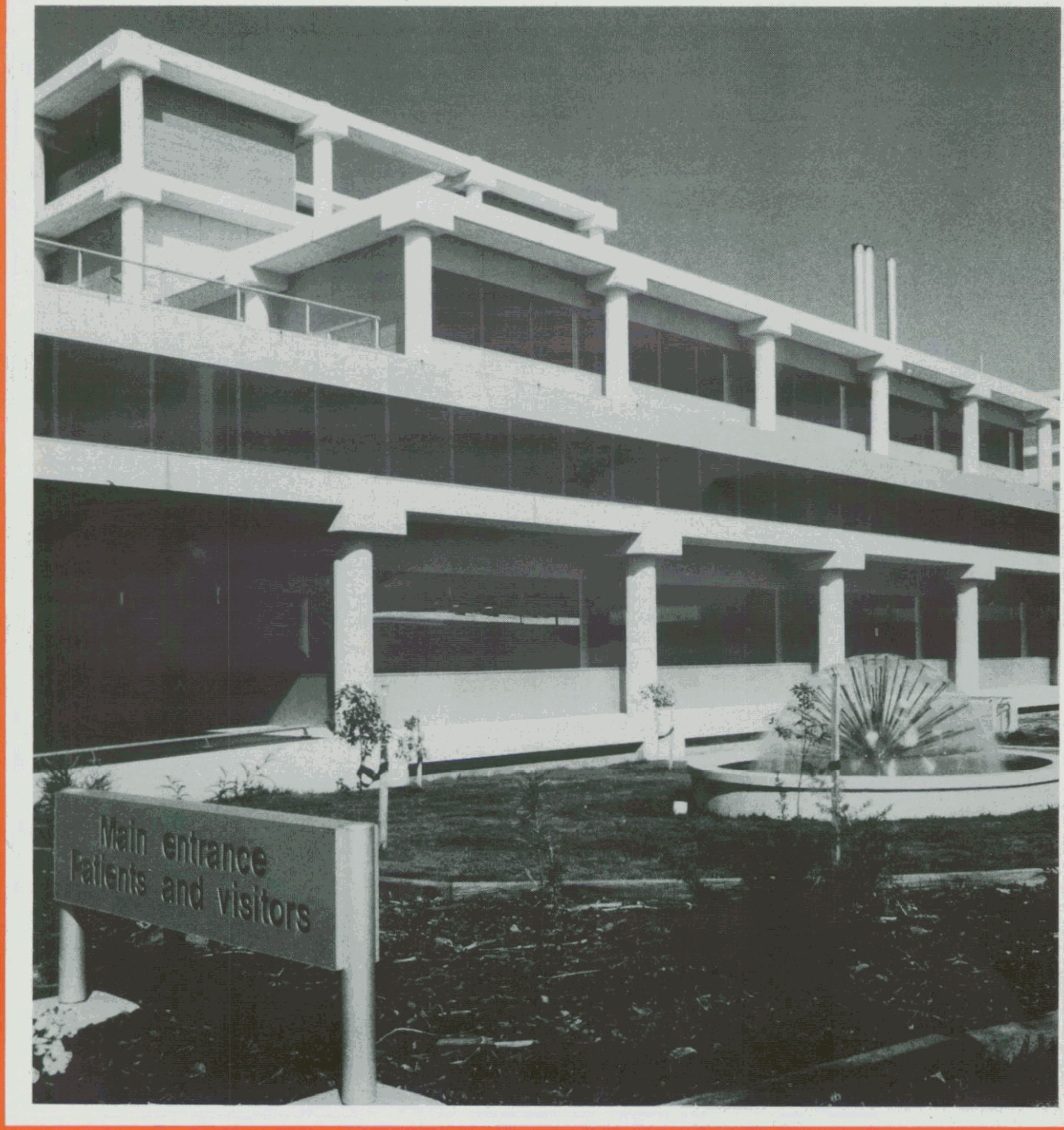
The Journal of The Institute of Hospital Engineering June 1984

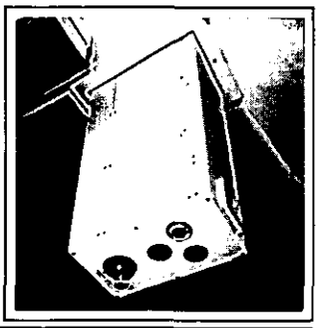
# HOSPITAL ENGINEERING

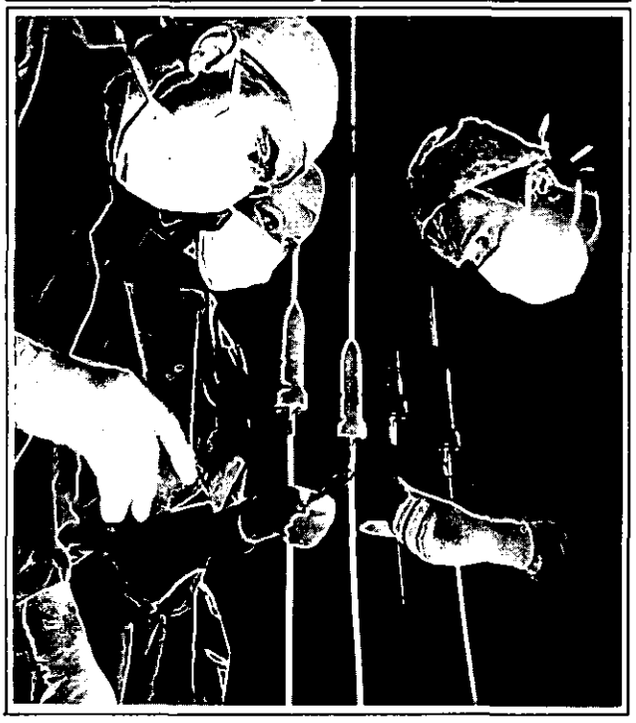
International Federation Issue




- News and views of Australian hospitals
- Falfield course
- Building and engineering assets

# VITAL PATIENT HEALTH CARE SYSTEMS



The MGI Group install, commission and maintain piped medical gases and vacuum systems in hospitals, clinics and laboratories throughout the world.

MGI design and manufacture their own equipment, extending their technical ability into other vital electrical and mechanical services, including oxygen concentrators for home care oxygen therapy and hospital use.

Innovation, product excellence and professional ability are qualities that have established MGI's reputation for dedicated commitment to patient safety.

Medical Gas Installations Limited,
Monmer Close, Stringes Lane,
Willenhall, West Midlands
WV13 1JR.
Tel: 0902 631225 Telex: 334482
MEDGAS

**mgi**

# besam Automatic door systems

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

Why not consult our full technical and advisory service?


## let besam ease the way

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

Hinchingbrooke Hospital, Cambridge ● RAF Hospital, Ely
Disabled Living Foundation, Birmingham ● RNOH Stanmore
London Chest Hospital ● Preston Royal Infirmary
St. Mary's Hospital, Portsmouth ● Queen Alexandra Hospital, Portsmouth ● John Groom's Centre for the Disabled
Princess Grace Hospital, London ● Glasgow Royal Infirmary
Hope Hospital, Salford ● Rotherham District General Hospital
Milton Keynes Shopping Centre (doors for handicapped)
Cheshire Homes (several) ● Lansdowne Road Hospital, Bournemouth ● Poole General Hospital ● Fazackerley Hospital, Liverpool ● Freeman's Hospital, Newcastle
North Tyneside District General Hospital ● Papworth Disabled Settlement ● American Medical Hospital, Cheadle
Roehampton Artificial Limb Centre

**besam**

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

HOSPITAL ENGINEERING is published ten times a year by Tully Goad Vinall. In January and July the HOSPITAL ENGINEERING Newsletter is circulated to Institute Members only.



The Annual Subscription is UK: £28.50 Overseas: £35.00 USA: $55 Canada: $67

**Editor**
Jenny Campbell

**Advertisement Manager**
Michael Birch IMR International 14 Bath Road Swindon Wilts SN1 4AA Telephone: (0793) 45311

*All correspondence relating to the Journal should be addressed to:*
HOSPITAL ENGINEERING
Tully Goad Vinall St Agnes House Cresswell Park Blackheath London SE3 9RJ England Telephone: 01-852 9448


UK ISSN 0309-7508
Photoset by Hive Photosetting

Printed by Marsan Printing Company,



The Institute of Hospital Engineering
20 Landport Terrace
Southsea, Hants PO1 2RG, England
Telephone:
Portsmouth (STD 0705) 823186

**President**
L G Hadley CEng FIMechE FInstE FCIBS MConsE FIHospE

**Secretary**
J E Furness MBE VRD*

**Hon Librarian**
D L Hall FIHospE MIPlantE MRSH MBIM LHA
49 Fitzroy Avenue Harborne
Birmingham B17 8RL
Tel: 021-554 3801, ext 4838 (Office hours)

The International Federation of Hospital Engineering
126 Albert Street London NW1 7NF England

# HOSPITAL ENGINEERING

I.F.H.E.

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

**Volume 38 No 6**
**International Issue No. 50** **June 1984**

*Front cover: Essendon & District Memorial Hospital, Victoria, Australia – just one of the many hospitals that delegates to the IFHE Congress in Melbourne, will be visiting.*

# SOMMAIRE FRANÇAIS

# IFHE: PERSPECTIVES D'AVENIR

Dans son article paru sous la rubrique 'Opinion' dans le numéro de décembre 1983 du périodique Hospital Engineering, Basil Herman a passé en revue les développements qui ont abouti à la révision des Statuts et des Ordres Permanents de la Fédération Internationale de l'Ingénierie des Hôpitaux (IFHE) et a mis en relief le rôle futur élargi de la Fédération dans la formation des ingénieurs des hôpitaux et dans la fourniture d'aide et la diffusion de conseils aux pays en voie de développement.

Jusque-lá, l'activité principale de la Fédération a été d'organiser des congrès internationaux bisannuels, dont le huitième doit se tenir à Melbourne en novembre de cette année. Le succès de ces congrés est démontré par le fait qu'ils ont attiré jusqu'à 1000 délégués et qu'ils se sont tenus dans des endroits partout dans le monde – en Europe, aux Etats-Unis et en Australie. Il n'y a aucun doute qu'ils ont fourni une tribune trés utile pour l'échange international des connaissances et des idées.

Il semble tout à fait approprié que la Fédération, à mesure qu'elle devient plus importante, élargit al gamme de ses activités pour comprendre la formation et l'assistance technique pour ceux qui en ont besoin. En plus de l'échange des idèes au sujet des toutes dernières techniques les plus sophistiquées dans le domaine de l'ingénierie des hôpitaux, la Fédération peut donner un soutien actif au concept de la technologie appropriée, en reconnaissant et en encourageant les travaux réalisés par des ingénieurs n'utilisant que des ressources minimales pour fournir un sourtien rudimentaire dans le domaine de la santé. Après tout, en ce qui concerne l'amélioration des soins sanitaires, la fourniture d'un approvisionnement en eau propre ou d'un système d'égouts dans le cadre de la mise en place d'un système de soins sanitaries simples dans un pays en voie de développement peut être une réalisation aussi importante que la fourniture de nouveaux services sophistiqués dans le tout dernier hôpital polyvalent dans une ville moderne. Maintes et maintes fois, notre attention est attirée sur le fait qu'il n'y a pas assez d'ingénieurs et de techniciens avec une formation appropriée dans les pays du tiers monde pour utiliser les matériels et les services de plus en plus complexes nécessaires pour le soutien des services de santé.

Lors de nos visites dans ces pays, certains d'entre nous ont vu des appareils de réanimation, tels que des oxygénateurs ou des incubateurs pour nouveaux-nés, qui traînent dans les couloirs des hôpitaux, inutilisables pour une période indéfinie faute d'un entretien simple. Lors des congrès internationaux, des conférenciers ont rapporté des incidents semblables et ont lancé des appels d'aide.

Les raisons des pays plus riches de soutenir les activités accrues de la Fédération dans ce sens ne doivent pas être entièrement désintéressées et altruistes, à cause des liens qui existent entre l'aide et le commerce, mais l'objectif global sera toujours conforme à l'article 2 du Statut de l'IFHE, c'est-à-dire qu'il faut tout faire '... pour que les malades partout puissent recevoir de meilleurs soins de santé.'

L'élargissement de l'association IFHE pour comprendre les nouvelles catégories de 'soutien' C et D devra considérablement améliorer sa situation financière et ses possiblités de développement. Les détails concernant les premiers membres de la catégorie D (entreprises professionnelles, commerciales ou industrielles travaillant dans le domaine des soins sanitaires) ont été publiés dans le numéro du mois de mars du périodique Hospital Engineering, et nous espérons que leur adhésion sera suivie par celle de nombreux nouveaux membres qui aimeraient s'associer aux travaux de la Fédération.

Comment la Fédération remplira-t-elle son rôle élargi?

L'organisation des congrès internationaux a été entreprise par les associations nationales des pays hôtes qui, dans le cadre des directives établies par la Fédération, ont en grande partie élaboré le programme et ont entièrement accepté le risque financier, L'IFHE devrait-elle jouer un rôle plus actif à l'avenir dans une sorte de gestion partagée pour être plus responsable devant ses membres en ce qui concerne l'organisation et le programme des événements?

En 1979 et 1982, la Fédération a organisé deux séminaires internationaux pour les ingénieurs des hôpitaux avec le thème 'Comment choisir la technologie appropriée'. Ils ont été organisés pour le compte de l'IFHE conjointement par l'Institut d'Ingénierie dans les Hôpitaux et le Ministère de la Santé britannique au Centre d'Administration des Biens Immobiliers et des Constructions Mécaniques dans les Hôpitaux à Falfield. Il n'y a pas de doute que ceux qui ont assisté ont énormément profité de ces séminaires, et des lettres de remerciement de beaucoup d'entre eux ont été publiées dans les divers numéros de ce périodique, et beaucoup d'autres y auraient participé s'ils avaient pu obtenir le soutien financier nécessaire. L'IFHE a effectivement écrit aux Administrateurs Régionaux de l'O.M.S. au sujet du deuxième séminaire, mais est-ce que cela indique le besoin d'un rôle plus dynamique de la part de la Fédération dans létablissement de liens avec les organisations d'aide nationales et internationales pour les persuader des avantages qu'une gamme de programmes pour la formation des ingénieurs d'hôpital pourrait apporter aux soins sanitaires?

En entrant dans cette deuxième phase de son existence, la Fédération devra maintenir l'élan créé par la première phase, au moyen de l'enthousiasme et du travail dur des individus qui ont donné bénévolement leur temps et fourni de grands efforts. Est-ce que le rôle élargi de l'Association sera plus important que celui qui pourra être soutenu par les efforts bénévoles des membres, et est-ce que le temps approche où l'IFHE aura besoin de faire appel à un secrétariat à plein temps? Ce sont peut-être des questions que devront se poser les membres du Conseil de l'IFHE en vue de leur conférence à Melbourne.

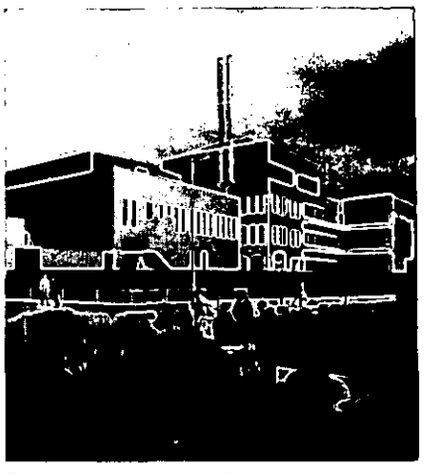
# IFHE News

## Welcome to new D members

Troup Bywaters & Anders, a multi-disciplinary firm of Consulting Engineers specialising in Building Engineering Services. The Partnership was established in 1958 and the practice operates from four offices in London, Essex, Yorkshire and Kent.

Early commissions were largely major hospital developments each with wide and varied engineering requirements and this led quickly to appointments on practically every type of commercial, industrial and institutional buildings including the National Westminster Tower in the City of London.

Whilst the practice has diversified into designing engineering services for all types of buildings the mainstay remains hospital projects. Major hospital engineering work is currently being carried out for many Health Authorities in the United Kingdom. Overseas hospital developments have been completed in Ghana, liaison work with major hospital equipment suppliers requiring specialist advice in the Middle East, medical research laboratory work in France, together with Hotel work in Madeira and the Canaries.



*Croydon District General Hospital recently completed and Engineering Services designed by Troup Bywaters & Anders. Constructed to DHSS 'Nucleus' requirements and including 300 beds, 8 operating theatres and 1250 meal kitchen and dining block.*

## Spain – AEDIAH round table

The Spanish Association of Hospital Engineers and Architects (AEDIAH) – Catalonia, organised a round table on Flooring in Hospitals, in Barcelona on 24th and 25th November. Several firms demonstrated the special features of their flooring and their particular suitablity for use in hospitals. There was a lively discussion, with members contributing their own experiences.

AEDIAH has published the Monograph No. 2 CURSO DE FORMACION HOSPITALARIA (Part I) by the architect Fernando Florez Plaza.
The monograph has 130 pages, 31 figures and 20 graphics. This volume includes Planning, Programmes and radiodiagnostic.
Language: Spanish Price: 1.000,-ptas

**Portuguese Association of Hospital Engineering**

## 2nd SYMPOSIUM ON SAFETY IN HOSPITALS

## Figueira da Foz, 25 and 26 October 1984

### Organization

This 2nd Symposium is organized by the APEH – Portuguese Association of Hospital Engineering and sponsored by the IFHE – International Federation of Hospital Engineering. Its principal aim is to promote technical exchanges among hospital engineering technicians.

### Venue

The 2nd Symposium shall be held in the premises of the Municipality Museum – Library Dr. Santos Rocha, at Figueira da Foz, a seaside resort located in the Centre of Portugal (about 115 miles North of Lisbon).

### Registration

May participate at this Symposium:
- members of foreign Associations affiliated with IFHE.
- members of APEH.

There is no registration fee to members of foreign Associations.

### Get-together dinner

On the 25th of October 1984, a regional Dinner will be offered to all participants by the APEH and the Municipality of Figueira da Foz.

### Subjects

The general subject is: "SAFETY IN HOSPITALS" Partial subjects are:
ST. 1 – Architecture and Hospital Safety
ST. 2 – Engineering and Hospital Safety
ST. 3 – Safety against Hospital Infections
ST. 4 – Food Safety in Hospitals
ST. 5 – Safety and Law
ST. 6 – Safety against theft

### Papers

a) – Papers can be written or presented in Portuguese, in the official languages of IFHE (English and French) and in Spanish and Italian.
b) – There shall be no simultaneous translation.
c) – Maximum time alloted to presenting a paper is twenty minutes.
d) – Titles of papers should be sent to APEH before the 15th of July, 1984.
e) – Summaries of papers (no more than one page on size A4, typewritten in double space) must be received by APEH not later than the 31st of August 1984.
f) – Each participant will receive a collection of copies of the summaries of all papers.
g) – Only the complete texts of papers, diagrams, drawings, catalogs, etc., supplied to APEH by their authors will be distributed.
h) – Equipment for the projection of slides, films, tranparencies, etc will be available.

### Information

a) – A final Program of the 2nd Symposium shall be sent in due time.
b) – Any additional information to be requested from:
**APEH – Associação Portuguesa de Engineering Hospitalar**
**Avenida Miguem Bombarda, 133-5º B**
**1000 LISBOA – PORTUGAL**
**Tel.: (351.1) 545947**

*The author is Past President of The Institute of Hospital Engineering, Council Member of IFHE, and Chairman of Static Systems Group Ltd*

# Microprocessor nurse call handsets – an application of advanced electronics for easier patient operation and greatly reduced maintenance costs

LAWRENCE TURNER OBE BSc CEng FIWW FCIBS

The majority of nurse call systems installed in hospitals within the NHS are based broadly on Hospital Technical Memorandum No 15 and also on Bedhead Design series A and B.

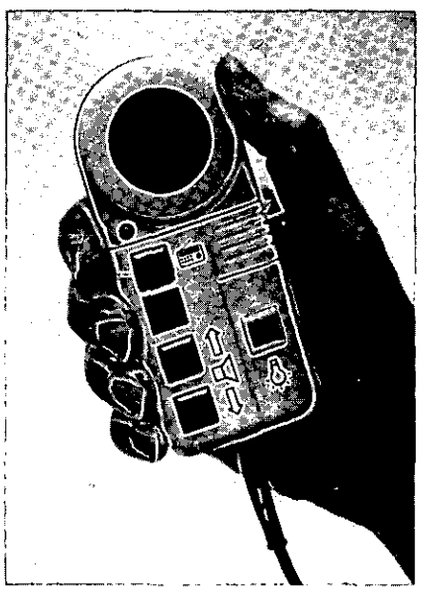
Since both these documents were published by the Department of Health in the late 1960's, it is perhaps not before time that the situation should be reviewed to establish how the current rapid advance in micro electronics can benefit the next generation of nurse call equipment.

The fundamental requirement for a nurse call system is to provide the patient with facility to call the nurse, operate the bedlight and also to select any of six radio and TV sound entertainment channels fed through an acoustic headset. Since the patient is possibly unable to operate wall-mounted controls, it is usual practice to provide these facilities in a portable handset connected to the bedhead panel or service trunking by means of two metres of 20-core flexible cable and a multipin plug. It is the plug which has attracted most criticism from the hospital maintenance staff.

A recent survey of a large district general hospital revealed that most of the maintenance problems were caused when the handsets were dropped or pulled sharply away from the wall socket. This was most likely to occur when the beds or lockers were moved for cleaning.

None of the available economically-priced 20-pin plugs and sockets appeared to be capable of withstanding this treatment. So it became obvious that the only real solution lay in reducing the number of conductors required to enable a more robust, jack type plug and socket to be utilised. After exhaustive tests the B.T. type 420 plug was selected as ideal for the purpose, particularly now that it has been withdrawn from telephone use by British Telecom.

It was also appreciated that advanced micro electronics would permit use of the latest tactile calculator type pushes instead of traditional, vulnerable bulky controls. In addition to allowing a greatly improved ergonomic layout, this would also significantly reduce the weight and size of the handset and in consequence reduce any damage caused by



## SOMMAIRE FRANÇAIS

## TECHNIQUES HOSPITALIERS

### Combinés d'appel d'infirmière à microprocesseur

Il était temps que les combinés d'appel d'infirmière au R.U. soient mis à jour de manière à exploiter la nouvelle micro-électronique. En conséquence, le Static Systems Group a mis au point un combiné révolutionnaire qui fait appel à un microprocesseur intégré avec une fiche de jack quadripolaire grande puissance et un câble à quatre conducteurs. Deux des quatre conducteurs multiplexent la station radio, le volume et la lampe de lecture. Les autres conducteurs sont destinés au circuit de nuit de l'infirmière et à la veilleuse. Le bouton en est l'élément le plus grand. Allumé, il opère avec un déclic perceptible. Quatre petits boutons-poussoirs actionnent la lampe de lecture, le choix de canal radio et le volume. Les nouveaux appareils sont légers, peuvent être actionnés par une très petite main et sont moulés en plastique ABS robuste. Une pince à linge les attache au vêtement ou au drap du patient.

repeated dropping.

Static Systems Group decided therefore to engage the services of Malcolm Withnall, MSIA and Neil Fraser, BSc as consultant designer and ergonomist respectively, to work closely with our research and development engineers. Considerable help and encouragement has also been contributed by many experienced nurses and hospital engineers which, added to the company's 20 years' experience in nurse call manufacture, has greatly helped the final concept.

The result is a dramatic departure from what has previously been available.

First, the new prototype handset uses an integral microprocessor to communicate with a similar device in the bedhead panel.

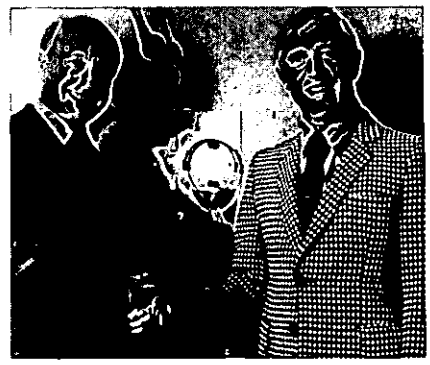
Second, the usual 19-pin plug and 20-core cable is replaced with a heavy-duty 4-pole jack plug and 4-core cable, which solve the problem of very high maintenance costs involved in repairing 19 soldered joints. Two of the four cores are used for multiplexing the entertainment channels, volume control and bedlight operation; and the remaining cores are used exclusively for the nurse call circuit and reassurance light. This circuit, which is continuously monitored so that any break in the conductors will register a call, is totally independent of the microprocessor. In fact, a simple call button can alternatively be plugged into the same jack socket where the handset is inappropriate for a particular patient without any circuit changes.

The nurse call button is the largest component on the handset. 34mm in diameter and permanently illuminated, it operates with a distinct, audible 'click'. Four smaller pushes control the bedlight, radio selection and volume control. Indication of the radio programme selected is by means of a large, illuminated, seven-segment, digital display. The standard handset will control six entertainment channels plus off position; up to 14 channels can be provided.

The new units are light in weight, designed to be operated easily in the smallest hand and are moulded from extremely tough ABS plastic. (Rubber pads are fitted to the base of the handset to prevent it slipping off the bedside table or locker.) A specially designed linen clip is incorporated which will attach to patients' clothing or bedlinen (a feature particularly requested by nursing staff).

The associated moulded parking bracket is designed with minimum projection and for easy stowage. It is also arranged to release the handset should it be pulled sharply away, to avoid damage to the cables.

There is little doubt that the new handset will have very great appeal to patients and nursing staff. Moreover, we foresee that the benefit in reduced maintenance costs and greater reliability will have an equal appeal to the hospital engineer.



*Jimmy Saville OBE takes delivery of an electronic nurse-call system from Static Systems Group chairman, Lawrence Turner, at Stoke Mandeville hospital's spinal injuries unit, for which Jimmy has helped raise funds.*

## From the 40th Annual Conference and IHEX '84

A large number of delegates attended the Institute's 40th Annual Conference held on 16-18 May in Bristol. After the opening by Mr W V S Seccombe, Chairman, South Western Regional Health Authority, a series of valuable and informative papers, each with particular reference to projects in the West of England, were presented over the two days.

For the first time ever the holding of IHEX '84 exhibition in conjunction with the Conference was extremely successful. Exhibitors were enthusiastic and several have already made bookings for next year. Delegates had many opportunities to visit the exhibition which proved a valuable forum for the exchange of views, news and information.

While delegates attended the session during the day, accompanying wives had their own programme of sightseeing and shopping. Everyone got together in the evening for a trip to Falfield – The Hospital Estate Management & Engineering Centre – which included a guided tour (pictured above) and ended with a barbecue. The next evening was the occasion of the conference Dinner & Dance which was a most enjoyable event.

More news from the Conference and IHEX '84 will appear in the August issue of HOSPITAL ENGINEERING and papers from the Conference are due to be published over the next twelve months.

# Essendon and District Memorial Hospital

W Geerlings

Most countries used to believe that no expenditure was too great to maintain the health of the population. It was only when the costs of health care escalated out of all proportion that the chill winds of financial reality began to blow, and one by one countries around the world recognised the fact that cost-effectiveness is just as relevant in health care as it is in business management.

In Victoria the new Essendon and District Memorial 200-bed community Hospital is a milestone in this process. Designed during the optimistic days of the early 1970's, acceptance of a building tender was authorised by the government less than a month before the first freeze on hospitals which heralded the present cost-effective philosophy.

It can therefore be truthfully described as the last major hospital of the optimistic period built in Victoria. It illustrates both the philosophic view and the state of hospital technology at that stage.

Essendon and District Memorial Hospital was established shortly after the Second World War as a 59-bed maternity hospital, later expanded to 77 beds. It was always the Committee's intention to establish on the site a community general hospital to serve the North-West suburbs of Melbourne.

Briefing and design of the hospital began in early 1974 and documentation was completed in early 1977, including a period of twelve months during which all work was suspended. Construction began in mid 1978 and took four years.

Due to changes in government health policy the hospital has not yet been commissioned.

## SOMMAIRE FRANÇAIS

Cet hôpital a été conçu au début des années 70, avant l'introduction de la politique d'austérité actuelle. Sa construction a été terminée en 1982, mais l'hôpital n'a pas encore été mis en service. Selon les directives initiales concernant le projet, il fallait construire un hôpital à 200 lits qui offre tous les services généraux pour les hospitalisés de la région, et l'hôpital existant va coninuer à servir, mais comme service obstétrique seulement. L'hôpital doit être totalement autonome, à l'exception des services de blanchisserie. Aucun service spécialisé ne doit être fourni.

## Brief

The basic brief was for a 200-bed hospital providing full general acute services for the area, with the existing hospital to be retained as the midwifery section. The hospital was to be fully self-sufficient except for laundry, which would be provided by an existing regional service. No speciality services were to be provided.

**Basic Statistics**

- 205 new beds, including 22 special beds.
- Key Services: 12 bed coronary and intensive care units
  four operating theatres
  full pathology service
  six imaging rooms
  accident and emergency outpatients.
- gross area 25,517m$^2$
- cost per m$^2$ (1976) $837.

## General Description

The design is a rectangular deep plan covering a ground area of about 122m x 65m, placed so that the hospital could in the future be doubled if desired.

Level 1: Basement plant

Level 2: (Ground level access from south and west)

Catering, cafeteria, supply, engineering, CSSD and staff change.

Level 3: (Ground access from north and east).

Main entry, outpatients, imaging, accident and emergency, medical records, pharmacy, pathology, administration and allied health.

Level 4: Operating theatres, day surgery, ICU, CCU and three 24-bed surgical wards.

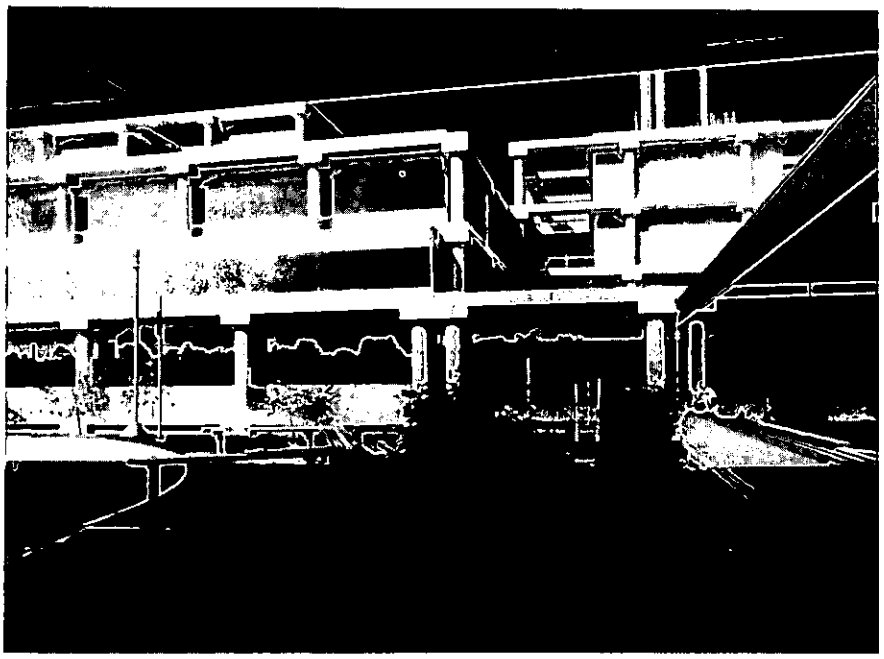
Level 5: Three 24-bed medical wards, 20-bed orthopaedic ward and 20-bed childrens ward.

## Design

One of the primary aims in the design of the building was to provide maximum flexibility for future change or extension.

Some of the measures employed are:

- Floor-to-floor height of 4.2m, giving a false ceiling space of 1.2m. This has enabled services to be layered within the ceiling into three separate zones (plumbing, mechanical and wiring) so that different services do not conflict.
- Provision for plumbing stacks at every second column, so that gravity wastes are possible within the plumbing ceiling layer from any point in the building.
- Fully excavated subfloor, so that all drainage is accessible for maintenance or alteration.
- Dry-well partitioning terminating at the continuous metal pan ceiling.
- Rationalised interchangeable joinery system, enabling additions, subtractions or changes to be made at will.
- Standard basin and toilet panels, incorporating prefabricated plumbing, which can be installed and connected with minimum delay or disturbance.
- Reusable curtain wall panels, and starter bars in external column capitals, enabling extension in single bays if desired.



*Central lift core and East wing of the Essendon and District Memorial Hospital, Victoria, Australia.*

## Services

**Steam Generation**
Two unattended 1034 kPa unattended boilers, dual fired on natural gas and light fuel oil. Space for two further boilers.

**Air Conditioning**
All air low velocity zone reheat with separate handling systems for departments and/or fire compartments.

**Chilled water Plant**
Three centrifugal machines with a total capacity of 3,500kw centrally located. Single cooling tower in separate partially underground building, connected by tunnel.

**Water Supply**
Duplicate supplies from different mains; steam heated calorifiers giving 60°C for general reticulation, 70°C for kitchen.

**Medical gases**
Reticulated medical compressed air, oxygen, suction; nitrous oxide, Entonox and natural gas.

**Sprinklers**
Fully sprinklered including ceiling spaces, zoned east and west wings on each floor with "early warning" systems in critical areas.

**Electrical Installation**
Three separate power distribution systems:
(i) General light and power (expendable in case of loss of one HV feeder or transformer)
(ii) Essential light and power (automatically supplied from active feeder, and by future emergency generator).
(iii) Emergency light and power, automatically supplied by 40 kw battery inverter system.

Most lighting is by open diffuser 2 x 40 w low brightness fluorescent light/air fitting.

Minor systems include nurse call, broadcast radio, TV aerial, general and emergency paging, intercom, fire and emergency warning systems.

**Waste Disposal**
Garbage and linen chutes to disposal areas. Shredder/compactors for hard garbage, pathological incinerator.

**Lifts**
Four installed, with provision for a further two. Geared variable voltage DC machines, 1.78 m/s.

**Telephones**
Ericsson ARD 591 crossbar PABX.

**Building Automation**
Honeywell Alfa Delta 1000, giving remote monitoring of plant security, alarm and fault, and capable of extension to provide remote stop/start.

Architects: Yuncken Freeman Pty Ltd
Mechanical & Electrical Consultants:
Kuttner Collins & Partners
Structural Consultants:
F C Dixon Consulting Engineers
Cost Consultants: Beattie Prowse Pty Ltd
Programming & Commissioning:
Tracey, Brunstrom & Hammond

**Main contractors:**
Builder: Hansen & Yuncken Pty Ltd
Mechanical Subcontractor:
Gardner & Naylor
Electrical Subcontractor: O'Donnell Griffin.

*The author attended the Senior Management Course for Developing Management Effectiveness at Falfield in October 1983. He has written a summary of a most enjoyable week. 'Perhaps it will encourage other international hospital engineers to attend,' he suggests. Mr Aitken is Chief Engineer at the King Edward Memorial Hospital in Subiaco, Western Australia.*

# An Australian at Falfield – an unforgettable experience

R A Aitken MIHA(Aust)

Having recently returned from four months extended leave in Europe, I can say without hesitation that one of the highlights was a one week course at the Hospital Estate Management and Engineering Centre at Falfield, Gloucestershire, England.

I was fortunate to have the opportunity to attend the Senior Management Course for "Developing Management Effectiveness" held in October 1983.

As the course title suggests the principal aim is to improve the ability of works staff to communicate with all levels of hospital personnel, be more effective in management skills and achieve greater proficiency in report writing and public speaking.

I believe the course fulfilled its objectives admirably, the following brief summary of a few of the activities will give some idea of the work undertaken by course members and the amount of careful thought put into the structuring of the course.

*The author (ringed) with members of the Senior Management Course (October '83) at Falfield. 'Friends and contacts . . . invaluable. The experience . . . unforgettable,' sums up Mr Aitken.*

The course commenced by way of a Welcome to Falfield at 1540 hrs on Sunday 16th October (I had arrived at London Gatwick at 0800 hrs from Western Australia). The fifty six course members had been split into six groups and individual groups then introduced themselves to each other and their tutor by giving a brief resumé of their background. This "broke the ice" and all group members then had some idea of their colleagues background. A post dinner session introducing the course left everyone reeling at the quantity of paperwork thrust upon them to read and inwardly digest. At 2100 hrs most members headed for a well stocked lounge bar while I prudently headed to bed with my head buzzing from a mixture of course content and jet lag.

The days that followed gave us all an insight to effective presentation of reports, use of visual aids and verbal skills. Exercises on chairing an inter-

## SOMMAIRE FRANÇAIS
## Un Australien a Falfield

M. Aitken, Ingénieur en chef du King Edward Memorial Hospital à Subiaco en Australie Occidentale, décrit ses expériences en tant que stagiaire pendant le stage pour cadres supérieurs concernant le développement de l'efficacité des gestionnaires qui a eu lieu en octobre 1983. Ce stage est organisé conjointement par l'Institut d'Ingenierie dans les Hôpitaux et le Ministère de la Santé britannique, et se tient tous les ans au Centre d'Administration des Biens Immobiliers et des Constructions Mécaniques dans les Hôpitaux, à Falfield, Gloucestershire, Angleterre.

M. Aitken présente le programme de stage, ses objectifs et les méthodes adoptées pour réaliser ceux-ci, et souligne le fait qu'il s'agit d'un stage participatif, dans lequel on donne à tous les stagiaires, des tâches associées à la prise de décision, à la rédaction des rapports, à la présentation des arguments et à l'art oratoire. Sur le plan des divertissements, on organise un dîner officiel pour les stagiaires et leurs professeurs le dernier soir du stage, lequel dure quatre jours et demi, et M. Aitken explique qu'une camaraderie se développe rapidement parmi les stagiaires.

Dans son exposé, il souligne le fait que le programme de ce stage concerne tous les cadres superieurs, de quelque comté ou même de quelque pays qu'ils viennent, et il conseille vivement à tout cadre supérieur qui pense venir en Angleterre de s'inscrire au stage Keele de Falfield au cours de sa visite.

view were role played in group rooms, this type of exercise was also used for the sessions on industrial relations. During the ensuing group discussions it became apparent that these situations and issues occurred in Australia. This applies to financial and manpower constraints recently called for, through to everyday operational problems and brought home the fact that nobody carries the whole world on their shoulders, it's pretty well shared out.

A very thought provoking and for some, a very soul searching session was presented under the heading of Management by Persuasion by a speaker who certainly knew his pyschology. The exercise on "skills in listening and styles of responding" left not a few members a little pensive following their self analysis. I found this session very interesting although others felt it was of little value. This difference of opinions occurred during other sessions and highlighted that individuals extracted varying degrees of benefit from the subject matter.

Interactive skills taught us not to pre-conceive a problem, that you may not achieve your objective in an interview/meeting situation and consequently you must remain flexible in your approach.

The major item on the week's programme was the preparation and presentation of a group project. This took many hours of research of documentation provided and all the activities that we had been involved in earlier in the course were applied in the preparation and presentation of the project, culminating in an 11 minute report presented by all groups in turn to all course members and tutors.

The days did not end at 17.30 hours, most evenings had some form of activity. The Falfield Factor was a lighthearted quiz show, the debate was a more formal evening on the art of debating. Most evenings also included sessions on public speaking where course members could come and go at their leisure and practise public speaking techniques for which there was an award presented at the course dinner for the most improved speaker.

It is not practically possible to summarise all the aspects of this course and what contributes to its overall success, but, refer you to an article "Developing Management Effective, 20 Years On" in the June 1983 edition of Hospital Engineering where the writer's attempt to pin point "the precise reason for the course's success, popularity and what makes it tick, adding that the answer has always been difficult to put into words." Let me try.

Arriving on the Sunday afternoon the assemblage of disorientated and unco-ordinated course members formed into groups which quickly developed a camaraderie and in my group in particular no overpowering individual emerged and we all warmed to the exercises which were set. The topics covered were universal and no one was left with the feeling that it did not concern him or her. This I believe was one of the keys to the success of the course. It would make little difference whether you came from the South of England, the North of Scotland or the other side of the black stump in Australia, I feel sure the course would be beneficial to all.

During my visit to the UK I also attended one of the technical courses at Falfield and these impressions which I had formed were substantiated by discussion with members of that course. However, without detracting from the obvious success of these technical courses, the management course retains the slight edge in being special, possibly because all who were at Falfield during the week were motivated towards a mutual goal, whereas during normal weeks several courses of varying technical disciplines run and members were inclined to segregate into their own disciplines.

The final evening was a formal dinner at which all members, tutors and invited guests relaxed and we quietly congratulated ourselves on "surviving" the week and emerging as more effective managers and thinking that nothing more could be done to augment the experiences of the past four and a half days (some members reckoned it was closer to four and a half weeks). How wrong this assumption proved to be.

Friday morning was dedicated to a session on "experiences in management" by a panel of top level managers. There could have been a tendency for course members to be subconsciously heading for home along some motorway before morning tea break, instead, we were "transported" throughout this session, absorbing the polished performance of the Chairman and the interaction of the panel, leaving us with the impression that we may have grasped the basics but we had some way to go.

There is no doubt that there will be ample opportunity to put into practise all that was offered to us during the week and that we should become more effective managers. I urge any international hospital engineer who is contemplating a trip to the UK to attempt to include the Keele course at Falfield. The friends and contacts you make will be invaluable and the experience will be unforgettable.

## 1984 Courses

Preparation of the courses for this year is well underway and in accordance with tradition, they have been updated in line with current developments in the NHS, and the demands on all Works Officers to improve their management skills.

### Middle Management Course – K17 (15th July-20th July)

*Target Population*

RHA Works staff up to and including TA1.
Senior Engineers and Senior Building Officers.
Engineers and Building Officers.
Electronics Technician Grades.
Foremen with potential for promotion.

### Senior Management Course – K18 (14th October-19th October)

*Target Population*

Senior RHA staff.
District Works Officers.
Unit Works Officers.
Works support staff above Senior Engineer and Senior Building Officer.
Others who have attended the Middle Management Course.
Consultant staff both building and engineering, are also eligible.

### Enquiries and Nominations

*These should be addressed to the Principal, Hospital Estate Management and Engineering Centre, Eastwood Park, Falfield, Wotton-under-Edge, Gloucestershire GL12 8DA (telephone 0454 260207).*

*This paper was presented at the 7th International Congress of Hospital Engineering in Amsterdam in May 1982. It has been amended to take account of progress made since that date. The author is Chief Engineer and Director of Works Operations at the Department of Health, London*

# Building and engineering assets – a total information system to support cost effective management

T A NICHOLLS BSc(Eng) CEng MIEE HonFIHospE

## 1 Introduction

The replacement value of the National Health Service (NHS) estates in England is estimated to be £20,000 million. A capital building programme, currently about £450 million per year, has resulted in the construction of many new hospitals but nevertheless the NHS relies, and must continue to rely, on its existing estates many of which are well over 50 years old, for the delivery of most of its health services. The UK Department of Health and Social Security (DHSS) has over recent years become increasingly aware of the importance of making the most economic and effective use of its existing health building estates through the development of improved planning techniques and better maintenance management procedures. If the managers of health care establishments are to achieve these very desirable objectives then they need to take proper account of the three basic resources of money, human skills and physical assets available to them both in their day to day management activities and when they are planning any longer term changes in the patient services delivered in these health care establishments. These three resources are interactive one with another and have a comparatively long time scale for change. To optimise their utilisation is a very complex process and one which is subjected to many pressures not all of which are necessarily logical or objective. In the longer term a planning system based on an annual review of a ten year strategic plan is seen by many people as the only sensible way to rationalise the affairs of an organisation as complex as a health service whether the service is that being provided by a small group of neighbourhood hospitals or by a national or multinational health care organisation.

The strategic planning process itself is often considered to be in two sequential and almost separate parts; service planning which is to determine the form and extent of the patient services to be provided and facility planning which is the manipulation of the health building estates to provide these patient services in the most economical way by the development and adaptation of the existing buildings and where necessary constructing new or demolishing obsolete buildings. These two parts of the planning process are in reality interdependent and should be considered together as a single co-ordinated activity. But unless the Works Officers responsible for the health building estates are able to contribute to these planning processes by providing advice and information on, for example, the physical and functional conditions of the existing buildings and their associated plants and equipments and their potential for reuse in the existing or some alternative clinical function then the planning process itself is unlikely to be very successful. The Works Officers also need a great deal of quite a different kind of information for the efficient day to day management of the maintenance of the health buildings and the operation of the associated engineering services.

If therefore one examines the complete range of information needed for the *enlightened management of the health building estates* it becomes very clear that it is extensive, wide


## SOMMAIRE FRANÇAIS

### Biens Immobiliers et Constructions Mecaniques – un Systeme Global D'Informations purr soutenir une gestion ayant un bon rapport cout/efficactite

Le UK National Health Service (Sécurité sociale britannique) est en train de mettre au point un système d'informations et de gestion des travaux de construction connu sous le sigle WIMS, conçu être utilisé par les responsables des travaux de construction, c'est-à-dire par les ingénieurs, architectes et géomètres experts chargés de la gestion des projets de construction pour le compte de la Sécurité sociale britannique. L'historique du développement de ce système et le système lui-même sont décrits de façon schématique, et cette partie du système qui a été complètement développée, informatisée et mise en pratique de façon régulière dans plusieurs services régionaux de la santé est décrite de manière plus détaillée.

ranging and that much of it can be derived from common data bases constructed from site surveys, records of performance, registers of assets, etc, and that an integrated management information system utilising automatic data processing (wherever this can be economically justified) will offer many operational advantages over the present methods and ensure a generally much better quality of information and therefore decision. It is often said that the quality of the decisions made by managers is only as good as the information on which they are based and this is nowhere more true than in the strategic planning of the use of health care buildings. Costly mistakes can very easily be made when decisions are being taken on the future use and development of these very specialised types of buildings particularly when these decisions fail to take full account of the present condition and future potential of the buildings concerned.

## 2 The Information System

Any integrated management information system must satisfy a number of tests if it is to be acceptable to all its potential users and anyone undertaking the development of such a system will be well advised to study the users requirements very carefully. For example the management of the health building estates involves many apparently unrelated activities of varying timescales. Some of these activities are not the direct responsibility of Works Officers and yet their information system must make allowance for them and in some cases be able to accept and process data prepared by other disciplines. As a further complication these activities are sometimes shared across different management tiers within a health care organisation according to the delegated levels of responsibility. Consequently each level of management in the various disciplines may require information on the same subject but in a different form or context. If duplication of work is to be avoided in these situations then all information must be generated as a product of the data and information being collected and used at local (hospital) level but processed according to the particular needs of the individual users. The size of the health care unit in which the information system will be used, (in UK terms a Health District) and the hierarchical management structures surrounding them are important considerations in the design of any information system. The information model can be designed to allow freedom for variations in management methods and styles but unless the managers in these local health care units follow a similar information model the data and management information prepared by the individual health care units will not necessarily be compatible one with another and therefore it may not be capable of being aggregated or even compared in any meaningful way by those in charge of the parent health care organisation. This incompatibility of data and information will prevent any monitoring of performance at higher levels of management. The facility to filter and aggregate information from local level and yet retain its accuracy as it is passed up the management chain is a fundamental requirement of any management system and is seen as an essential feature of any system developed for the UK National Health Service (NHS).

The system described in this paper is being developed for the UK National Health Service which comprises a large number of separate health care units (Health Districts) each serving a population ranging from about 100,000 to 700,000 all grouped within the framework of larger regional health organisations. The work is proceeding in parallel with the development of similar information systems for other disciplines in the NHS and as far as possible data will be transferrable and ADP systems integrated so that information relevant to more than one department or discipline can be exchanged without additional processing.

The task of producing a comprehensive and coordinated information system of this kind for the complete range of activities involved in the management of the health building estates is complex and potentially very large and certain criteria were agreed to limit the work to manageable proportions and to ensure as far as is possible that the system when fully developed will be capable of universal application in the UK health service.

These criteria are:

**a.** The data and management information required by all users of the system should flow directly from that generated as part of the normal management process at the local (hospital) level, that is a "bottom up" rather than a "top down" information system.

**b.** The entire system shall comprehend all the management activities of works staff but it should be so structured that it comprises a collection of independent but compatible sub-systems for the various management functions. These sub-systems shall all share the same data bases, be flexible in use and be so designed that users can, if they so decide, use only those parts of the system most appropriate to their perceived needs.

**c.** In view of the cost of collecting, storing, updating and processing data these shall be strictly limited to the minimum necessary to produce the information required for the management activities identified and described in the management model.

## 3 The Development of the System

The most difficult part of developing any information system is to identify the information required by management. To ask the working managers what they think they need in the absence of any model or description of the managers' activities is to risk the inclusion of a mass of data and information in the system which is not essential to the management function.

Works Managers in the health care services in the UK have three major areas of responsibility. These are:

**a.** The strategic development of the health estates

**b.** Property management and transactions

**c.** Management of the works maintenance and operational services.

Three small sub-groups of experienced managers from the National Health Service were formed to identify all the management activities related to these three areas of responsibility.

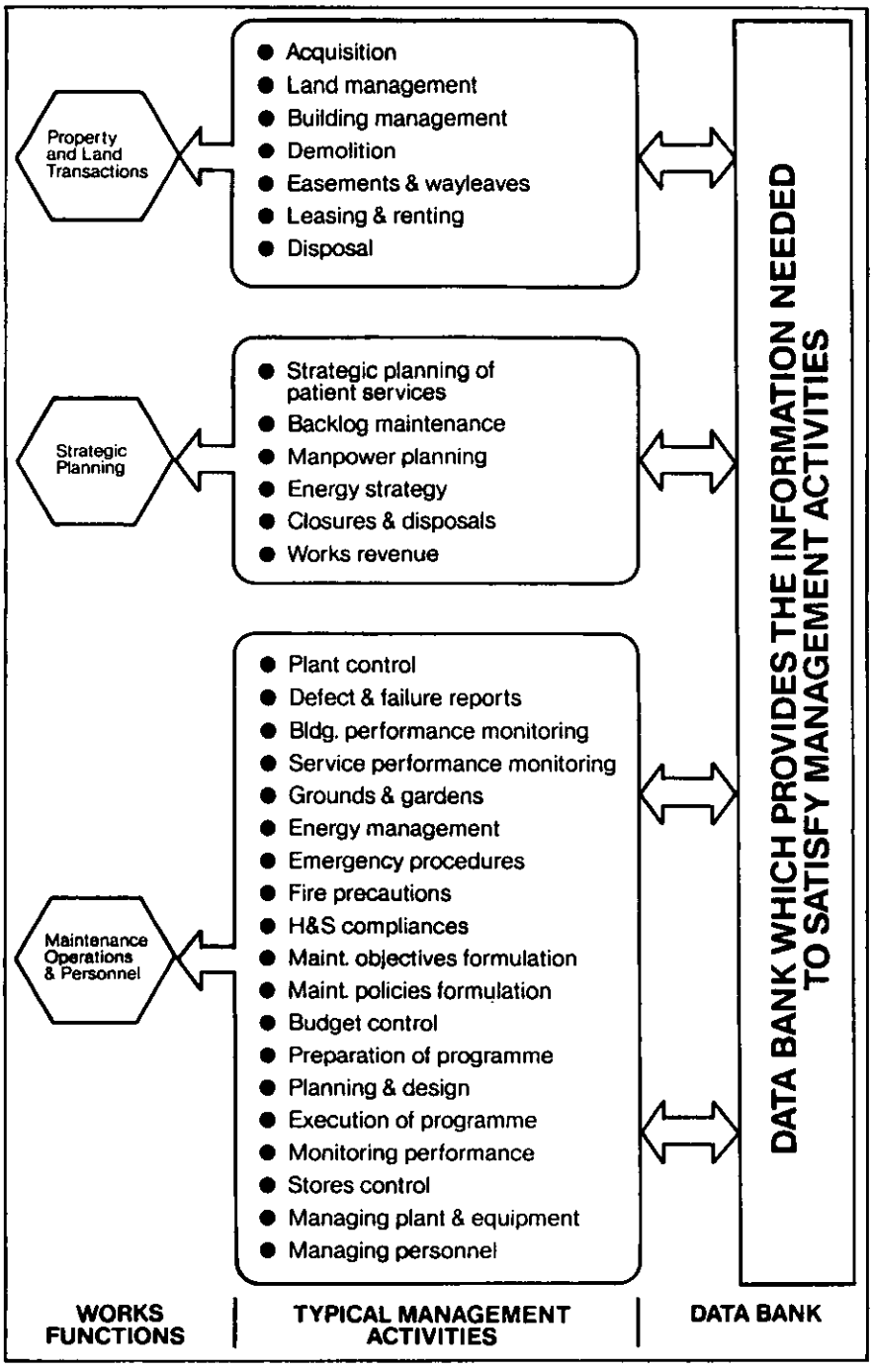



*Figure 1. Estate Management functions & typical associated activities.*

The information requirements and any supporting data for every activity identified by each group were described all using the same analytical techniques and all recording their information in the same format. Figure I indicates the type of activities identified.

This detailed analysis and then description of the managers' activities and the related data and information provided the foundation on which the whole system was constructed. Any group of experienced managers will bring a variety of management methods to a study of this kind. The sub-groups will not claim that the management methods described in this analysis represent the only or even in some cases the best way to carry out these management tasks but they will claim that the methods described are well founded, represent good practice and are all compatible within the context of the total information and management system.

A number of further stages were then necessary to convert these activity related lists of information into a management model. These can be summarised as follows:

(i) To classify these data and information according to their importance, frequency of use, cost of collection, etc. This task is very necessary because the information system identifies all the information required irrespective of its value and cost and therefore whether it needs to be held on file or only collected as and when required for special and perhaps very infrequent management actions.

(ii) To construct a model of the decision making processes in the form of flow diagrams and charts to illustrate the processing and transfer of data and information within and between systems, see fig 6.

(iii) To assess the minimum information needed for monitoring performance at the various management levels in the organisation and to identify suitable indicators for this purpose which can be derived from the management information generated and used at local (hospital) level.

(iv) To identify those parts of the management information system which could sensibly and cost effectively be computerised.

(v) To implement the system in selected health care organisations to gain some experience of its use in actual works departments.

## 4 Progress

The sections of the information system being developed for the strategic development of the health estates 3(a) and property management and transactions 3(b) have reached stage 3(ii).* More progress has been made with those parts of the system required for the management of the works maintenance and operational services and personnel. Maintenance and operational services are required for all health building estates and their increasing costs are a major

** Since first preparing this paper WIMS modules have been released to aid property management and to store and analyse the results of surveys to identify the broad physical condition of the Health Service estate. Further modules are under development. April 1984*

incentive for improving their efficiency. The DHSS has for many years been developing in collaboration with Works Officers in the NHS discrete management systems to improve the utilisation of labour, reduce the capital and revenue costs of buildings, plant and equipments, and provide measures against which managers can assess their own performance.

The management systems, which are predominantly manual in operation, include:

**a.** planned preventive maintenance system

**b.** an incentive bonus scheme

**c.** a system for controlling capital schemes

**d.** energy audit procedures

**e.** a system for monitoring maintenance performance.

The availability of these management systems meant that the designers of the works maintenance and operational services sections of the information system were able to make rapid progress and indeed in most respects stage 3(v) has been reached. The adoption of these various manually operated management systems by the NHS has involved an increasing number of clerical and administrative tasks within hospital Works Departments much of which could be assisted by computerisation. Indeed such systems require and generate much information and in many instances the information generated cannot, in practice be collated and utilised for management purposes unless some form of computerisation is adopted.

In an attempt to improve clerical efficiency and collate feedback information for maintenance work completed, limited use over the last ten years has been made within the UK National Health Service of main frame "batch" processing computers to undertake financial analysis of maintenance work. However, computer technology has developed extremely rapidly in recent years and it was decided that the computerisation of any part of this comprehensive estate management information system should be based on small interactive computers which allow the manager to define the exact information required, and to access that information where and when required. Such computers use a Visual Display Unit and Keyboard to enter and access information. Figure 2 is a schematic of the type of computer installation one might anticipate for the estate management information system when used within a UK Health Authority.

This section of the WIMS system forms the basic building block around which all other manual and computer based parts of the total information and management system will be modelled.

## 5 WIMS for Works Maintenance and Operational Services

Unlike some engineering management systems WIMS uses an asset register which describes the estates in the context of their component parts. This asset register is a corner stone of WIMS and many of the management facilities provided by it are dependent on the presence of this register; for example planned maintenance and job feedback. As well as providing a sound management discipline, this asset register also forms the basis for the addition of many other computer programs associated with the total WIMS. Asset numbers are based on a pyramid coding structure which is essential if the full power of the search facilities available from a computer are to be realised.

For the purposes of WIMS an engineering or building asset is either:

**a.** An item of equipment or plant for which it is necessary under statutory requirement to maintain records, such as pressure vessels, lifts etc.

**b.** An item of equipment or plant or group thereof for which it is desirable for management purposes to record either financial or technical maintenance feedback information. For example a pump, a calorifier, the fire alarm system in, say, the pathology department or the windows in, say, the maternity block.

**c.** An item of equipment or plant for which it is desirable to retain purchase/manufacturers details because of its value or for security/health and safety purposes.

**d.** An item of equipment or plant which, for any other reason, it is desirable to retain purchase/installation details or maintenance records.

Assets can be grouped in which case they are termed sub-assets, this is useful both in collating maintenance records and in reducing the number of individual manual maintenance jobs.

This section of WIMS currently incorporates the following principal maintenance management activities:

☐ The storing of technical details for any item of plant, or equipment or building element

☐ The scheduling of maintenance work

☐ The production of paperwork (dockets, job cards, etc.) for maintenance work

☐ The storing of technical information for all maintenance work completed by contract or by directly

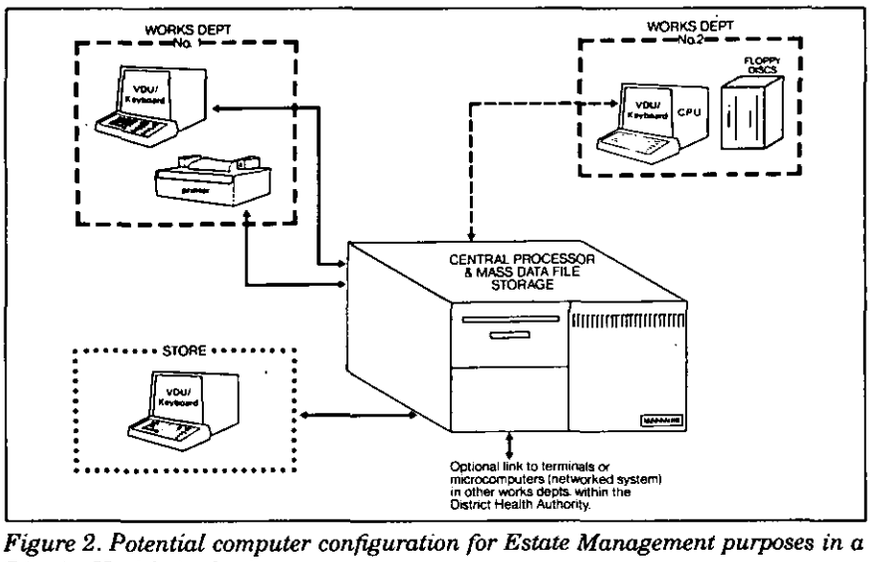



*Figure 2. Potential computer configuration for Estate Management purposes in a District Health Authority.*

employed labour

- ☐ The summation of maintenance expenditure information for management accounting purposes
- ☐ Inventory control of material stores and stock purchasing procedures
- ☐ The logging of reliability information and statistics for plant and equipment
- ☐ The planning of redecoration programmes within hospitals
- ☐ Budget/commitment accounting procedures

A more detailed check list of available WIMS modules is given in Table I. An indication of how this suite of programs has been designed is shown in Figure 3. By their very nature maintenance management activities overlap and therefore need a common data base. The software has been designed to accommodate this and the individual programs are capable of accessing a general pool of data files. The interlinking of this part of the WIMS programs, as illustrated in Figure 4, ensures that data is entered in a logical and sequential manner and that pooling and sharing of data is possible within the system. It is not possible to discuss each of the 97 programs which currently constitutes the WIMS package in any detail in this paper although further information can be provided on request. This suite of WIMS programs has been available to the UK health service since June 1981; and it is being implemented by 150 health organisations and many more are making preparations for its introduction. These WIMS computer programs have also proved to be attractive to maintenance management organisations outside the health care field. They are now available commercially and are being implemented in a number of diverse public and private organisations both within the UK and overseas.

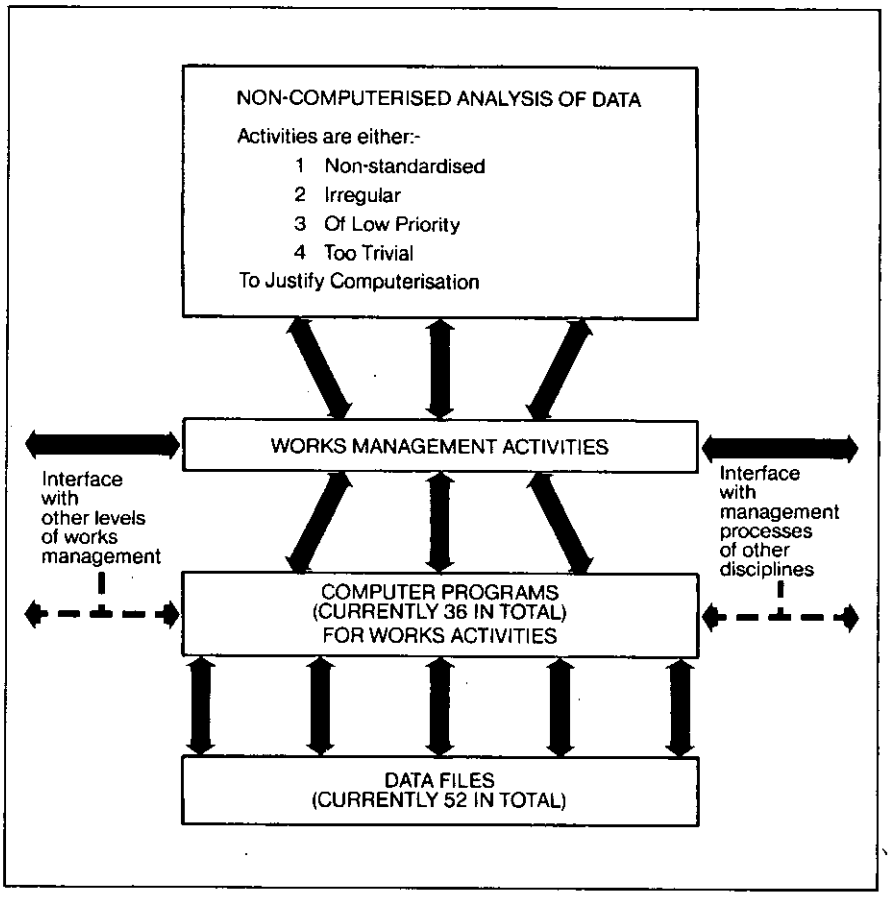



*Figure 3. Relation between management activities and data within the Works Information and Management System (WIMS).*

1. Asset Management Modules
   - *a. Asset/Plant Inventory*
   - *b. Planned Maintenance Schedule*
   - *c. Emergency Job Recording*
   - *d. Job Planning*
   - *e. Job Ticket Production*
   - *f. Job Feedback and Analysis*
   - *g. Labour Control Analysis*
   - *h. Job Description Files*
2. Stores control Module
   - *a. Stock Inventory System*
   - *b. Stock Purchasing Procedures*
   - *c. Plant Spares Lists*
3. Energy Management Module
   - *a. Monthly Fuel Audit*
   - *b. Annual Analysis of Expenditure and Usage*
   - *c. Vehicle Fuel Usage Log*
4. Redecorations Planning and Analysis Module
5. Budget Commitment Accounting Module
6. 10 Year Maintenance Plan Module
7. Property Register Module
8. Physical Condition Appraisal Module.

**TABLE 1 : List of current WIMS modules**

## 6 Performance Monitoring with the WIMS

One essential characteristic of any comprehensive information system of the kind described in this paper is the need for it to generate simple and meaningful indicators of performance. There are many indicators of performance appropriate to the management of the health building estates which can be derived from the normal processes of management but if they are to be credible they must be derived from data available to, and arising naturally from, the activities of the managers and their staff at local level and be understood and be acceptable to them. It should be said that numerical measures cannot by themselves give a full picture of performance or explain the reasons underlying variations. To do this requires professional judgement of those closely involved with the subject under review. The main value of performance indicators is to act as a first level of enquiry for selecting areas where more detailed investigation will be fruitful.

Whilst the number and type of performance indicators will in general change from a comparatively large number of "simple" secondary indicators at local (hospital) operational level to progressively fewer compound primary indicators higher up the management chain, levels of indicators and tiers of Management are not always coincident as shown in

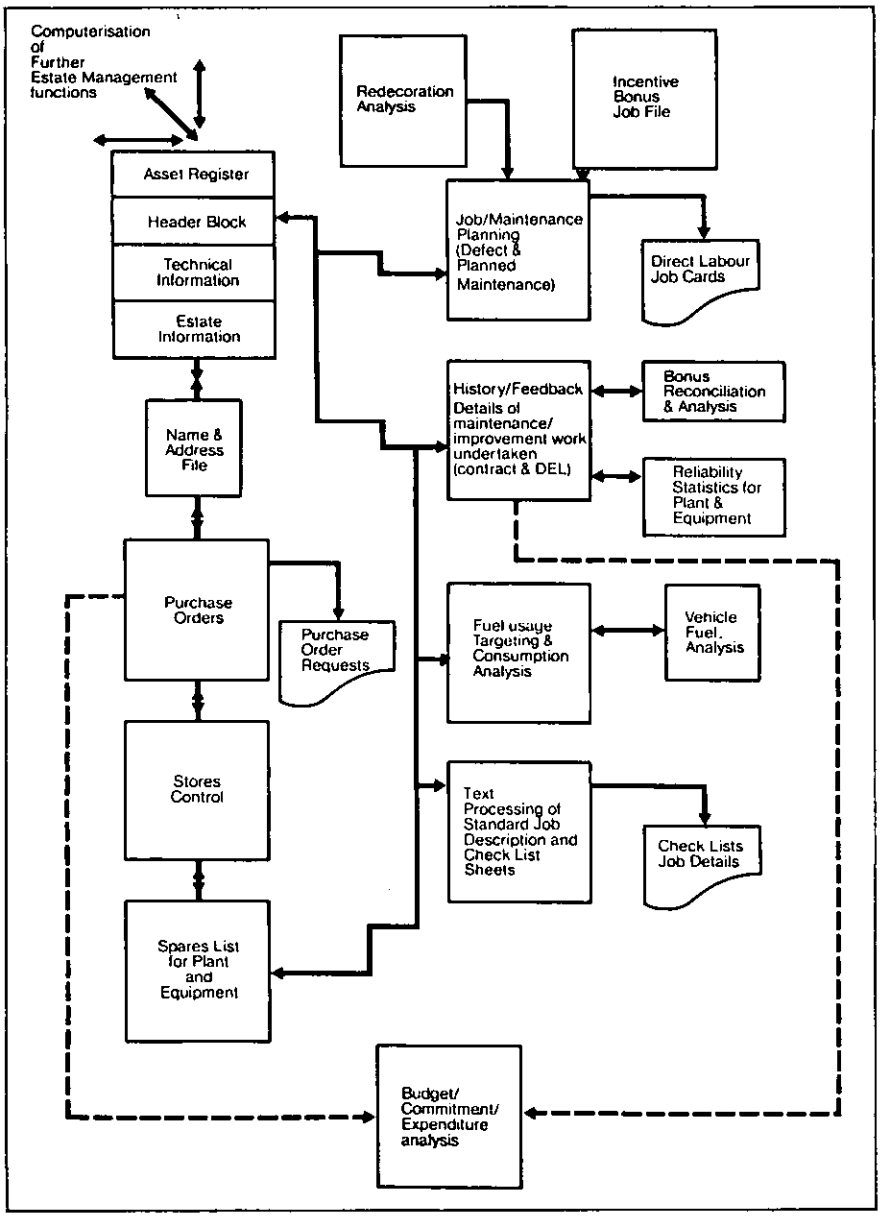



*Figure 4. Block diagram of the current principal activities covered by WIMS.*

Figure 5 below. Higher tiers of Management may have an interest in aggregated secondary indicators. The management authority responsible for one of the UK Health Districts, for example, will need answers to the following types of questions on the management of its estates:

**a.** Does the District hold more land than it needs?
**b.** Does the District hold more (or less) buildings than it needs?
**c.** Is the physical and functional condition of the buildings and their services and equipment satisfactory?
**d.** Is the level of maintenance expenditure, the efficiency of the maintenance department and the standard of maintenance satisfactory?
**e.** Is the usage and the efficiency of usage of energy at acceptable levels?

| Indicator Level / Management Tier | Primary | Secondary |
|---|---|---|
| DISTRICT | aggregation | aggregation |
| UNIT | ← | |
| HOSPITAL | ← | |

*Figure 5. The indicator matrix*

In order to provide answers to these questions the following set of primary indicators has been proposed. Namely:
Land: Hectares/1000 population
Land: Percent available for disposal
Building: Area/bed
Building: Area/population
Building and Services condition
Maintenance and Operations: expenditure per 100m$^3$ per annum
Energy: GJ per m$^3$ per annum

It is important that a set of indicators be interpreted as a whole and that individual indicators are not considered in isolation since all aspects of estate management interact and indeed ultimately interact with the total health care system.

Current work suggests that national norms are not particularly satisfactory as targets. Ideally a target level of say condition or land holding should be based on some form of local cost benefit analysis. However, there is still a degree of resistance to the use of cost benefit techniques where health or social service benefits are involved, although of course a de facto valuation of benefit is being made every time a health planning decision is taken. The application of cost benefit techniques to set performance indicator targets is currently seen as a longer term aim. In order to produce a more practical solution the potential for defining targets or alternatively for designing a procedure by which local targets can be set, is currently being investigated.

A key to the success of performance indicators is the ability to compare the performance of management units. This requires that aggregated data and management information be available in a similar form from all management units. This brings us full circle because in order to achieve the measure of compatibility all local management units, that is the originators of the base data, must use a similar management information system, such as the WIMS which embodies a standard management model and key data and information which collectively provide the measures of cost and performance required.

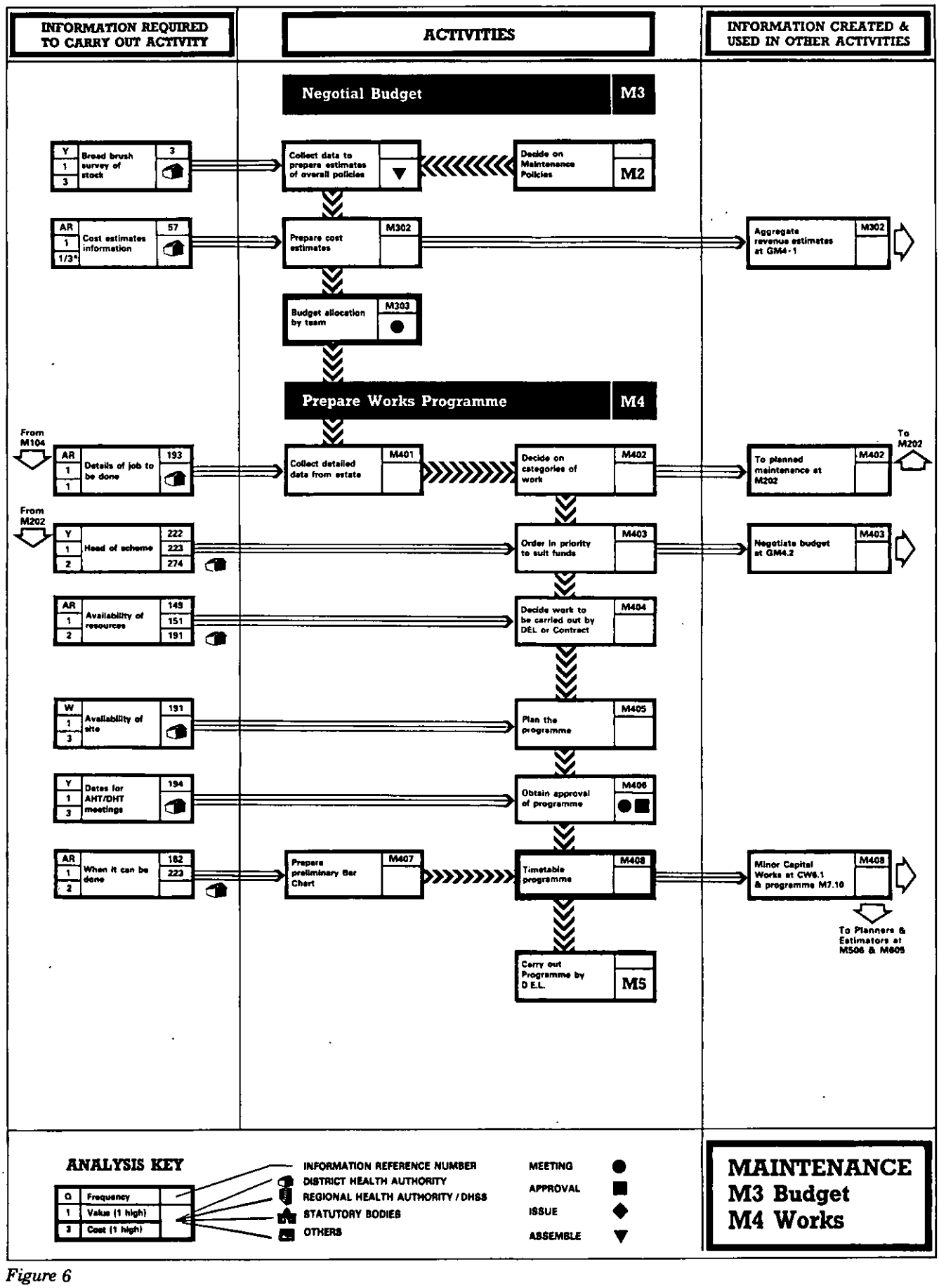

INFORMATION REQUIRED TO CARRY OUT ACTIVITY
ACTIVITIES
INFORMATION CREATED & USED IN OTHER ACTIVITIES
Negotial Budget
M3
Broad brush survey of stock
Collect data to prepare estimates of overall policies
Decide on Maintenance Policies
M2
Cost estimates information
Prepare cost estimates
M302
Aggregate revenue estimates at GM4-1
Budget allocation by team
M303
Prepare Works Programme
M4
From M104
Details of job to be done
Collect detailed data from estate
M401
Decide on categories of work
M402
To planned maintenance at M202
To M202
From M202
Head of scheme
Order in priority to suit funds
M403
Negotiate budget at GM4.2
Availability of resources
Decide work to be carried out by DEL or Contract
M404
Availability of site
Plan the programme
M405
Dates for AHT/DHT meetings
Obtain approval of programme
M406
When it can be done
Prepare preliminary Bar Chart
M407
Timetable programme
M408
Minor Capital Works at CW6.1 & programme M7.10
To Planners & Estimators at M506 & M605
Carry out Programme by D.E.L.
M5
ANALYSIS KEY
Frequency
Value (1 high)
Cost (1 high)
INFORMATION REFERENCE NUMBER
DISTRICT HEALTH AUTHORITY
REGIONAL HEALTH AUTHORITY / DHSS
STATUTORY BODIES
OTHERS
MEETING
APPROVAL
ISSUE
ASSEMBLE
MAINTENANCE
M3 Budget
M4 Works

*Figure 6*

| | | |
|---|---|---|
| 1. | Workforce | |
| 2. | Supervision | Manpower |
| 3. | Clerical Support | Resource Inputs to Maintenance Dept. |
| 4. | Incentive Payments | |
| 5. | Overtime Payments | |
| 6. | Percentage of Contract Work | |
| 7. | Percentage of Expenditure on Materials | |
| 8. | Extent of Work Requests | |
| 9. | Response to Work Requests | Service Provided by Maintenance Dept. |
| 10. | Backlog of Maintenance | |
| 11. | Downtime of Plant | |
| 12. | "Call Out" Work Load | |
| 13. | Extent of Emergency Breakdown Work | |

**TABLE 2 : List of indicators to monitor maintenance performance**

The primary indicators which are described above are not sufficiently detailed to satisfy the needs of local managers responsible for the day to day control of local works Management Units, and indeed explanations are required of primary indicator scores. To meet this goal another level of indicators is needed. As an example a suggested set of secondary indicators for monitoring maintenance performance has been derived and is detailed in table 2. This set of indicators might be used to examine in greater depth a maintenance organisation which is an outlier on first level indicators. Monitoring of these indicators can also be used to:

**a.** Study the performance of a maintenance unit over a given period.

**b.** Compare the performance of the maintenance unit in a given period of time with that in other periods.

**c.** Compare the performance of two or more units independent of size over a given period.

# 7 Conclusions

The UK DHSS and the NHS have identified the need to develop a unified Works Information and Management System (WIMS). The first substantial part of this total package which covers many maintenance management and operational activities has been developed and computerised and operates on a range of interactive computers. Although it is not envisaged that all parts of the WIMS will be computerised, the potential offered by modern computer technology will inevitably result in further parts of this system being computerised and hence becoming a part of the WIMS series of computer programs.

The need to produce compatible and comparable performance information in all management units is one of the fundamental objectives in this move towards a more standardised information system throughout the UK Health Service.

*The author is a director of Health Building Consultants Pty. Ltd, a consortium firm established to provide planning and architectural services to the South Eastern Medical Complex. Mr Bartlett has directed the briefing, planning and functional design of the SEMC.*

# Queen Victoria Medical Centre – how the South Eastern Medical Complex got off the ground

JAMES BARTLETT B Arch (Melbourne)

The South Eastern Medical Complex project has had a long gestation over 20 years, three starts having been made to planning, some exercises getting through to documentation before cancellation for lack of funds or changed direction of the Hospital's role. In 1982, a new government brought an enthusiastic commitment to construction of the Hospital, and now some eighteen months after planning commenced, substantial progress has been made in construction with a view to its completion in late 1986. A little over four years project time does not seem particularly interesting until it is noted that it is the total programme for all planning, design documentation and construction of a 436 bed teaching hospital of considerable complexity, and extreme economy.

The achievements of the project to date have been possible only because of a very positive team spirit built up among all participants – with the goals of achieving in time and on budget the successful completion of the Hospital, and equally the commitment to innovation which has made it possible.

## Project history

Melbourne, like so many major cities in the world, has grown rapidly outwards from an original city centre, with an ever-accelerating suburban growth in all buildable directions, often with one predominant vector, which in Melbourne's case is to the south east. Again in common with many like cities, transport systems are radial from the centre, and institutions - such as tertiary colleges and hospitals – have tended to develop centrally from modest beginnings in the 1800s to grow into major facilities competing, by their proximity, for 'customers' predominantly domicilled in the suburbs. While this is a gross oversimplification (there are hospitals in some suburban areas) there is a high concentration of services around the city centre.

In the early 1960s the new Monash University was built in Clayton, 18 kilometers to the south east of the city, recognizing the need to decentralize major institutions. The establishment of the University carried with it the expectation that a teaching hospital would soon be located nearby, and to this purpose it was determined that the Queen Victoria Medical Centre should move from the city centre to Clayton. This hospital will occupy the South Eastern Medical complex on its completion, providing services appropriate to its location near the demographic centre of Melbourne, within a kilometer of Monash University, and coincidentally releasing a highly valued site in the Central Business District for reuse.

A further impetus to relocation is the mounting cost of operating a modern health service out of old buildings, some dating back over 100 years. One aim of the project is to provide a modern facility, having essentially similar health service provisions, operating at substantially less cost than the existing hospital, with the accumulated savings being capitalised into the construction. Hence the capital budget for the project is set well below recent comparative buildings, and hence rapid completion is essential to minimise lost 'income' on funds progressively invested in the new building.

Affectionately known in Australia as 'the Queen Vic', the Queen Victoria Medical Centre is an institute of grand tradition and service excellence, operating in buildings of grand age and service restriction. The hospital is a world leader in research and clinical application in Invitro Fertilization, Early Human Development and Neonatal Intensive Care – reflecting its establishment in 1896 with its motto 'by women, for women,' and in specialized surgery and pathology its evolving role in the general medical

## SOMMAIRE FRANÇAIS

### Centre Hospitalier Queen Victoria

L'article décrit un projet pour changer l'emplacement du Centre hospitalier Queen Victoria à Melbourne en Australie. Le nouveau Centre comprendra 336 lits d'hôpital publics et sera intégré avec le nouvel Hôpital privé Jessie McPherson à 100 lits. Les travaux de chantier pour ce projet, qui va coûter 150 millions de dollars autraliens, ont commencé au début de 1983 et le projet doit se terminer en 1986; on y met en oeuvre une technique de construction rapide. Ce projet devra intéresser les participants du 8e Congrès international qui se tiendra à Melbourne en novembre 1984.

field.

The hospital will have 436 beds, with a heavy emphasis on obstetric, gynaecological and paediatric services constituting over half the beds. Supporting these beds, and extensive specialist outpatient consulting areas, are the range of services expected in a major teaching hospital, including provision of clinical school laboratories and teaching space for university research and teaching.

## Masterplan

The mix of services of the new Hospital has a disproportionately high emphasis on obstetrics and paediatrics, which has been taken as an inspiration to not plan on traditional models. The extent of these specialist services is large enough to justify analyzing the problem as an integration of three separate inpatient hospitals, supported by joint supply and outpatient/diagnostic services so that the community may come to identify with smaller components of a larger whole – the obstetric, paediatric and adult acute hospitals, and outpatient care services, such as accident and emergency, outpatient consultation, occupational and physio therapy.

Under the constraints to minimize the height of the complex to reduce impact on surrounding residential areas, and not conflict with flight paths to a nearby light aircraft airport (to be used for aerial ambulance services), the Hospital has been planned in horizontal layers, each reflecting the discreet components of the whole, broadly as follows:

Level One: Supplies, engineering support and staff facilities
Level Two: Outpatient and diagnostic services
Level Three: Adult acute and treatment services
Level Four: Paediatric services, administration
Level Five: Obstetric services.

Within this layered approach, there is a concentration of private wards and consulting suites in the south west corner, a concentration of laboratories in the north east corner, including Pathology Services and clinical Schools, and the specialised treatment areas grouped together in the north west corner. The main complex occupies a central zone on the site, surrounded by a ring road and carparking. Outside the ring road, residential facilities are located in the eastern section of the site whilst McCulloch House, an existing 41 bed geriatric nursing home, is retained in the south west sector.

The massing of the hospital has developed as two major building elements, north and south, linked at the four lift nodes. These links enclose a central Atrium Court-yard surrounded by the primary internal circulation route on each level. This atrium will provide a central visual form for the complex.

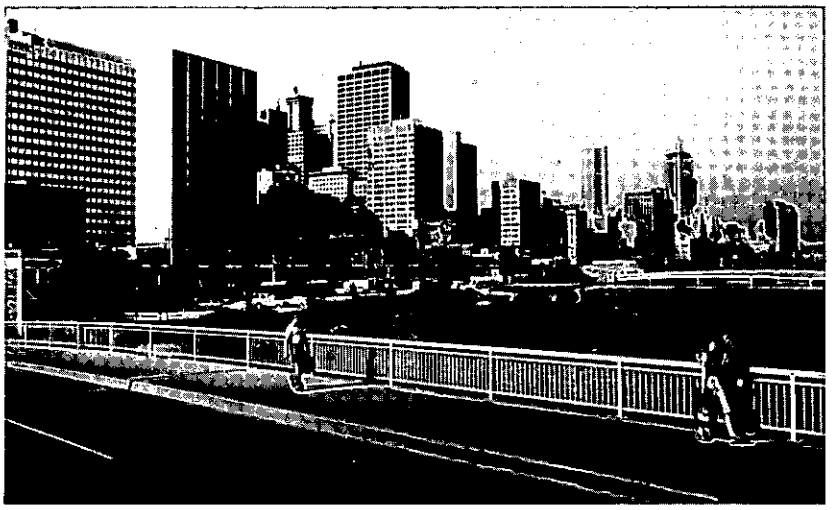
The main activity zones within the hospital are linked by the primary horizontal circulation route to form a multi-cellular building complex linked by secondary vertical circulation at the lift nodes. Detailed planning of departments has maintained the principal that entrances are located close to lift nodes, so that within a building with a large horizontal spread, interdepartmental travel distances are minimized.

## 8TH CONGRESS OF THE IFHE 18-24 November 1984

Looking forward to November in Melbourne (our Autumn, their late Spring) delegates to the 8th Congress of the IFHE can expect a valuable and exceedingly interesting week. A rare opportunity is offered for an exchange of news and information between international collegues. Planning is well advanced and the second announcement of the provisional programme and registration information has been sent out. This includes details of registration fees, hotel costs and a provisional programme of speakers. Please note that delegates registering before 31st July may obtain reduced fees.

A full and enjoyable social programme is being organised for delegates to the Congress, together with a further itinerary for accompanying persons. Melbourne has much to offer visitors – restaurants, shopping, art galleries and museums, theatres and concerts, spectacular wildlife, bayside beaches and some of the prettiest scenery in Australia.

**Details, together with the Accompanying persons programme and Post Congress tours are all listed in the registration booklet. All enquiries to: 8th Congress Registration, IFHE, PO Box 235, North Balwyn, 3104, Australia.**



*Melbourne, Australia's second largest city, is the capital of the southern state Victoria. Renowned for its parks, gardens and many fine 19th Century and modern buildings, it stands on the shores of Port Phillips Bay. Our picture shows the view north east over the Yarra River from King St Bridge. The city heli-pad floats on pontoons by the river's bank. (The Australian Information service, London).*

Wherever possible, this emphasis on horizontal movement has been achieved with most hospital functions and their supporting activities or services planned on the same floor level in close proximity. Should these hospital services grow as the result of future community health needs, then the related departments must also be capable of growth. The master plan has therefore provided the capacity for limited horizontal expansion in all areas, and for the addition of beds to the south east corner.

## Ward design

A ward full of light and warmth with patient areas overlooking landscaped courtyards and local gardens will be the visitors' first impressions. This relaxed atmosphere will be the public face of the acute ward which has been designed to meet the need for efficiency in both the use of space and the number of staff required to manage the areas.

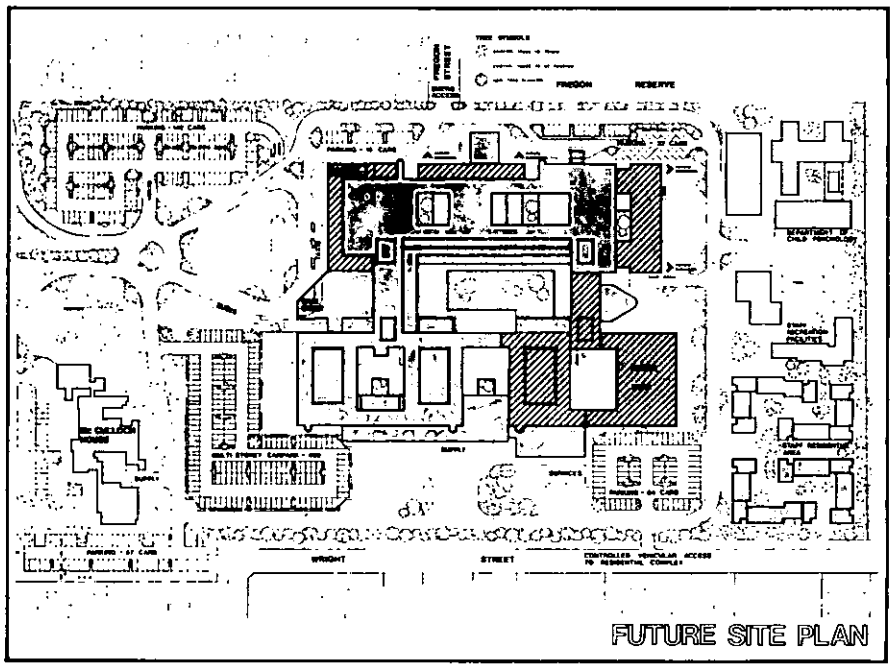
To achieve these efficiencies and to provide flexibility in wards use, the design allows for wards to be grouped in pairs to form twin wards. This encourages the sharing of teaching and staff facilities and provides adequate flexibility of bed use by permitting each ward to overflow into the adjacent ward. Further staff efficiencies will be achieved by ensuring that the principal features of the ward layout and service cores in all wards are identical.

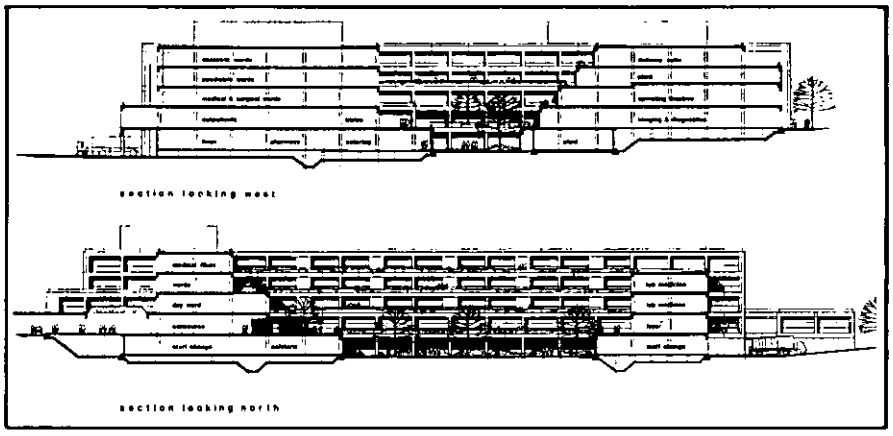
Patients will be nursed according to modified 'progressive patient care' principles. This system of nursing is not meant to imply that there will be constant movement of patients from one bed area to another, but that the nursing staff have the opportunity to group patients according to degree of illness, sex or nursing needs. As an example, patients requiring constant attention may be grouped close to the staff base in an acute care zone consisting of a 4 bed ward and a minimum of 2 single bed wards.

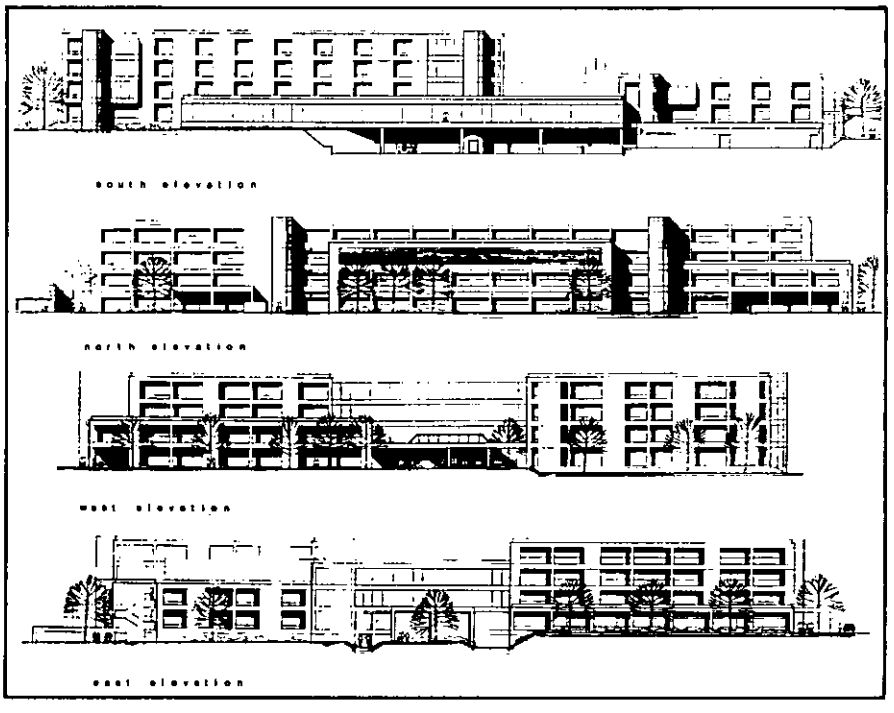
Ward bed numbers differ according to their function and content:

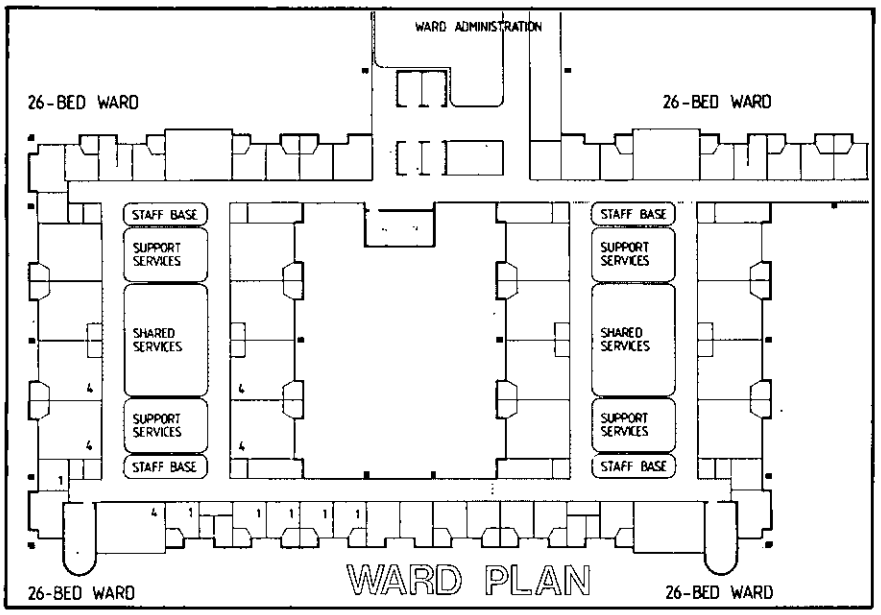
Medical, Surgical and Gynaecology Wards: 26 beds
Paediatric Wards: 20 beds
Obstetric Wards: 24 beds

Each ward is a self-contained unit, operating from a central service core





WARD PLAN

with the staff base located to give direct visual control over 50% of the beds. En-suites are provided and special air handling facilities will be installed to some single bed wards which may be required to nurse immunosupressed patients or contagious cases.

The wards are grouped in pairs locked together by shared lift nodes and links to the northern block of therapeutic departments. It successfully amalgamates the private and public ward accommodation by the grouping of all private accommodation within the western block of the twin wards. This permits the introduction of a separate entrance at Level 2 to both the private consulting clinics and the private wards above.

The Hospital provides other in-patient ward accommodation for day surgery, critical care, neonatal care and for psychiatric patients both adults and children. These wards have been individually designed to meet special requirements and are generally located adjacent the therapeutic departments in the northern block. However, psychiatric patients are located at ground level to permit the wards to be designed in a more casual manner taking full advantage of local garden areas.

## Building design

The project has been subject to stringent budget limits and controls, and this has been reflected in the extensive studies carried out to find the most economic yet architecturally successful expression possible. Initial advice received from the Quantity Surveyors indicated that the budget was sufficient only to permit consideration of a flat-faced, brick-enclosed building, punctured with a limited number of double hung windows. However, early design studies on this basis indicated that this approach would not satisfy many of the identified design criteria including the appearance of building bulk, height, thermal performance, maintenance and, importantly, the ability of the facade to accept within an ordered context, a range of fenestration configurations generated by the functional requirements of the various departments within the complex.

The principal aims in design were to create an envelope which would:

- ☐ Be of human scale and feeling within its immediate environment, despite the size of the complex.
- ☐ Economically accommodate the various functions and indeterminate future needs of the hospital.
- ☐ Be expressed in a manner which will not date, and which can reasonably be matched in the future.
- ☐ Incorporate a simple range of facade elements and materials arranged with harmonious proportion and relationships.

The masterplanning of the hospital created a framework in which individual departments could develop reasonably independently, and considered questions of scale and general massing. This has allowed the perimeter of the building to be relieved by stepping back the upper floors, when planning makes this possible, and has permitted the introduction of breaks or recesses in the facade at logical points, such as stairs, to divide the long facades into smaller elements. Each such element has a slightly varied architectural expression generated by external climactic and internal functional needs, rather like the streetscape of a city block of buildings all with the same base theme but individual variations. Within the building complex, the hospital is penetrated to its lowest level by large courtyards which will bring light, air and visual relief into occupied areas, and provide opportunities for landscaping and access for staff and patients. A large central 'Atrium' is bounded by most of the major public and patient circulation routes, and will be developed and landscaped as an active area. The northern face of the Atrium is stepped and terraced to allow sun penetration to the lowest level, even in mid-winter.

The search for a 'timeless' design is a task of major significance in the context of a hospital building which has a larger life than most, and is subject to a greater degree of differential expansion and change than any other building type. It is equally important that the materials and techniques employed can reasonably be expected to be available in the future to facilitate the visual integration of later additions and alterations.

In developing the theme of the building, it was determined that the structural skeleton should be expressed to provide a rhythm of columns linked to strong horizontal edge beams. This expression serves to emphasize the horizontal planes of the building and provides a framework for the integration of complimentary, less powerful, elements. This expression produces a reduction in apparent height and a more human scale.

Solid elements of matching colour interrupt the rhythm of the columns in selected locations to soften and vary the expression, and give definition to corners or changes of plane.

Set back within this envelope, the

external panellised wall is free to respond to varying functional and climatic requirements with varying window sizes and types. The colour of this inner 'membrane' is selected to recede from the frame and avoid visual conflict.

The selection of materials and finishes for the envelope have concentrated on 'earthy' colours which blend with the surrounding environment and which will also harmonize well with the landscaping within the environs of the site as it becomes established to form a 'campus-like' setting for the hospital. The colours and materials will also extend into the ancillary buildings to tie the development on the site together in a unified manner.

A number of major elements will act as visual foils to the building but are treated in a manner which will harmonize with the main structure. These include the Auditorium, the Nuclear Magnetic resonator, the outpatients department at Level 2, and the entrance canopies which project from the building at lower levels and help to ease the transition from ground landscape to multistorey block.

## Project implementation

The total programme set out for the SEMC Project, including allowances for reasonably foreseeable delays, is 50 months. To achieve this construction had to commence within six months of our commission as planners and architects for the hospital. By comparison, a hospital delivered by sequential briefing, planning, design, documentation, construction and commissioning sequence, allowing for minimal approval and funding delays, would have taken at least ten years, and been the source of much frustration, abortive effort, and premature obsolescence.

The applied technique of fast-tracking will be familiar to many. In simple terms, it is a programming method based on the precept that the total project time should be little longer than the longest single sequence of activity – in most cases the building critical path. Decision making in all areas proceeds in a staged yet parallel manner, based on a rigourously monitored master-programme, interelating briefing decisions through planning and documentation to construction.

Fast-tracking any project, especially one as complex as a hospital, involves making broad and universal decisions in early stages in the expectation that these will not unduly limit future detailed decisions. On the SEMC Project, earthworks and foundation documents were started in December, 1982, from an outline of the masterplan, within three months of planning commencement. Construction commenced in April, 1983, at the same time as the masterplan was formally presented for approval, and as provisional documents for the structure were out to tender. As time progresses, and particularly before construction of any element of the building is to commence, all relevant decisions are frozen and thereafter requirements have to work around committed works. At each stage of commitment therefore, all members of the project team must apply their experience to ensure that upcoming more detailed requirements can be accommodated, although they are not yet designed.

Inevitably, in fast-tracking programmes, wrong assumptions will be made, late changes will occur. Contractually, the impact of high speed design and documentation just ahead of the builder could spell financial disaster for a project, with variations and delays attached to any changes initiated after contracts are let. In the first weeks of our commission, intense consideration was given to the contractural alternatives available for carrying out the project on a fast-track programme. The alternatives came down to a deferred let contract, or a construction management consultancy, of which the latter was chosen.

While a deferred let contract with a head contractor has advantages in terms of performance liabilities, it places the builder in a contractual situation where maximum profit can be made form incomplete documents and any delays to the programme. It was felt that performance liabilities could be maintained with each of the 300 odd separate trade packages involved in a construction management approach, while the principal 'builder' is acting as an agent of the client with a motive of profiting by resolving conflicts, minimizing costs of incomplete or late documentation and ensuring early completion.

To date this choice has been vindicated with the project on budget with 45% of contracts let and on programme towards completion in 1986. At the time of the IFHE Congress later this year, we will have run approximately half our course, and the building should have a large part of its services installed and visible for inspection and discussion.

We look forward to welcoming those who can make it down under to the Congress in November this year in Melbourne, where all are assured of an interesting and enjoyable time sampling the wide range of hospital projects in the city, and the wider range of tourist attractions.

**James Bartlett presents in the IFHE September issue greater detail of how the planning of the Queen Victoria Medical Centre serves both staff and patients.**

## FORTHCOMING BRANCH MEETINGS

**Thursday 7th June:** Oxford Spring Lectures John Radcliffe Hospital (Organised by the 6 Branches).

**Highland Branch:** *Hon Sec M. J. Shand Inverness (0463) 234151*

| | | |
|---|---|---|
| *June 13th* | *Hydro Board, Control Centre Elgin* | |
| *July 11th* | *Hydro Board, Pump Station, Foyers* | |

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

| | | |
|---|---|---|
| July 11th | 'Thames Barrier Flood Preservation System' Derek Ayres Esq. | Board Room, Royal Hampshire County Hospital, Winchester. |

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

## National Training Authority

In the August issue we publish a paper on The National Health Training Authority by the Authority's distinguished chairman Sir John Donne. The paper was originally given at an Updating Seminar held in March and gives information about the objectives of the new training authority.

# CLASSIFIED ADVERTISEMENTS
## Appointments & Situations Vacant

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

**NORTH STAFFORDSHIRE HEALTH AUTHORITY**

## ASSISTANT DISTRICT ENGINEER (CAPITAL)

**Scale 3: £10,395-£12,339**

Applications are invited from suitably qualified candidates with previous capital works experience for this new post in the District Works Department.

The successful candidate will assist the District Engineer in a full range of duties including management, planning, capital works, operations and maintenance of building services. He/she will also be expected to make a significant contribution to engineering policies within the District.

For further information or an informal discussion please contact Kevin Millington, District Engineer, Tel. 0782-621133 Ext. 2398. Job description and application form available from the District Personnel Department, The Limes, Hartshill Road, Hartshill, Stoke-on-Trent, Staffs ST4 7PS. Tel. 0782-621133 Ext. 2442.

Closing date for receipt of completed application forms: 29th June 1984.

WEST DORSET HEALTH AUTHORITY

**HERRISON HOSPITAL**

## WORKS OFFICER 2

**Salary: £9,262.00-£11,490.00 p.a.**

Applications are invited for the post of Hospital Works Officer 2 responsible for the building and engineering maintenance of Herrison Hospital, a large mental illness hospital of over 500 beds near Dorchester. The site includes a District Laundry and a large steam boiler house.
Applicants should have experience in these fields. Qualifications as laid down by the National Health Service.

Application forms and job descriptions from the District Works Office, West Dorset Health Authority, Damers Road, Dorchester, Dorset.
For informal discussions, please telephone Mr P Webb 0305 63123 Ext 311.

**Closing date for completed application forms is 22 June 1984**

**Ireland**

## Senior Assistant Technical Services Officer

(with responsibility for energy conservation forming part of the duties) South Eastern Health Board.

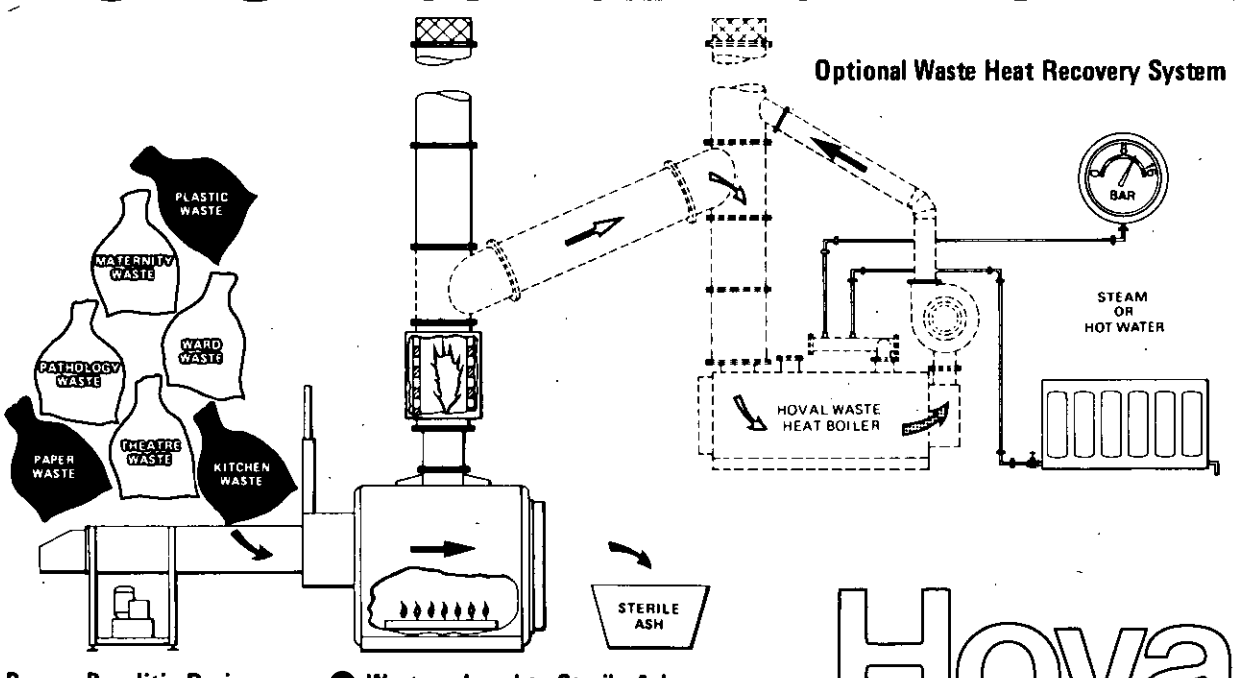
**Essential:** Degree in architecture or engineering or Fellowship or Professional Associateship (Building Surveying Division) of the R.I.C.S. or equivalent; five years' experience of architectural, engineering or building surveying work, including experience in the construction or maintenance of the mechanical electrical and heating services of buildings.

**Salary scale:** IR£12,552-IR£16,868.

Application forms etc, from: Secretary, R316, Local Appointments Commission, 1 Lower Grand Canal Street, Dublin 2.

Closing date: 28th June 1984.

# Hoval INCINERATORS SOLVE YOUR HOSPITAL WASTE PROBLEMS




- Proven Pyrolitic Design
- Pollution Free Emission
- Low Noise Levels
- Waste reduced to Sterile Ash
- Automatic Feed and Operation
- Available with Heat Recovery System

Hoval

Newark Notts. Telephone Newark (0636) 72711 Telex 37164

# Air Velocity and Temperature Measurement at the touch of a button


# AIRFLOW

## INSTRUMENTATION

The TA 3000T and TA 6000T are the latest additions to Airflow's range of Thermal Anemometers. These instruments incorporate all the features of the standard TA models with the added facility of temperature measurement. The compact design, slim probe and easy-to-read scales make these anemometers ideal for a wide range of applications. Versions of each instrument are available calibrated in metric or imperial units.

**AIR MEASUREMENT TECHNOLOGY AT ITS BEST**

I would like to know more about Airflow Thermal Anemometers

Name _____

Position _____

Company _____

Address _____

_____

_____

Tel _____

*Send to:*
**FREEPOST**
Airflow Developments Limited
Lancaster Road,
High Wycombe, Bucks.
HP12 3QP
*Telephone:*
High Wycombe (0494) 25252
*Telex:* 83288