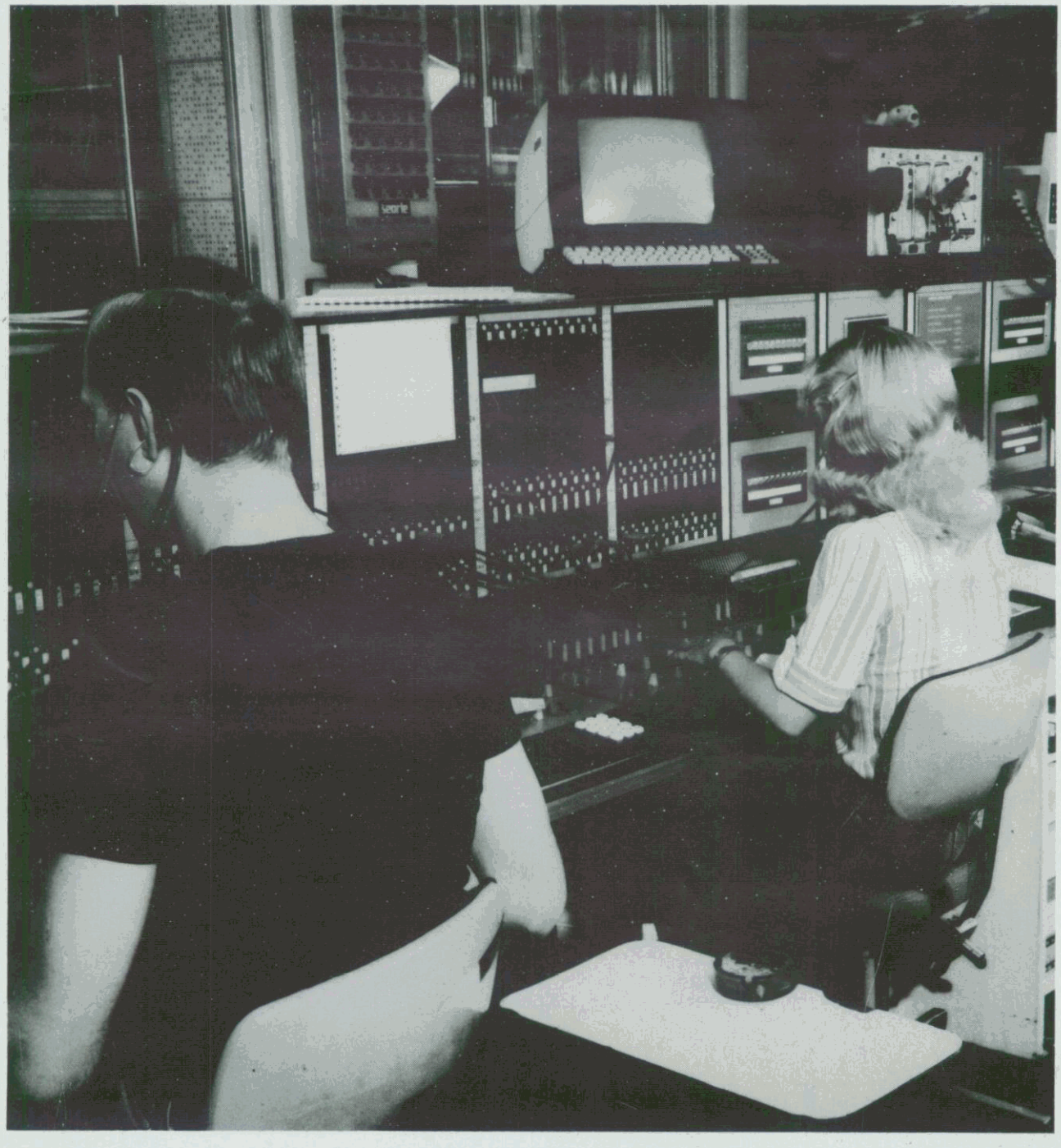
The Journal of The Institute of Hospital Engineering October 1984

HOSPITAL ENGINEERING



SPECIAL TELECOMMUNICATIONS ISSUE

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

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

Director David B Goad MSIAD MIOP

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

HOSPITAL ENGINEERING

The Journal of The Institute of Hospital Engineering

Volume 37 No 10 **October 1984**

Front cover: The Westminster Hospital switch board with a Tel-Tag VDU for use by the operators

Will Griffiths' affect hospital engineering

R J SEAR FIHospE

All engineers who work within the NHS are by now fully aware of the DHSS proposals for the implementation of the **NHS management inquiry report** (known within the service as **'Griffiths'**). Authorities at region and district level are busily working at structure plans, job descriptions for the 'general manager' and assessing the effect that these changed arrangements will have on chief officers at region and district and in particular on the accountability issue of professional officers to general managers.

How then will 'Griffiths' affect hospital engineering? In its broadest sense the answer is probably not very much, indeed it could be said that if 'Griffiths' succeeds in bringing a more business-like approach to the management of resources, the current high levels of backlog maintenance within our hospitals (recently identified by the 'Ceri Davies' condition surveys), may well be funded at higher levels. After all, no 'Business' would allow the deterioration of its capital assets in this way. In addition the real issues of either closing facilites and services or providing adequate funds for them to be properly maintained, serviced and staffed, may now be resolved by the implementation of 'Griffiths'. Or is this just a pipe dream?

Whatever happens I am sure that hospital engineering will survive and flourish in whatever management arrangements we have now or in the future. This is readily borne out by past experience within and without the NHS. I recall well, the opening address to the 1970 Annual Conference in Birmingham and I quote in part:

'Engineering is a fascinating profession and hospital engineering is an equally fascinating branch of it. Whether you look backwards, historically, or take a sensible look forwards, you cannot but come to the same conclusion – that the engineering content in hospitals and medicine has been steadily increasing and will go on increasing, whether one measures it as an absolute quantity or measure its complexity.

'There can be no change in this pattern whether one looks forward five years or ten years. This is because our ordinary services, the heating, lighting, air conditioning and ventilation, remain vital. Then there are the fields where we are more closely allied to the medical fraternity, such as with X-rays, both diagnostic and for treatment, accelerators and the whole range of electronics, again both diagnostic and for treatment. Now of course we are beginning to move into the zone of automated testing . . .'.

These words are as true today as they were when they were first uttered nearly fifteen years ago. The introduction of computer hardware and software in all its forms has and indeed will continue to revolutionise all aspects of hospital engineering and patient care.

If one adds to these thoughts the perspective of the three main objectives of the health service, namely:

a To provide the best health care possible within the resources provided.

b To provide the best trained staff and equipment possible for the provision of health care.

c To provide a suitable total environment for staff, patients and equipment to enable the best health care to be given.

It is the latter objective that all the works professions have always and I am sure will continue to concentrate their efforts, using their wide range of experience, training and skills.

My conclusion, therefore, is that the implementation of 'Griffiths' will not affect 'hospital engineering' in its physical and abstract senses, indeed my view is that hospital engineering will continue to flourish at an accelerating rate.

This may not be true, however, of the people working within hospital engineering. The implementation of 'Griffiths' will inevitably cause changes to the relationships between professionals themselves and between professionals and other disciplines. Whether these changes will increase or reduce the status (and all that flows from that) of engineers within hospital engineering, is yet to be seen.

Food for thought? or perhaps another 'talking point'.

Basil Hermon retired from the NHS in September but he intends to continue with his involvement in the affairs of the Institute and with the administration of the International Federation of Hospital Engineering.

Retirement... and now?

BASIL HERMON CBE CEng MICE FIMechE CIHospE

Basil Hermon began his career in 1934 with a small firm of gas and hot water fitters carrying out sub-contract work for the Croydon Gas Company and later began his technical education at Thornton Heath Technical College. During the first two years of the war he worked on the installation of vacuum pipelines in a number of ordnance factories being built in various parts of England and Wales and on specialised ventilation plant in steelworks in Sheffield. His career development came to a halt whilst he served in the army for the rest of the war years, although at every opportunity he studied mathematics and engineering sciences by correspondence course.

After demobilisation from the army he joined Thomas Potterton and soon moved into the technical side of the firm and took courses for the ONC and Heating and Ventilating at the Borough Polytechnic in London and obtained membership of the IHVE. He later joined the engineering subsidiary of Holland, Hannen & Cubitts and became their Chief Mechanical Services Draughtsman on design and contract work in schools, flats and factories the largest contract being a new motor car pressing and assembly plant which was designed and built within a few months using the parallel working method.

He entered the NHS in 1956; he joined the Sheffield Regional Hospital Board when the Regional Engineer and one other were the total complement of the engineers' department. In those days the capital allocations were about £0.5 – £0.75m so developments were mostly confined to extensions and a lot of money was spent on replacing plant which ought to have been replaced before the appointed day in 1948. Whilst in Sheffield he studied at the Polytechnic for higher qualifications and became a Member of the IMechE.

In 1961 he moved to the Birmingham RHB as Deputy to John Constable, the Immediate Past-President of the Institute, and that was the year in which the Government published a White Paper proposing a rapid expansion of capital expenditure and introduced a ten-year plan to build a number of large general hospitals. Engineering departments expanded rapidly attracting staff from other public sector programmes and from the private sector – everyone was on a learning curve and the conditions of employment were outdated. Basil joined others with similar experience giving lectures at seminars and crash-courses. He joined the Staff Side of PTB Whitley Council Committee 'F' and in 1967 was invited to join the first Council of the now incorporated Institute of Hospital Engineering on which he served until May 1984 when he decided not to submit himself for re-election. In his eight years at Birmingham many large DGH projects were started and the rationalisation of laundry services began.

In 1969 he was appointed Regional Engineer with the Oxford RHB where he remained until the Reorganisation of the NHS in 1974. It was whilst he was at Oxford that the first International Congress of Hospital Engineering was held in Rome in 1970 and it was at that Congress that he joined with a small group of engineers from Italy, France, Portugal and Sweden and laid the foundation for the International Federation of Hospital Engineering which now embraces representatives from 34 countries. He represented the UK on IFHE Council until 1976 and became Treasurer in 1980.

As Regional Works Officer with South West Thames RHA since 1974 he has seen some major developments completed and opened in spite of the reduction of financial allocations in real terms experienced by the Thames Regions which has highlighted the need to rationalise services and the estate by closing under-used hospitals and making better use of others.

Institute News

NHS Supplies Officers publication

Once again we are pleased to announce that the section of the publication of the Association of NHS Supplies Officers which is of particular interest to Engineers and Works Officers is being supplied FREE OF CHARGE to each member of the Institute.

The publication will be despatched direct to members in mid-October.

Welsh Branch

The Welsh Branch wish Mr. Jeffery Jackson (formerly Assistant Secretary of the Branch) Good Luck in his new spot with the East Berkshire Health Authority. Jeff began working for his new Authority on August 20th 1984.

Congratulations are extended to Mr. Keith Jones, Energy Conservation Officer, South Glamorgan Health Authority, who was successful in his Diploma in Energy Management this year.

Congratulations are also extended to the Secretary, Mr. Michael Back, who was successful in his Diploma in Management Studies.

Institute News

Companion of The Institute

At its meeting held on the 4th September Council were most pleased, unanimously, to elect Dr K I Murray to be a Companion of the Institute.

Dr Murray, of course, has only just retired from the post of Assistant Chief Engineer, Department of Health and Social Security and another note to mark this occasion is published in the September issue.

It would be hardly necessary and in any event would not do credit to the sum of Dr Murray's contributions simply to list his various activities since he joined Council in 1973. However, briefly, he has been Chairman of Council's International Affairs Committee for 10 years, a member of the Finance and General Purposes Committee for 10 years, and of Education Committee for 11 years.

Dr Murray, also, was Chairman of the Institute/DHSS Keele Courses for 8 years with final responsibility within the Department for all aspects of the Courses when the Institute staged these at the University of Keele and, of course, his involvement continued subsequent to their transference to the Hospital Estate Management and Engineering Centre, Falfield.

Finally, it would be quite improper to end this short list without making a special reference to his contributions to the International Federation of Hospital Engineering. He has been one of the Institute's two representatives for 8 years in all and also has acted as Chairman of the Institute/DHSS Working Group which organised and operated the two International Seminars on Appropriate Technology which the Institute was asked to organise by the International Federation.

Dr Murray's contribution to the Institute, to the International Federation and to 'hospital engineering' in general have indeed been many and strong and Council were one in their opinion that they warranted his election to the category of Companion.

International study grants in engineering

The Fellowship of Engineering, as part of its programme of fostering overseas links in engineering, is announcing a new scheme to provide grants to UK engineers for short periods of study abroad. The Fellowship will consider applications from engineers in positions of responsibility in industry, institutions of higher education, research organisations and local authorities for a contribution towards the costs of visits to organisations abroad, and to major conferences and workshops, for periods not exceeding 2 months. There is no restriction as to engineering topic, but preference will be given to electronics, systems and software engineering, production engineering, advanced manufacturing technology and marine and materials technologies.

Details of the Scheme are available from Miss Gillian Stannett, The Fellowship of Engineering, 2 Little Smith Street, Westminster, London SW1P 3DL. Tel: 222 2688.

NEXT MONTH
November

Highlight of this year's conference was the Torbay Hospital Solar project. This will be a major feature plus other supporting articles.

TELECOMMUNICATIONS 1984

Telecommunications was the subject of a successful one-day symposium held on 5th July, 1984, in London. The programme was put together by Norman Newton, Principal Assistant Engineer to the South West Thames RHA (he gives an account of the proceedings below) and with the kind permission of Mr A L Bristow, Regional Engineer of the Authority.

Symposium Telecommunications 1984

The programme was full and varied, a succession of able speakers offering an insight into the rapidly changing world of telecommunications. For the many delegates attending it was a most informative and interesting day.

Perhaps the most important message conveyed by the day's proceedings was that liberalisation, computerisation and privatisation of telecommunication services would by necessity require the Hospital Engineer to become more directly and deeply involved than ever before in the management, control and maintenance of voice and data systems.

Changes to the current long standing modes of information transfer were forecast. The introduction of Health Net and similar systems would provide a fast, secure and effective network for improving hospital communications, saving staff abortive effort and give management an effective tool to enhance services. The prolification of V.D.U.s and access terminals may possibly become commonplace throughout all hospital departments, with eventual links into Regional or even National data banks.

The convergence of computing and telecommunications technology in practical terms means that new electronic telephone exchanges are computers with a specific ability to switch voice and data. The latest generation of digital telephone equipment incorporating 2 M bit/s interlinks will function as a transparent link between data terminals and with the flexible software permit adaptation to users individual requirements. With British Telecom's intention to market the Thorn Ericsson MD 110, approval to simultaneous speech and data over the same extension line, can only be but a short time away. This will have considerable influence, everywhere a telephone exists a computer terminal may soon follow. If the installed telephone wiring can be utilised for both systems, installation costs for computer network introduction will be more economical and less trouble.

The schedules of equipment telephone key systems and private branch exchange manufacturers/suppliers give indication of how liberalisation has presented the purchaser with a range of products hitherto undreamt of. A warning, however, was given relating to unapproved equipment and the requirement on the purchaser to ensure any proposed system could actually meet the required operational task. Cost is only one of the factors into which the Hospital Engineer must investigate when comparing systems. The open tender principle, always used previously for large telephone exchanges, can now be applied throughout the complete range. The requirement for competitive maintenance contracts is entirely new and may possibly offer the Health Service revenue savings. The purchase of handsets will certainly achieve considerable revenue savings and, no doubt, will soon be standard practice.

Since the 6th August, 1984, British Telecom have been BT plc, which has introduced significant changes in their role and marketing situation. By statute they are now required to charge for surveys, advice and in-depth guidance, therefore their vast experience on the previous free basis can no longer be utilised. Their proposed amalgamation of Areas and Districts has a familiar ring to hospital employees.

Mercury Communications demonstrated how they can currently offer a competitive service for introduction of District Networks. The interlinking of all hospital sites with a 13 GHz digital microwave signal beamed from dish antennae located on the tallest building. Indication of their future proposals for an alternative national and international public service gives true interpretation to the liberalisation policies being introduced by the Department of Trade and Industry.

The establishment of OFTEL 'The Office of Telecommunications' a Government Department under the Director of General Telecommunications means for the first time in the U.K. the consumer will have an independent telecommunications watchdog with real teeth. Their task will be to monitor the licences of British Telecom and other operators, safeguarding the interests of subscribers and encouraging fair and true competition.

The Department of Health and Social Security Working Group 7 was well represented. This Inter Authority team has members drawn from England, Ireland, Scotland and Wales, active in all forms of telecommunications, telephones, call data logging, staff location radio call systems and ambulance communication, issuing standard guidance, specification documents and appraisal information.

It was evident from the proceedings that there was a requirement to:

- Establish a District Plan programmed over the next 10 years.
- Consider communication flow as a complete concept.
- Appoint a single source as communications manager.
- Individually keep abreast of latest developments.

The author is a Superintending Engineer, DHSS, Northern Ireland and is also Chairman of the DHSS Inter-Authority Working Group 7 (Telecommunications)

Telecommunications in The Health Service

G C McCONKEY CEng MIEE

Developments in health care during the last 20 years, together with the growing awareness of the general public to the services available, have given rise to a need to provide efficient communications for the general public and health service staff in the 1980s.

This paper will look at the communication needs of the hospital, the development of equipment and examine some future trends.

1. Communication needs

A number of studies have been commissioned into the communication needs of a hospital; various methods were used one of which was activity sampling. These needs are wide and varied but can be broken down into 2 distinct areas:

1. External communications.
2. Internal communications.

Figures 1 and 2 indicate the source, typical destinations of these communication channels and how they are achieved. From the tables it can be seen that all the communication needs listed can be met in one of the following ways:

1. Telephone
2. Radio
3. Paging
4. Post and messenger services
5. Hard wired call systems
6. Telex
7. Computers

2. Communication development

The systems listed above have developed independently over the past 50 years and have expanded considerably to meet the needs of the modern hospital. Take, for example, the hospital telephone system; this has developed from being a small manual switchboard in the Matron's Office to a large telephone system providing internal and external automatic voice communications. Telephone system growth in hospitals as shown in Figure 3 has followed very closely the growth of the Public Switched Telephone Network (PSTN).

These systems were mainly electro mechanical (Strowger or Crossbar) and had limited facilities and features. They provided by means of a switching train, a connection between 2 extension users for voice communication only.

Radio communications were first used by the ambulance service in the early 1950s and up until the late 1970s the ambulance service was the main user of radio telephone equipment. In the past 5 years however we have seen an expansion in the provision of radio telephone systems making them available to doctors, nurses, midwives, works staff, etc.

Source	Destination	How achieved
General Public	Enquiries	Telephone
	Bookings	Telephone
	Appointments	Telephone/Post
General Practitioner	Appointments	Telephone/Post
	Reports	Telex/Post
	Bookings	Post/Telephone
Supplies	Administration	Telephone/Post
	Accounts	Telephone/Post
	Works	Telephone/Post
	Para Medical	Telephone/Post
	Medical	Telephone/Post
Ambulance Service	Accident & Emergency	Telephone/Radio
	Appointments	Telephone/Telex
	O.P.D.	Telephone/Radio
	Wards	Telephone/Radio
Adjacent Hospitals	Medical Records	Telephone/Post

Figure 1 External communications

Source	Destination	How achieved
Wards	Service Departments	Telephone/Memo
	Requests	Telephone
	Para Medical	Telephone/Radio
	Mobile Medical Staff	Paging
Patient	Nurse	Call System
Laboratory/Radiology etc	Wards	Written Report
Administration	All Departments	Telephone/Memo
	Accounts	
Medical Records	Statistics	Computer

Figure 2 Internal communications

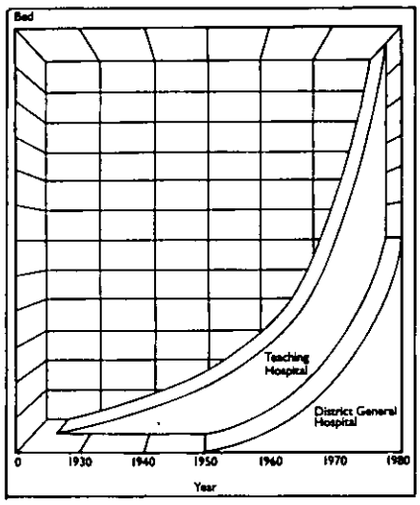


Figure 3 Telephone penetration in hospitals

The past 25 years have also seen major developments in paging systems. The early systems were of the loop aerial type for on site coverage only. Modern systems now mainly employ VFH or UHF radio and can be provided with facilities such as telephone connect so any extension user can directly call any paging user from an extension telephone. With the changes in regulatory requirements and the use of digital transmission these systems can now provide both 'on-site' and 'wide area' coverage. Additional features such as one-way speech, digital transmission, message transmission, message storage, etc are now being offered.

A postal and messenger service is also an essential part of the hospital communication system and is used with varying degrees of regularity and efficiency to deliver internal mail, reports, specimens, etc.

Communication between patient/nurse has largely been achieved by using a push button operated hard wired call system with audible and visual signalling at the sister's office and/or nurses' station. The system normally has built-in signal cancellation buttons and reassurance lamps at the patients' bedside or in each individual ward.

The above systems are shown in block diagram form in Figure 4.

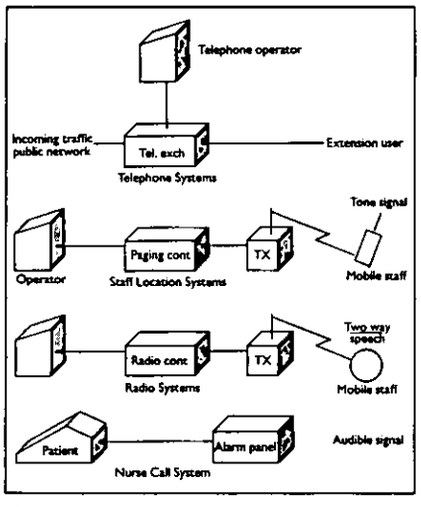


Figure 4 Communication systems, block diagram

I have attempted to briefly outline the communication needs of a typical hospital showing how their needs have been met with the equipment and techniques available. The scene is however changing and changing rapidly. In the last 5 years we have seen an unprecedented advance in the application of micro processors and micro computers; and their application to computing and control has opened up new horizons. The use of micro computers and micro processors has penetrated every aspect of our lives and enabled us to accomplish tasks which could only have been dreamt of in the recent past. The Health Service has not been immune from these advances.

We now have stored program control telephone exchanges, high powered micro and mini computers, computerised paging systems and computer controlled radio systems. They provide many additional features and facilities over and above those provided on conventional systems, offering scope for integrated methods of communication previously regarded as 'self-contained'. This equipment normally provides new facilities but causes us to reappraise our approach to their use and management.

A typical example of the use of computer technology is the development of Stored Program Control (SPC) Telephone exchanges enabling new facilities to be provided and programmed according to the needs of the user, eg:

- Transfer
- Follow-me
- Camp-on-busy
- Abbreviated dialling
- Discriminatory barring

These and many other more sophisticated facilities can be offered to each extension user on a provide or deny basis. This also implies the need for staff training to ensure that the features and facilities provided can be used by staff to obtain maximum benefit from the expensive equipment. Such exchanges will also allow telephone users access to the paging system and, apart from reducing the operator load, tends to make the 2 systems more effective.

3. Future Trends

The liberalisation of United Kingdom telecom policy together with the unprecedented advance in technology is having a dramatic effect on all areas of telecommunication. I propose to deal with 5 of these developments namely:

1. National Paging System

A national paging service has already been provided by British Telecom. The Department of Trade and Industry has now approved 3 other system providers from the private sector to set up in competition with British Telecom. These systems can be used for paging staff and for sending messages in digital form. Working Group No 7 — Telecommunications, has already made a case to the Department of Trade and Industry requesting that the health service be allocated channel space to enable it to operate digital VHF area wide paging systems.

2. Cellular Radio Systems

Cellular radio is being developed and will provide a local 2-way radio system:- 2 system providers from the private sector have been nominated. This service is in the early stages of development and we await further information before we can say how best the health service could take advantage of cellular radio.

3. Public Network Services

Up until the advent of digital technology the networks provided by the then Post Office and now British Telecom developed along completely separate voice and data lines, for example we have the Public Switched Telephone Network (PSTN) and the Telex Network as 2 separate independent systems. The PSTN having only limited low speed data capability, eg Prestel.

Recent developments on the data

side have seen the introduction of the Packet Switched Network and the provision of a national private circuit digital network covering such services as Megastream and Kilostream.

Megastream is a high capacity digital point to point service which can be connected directly to modern digital telephone exchanges for voice transmission and transmits at either 2 or 8 million bits per second. The 2 M Bit/second link is capable of carrying 30 telephone conversations simulataneously. It can also be used for very high speed data transmission or it can carry a mixture of voice and data.

Kilostream offers a digital service at 2.4 to 64 K Bits per second and can be used, among other things, for single data links between VDUs, teleprinters at 2.4 K Bit per second, high speed Facsimile Transmission (FAX) at 9.6 K Bit per second, high speed computer data at 48 K Bit per second and voice transmission at 64 K Bit per second.

Megastream and Kilostream are now available nationally and if the equipment available within your Region is capable of accepting this type of service than considerable revenue savings can be achieved; one Megastream link replacing upwards to 10 analogue private circuits between 2 large sites would give space capacity for the transmission of data as well.

While these developments have been taking place, British Telecom have been developing the System X digital network involving the replacement of analogue exchanges by digital units. This will provide a multipurpose Integrated Digital Network (IDN) based on these exchanges being interlinked with digital transmission and common channel signalling. Extending this IDN by providing customers like the Health Service with Digital Access Links will create an Integrated Services Digital Network (ISDN) capable of supporting a wide variety of both voice and non-voice services.

Although the ISDN is aimed initially at business customers using modern office machinery the growth of such things as videotex and home computers will also make it attractive to the residential user.

Customers will assess the ISDN through local access facilities marketed as Integrated Digital Access (IDA). Two forms of IDA will be available:

1. single line IDA — this provides 2 connections, one for voice up to 64 K Bit per second data and the other as a connection which will carry up to 8 K Bit per second data; and

2. multi-line IDA — provides integrated service PBXs with up to 30-64 K Bits per second exchange connections carried on a 2 M Bit per second digital path.

It will be a number of years before the full public network is digital and it will be necessary therefore to interface with existing networks until such times as they are absorbed by ISDN, in order to permit access to and from their customer or facilities. Figure 5 shows a typical ISDN connection, the shaded area being the digital ISDN showing its connection to existing and customer services.

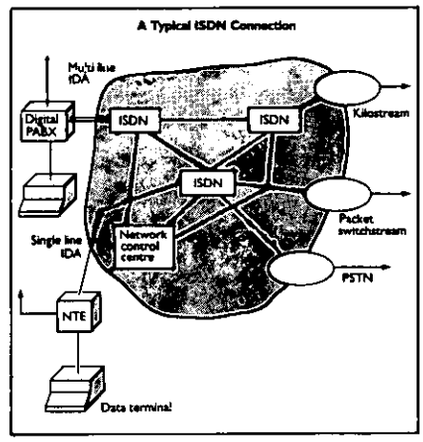


Figure 5 A typical ISDN connection

British Telecom are introducing a trial service of IDA later this year and by early 1985 will have a pilot service based on 4 System X exchanges. The service will expand with the National ISDN and all exchanges installed after mid-1985 will offer an IDA facility.

4. Private Networks

In recent years simple networks have been developed based on electro-mechanical exchanges but the limitations of these exchanges led to lengthy routing codes and the codes could differ from site to site within the one network. A typical network is included as Figure 6.

In SPC exchanges, the software may be configured to enable a linked

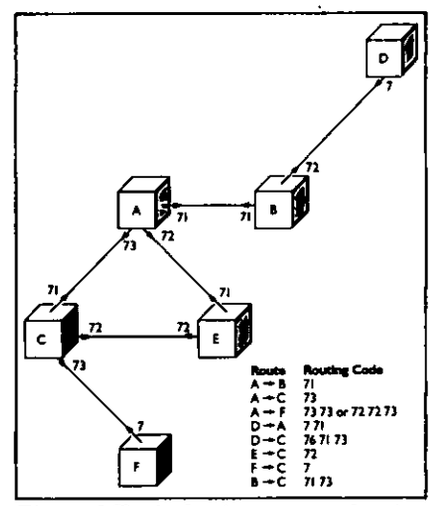


Figure 6 Typical private network using electro-mechanical exchanges

numbering scheme to be adopted throughout the network. Applying this principle to the simple network in Figure 6 the first two digits of the extension number can be allocated to individual sites so that when the digits for a particular site are keyed the system automatically selects the optimum route to the destination: if this is engaged and there is an alternative route available the system can select and use it. The scheme and programming of the exchange can also be arranged to bar the PSTN numbers of the private network sites, thus forcing the users to use the private network.

Another solution to this network problem may be the installation of a tandum exchange with all the main sites being directly connected into this exchange (see Figure 7). This has the advantage of reducing the number of switches which are connected in series

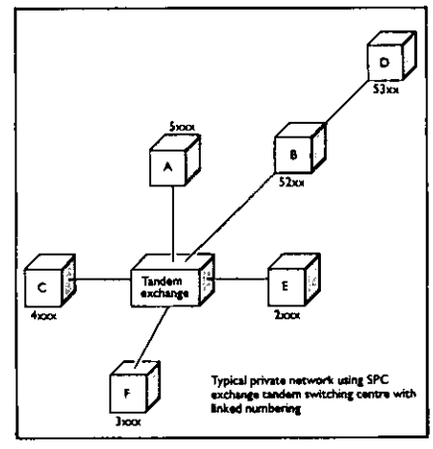


Figure 7 Typical private network using SPC exchange tandem switching centre with linked numbering

in some parts of the original network, thus reducing the speech path loss which can occur in private circuit networks with multiple numbers of switches.

It should be noted that in the network depicted the exchanges at D and B are small, ie less than 100 extensions, and if direct dialling from the PSTN is used and the amount of trunk barring is reduced then the exchange at Site D could operate as a satellite from Site B with peripheral working and distributed processing. This facility would enable the users on Site D to have direct access to the PSTN with all incoming calls from the PSTN being received at Site B, without the loss of any PABX facilities on the network.

Networks are also being developed in the health service to interconnect for:

a. computerised diagnostic equipment in radiology, laboratory, intensive care, coronary care and many other hospital departments;

b. mini and micro computers for stores, patient administration systems, accounts, estate management, etc, etc; and

c. microprocessor based air conditioning control system, boiler controls, building management systems, etc.

All these systems can if necessary be linked and can, if the right technical conditions are met, be used together to provide an integrated network with more up-to-date information and control in the hospital environment. Their development will have a marked effect on future trends in telecommunications. Each system generates information which needs to be transmitted from one location to another and this can be done either by land line or by radio and the extent to which they require to be interconnected could, depending on the policy adopted, affect the size, type and capacity of the hospital telephone system.

5. Data Communications

Up to the present the telephone exchange has been predominantly used for voice traffic — the amount of data carried through telephone exchanges and networks in the health service is very small. Limited data facilities, namely Prestel, have been provided over the Public Switch Telephone Network (PSTN) but in general two networks, one for voice and the other for data, have developed side by side. However, it looks as if communication growth will be much greater in the data transmission area than in the area of voice communication. Two options are open to the user in these circumstances, 1. to provide separate voice and data networks or 2. provide a combined network capable of taking both voice and data. The options available may change depending on the state of the art and the extent of data transmission needed at the time in question.

The error rate with data transmission through electro-mechanical exchanges can, because of the losses in the switching mechanism, be very high and consequently the maximum transmission speed is very low.

The new digital SPC exchanges however can cater for very high data transmission rates but there could be other limitations in using digital PABXs for data transmission and switching, the first of these is the traffic handling capacity of the exchange. The amount of data and the transmission time should be ascertained so that when the exchange is being specified this can be taken into account. At present using SPC telephone exchanges for the transmission of voice and data can be an attractive and cheap option provided that the number of terminals requiring this facility is low in relation to the size of the exchange, say less than 10%, and the traffic generated by the data circuits is not excessive. Otherwise heavy use of the exchange for data traffic could possibly block a PABX primarily designed for voice communications.

If an SPC telephone exchange is to be used for the transmission of data it has to be specified at the tender or contract stage so that it can be catered for in the system software, otherwise the user could be faced with a costly rewrite of the system software if the data option is required after installation. Often separate voice and data ports need to be associated with one extension and this could require additional cabling and data plugs for each data port. Present day costs including extension wiring depending on the type of exchange could be in the order of £800 to £1,000 per port.

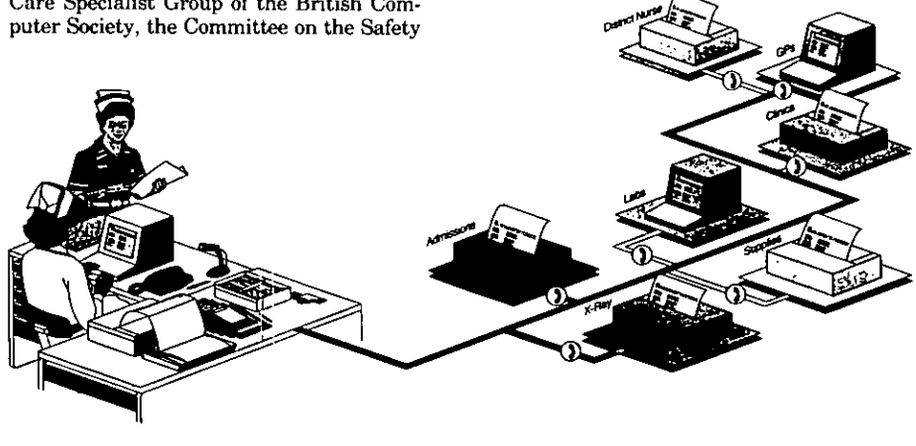
Health Net

Health Net is a communications and information system for transmitting forms, letters and memos from point to point over the telephone network. It uses microcomputer based terminals which simply plug into and share existing telephone wall sockets.

Health Net is the result of a detailed and wide ranging study in a number of major health districts. The study was partly financed by the Department of Trade and Industry. Valuable advice and guidance was sought and received from District and Regional Health Authorities, the BMA, the Royal College of General Practitioners, the Körner Secretariat, the Primary Health Care Specialist Group of the British Computer Society, the Committee on the Safety of Medicines, Local Authority Social Service departments, and Family Practitioner Committees.

Each basic Health Net terminal comprises a typewriter style keyboard, a monitor, a printer, a microprocessor and a modem. (A modem is a device which allows data to be sent and received over a telephone line.) The terminal employs elements produced by Acorn Computers Ltd, one of the best of Britain's microcomputer equipment manufacturers.

The primary function of the terminal is to prompt and facilitate the entry of letters, memos and forms and to transmit that data to other Health Net terminals via the telephone network.



These considerations could reduce the attractiveness of integrated voice and data since a separate data switch can, depending on the facilities required, cost of the order of £15,000.

Summary

What I have tried to do in this paper is to indicate the telecommunication needs of the health service and show how they are being met. The techniques currently available and being developed have much to offer and if properly applied, will keep hospital communication in line with current technology.

However this means that management has much more responsibility for managing communication systems than was available in the past. The advent of digital technology has also enabled these systems to be interconnected and for the first time we can start looking at a total integrated communication network for the hospital environment including voice/data, fixed/mobile radio covering not only the hospital site but adjacent sites and the community. A number of projects are being developed to provide these links, one such system is called Health Net which is still in the development stage and I understand is just about to enter the trial stage. We await with great interest the results of the trial because if it is successful this could provide efficient communication for both voice and data between the community and the hospital.

The advent of new micro technology gives the health service the tools to enable it to meet the demands of the computer age. We have to be aware of the advantages and shortcomings of this technology so that it can be used to the best advantage of the patient.

The author is Government Sales Manager for Mercury Communications Limited.

Mercury Communications

LESLIE NASH CEng MRAeS

Following the Telecommunications Act 1981 the consortium of Cable & Wireless, British Petroleum and Barclays Merchant Bank was granted a licence authorising an operating subsidiary, Mercury Communications Ltd, to provide all forms of communication within the United Kingdom. Approval was also given for ownership and operation of leased and switched international services through satellite earth stations. The Telecommunications Bill 1984 give both Mercury Communications and British Telecom the status of public telecommunications operators.

The services

Mercury Communications has commenced service with the provision of leased circuits to the commercial and public sectors capable of carrying voice, data and image traffic transmitting and operating to CCITT standards. Following introduction of the British Telecom digital network it is the intention to operate both networks synchronously.

Mercury has commissioned British Rail to lay a fibre optic cable in the telecommunication ducts alongside railway tracks. BR will be responsible for the maintenance and will use it for its own telecommunication services.

This initial core network, capturing most of the main commercial centres of England, will be expanded. Trunk Access Nodes connect local customers to the network, usually via a microwave link to a local distribution node. These are located on tall buildings and individually cover areas to a distance of approximately eight miles. Customers by microwave can share distribution nodes, frequency re-use, and time division multiple access techniques are used to conserve the frequency spectrum and to avoid cross interference. Subscribers require a small roof mounted microwave antenna dish – or cable link to the local distribution node – and some terminal equipment. Mercury prepare the necessary drawings and applications for planning permission to mount the dish. A General Development Order will soon allow Mercury to install one dish per building, without going through individual planning application procedures. Distribution by coaxial cables, through the ducts and risers in the building, complete the connection to the end of line equipment. If there is an inter-connection with existing British Telecom equipment, or lines, this is achieved through an interconnection junction box.

Multiplexers bring together the mix of voice, data or video signal that the customer wishes to transmit.

Specialist hospital services

Mercury can also help with off-network private applications, interconnecting all hospitals in a District for full intercommunication or in instances, such as a group of satellite hospitals working to a central telephone exchange. A discreet microwave system is provided which could also link direct to the trunk network, if within reach of the area, or make such connection using a BT leased line to the Mercury trunk. Inter-connection between BT and Mercury is possible when planning such communication systems. Both voice and data systems, such as the Patient Administration System, can be integrated to make cost effective use of the communication links between the hospitals. Mercury are providing the links for the proposed introduction of a video teaching system at the Charing Cross and associated hospitals.

The capacity of such a link is normally 2Mbit/s, which can be broken down into 30 × 64 kbit/s channels giving a potential of 30 voice channels, or

any mix of voice or data. Frequently spare capacity will be available for future expansion at little cost, or the introduction of night transfer of operator services with the resultant revenue savings, or centralised call information logging equipment.

Monitoring and maintaining performance

The quality of the transmissions on Mercury's main network is monitored by telemetry at two National Operation Control Centres located in Birmingham. The maintenance organisation is organised from the Control Centre on a geographic basis, to enable prompt arrival of a technician at a customer's premises in the event of a fault. The trunk network is a ring to ensure that a fault on one section will not inhibit traffic being passed via the alternative route around the ring. Reserve capacity is maintained to accept the total traffic load in a diverted situation. Microwave spurs from the main ring carrying capacities of 8 Mbit/s and above have duplicated equipments to ensure reliability.

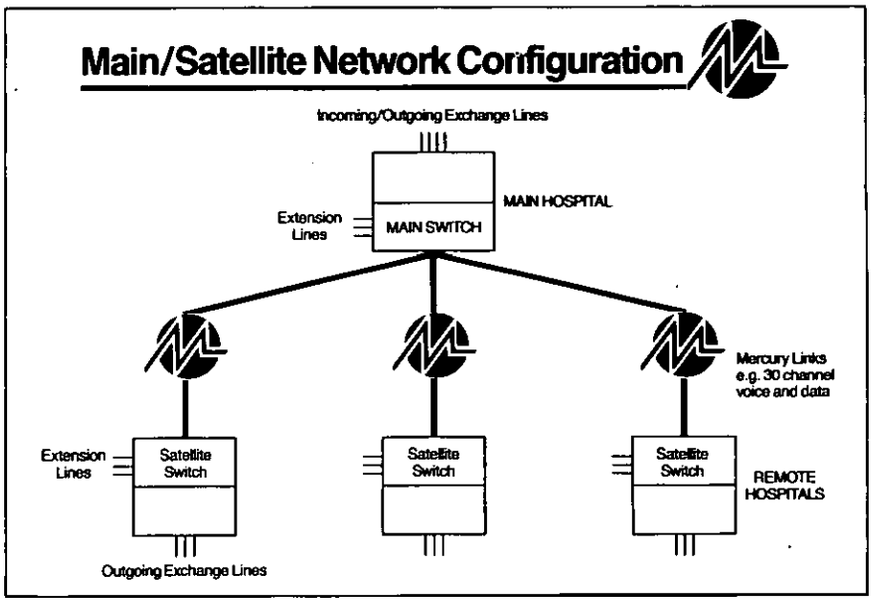
Our current development

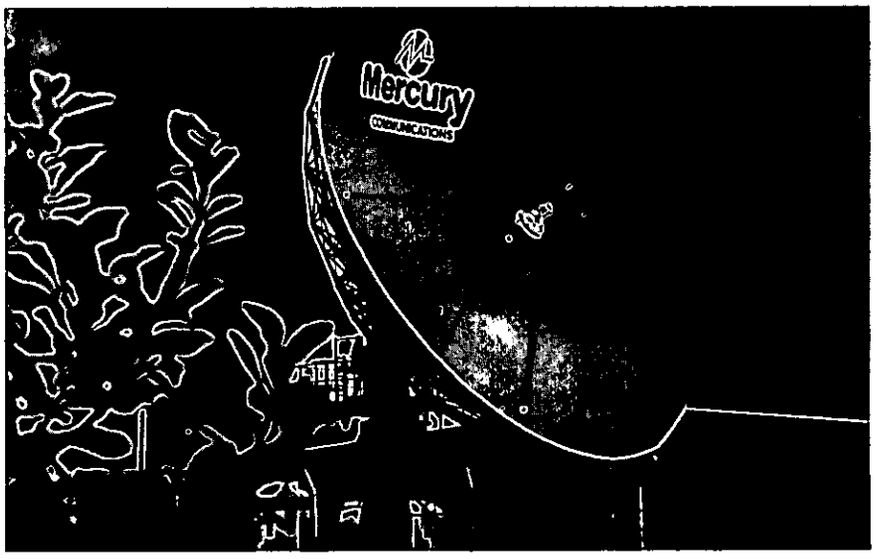
Major progress has been made in London where four distribution nodes are in operation, with additional units planned.

Mercury has two satellite ground terminals installed, one offers a trans-Atlantic service to New York. Further services to Europe and the Far East and satellite ground terminals will follow. The microwave link to Birmingham has been operational since December 1983 and will soon be extended to Manchester.

Our future development

Expansion beyond the initial core network will inevitably be driven by market demands, however further short spurs to reach towns or customer sites off the main network are under consideration, and also the possibility of reaching isolated towns and cities by satellite. However, our ability to do this will be limited by the availability of high power satellites to work to satellite ground terminals with dish sizes of 3 metres or less.





Transatlantic communications are provided by Mercury's satellite communications centre at East Wood Wharf, close to the City of London.

Once the core network is in position the first major new service to be added will be switching. We intend to provide both voice and data circuit switching and data packet switching, utilizing the most modern digital equipment.

Cable television

Following publication of the Government's White paper 11 cable T.V. companies have been issued with licences. Mercury hope to provide services to these operators by distributing the programme from the source to the cable head end. We can then also use the cable television network, as the means of providing a local distribution system for the Mercury service.

Summary

With Mercury the user has a modern digital network at his disposal, capable of carrying not only all existing services, but many new potential services. We may expect to see the early introduction of digital facsimile, video conferencing, distributed computing, electronic mail and so on.

As the Government's liberalisation policy becomes effective the customer must inevitably benefit from the range of competitive services offered to him by the two UK common carriers.

Since the symposium in July, Cable & Wireless plc has become the sole owner of Mercury Communications Limited.

The author is Senior Executive Officer, Telecommunications Division of the Department of Trade and Industry.

Progress of the Government's liberalisation policy

R CROWHURST MCIT

This paper outlines the Government's telecommunication policy which affects the supply, installation and maintenance of call routing apparatus – PBX's and key telephone systems – instruments and wiring. The developments from analogue to digital switching with the ability to integrate computer technology has greatly expanded the applications of telephone services and increased the requirements to broaden the market with competitive stimulus.

An example of the many and far reaching changes is the brain scanning pilot system at Bristol where a transmitter sends brain scans, x-rays or ultrasound scans from the hospital via telephone lines to a receiver linked to a TV set in doctors' homes, building up a picture in about 30 seconds. So if there is a serious casualty or emergency in the middle of the night or other time when no specialist is available, he can be contacted at home, dial the special number for the link and pick up the picture. The saving in time and health could be critical.

The Telecommunications Act 1984 enables British Telecom (BT) to be transferred to the private sector, coming under the discipline of shareholder control, as well as to free it from the borrowing constraints of public sector financing. British Telecom in the process have lost their exclusive privilege. The Act makes common rules relating to all network operators but is flexible enough to be fair and appropriate to the circumstances of particular networks.

With the twin threads of privatisation and liberalisation, the Government anticipate Britain's telecommunication services will lead worldwide. The implications are profound, affecting carriers, manufacturers and users. OfTEL, under the Director General for Telecommunications has been established as the new and independent regulatory authority: it will safeguard fair competition and users interests.

The three initial intentions for liberalisation were:-

First – competition in the provision of the means of transmission;

Secondly – free competition in the supply of value-added services over BT's network;

Thirdly – competition in the supply of all kinds of attachments for connection to BT's network.

We have come a long way in a short time: Mercury are now well established, 86 companies have been issued with a general licence for value added network services offering many facilities, electronic mail, viewdata, teleconferencing, protocol conversion and computerised ticket reservation, while proposals for cellular radio are well advanced with two national networks expected to be fully operational by next March.

Three principles are underlined in the attachments to the Government's liberalisation policy:-

First – that there must be machinery to ensure that harmful apparatus is not connected to BT's network. The elements of this machinery are standards to which apparatus must conform, approval of apparatus, and statutory marking requirements;

Secondly – that standards should be minimal and written by the consensus of all interested parties;

Thirdly – that the approval of the generality of attachments should be carried out independently of Government and BT.

A phased introduction was agreed to permit all parties to make advance planning, permit formulation of standards and establish approvals machinery. The programme was ambitious and the issue of standards due to the complex nature of standards writing requirements has not been met. However the Department of Trade and Industry have implemented a number of arrangements to ensure the Government's intentions and objectives have been substantially achieved. Thirteen standards and a code of practice have been written and published, the British Approvals Board for Telecommunications is at work and busy, and about 350 very varied products including 163 telephones, which 3 years ago were within the monopoly, have been approved and can be supplied competitively for connection to BT's networks.

To permit a more speedy approvals procedure, a streamlining of arrangements was announced in April 1984. This provided for standards to be reviewed and simplified, and

established a procedure whereby systems undergoing approval testing could, subject to certain safeguards and limits be released for general sale.

So far as call routing apparatus specifically is concerned, many products previously supplied exclusively by BT have been 'grandfathered' permitting their direct supply to the market by the manufacturer. Interim approval schemes, such as SCRAPP 1 (Small Call Routing Apparatus), have passed five PBXs, eight key telephone systems, four dealer-boards and two small automatic call distribution systems. The introduction of SCRAPP 2 and a new scheme for PBX's (announced on 5 July) should increase even further the subscribers' choice of systems, together with proposals for new interim approval arrangements and secondary operational mode for key telephone systems.

Competitive maintenance is also being phased-in, to a timetable that will be completed in 1986. Already all kinds of new stored programme controlled digital call routing apparatus, together with new dealer boards and new key telephone systems of all kinds qualify for competitive maintenance.

As from 31st December 1984, all exchanges up to a maximum 120 extensions will be liberalised and on 1st July 1985, those exchanges above 120 extensions. These dates do not relate to BT owned apparatus in users premises. Apparatus moved from one site to another is eligible, provided connection is first made to the PSTN at the new site after the relevant qualifying date to be set out in the phasing-in schedule. Similarly a PBX or similar apparatus originally without connection to the PSTN will qualify if it is first connected to the PSTN after the qualifying date. But call routing apparatus will not qualify for private maintenance simply by being taken out of service and re-connected to the PSTN after the qualifying date.

The maintainer responsible for the call routing apparatus must also take responsibility for the maintenance of all extension wiring connected to that apparatus and for the maintenance of the extension telephones if they are hard-wired connected or if they have, for approval purposes, been treated as an entirety with the switch (this is what the BSI committee has come to call 'black box' apparatus.) The maintainer may sub-contract some of this work provided he retains final responsibility, monitors the performance of sub-contractors, and the sub-contracted work does not amount to a significant part of the whole. Maintainers will have to be registered by the BSI to validate their competence and quality control arrangements and then approved by the Secretary of State. BSI has set up a registration system for this purpose and a number of companies have been registered and approved. It is important to understand that each maintainer must be separately assessed in respect of each model of approved call routing apparatus he wishes to maintain. In these early days, if BSI is unable to complete assessments by the time particular apparatus becomes eligible for private maintenance the Department may, in the meantime, grant – again subject to certain safeguards and extra conditions – approval while the BSI assessment is completed.

It may of course be important to the user that he has other apparatus connected to (or disconnected from) his call routing system. Such work – and alterations to such apparatus – may be done by his system maintainer or by anyone else with his agreement or, after 14 days notice have expired, by anyone else whether or not the maintainer has agreed. Any new wiring must, of course, be installed in accordance with the code of practice.

I should also refer to 'user maintenance' which is not permitted. It is important from the point of view of the security of and prevention of fraud on the telephone network that a customer should not have access to make detailed alteration to his own equipment but be required to employ an independent person to maintain. And, just as with financial audit, it may well be in the company's (as opposed to its individual members' or employees') best interests also.

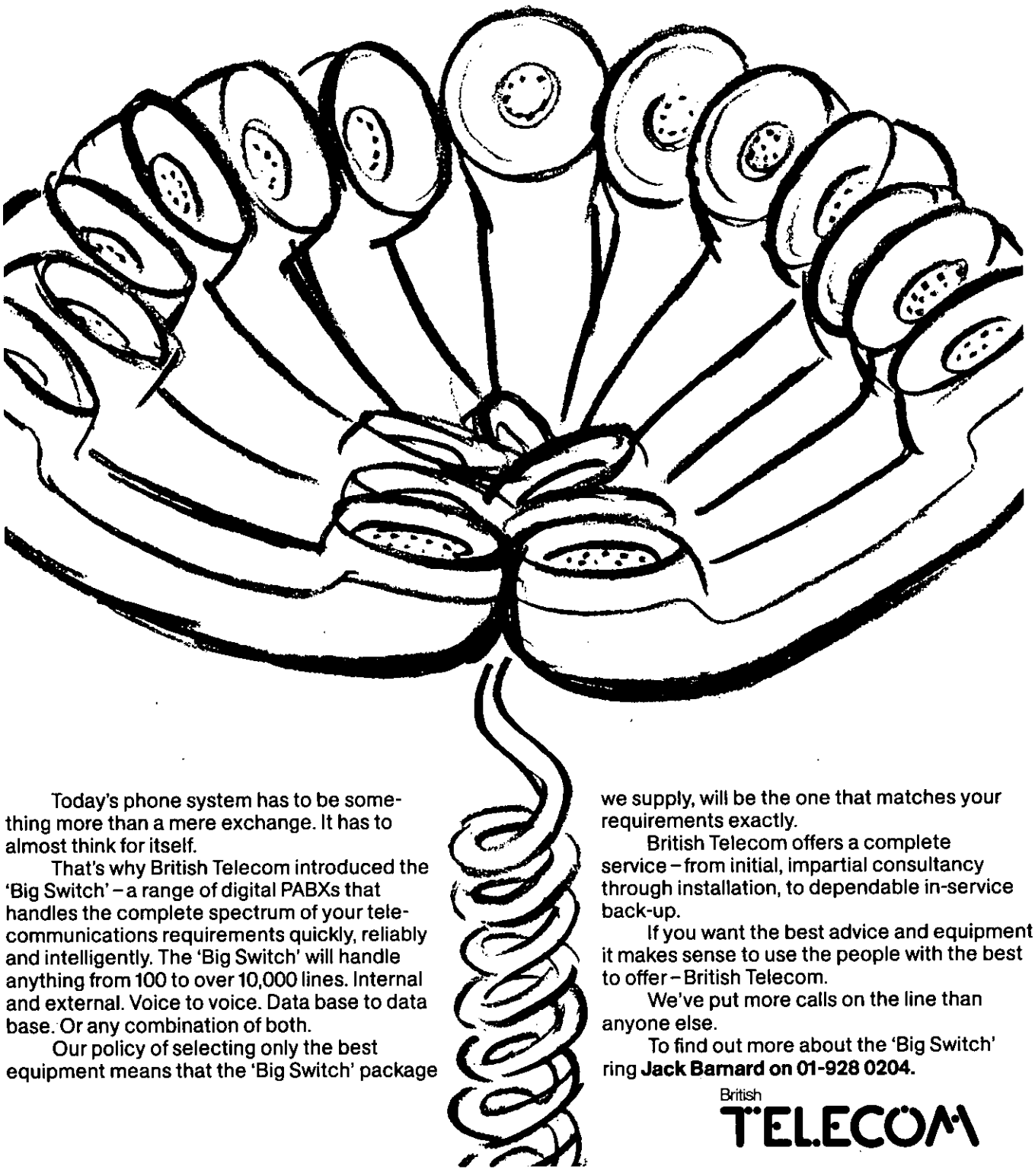
Installers of equipment and wiring need not be registered or approved but bringing into service remains the exclusive right of BT. Systems must however be installed in accordance with one of the DTI's Codes of Practice (to be superseded by *British Standard Code of Practice, Small Call Routing Apparatus BS 6506.)* BT require the subscriber at time of connection to give a binding undertaking that the codes have been met. Subscribers should check carefully that they receive such an undertaking from the installer. This is necessary to safeguard the PSTN and ensure quality of transmission.

In the last year, some attention has focussed on problems that can arise when a customer wishes to attach a new, privately-supplied switch to existing wiring which is owned and maintained by BT. This is a complex problem because in many cases BT's wiring forms part of an integrated wiring scheme. Not only are 'monopoly' services such as direct exchange lines commonly combined in the same multi-core cable with PBX extension wiring, but in multi-occupancy buildings, the same cable may carry several subscriber's extension circuits. It can be very difficult to untangle all this so that an individual user can have control of his particular wiring, and partly for this reason there have been a number of cases where BT has been unwilling to part with its extension wiring. Users then face the choice of installing new extension wiring, often at considerable expense, or continuing to use BT supplied and maintained wiring. This then means that BT must maintain the entire PBX and wiring system. BT therefore gains a competitive advantage over other suppliers – not because of deliberate unfairness but because of the complexities of a legacy from the past.

The conditions in the BT licence are designed to provide a framework for a fair regime: BT will be required to make available – either through outright sale or rental – on reasonable terms wiring already installed on customers premises which will not in the future be part of BT's system.

Secondly BT's ability to install integrated wiring is limited to 31 December 1985. This is so that, while BT will continue to have sole responsibility for direct exchange lines, these are not to be installed so as to be integrated with PBX extension wiring; this would inhibit the liberalisation of the supply and maintenance of PBX's.

We put more calls on the line.



Today's phone system has to be something more than a mere exchange. It has to almost think for itself.

That's why British Telecom introduced the 'Big Switch' – a range of digital PABXs that handles the complete spectrum of your telecommunications requirements quickly, reliably and intelligently. The 'Big Switch' will handle anything from 100 to over 10,000 lines. Internal and external. Voice to voice. Data base to data base. Or any combination of both.

Our policy of selecting only the best equipment means that the 'Big Switch' package we supply, will be the one that matches your requirements exactly.

British Telecom offers a complete service – from initial, impartial consultancy through installation, to dependable in-service back-up.

If you want the best advice and equipment it makes sense to use the people with the best to offer – British Telecom.

We've put more calls on the line than anyone else.

To find out more about the 'Big Switch' ring **Jack Barnard on 01-928 0204.**

British TELECOM

The author is British Telecom's Major Account Manager for the Hospitals and Regional Health Authorities.

British Telecom – at your service

J BARNARD

Telecommunications in the early 80's have been subject of relentless change and British Telecom, as Britain's largest telecoms company, is in the forefront of adapting to face this radically different environment. At an operational level, BT is undertaking several major engineering and marketing exercises, including the complete digitalisation of our public network. The organisational structure at both national and local levels is being thoroughly revised to further improve customer service.

New organisations like Merlin and National Networks have emerged whilst more established names such as Inland Division have disappeared. Many of you will have dealt with the new field sales force with their new titles – MAMs, MAEs, MSRs. The old established areas are to be replaced by the District as British Telecom's basic organisational unit. The three major factors which have stimulated British Telecom to reorganise have been:

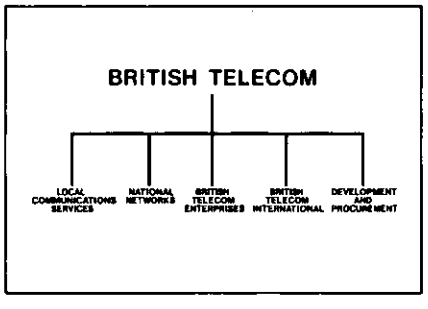
1. Rapid and significant developments in technology ever widening the scope of the telecoms market;

2. Liberalisation of the market in 1981 imposing a strong competitive influence;

3. Changes in British Telecoms status as recently as 1979, B.T. was still a division of the Post Office running a state monopoly. As of the 6th August 1984, British Telecommunications plc became one of several companies licenced by the Department of Trade to operate in the field of telecommunications. A radical change within only five years.

The national organisation

Most reorganisation to date has been at national level, formulating five divisions. The old inland division now comprises two independent profit accountable business units – Local Communication Services (LCS) and National Networks (NN). The split was designed to promote active competition on the trunk network. LCS concentrates on the local customer and operates within telephone areas, whilst National Networks are responsible for the long distance trunk network and other nationally orientated networks.



Local Communications Services (LCS)

LCS the biggest division employing nearly 90% of British Telecom staff, it provides customer sales, maintenance and network services on the local telephone network. Because of the huge size and geographical spread of the network, linking 20-million customers nationwide, LCS is sub-devided into 61 telephone areas.

Both LCS and National Networks are replacing electro mechanical Strowger exchanges with stored programme controlled electronic and digital exchanges. B.T. is in the frontiers of innovation with the new fibre optic cables which are fast becoming the main backbone of the network.

LCS offer a comprehensive range of attachments to connect to the telephone system. Most are provided through commercial arrangements with British Telecom Enterprises, although areas can deal directly with other suppliers.

Future developments in which LCS are involved include cable television and direct broadcasting by satellite.

National Networks (NN)

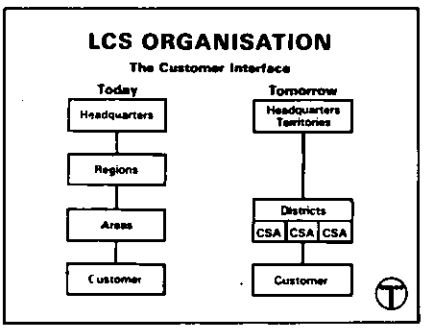
National Networks (NN), the other half of the old Inland Division is principally responsible for the planning, operation and maintenance of the long-distance trunk network including all transmission systems and switching centres. NN controls the Telex network, still the country's largest text communication network, which is currently undergoing extensive modernisation.

National Networks is also responsible for the family of advance digital network services known as x-stream services. Detailed later.

British Telecom Enterprises (BTE)

British Telecom Enterprises (BTE) was set up in 1981 to promote new products and services and to explore fresh business opportunities. The need for a separate division was to provide independent management, and to comply with the new regulations forbidding cross subsidisation.

BTE is divided into four main parts which correspond to the four main markets in which it operates. Consumer Products (CP), Merlin, Mobile Systems and Value Added Systems. Consumer products acts as a marketing distributor to the LCS division



for telephone instruments, call-makers and answering machines, and small key systems.

Merlin – British Telecom Business Systems – markets business equipment through the local telephone areas. The product range is expanding to meet the ever increasing convergence of conventional telephony, data transmission and computer technology. The product range includes an extensive range of PABXs with the Herald and Monarch as market leaders. Merlin's three large switches are the MDX, SX2000 and BTeX.

Recently Merlin has entered the office automation market with the M4000 of word processor.

In order to satisfy specific customer demands, areas can purchase equipment not available from Merlin and Consumer Products. This ability to go it alone provides LCS with additional flexibility and acts as a stimulus to both Merlin and Consumer Products.

The new mobile systems division has been formed out of the former radiopaging, radiophone and cellular systems units.

Prestel and Yellow Pages are the two most familiar product services controlled by Value Added Systems, but both are undergoing continual enhancements. In 1982 Yellow Pages launched a new product – Europages, a business to business directory for importers and exporters in the EEC. Prestel continues to grow in popularity by providing new services such as Homelink, The Home Banking Facility, and Micronet 800, the largest tele software database in the world. Value Added Systems also market Telecom Gold, the electronic mailbox, which is rapidly becoming the standard electronic mailing facility in the United Kingdom.

After the complexity of British Telecom Enterprises, our last two divisions are relatively straightforward.

British Telecom International (BTI)

British Telecom International (BTI) is

responsible for the international extensions of BT services. Using submarine cables, satellites and microwave transmission, BTI provides an ever expanding service. BTI pioneered a videoconferencing service to North America. BTI's international packet switched service now operates to 26 countries.

Development and procurement

British Telecom's fifth division is development and procurement, its two responsibilities are research and development, and the procurement of exchange equipment and engineering stores. BT's laboratory at Martlesham is one of the most highly regarded telecommunications research centres in the world. The £200-million a year spent on R&D maintains British Telecom in the forefront of world telecom technology.

Local area reorganisation

The aspects of reorganisation which most directly affects Telecom users, is that which alters the customer interface at the local level.

Until recently the structure of telephone areas nationwide was very similar with rigid controls imposed from regional and national headquarters. The main disciplines of engineering, sales and traffic all performed their respective roles generally independently of each other.

BT responded to the 1981 Telecommunications Act by streamlining the areas, and de-centralising the management decision-making process. The areas were made accountable for their performance by making them independent profit centres. New customers orientated business units have been introduced with engineering, sales and administration working together to satisfy customer's demands in particular business sectors.

Between now and 1986, the regional and area structures are to be replaced by a system of territories and districts. There will be only four territories covering the whole of the UK outside of the capital. London will form the fifth territory, although it is unlikely to have districts of the same type envisaged for the provinces. The four territories will be divided into 24 districts which will become the basic operational units of BT.

Each district will be further divided into customer service units corresponding to local business and residential demands.

Local circumstances will almost certainly produce district structures which are not identical. The first district will be established before the end of 1984.

Following the 1981 Telecommunications Act, it was obvious that if British Telecom was to compete in an open market for the supply of equipment, the whole sales operations had to be completely reviewed. To this end, the new field sales force was established along similar lines to other large companies. The field sales force was recruited both internally and externally and has incorporated four separate grades within two distinct functions.

ROLE OF THE MAJOR ACCOUNT MANAGER

- **Strategic Advice & Guidance**
- **Product & Services Updates**
- **Commercial Interface with largest customers**

Marketing Account Executives (MAEs) and Marketing Service Representatives (MSRs) actively sell the equipment. They are grouped under the control of Field Sales Managers (FSMs), operating in individual telephone areas. Normally, accounts are allocated on a geographical basis.

The Major Account Manager (MAM), act as British Telecom's commercial interface with the largest customers, offering an additional service by providing strategic advice and guidance on developments in the field of telecommunications and British Telecom; giving product and service updates; and assisting customers to obtain consistent treatment across area boundaries.

Customer responsive

The main aim of British Telecoms reorganisation in recent years, has been to make BT more responsive to customer demands, by moving the managerial decision making process nearer to the customer interface.

Telcare, is a recent introduction, independent market research agencies which undertake nationwide telephone surveys to measure customer perceptions of our services. Randomly selected customers are telephoned and their attitudes and needs are assessed on service, billing, maintenance and quality of lines.

With over 1.5 million interviews a year, Telcare will provide regular and sophisticated feedback to BT management, and identify areas for active improvement.

New technology

BT is undertaking several major engineering programmes over the next decade.

Central to the future of telecommunications in the UK is digitalisation. Replacing British Telecom's entire national network is a massive task, the introduction of System X will bring far reaching rewards for both BT and customers. The current programme is for the 30 principal centres of Britain to be interlinked by digital transmission by 1986; and the complete network of 60 trunk exchanges should be operational by 1988. Annual capital expenditure of £1,000,000,000 is being incurred in introducing completely digital network with integrated switching and transmission. The Integrated Service Digital Network (ISDN) as it will become known, will bring together voice, data, facsimile and video transmission in a single network – cheaply and efficiently. BT is already well advanced with the installation of sophisticated dedicated networks to serve data users. The National Private Circuit Digital Network is the basis for both the Kilostream service, and also the Megastream service.

To fully utilize the enhanced services available on ISDN, users own private equipment should incorporate IDA – integrated digital access which provides compatable interlink from the customer's premises to the local exchange with high quality digital service. IDA offers digital access to all users of telecommunications both voice and data, from small scale users right through to large multi-line installations, mostly PABXs.

X-stream services

The X-stream family of Digital Network Services offers greater cost-effectiveness and reliability to meet all current customer needs. The 2 private circuit services – Kilostream and Megastream – provide not only direct replacements for existing analogue voice grade and wideband private circuits, but also new opportunities for further developing corporate communications.

Kilostream will be BT's major digital private circuit service; it will be used as long term replacement for 'Tariff T' and other voice grade circuits. It will be available at over 400 multiplexor locations by the end of 1984, with plans for a virtually nationwide service before the end of the decade. Quality of service will improve significantly following BT's introduction of automatic fault detecting, line testing, and alternate routing facilities.

Kilostream offers wholly digital transmission of two distinct types: a service at what have traditionally been called 'Medium' and 'High' bit rates: 2400, 4800 and 9600 bits per second using CCITT X21 or X21 BIS interfaces; a service at 64 thousand bits per second using the CCITT X21 fully digital interface, which also offers an unstructured data channel for customer use.

For many data applications, Kilostream is more cost-effective than the combination of analogue private circuits plus modems.

Megastream is a high capacity digital point-to-point service capable of operating at 2, 8, 34, and 140 megabits per second. British Telecom can supply 2 megabit Megastream nationwide and add appropriate multiplexors to suit user needs. Channels can be presented to the user with digital interfaces for connection to the new range of digital PABXs or analogue interfaces and with synchronous or asynchronous operation, or a mix of these.

The Public Packet Switched Network (PSS) is a further extension of BT's data transmission services offering flexibility and nationwide availability.

Some redesign and reconfiguration of customers existing networks will be necessary to exploit the full capability and sophisticated facilities of the service.

Packet switching is now a mature service, and the ideal vehicle for transaction data. Further developments in access of technology and services are necessary to increase its potential to carry other types of traffic.

British Telecom recognise that analogue users with major investments in existing networks are reluctant to instigate immediate change and will seek to implement strategies which bring an orderly transfer to the new order. This will entail continued service from analogue networks and in some cases extension and enhancement of them. BT will continue to supply voice grade circuits, channeling equipment and associated services whilst demand continues. BT offer a range of 4th generation modems and multiplexors as part of our network packages. The same standards of commitment and service apply to analogue as to digital.

In the provision of X-Stream services, BT will continue to provide as wide a range of services as possible, recognising that differing customer needs lead logically to a variety of customer transmission and network implementations. Central to major corporate communications networks are PABXs.

British Telecom provides PABXs from a number of manufacturers, and are able to integrate switches and X-Stream services into a cost-effective network design. Our substantial expertise in signalling systems and interface standards secures rapid and trouble-free installation. Internal wiring is undertaken using new techniques centring on the plug and socket principle. BT provide a range of finance arrangements for purchase, rent and lease. British Telecom is uniquely placed to provide a total network package for the user.

In conclusion this paper has attempted to give a general overview of the main dynamic influences affecting British Telecom and its customers in 1984. I hope I have clarified organisational changes and highlighted major technological developments. British Telecom is always at your service.

The author is Principal Assistant Engineer, Telecommunications to the South West Thames Regional Health Authority. He is currently involved with the Computer Policy Committee, which is looking towards establishing guidelines for the whole of the NHS and is also a member of DHSS Working Group 7.

New exchanges

NORMAN NEWTON MCIBS

This paper examines the factors to be considered when proposing a new telephone exchange installation.

Where is the money coming from?

In the Health Service there is unlimited demands on limited resources. Telephone exchanges are highly specialised items integrating computer technology and components. When considered along with associated items, inter connected staff location and alarm systems, data terminals, networking and accommodation, they attract substanatial capital charges.

The engineer is required, when making a bid for funding to therefore prepare an assessment of need, scheduling all options and associated costs. The present worth accounting technique can help to identify the most economic proposal in consideration of both the initial capital and recurring revenue consequences attracted by telephone exchanges. I refer you to H.M. Treasury booklet "Investment Appraisal in the Public Sector: A Management Guide for Government Departments" issued under Health Notice (82)34.

Existing hospitals: replacement of telephone systems

The telephone equipment installed throughout our hospitals is obsolete in type and technology, similar exchanges are now either no longer recommended on economic grounds or commercially available.

There has been no standard arrangement, so a wide selection of systems exist including PMBX (Private Manual Branch Exchanges) rented from BT operated in conjunction with internal PAX (Private Automatic Exchange); wholly owned Strowger PABX3 (Private Automatic Branch Exchanges) or Crossbar PABX units. All such equipment has a general anticipated life in the order of 15 to 20 years, but because of operational difficulties may well require earlier replacement. More frequent breakdown can be anticipated with advancing age. Immediate availability of replacement parts could not be guaranteed and neither could, therefore, an assured continuity of service.

The introduction of competitive maintenance may alter the existing single standing charge, in future there could be a loading factor to take account of the age, condition and increased involvement of call out technicians. The eventual replacement of every telephone exchange under your control is, therefore, inevitable, the only doubt is when?

New electronic digital exchanges can save significant revenue costs in comparison with a PMBX/PAX system and marginal savings over PABX3 equipment. In consideration of PMBX exchanges of 450 extensions and above the initial capital charges for the new digital systems may be recovered by reduced revenue costs in 3 to 4 years.

The smaller the exchange, the longer the time before capital payback is achieved, as it becomes more difficult to reduce the compliment of operators, however, the interlink of these small exchanges with larger units and formation of District networks can show considerable revenue savings. A stand alone 170 extension exchange can take 6 to 7 years to recover capital costs, but when interlinked to a larger unit and

operated as a satellite or remote peripheral, payback is achieved in 2 to 3 years.

Cost, however, is only one of many advantages offered by new technology. Operators desk top units are simplicity itself to control and give an enhanced service, extensive programmable extension facilities are available, improved call handling and an overall more efficient communications system is obtained. The National Health Service in 1984 is using 1948 communication techniques, we must put our house in order, then both patient and staff can benefit.

There is an urgent need to improve communication systems and achieve maximisation of available funds. New telephone exchanges meet both of these parameters.

Establishing existing service

It is impossible to know what replacement telephone exchange is suitable until the existing has been analysed. It will be necessary to undertake a full survey, look at each extension, its usage, needs, location, if any system plans are operating (1A, 105, 107, etc.) what small sub-boards are connected off the main system (keyswitch or PMBX) check tie lines, exchange line utilisation, network services.

Call data logging can help in many respects. If no such facilities exist, specialist companies can undertake temporary connections to the existing exchange. Costs for this service are in the order of £1,500 for 150/200 extensions exchanges, £3,500 for 400/500 extension exchanges. A two week log should suffice, ask for the information to be presented in the form best suited to your needs, some present their findings as individually prepared summary reports, others just hand you 2 miles of computer printout with their invoice on top. If undertaken correctly and presented in suitable form it can be money well spent.

The log should include to identify under-utilised extensions, namely those in actual use for under five minutes each day. Experience has shown that for long established hospital telephone systems this can be as high as 20% of all connected extensions.

Some surveys have shown that 1 in 5 telephone calls are never answered. Ask the question are all existing handsets strictly necessary? because provision for each extension on the new exchange attracts capital charges of £250/£300. The renewal of the hospital main telephone exchange should be utilised by management as the perfect once only opportunity to re-assess the telephone needs. There certainly appears scope for making savings and putting a neglected house in order.

Above all consult with your own telephonists, their co-operation is essential, without which even the most perfect of systems will be made to appear wanting. After all it is their realm and they will be involved in far reaching major changes to long standing working arrangements. To us the advent of computerisation in telephone exchange equipment is an exciting and challenging time, to the telephonist it can mean the fear of redundancy, as fewer operators are required and for those left in employment call data logging equipment constantly monitoring their efficiency.

Diplomacy and understanding must be the order of the day.

Findings should be catalogued in schedules and on drawings for inclusion as part of your invitation to tender package.

But what about your future communication needs?

Future requirements

Look ahead and make a comprehensive investigation as to future possible intentions and requirements of the telephone system. When replacing the telephone distribution block wiring, further cores may be required to establish a computer LAN (Local Area Network). Simultaneous speech and data on the same line (copper sharing) has not yet received approval, so separate cores are currently necessary. The minor extra installation charge for a 3 pair cable to each telephone handset as opposed to 2 pair cable could save considerable future costs for laying a second BDS (Building Distribution System). A common network offers better utilisation of data equipment, single maintenance responsibility and lays the foundation for introducing the electronic office.

Is the main telephone exchange to switch the computer data, or is a separate but interconnected data switch to be considered, what types of interfaces are necessary? What outside private lines, kilostream, megastream or Mercury 13GHz digital microwave link may be anticipated? What interlinks with other PABX equipment to give automatic interconnection without operator asistance, computer access, night-time transfer of operator services to a district centre. All these facilities are now available with new electronic telephone exchanges. Interlink the staff paging system into the new telephone exchange to give automatic access. New digital information display pagers can relieve the operators of a significant work load. Make reference to site and district development plans.

Assess telephone needs on a time scale, as the intention is not to expend funds now on some uncertain future element, but to ensure the telephone system selected is suitable for later upgrade should the dream become reality.

Having rationalised the existing service and integrated with future requirements, one is then in a position to prepare a detailed specification of system requirements for the telephone equipment supplier.

Specifying requirements

In the absence of DHSS Standard Specification C47, the DHSS Working Group 7 interim Standard Specification should prove useful, and perhaps HM Treasury CCTA 'PABX User Requirement-Specification Notes' issued May 84 under Information Technology Circular No 207. Using these as your base, carefully detail each requirement separating present from future. Insist on the tenderers completing a standard schedule of costs to permit true comparison and omission of items where cost exceeds the value of service gained. To contain costs, manufacturers endeavour to offer their standard package, carefully

Key switch telephone systems.
Group 1 (5th issue August 1984)

Origin	System	Line	Phones	Supplier	Approved
T.M.C.	KBX 3	1	3	Philips	Y
C.G.C.T.	Diapason 3	2	3	Awaited (French origin)	N
G.E.C.	Ambassador ESS	1/2	3/4	B.T. (Rental only)	Y
Ideal	1+5	1	5	Ideal	N
—	Minimaster 2	1	5	B.T. (To be announced)	N
C.T.S.	D.F.G. Cockpit 2005	2	5	Ideal	N
—	Minimaster 1	1	6	B.T. (To be announced)	N
Mitel	SX5 Talkto	2	6	Awaited	N
T.M.C.	KBX 6	2	6	Philips	Y
Telrad	ES23	2	3/6	Awaited (Israel origin)	N
Ferranti GTE	Rhapsody Elite	3	6	B.T. and Ferranti	Y
Hagenuk	CRA 35	3	6	DAC/NEI (West German)	N
N.E.C.	E308	2/3	2/8	Ansafone (Japan origin)	Y
Nitsuko	Key System 308	3	8	Plessey	Y
A.D.I.P.	Stat 10	4	9	Vanderhoff (French origin)	N
Empire	12	2/3	10/9	Small Systems Engineering	N
Lake	210	2	10	B.T. (Minimaster 3)	Y
Mitel	Entrepreneur	4	10	Cass, C.M.R., Datatime, Energy Communications and Norton	N
Midas	MST 510	5	10	Awaited	N
G.E.C.	Merlin S4022	5	10	B.T. (Senator 2)	Y
T.M.C.	KBX 10	6/2	6/10	B.T. (Ensign 2–Merline S3012)	Y

PABX and key switch telephone systems
Group 2 (5th issue August 1984)

Origin	System	Lines	Phones	Supplier	Approved
Plessey	DEKTS	4	12	Plessey	N
Detewe	E12	3/6	6/12	Eagle, General Telephone, Securicor (Robophone) Shipton & Ideal (2001)	Y
Intercom Nottingham	Vision 2000	2	12	Eagle and Ideal	Y
Northern Telecom	Vantage 12	6	12	B.T. (To be announced)	Y
Hagenuk	CRA 661	6	12	DAC/NEI (West German)	N
TIE	EK 612 Ultrakey	6	12	B.T. (Merlin S6022)	Y
G.E.C.	Digimite	2	14	Reliance	N
Nitsuko	Key System 616	6	16	B.T. (Merlin S2616) & Plessey	Y
Panasonic	GX 616	6	16	General Telephones	N
TIE	EK816 Command Key	4/8	8/16	Telephone Rentals (TR 816)	Y
N.E.C.	E616	4/6	8/16	Ansafone	Y
Telerad	Key BX 816	8	16	Awaited (Israel origin)	N
Blick	Alcatel T16	8	16	Awaited (French origin)	N
G.E.C.	Keylink 520	5	20	B.T. (Tudor), Ideal & Reliance	Y
Seimens	Saturn 200	5	20	Awaited	N
Seimens	Saturn 220	6	20	Awaited	N

check where they have deviated from your specification requirements. Where manufacturers think you may benefit from further available services, this will appear as an optional extra. Above all ensure the special nature of a hospital switchboard is emphasised and summaries of call data logs on the existing system are included in the specification documents.

Many of the problems being incurred by hospitals on recently installed SPC equipment could have been avoided. A well-researched and presented specification is essential. Without one, you may be courting disaster.

Tender list

In Europe during 1983 it is estimated the PABX market was worth approximately £3.5 billion and the forecast is that this will quadruple by 1988. On a global scale the sales potential is larger than can be comprehended. There are therefore a multitude of new and old companies actively engaged in establishing themselves in this new and expanding market.

In the UK the only current restriction to this bonanza is the relatively slow procedures in obtaining equipment approvals. When drawing up your tender list check that each system included has reached final approval stage and is working satisfactorily in a similar environment to that proposed. Visits to, or personal contact with these locations should be arranged, to satisfy yourself that all is well. The schedules are comprehensive, not selective, any omission was not intentional.

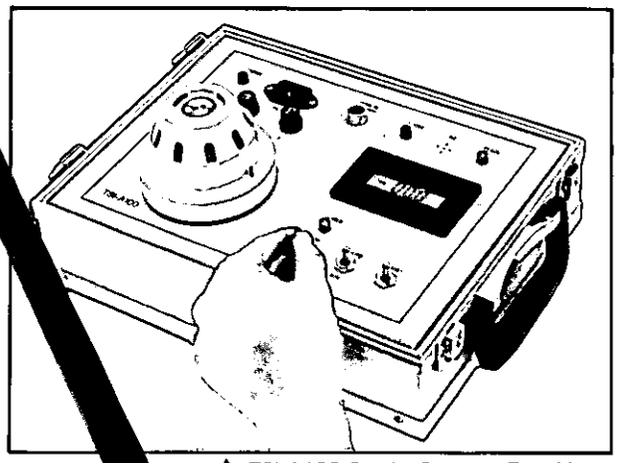
Each system offers a unique architecture of software and hardware with individual advantages. In consideration of these subtle differences money should not be used as the single influence on choice, in close tender situations check facilities and circuit configurations, there will most certainly be variations on networking arrangements and output data for call logging.

The schedules have been tabulated in order of the maximum extension capabilities from small keyswitch systems suitable for a single doctor's practice, to the largest network configuration of 12,000 extensions. The groupings relate to the limitations of reproduction and do not have any significance. The list should, therefore, be continuous and overlapping. With so many systems currently passing through the approvals procedure, the picture can quickly change. The following indicates the position as at summer this year.

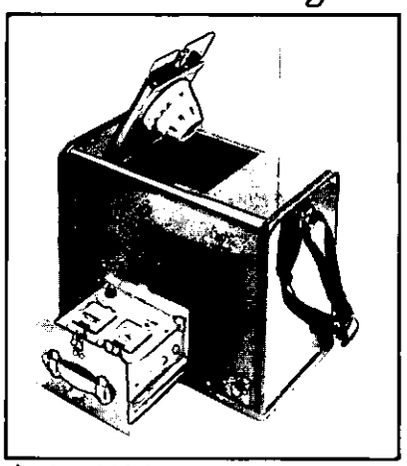
Maintenance

It would appear that in certain cases BT may be reluctant to offer a maintenance service for the latest equipment unless BT were instrumental in the supply and installation of the system. With so many systems available and each of individual character, one agent cannot be expected to be expert on them all. The suppliers of the system are, therefore, becoming, wherever possible, approved maintainers.

Maintenance made easy



▲ *TSI A100 Smoke Detector Test Meter*



▲ *TSA B220 Smoke Sensitivity Test Unit*

◀ *TSE A100 Smoke Pole*

TSI A100 SMOKE DETECTOR TEST METER

Gives service engineers the ability to quickly confirm that the electronic performance of the detector has not changed from original setting. Either ionisation or photoelectric detectors can be tested on this portable unit powered from rechargeable batteries.

TSA B220 SMOKE SENSITIVITY TEST UNIT

Specially designed for fast and efficient testing of smoke detectors and offering the advantage of compactness and portability for versatile use in the field. Compatible with most UK and European smoke detectors.

TSE A100 SMOKE POLE

This universal smoke detector test unit is the result of extensive research and development, aimed at making in situ testing a simple and time saving operation. Light weight telescopic construction for easy adjustment to ceiling height. Integral, simple-to-operate, controls and power supply, plus smoke generation.

Avoid expensive and annoying false alarms, often caused by inadequate testing and maintenance, by using the quick, simple and cost effective Hakuto range of maintenance and testing equipment. Hospitals, hotels, factories, laboratories and all other establishments, where smoke detectors form the first line of fire defence, will improve protection by reliable and regular maintenance. Hakuto equipment makes testing and maintenance of any smoke detectors a simple and time saving process, for both service engineers and in-house maintenance staff.

HAKUTO

EFSEC DIVISION

HAKUTO INTERNATIONAL (UK) LTD.
ELEANOR HOUSE
35 ELEANOR CROSS ROAD
WALTHAM CROSS
HERTFORDSHIRE EN8 7LF.
TEL: 01-367 4633 (2 LINES) LEA VALLEY (0992) 769090 (4 LINES)
TELEX: 299288 HAKUTO G

I am interested in your range of smoke detector maintenance equipment. Please send me further information.

NAME _____

ADDRESS _____

_____

_____

_____

Hakuto — the wisest choice

PABX telephone systems
Group 3 (5th issue August 1984)

Origin	System	Lines	Phones	Supplier	Approved
Thorn Ericsson	Diavox 824	2/4	12/24	B.T. (Earl) & Thorn Ericsson	Y
Mitel	SX10	6/8	16/24	B.T. (Viceroy), C.M.R., Datatime, Energy Communications, Cass & Norton	Y
Ferranti/GTE	8800	12	24	Ferranti	N
C.G.C.T.	Diapason 30	10	30	Awaited (French origin)	N
Dellfield	32		32	Reliance	Y
Iskra	Meridian	6	32	FS Texcel	N
Mitel	SX20	8	32	B.T. (Kinsman) Cass, C.M.R. Datatime, Energy Communications & Norton	Y
Plessey	DEKTS	10	32	Plessey	N
Panasonic	GX1232	12	32	General Telephones	N
TIE	HK1232	12	32	Awaited	N
Thorn Ericsson	Phoenix 1	12	32	Thorn Ericsson (Intertel 1232)	N
Telrad	KSU 16/32	16	32	Awaited (Israel origin)	N
Intercom Nottingham	Vision 2000	4	36	Eagle and Ideal	Y
Nitsuko	Key System 1236	12	36	Plessey (Japan origin)	Y
Thorn Ericsson	New Diavox	28	36	Thorn Ericsson	N
S.T.C.	Coronet		40	S.T.C.	N
T.M.C.	KBX 100A	12/8	32/40	B.T. Herald	Y
T.N.	TN40	2/12	36/46	General Telephone Systems	N
Northern Telecom	Vantage 48	16	48	Awaited	N
Mitel	SX 20	12	48	B.T. (Kinsman) Cass, C.M.R. Datatime, Energy Communications & Norton	Y
TIE	HK 1648	16	48	Awaited	N

PABX telephone systems
Group 4 (5th issue August 1984)

Origin	System	Lines	Phones	Supplier	Approved
C.G.C.T.	Diapason	64	52	S.T.C. (French origin)	N
T.M.C.	KBX 100B	8/18	76/56	B.T. (Herald) (100C due Autumn 84)	Y
TIE	HK 2056	20	56	Awaited	N
Nitsuko	PKS 2260	22	60	Plessey	N
Dellfield	64		64	Reliance	Y
GEC/Plessey	CDSS	16	64	B.T. (Monarch 1)	Y
Telrad	KSU 28/64	28	64	Awaited (Israel origin)	N
Mitel	SX20	8	72	B.T. (Kinsman) Cass, C.M.R. Datatime, Energy Communications & Norton	Y
Thorn Ericsson	Phoenix 2	32	80	Thorn Ericsson (Intertel 3280)	N
Dewete	Content 300	6/12	30/80	Shipton (German origin)	N
Seimens	EMS 91		88	Awaited	N
Harris	110	—	30/10	S.T.C.	N
GEC/Plessey	CDSS	32	120	B.T. (Monarch 120B)	Y
Mitel	SX 200	28	130	B.T. (Regent 247–Merlin S1187) Cass, C.M.R, Datatime Energy Communications, Norton & Telephone Rentals (To be replaced by Generic 1000)	Y
C.G.C.T.	Diapason 160	32	157	Awaited (French origin)	N
TIE	Datastar	64	192	Awaited	N
Philips	TBX 250	23	227	Philips (Due Autumn 85)	N
GEC/Plessey	250 CI	64	252	B.T. (Monarch) (Merlin S7250)	Y
STC	OCS 300	24	128		
		30	182		
		36	240		
		40	292	S.T.C.	Y
Plessey	1DXS	48/32	240/304	Plessey & Telephone Rentals	Y
G.E.C.	Single Processor SLX	35	150/350	Reliance	N
TIE	TX 450	48/96	288/384	Awaited	N

Check before purchase who can undertake maintenance, if a choice is available then perhaps competitive quotations can be invited. The availability or otherwise of a suitable maintainer may even affect the choice of system.

Some suppliers have long established PAX maintenance teams and PABX installation technicians fully experienced with on site problem solving. They are well aware of the very special nature of an acute hospital and the major role the telephone network plays. They can offer a maintenance cover best suited to each individual's needs.

New PABX systems incorporate self diagnostic facilities which can be interrogated from afar. Suppliers are actively pursuing the establishment of Regional Centres to constantly monitor the status of all local exchanges within their jurisdiction. Mobile maintenance teams on radio link would respond to emergency situations, perhaps even before the user was aware of the malfunction.

As an indication of the potential savings to be achieved by central diagnostic units, Pitney Bowes find for their facsimile machines that 50% of customer service request calls can be dealt with by a technician without ever leaving his office.

The user is now directly involved with the issue of maintenance contracts for each and every new exchange. When accepting a specialist's own contract conditions, carefully read the small print and check exclusion clauses. The maintainers are endeavouring to offer an alternative economical service, their offer will be priced to meet your specification. Clearly detail the individual nature of your requirements, with special care and consideration given to call out response and if a 24 hour, 365 day per year cover is required. Again a good specification can be to all parties' benefit, both contractor and client alike.

Maintenance of handsets

In the past it was the accepted practice to rent all telephone extension handsets from BT, which attracts revenue consequences of

PABX telephone systems
Group 5 (5th issue August 1984)

Origin	System	Lines	Phones	Supplier	Approved
Detewe	ABP 600	24/70	170/600	Shipton (German origin)	N
I.B.M.	1750	32/96	248/760	I.B.M. (Analogue)	Y
Harris	D400	100	800	S.T.C.(OCS 800)	N
Seimens	EMS 601		800	Norton (MCX)	N
Philips	TBX 1000	81	815	Philips (Due Autumn 85)	N
Ferranti (GTE)	GTD 1000E	256	1000	Ferranti (G.T.E.)	Y
Philips	TBX 3000	96	576		
		192	1152		
		576	2304	Philips (USA origin)	Y
Harris	D1200	—	300/1200	S.T.C. (USA origin)	Y
TIE	TX 2000	80/240	480/1920	Awaited	N
I.B.M.	3750	292	2264	I.B.M. (Analogue)	Y
Ferranti (GTE)	GTD 4600		4600	Ferranti (GTE)	N
G.E.C.	SLX		350/7000	B.T. (BTX) and Reliance	N
Philips	EBX 8000		250/8000	Philips (Analogue)	Y
Plessey	IDX		300/	B.T., Plessey &	
			10,000	Telephone Rentals	Y
Mitel	SX 2000		10,000	B.T. and I.C.L.	Y
Thorn Ericsson	MD 110		150/	Thorn Ericsson	
			12,500	/B.&T. (Autumn 84)	N
American Telephone & Telegraph (Bell)	Dimension 85		—	Olivetti	N

£4.10 per extension, per quarter, plus VAT.

Liberalisation now offers a far more economical alternative in the form of outright purchase of handsets. These must be BABT approved for connection on the network. Competitive quotations from suppliers should be invited, state nature of instrument operation and that it should come fitted with BS plug. Schedule the numbers of the individual types and colours required.

Prices recently received for an MF operation Statesman type telephone varied from £26 to £36 (inclusive of VAT) for approximately 200 instruments. It pays to shop around.

Once purchased the instruments are your property and responsibility, various options are now open to keep the units operational. A maintenance contract on telephone instruments can cost in the order of £1.25 per unit, per quarter. Instruments can be left until they fail and repaired on time and material. To maintain service whilst the instrument is under repair, spare telephone handsets should be kept in stock. It is considered, to meet all contingency situations, the number of spare handsets in stock should equate to approximately 10% of the total of connected extensions.

In house maintenance holds the most promising avenue for saving costs. When an old handset becomes faulty it can be unplugged and replaced immediately with an instrument from stock. The old handset is inspected by the hospital works staff, if a minor fault is detected the unit is repaired in the electronic workshops, if major the unit is discarded as repair costs could approach replacement costs.

The purchase of telephone handsets once each year, to replace discarded instruments, should prove far more economical than a blanket maintenance contract, or time and material for repairing all faulty units.

To discourage theft new telephone instruments could be engraved HOSPITAL PROPERTY, consideration should be given to MF operation which does not currently work on the home phone outlets. A bridge can be fitted to the telephone socket which requires a screwdriver to remove the plug.

Existing rented handsets

No charge is made by BT for disconnection and removal of their existing handsets. The £4.10 rental ceases 7 days from receipt of the instruction.

If no BS telephone plug exists and BT own the block wiring, a charge in the order of £15 per unit will be levied for removing the old connector block and fitment of a new outlet socket. The cost for these works on large sites should be negotiated with BT to reduce the £15 unit cost. If the hospital owns the block wiring then seek competitive quotations for the adaptation, or arrange for the works department technicians to undertake the task.

Following connection of the new purchased handsets, if BT own the block wiring then they will charge 55 pence per extension, per quarter, for cable maintenance. However, before any charge can be levied an instrument or service must be connected to the cable.

Reliability

With all this talk of maintenance I must emphasise that with established electronic exchanges and new style handsets, reliability has been found to far exceed the performance of the old Strowger relays and rotating dial instruments.

CROSS REFERENCE

Picked from the journals of professional colleagues, articles and news items of interest to hospital engineers.

ELECTRONICS & POWER

Future fuels for generating sets – an article by Mike Holland which discusses the need to conserve world oil reserves and the availability of potential alternative fuels, a combination which has led a diesel-engine manufacturer into extensive research aimed at modifying its engines. *August, page 628*

BUILDING SERVICES

Probes for energy cuts in hospitals – a series of articles on the big energy savings to be made in hospitals. *September, page 47*

Your energy bill needs intensive care

Have you struggled with your treasurer over increasing costs? Are you threatened with cuts?

Relax— help is at hand. Put Future Laundry Systems in charge of your energy crisis and you'll soon be on the road to recovery.

Our heat recovery systems are guaranteed to reduce energy costs in your laundry—with payback in under 18 months.

Every way you lose heat is covered... Washers... Tumblers... Ironers... Boilers.

The Dynatherm recovers up to 85% of energy otherwise lost from washer extractors or tunnel washers with flows up to 5000 gallons an hour.

The Ludell handles recovery from washers in large laundries where flows exceed 5000 gallons an hour.

The Ducker gives 60% energy recovery from tumblers and reduces steam consumption by 30%.

The Winterburn enables 80% recovery of the energy from ironers.

The Sentry recovers over 90% of boiler blowdown heat.

To give your energy bill the care it needs just fill in the coupon, telephone or telex. We're on call 24 hours a day.

Heat Recovery Systems

FUTURE LAUNDRY SYSTEMS LIMITED

Energy Conservation Specialists to the Laundry Industry

Farnborough Grange, Farnborough, Nr. Banbury, Oxon OX17 2EA
Telephone: 0295 89 771. Telex: 837366 MJE UK G.

I would like to give my energy bill some intensive care

Name_____

Position_____

Company _____

Address_____

_____ Telephone_____

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

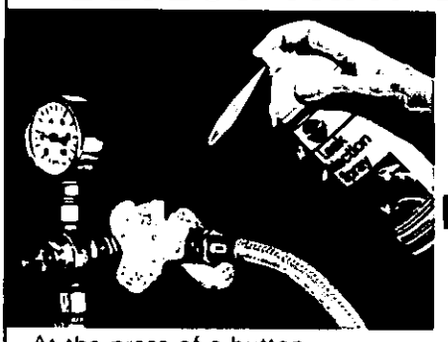
Some hospital and handicapped persons' projects completed by Besam:

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

DETECT THAT LEAK!



Galutec

Leak Detection Spray

At the press of a button—
instantly ready to locate the smallest low pressure leaks from compressed air and every type of gas—quickly, reliably, safely and conveniently.

★ Non-inflammable ★ Non-corrosive ★
★ Non-toxic ★ Free from oils, alcohols, halogens ★
★ Biodegradable ★ With corrosion inhibitor ★
★ Totally safe to user and equipment ★

NEW! For sub-zero ambient temperatures down to −45 °C now use GALUTEC LT 45.

Gotec Trading Limited
Gotec House
2A Bedford Road
London N2 9DE
Telephone 01 - 444 4441
Telex 24920 GOTEC G

gotec

WINTER POWER PROBLEMS?

HOSPITAL

DIESEL GENERATORS

Fully serviced or repaired by our own, mobile team of diesel generator engineers nationwide. – All types incl. Dorman, Ruston, Rolls Royce. Paxman, Mirrlees, etc.

FROM ONLY £80

(Maintenance contracts also available)

24hr Emergency Service

LD

LINCOLN DIESELS HOLDING LTD
GREAT NORTHERN TERRACE, LINCOLN
TEL: (0522) 39445 TELEX:56430
AFTER HOURS TEL: (0522) 720406

THE SPECIALISTS IN DIESEL GENERATOR SERVICE

Product News

Alpha-numeric paging extended

Datacall, the only completely British fully alpha-numeric paging system, is now available in UHF, thereby increasing its range from 'on-site' to town or city wide.

For further information: Blick International Systems Ltd., Blick House, Bramble Road, Swindon, SN2 6ER. Tel: (0793) 692401.

New call assistance system for hospitals and nursing homes

The system comprises of a complete range of control equipment and accessories ranging from call buttons and indicators to central control panels – all of which can be integrated to specifiers exact requirements.

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

Medical alert system

A new medical alert system based on paging allows immediate response to any urgent call. The DP6000 paging system from the Communication and Control Division of Philips Business Systems, has been incorporated with Thrust Technology's alert product 9001 to form the new system.

The result is a control box which can take a large number of personal calls and need not be manned. It is especially useful for use in sheltered accommodation where the residents need to carry units such as pull cords in case of emergencies.

Bi-way through-screen intercom

A breakthrough in voice communications through glass and other barriers the through-screen intercom permits people on either side of a partition to hear each other clearly and naturally, as if there were no barrier between them. As the direction of speech switches automatically, there is no need to press buttons or operate other controls.

Further details on Bi-way and new medical alert system from: Philips Business Systems, Communication and Control Division, Cromwell Road, Cambridge CB1 3HE. Tel: 0223 245191.

Bi-way through-screen intercom

New hospital fire alarm control panels

A new hospital fire alarm system, from Static Systems, is basically a range of easy-to-install and look after slimline Statiscan VTS 16 panels each with its self-contained battery and charger. A 6mm locking glass door prevents unauthorised operation of each panel.

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

New sump pump

A new range of compact sump pumps from Grundfos Pumps Ltd, comprising two models – the KP 200, available for 240 volt single phase 50 Hz electrical supply, and the KP 500 for 415 volt three phase 50 Hz supply.

The KP range, which was developed after close market and technical analysis of competitive products, is capable of handling flows up to 20 m^3/hr, heads up to 7.8 metres, and pumped liquids with temperatures up to 90°C. The KP is capable of handling fluid temperatures of 55°C if partly submerged, and 90 degrees if completely submerged (though not for more than five minutes). Maximum working pressure is 1.5 bar and maximum recommended submerged depth is 10 metres.

British Telecom Voicebank

This multifrequency keypad allows users to call up, repeat and store messages in the system's electronic mailbox.

Voicebank, is the first telephone answering service that works in conjunction with British Telecom's Radipaging service. Messages can be stored and retrieved through almost any telephone in the world.

Further details from British Telecom Press Office, 2-12 Gresham Street, London EC2V 7AG. Tel: 01-357 3814.

99-channel portable pocketfone

A new synthesised, 99-channel pocketfone called the PFX, has a wide range of facilities for major systems users.

It is intended for customers such as emergency and security services, public utilities and oil companies. There are versions of the PFX covering VHF or UHF frequency bands from 68 MHz to 512 MHz, and a choice of transmitter powers to suit usage.

Further details from: Pye Telecommunications Ltd, St Andrews Road, Cambridge, England CB4 1DW. Tel: (0223) 61222.

99-channel PFX pocketfone

PABX systems

The CASSTEL systems have been developed from an association between Cass Electronics, a member of the Cass Group plc, and Mitel. The SX-200 model performs all the functions of a modern telecommunications set up, with a flexible maximum capacity of some 24 exchange lines and 150 extensions (the permutations are variable), with many features to make life easier for the switchboard operator, the staff and outside callers.

The system is British Telecom approved and is installed and maintained by Cass Electronics, who have a national network of service engineers.

Further details from: Cass Electronics Limited, Crabtree Road, Thorpe, Egham, Surrey TW20 8RN. Tel: (STD.0784) 36266. Telex: 934593.

Washex International and Future Laundry Systems move

Washex International and Future Laundry Systems moved offices on August 1st 1984.

Washex International handles the European sales of Washex's range of washer extractors, tunnel washers and dyeing machines manufactured in Wichita Falls, Texas.

Future Laundry Systems specialises in energy recovery for tumblers, ironers, and washers.

The new address is: **Farnborough Grange, Farnborough, Nr. Banbury, Oxfordshire OX17 2EA Tel: 0295.89.204.**

Recent BRE publications & news

Building Management Systems – New BRE Digest

Developments in microelectronic technology have greatly increased the scope for the cost-effective use of building management systems for building services. Choosing the monitoring and control functions calls for relatively new skills from the building services engineer. A new Building Research Establishment Digest on 'Building Management Systems' introduces the principle of these systems; it outlines the strategy for their evaluation and discusses site installation requirements.

Copies of BRE Digest 289, 'Building Management Systems', are available from HMSO Publications Centre, PO Box 276, London SW8 5DY, or from HMSO bookshops. Single copies cost £1 (including postage).

British Standard Institution

BS 3375 *A guide to work study and organization and methods (O & M) Part 1 Guide to organization study* has been published to supplement the glossary BS 3138, and to explain how each of the terms and disciplines inter-relate with each other.

The guide is published to give an understanding of organization study to all levels of management and employee representatives who may be involved in investigations of the organizations in which they operate.

Copies may be obtained from the Sales Department, British Standards Institution, Linford Wood, Milton Keynes MK14 6LE. Price: £15.20 (£7.60 to BSI subscribing members).

Institute News

FORTHCOMING BRANCH MEETINGS

North East Branch: *Hon.Sec. G. Baxter Darlington (0325) 460100*
November 13th 'Energy Conservation' South Cleveland Hospital
December 14th Visit to Cameron's Brewery, Hartlepool.

East Anglian Branch: *Hon.Sec. J.A. Parker TN Norwich (0603) 611 233*
November 24th 'Incineration/Heat Recovery' West Norwich Hospital

Highland Branch: *Hon.Sec. M.J. Shand TN Inverness (0463) 234 151*
November Visit to Headquarters, Northern Constabulary, Inverness.

Southern Branch: *Hon.Sec. R.P. Boyce TN Chichester (0243) 781411*
November 15th Visit to Cathedral Stonemasons and tour to see Cathedral restoration works, Chichester.

Midlands Branch: *Hon.Sec. W. Turnbull TN 021 378 2211 ext 3590*
October 10th Air to Water Heat Pumps Warwick Suite, Aston University.
November 21st Operating Theatre Air Conditioning Post Graduate Medical Centre, Queen Elizabeth Hospital 'Sepsis v Energy Conservation'

North West Branch: *Hon.Sec. E.A. Hateley TN 061 236 9456 Ext 266*
October 17th Visit to West Cheshire Hospital
November 9th Jacobean Banquet Worsley Old Hall
November 13th Visits to British Nuclear Fuel Establishments at Springfields and Risley.
December 5th Hybrid Fuels and Specialist Services Salford University.

Please contact the local Branch Secretary should you wish to attend any of the above meetings.

BRANCH NEWS

Welsh Branch

Members evening

There will be a Members Evening on Thursday, November 8th at 6.30 p.m. at the Ambulance Training H.Q., Waterton Cross, Bridgend, Mid Glam. This is a new approach and we hope it will engender interest in all our other members to make this a regular venue. Three Institute members have agreed to give talks on subjects which interest them outside of normal working hours:

(1) Mr. M.J. Back will talk on Steam Locomotives.
(2) Mr. R. Parsons will talk on Stage Lighting applications.
(3) Mr. K. Jones will talk on the Inland Waterways Association.

We intend to carry this out on an informal basis and members are invited to bring their wife and family or friends along.

Members outside of the Welsh Branch wishing to attend the foregoing meetings should contact the Secretary in working hours on Cardiff 755944 Ext. 2562

LETTERS

Dear Sir,

I am writing with regard to the Award of the Lucas Scholarship to myself.

I must thank the members of the Council of the Institute for awarding me the Scholarship, and to Dr. Lucas for making the award possible, which I gratefully accepted.

The conference itself had speakers on various topics, all of which were interesting, with some having a direct relevance to my present working environment ie. Coal firing and the future and Equipment management in practice.

The detailed description provided on the Solar Energy Project at Torbay, was very informative, especially as I had not heard about this project before, and demonstrated the necessary involvement and difficulties encountered on such a project. Together, with the insight into the results of its effect on the fuel bills and its pay back period (dependant upon the future cost of fuel), I found this to be a well documented discussion.

The visit to the H.E.M.E.C. at Falfield gave a good insight into the centre, I have attended once before (1979) but only saw the mechanical laboratory area, and its present development away from just the engineering field. Together with the scenic mystery tour on the way to the centre, and the barbeque which rounded off the visit, I felt that it was a highly successful evening, and I believe the ladies attending also found it an informative and enjoyable evening.

The exhibition had a good representation of the suppliers commonly used, and that advice was forthcoming without the usual pressurised sales tactics generally employed.

While talking to other works officers at the conference I was able to obtain information on the differing methods of department operation and organisation.

May I suggest that one possible topic for discussion during next year's conference, is the use of Heat Pumps in the Health Service, which I believe could have a considerable influence in the next few years.

R.M. Mason

CLASSIFIED ADVERTISEMENTS

Biomedical Engineers
Biomedical Equipment Repair Technicians

US Dollar Salary — Jeddah, Saudi Arabia

Openings exist for qualified Engineers and Technicians for an existing Biomedical Engineering Services Group at a renowned and modern 200 bed military hospital. These positions offer challenging career opportunities for those with a minimum of 4 or more years experience in hospital or institutional types of environment.

Engineers: Should have first or Higher Degree in Engineering with a Biomedical component. 4 years experience in a health care environment is essential. Positions will be oriented towards technician support and supervision, training, and managing in a support services organisation.

Technicians: Should have an appropriate qualification from a recognised technical college or equivalent. A minimum of 4 years hospital experience in medical equipment repair work is essential.

All candidates should have experience in one of the following:

- Dialysis Equipment or Laboratory Systems
- X-Ray
- Patient Monitoring Systems, Anaesthesia or Respiratory Equipment.

Contracts are single status for 1 year (renewable). Benefits include furnished accommodation, full health care, leave after six months and tax free salaries.

Write, enclosing full career details to R. Griffin, Bechtel Great Britain Limited, PO Box 739, London W6 8DP. Or telephone 01-846 6197 (out of hours 01-846 6262).

Eaton Hall International

Fire Protection Techniques in Hospitals

An intensive 3 week certificate course

Details from the Director,
Eaton Hall International, Retford
Nottinghamshire, DN22 0PR, England.
Tel: 0777 706441. Telex 377494 MKLEING

Applications are invited for the permanent post of:-

ENERGY SERVICES OFFICER

EXPERIENCE
Candidates should have a high standard of technical training and general experience in the installation, operation and maintenance of mechanical and electrical plant equipment and energy management in large institutions. Extensive experience of boiler, incinerating, generating plants, steam/water distribution, electrical services plant and equipment, etc., is essential.

QUALIFICATIONS
An appropriate third level engineering based qualification is desirable.

SALARY
Salary Scale of IR£11,897-IR£13,836 applies. (An appointee with special qualifications or experience may be permitted to enter the scale at a point above the minimum).

Application forms and relevant particulars can be obtained by written request to the Personnel Officer, St. James's Hospital, P.O. Box 580, James's Street, Dublin 8, Ireland to whom completed applications should be returned not later than **Wednesday, 17th October, 1984.**

ST. JAMES'S HOSPITAL
P.O. BOX 580, JAMES'S STREET DUBLIN 8

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.

EPSOM DISTRICT HOSPITAL

ENGINEERING OFFICER

Salary: £7,819 – £8,752 inclusive of London Weighting and bonus at 15%.

Based in the General Division Works Dept. at Epsom District Hospital the Engineering Officer will assist the Senior Engineer in managing the day to day maintenance of the hospitals within the unit including some project work. There is a planned preventative maintenance and incentive bonus scheme in operation for a trade staff of fifteen.
With a growing awareness of energy conservation a microprocessor energy management system is at present being installed at the main Epsom Hospital site. The successful applicant must hold at least an O.N.C./O.T.C. or equivalent in engineering and intend continuing to study for higher qualifications. Informal enquiries will be welcomed by Mr. I. Friday, Unit Works Officer on Epsom 26100 Ext. 415.

Application forms and job description from Unit Personnel, Epsom District Hospital, Dorking Road, Epsom, Surrey. Tel: Epsom 26100 Ext. 428.

Closing date: 26th October 1984.

Mid-Surrey Health Authority

GREAT YARMOUTH AND WAVENEY HEALTH AUTHORITY

Unit Works Officer 2

LOWESTOFT & COMMUNITY HOSPITALS (SOUTH).

An experienced and effective manager is required to take responsibility for the operation and maintenance of the Works Services for a group of four community hospitals.
The post is based at Lowestoft.
The Unit Works Officer will be required to co-ordinate the building and engineering functions into a combined Works Department capable of providing an efficient response to the needs of the users.
Qualification requirements are as detailed in PTB 4/82.
Salary scale £9,262-£11,490. (Increase pending.)

Further details and application form available from: Mr. E.M.D. Goddard, A.H.A., Administrator, Lowestoft & Community Hospitals (South), Lowestoft & North Suffolk Hospital, Tennyson Road, Lowestoft, Suffolk, NR32 1PT. Tel. No. Lowestoft 87311. Ext. 284.
Closing date: 24th October, 1984.

WELSH HEALTH TECHNICAL SERVICES ORGANISATION
DIRECTORATE OF WORKS
CHIEF ENGINEER'S DEPARTMENT

TECHNICAL OFFICER – COMMISSIONING

Salary Scale: £9,637 – £11,451 p.a. (increase pending)

A vacancy has arisen for a Technical Officer to undertake commissioning of hospital electrical works throughout Wales. The appointee must have extensive experience preferably in commissioning and/or operations and maintenance of electrical services for buildings including 11KV installations.

This post will involve extensive travelling and possession of a car and/or a current driving licence is essential.

The qualifications required are:–
HNC Electrical or an equal and approved qualification
plus
4 years experience as a Technical Asssistant Grade 1
or
8 years relevant experience in a similar post

Additional information on this post may be obtained from Mr. M. T. Jenkins, Assistant Chief Engineer. Telephone Cardiff 499921 Ext. 114.

Application forms, detailed job description and full details may be obtained from:–
The Personnel Officer,
Welsh Health Technical Services Organisation,
Heron House,
35/43 Newport Road,
Cardiff CF2 1SB
Telephone No. Cardiff 499921 Ext. 138.

Closing Date:
18th October 1984

NORTH WESTERN REGIONAL HEALTH AUTHORITY

X-RAY ENGINEER

Applications are invited for a post of X-Ray Engineer within the Regional Works Department of the Regional Health Authority.

Applicants will be expected to have a sound knowledge of all types of X-ray equipment used in hospitals, their applications and the testing of performance and safety.

Candidates should be academically qualified for chartered membership of the I.E.E. or I.E.R.E. to be appointed at full Main Grade Engineer level, although an H.N.C. or suitable alternative qualification would be acceptable for an appointment at a lower grade.

Salary scale for Main Grade Engineer is within the range of £6,809 to £11,451 with a starting salary dependent upon experience. For appointments at Technical Assistant I level, the salary is within the range £7,788 to £9,187 with new entrants from outside the Health Service starting at the bottom of the scale. There is a pay award pending.

This post could be very suitable for personnel with appropriate experience and qualifications who are due to leave the armed services.

More detailed information and application forms are available from the Regional Personnel Officer, North Manchester Regional Health Authority, Gateway House, Piccadilly South, Manchester M60 7LP, telephone 061 236 9456, Ext 425.
Please quote reference number 3031D.
Closing date 30th November, 1984.

CROYDON HEALTH AUTHORITY

ENGINEERS

We have vacancies for Engineers to join our Works Team in providing an efficient service to Hospitals and Community Health Care Services in Croydon.

We are looking for Engineers with technical competence, a professional attitude and enthusiasm to work in a number of areas including energy conservation and maintenance management. We can offer interesting, technically challenging and extremely varied work in a highly motivated department with good promotional prospects. Encouragement will be given to study for further qualifications. Previous National Health Service experience is not essential and applications from candidates outside the National Health Service will be welcome.

You must have good practical training in mechanical or electrical engineering with 5 years' relevant experience and have obtained Engineering qualifications at ONC level or above.

SALARY: £7915-£8848 inc. p.a.
(a further performance related allowance up to 15% may be payable)

Consideration will be given to exceptional candidates being appointed to a higher grade.

For further details please ring Mr. D.F. Scott, District Engineer, on 01-684 6999 ext. 4317.

Application forms and job description from District Personnel Department, General Hospital, London Road, Croydon, tel: 01-684 6999 ext. 2033.

Closing date: 19th November 1984.

BUCKLE & PARTNERS
Consulting Engineers
require

Resident Engineers

for

1200 Bed General Hospital
under construction in
BENGHAZI, LIBYA

Applications are invited for qualified and experienced engineers to supervise the installation of building services in a 1200 bed hospital. Two engineers are required:

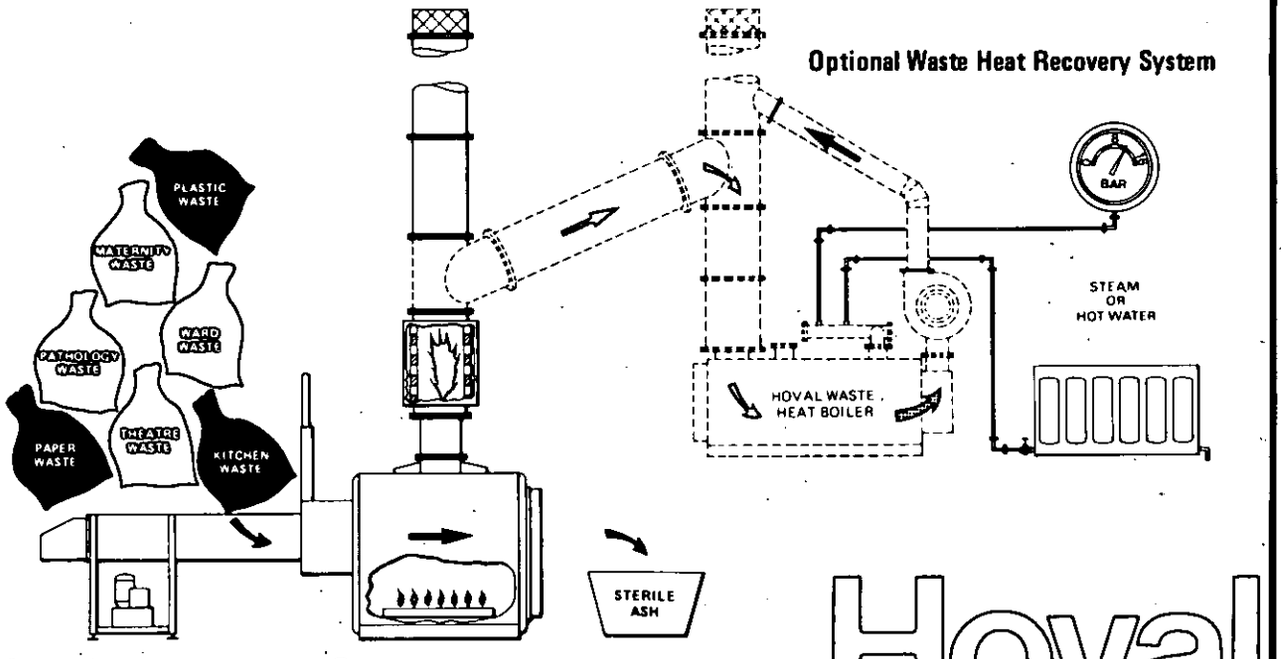
1. SENIOR M & E
to head resident engineer team.

2. ELECTRICAL ENGINEER
to work as member of team.

Two year contract proposed either single or married status. Salary negotiable. Generous leave and travel agreement. Please send C.V.s to R. V. Kent.

Buckle & PARTNERS
2 Harrington Gardens, London SW7 4LG
Telephone 01-373 8100

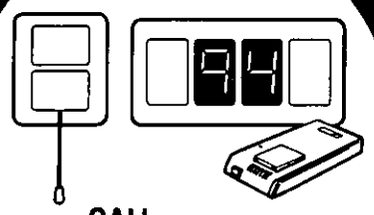
Hoval INCINERATORS SOLVE YOUR HOSPITAL WASTE PROBLEMS



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

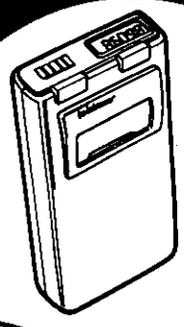
Hoval
Newark Notts. Telephone Newark (0636) 72711 Telex 37164

CASS leads the way in communications



CALL SYSTEMS

PAX/PABX SYSTEMS

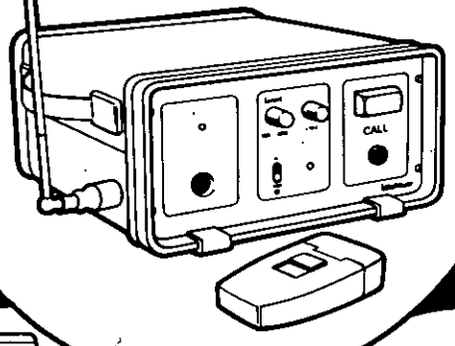


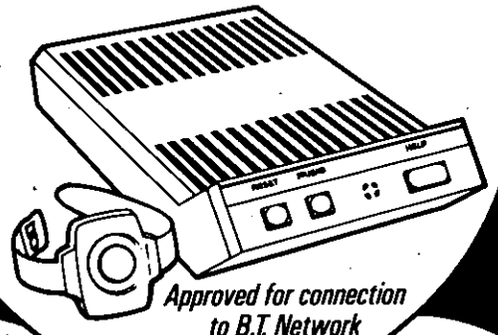
POCKET PAGING

RADIO COMMUNITY CARE ALARM

COMMUNITY ALARM SPEECH AND CALL

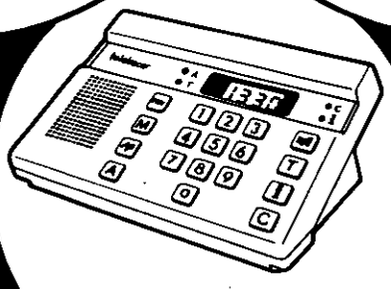
FOR INDIVIDUALS OR GROUPS OF DWELLINGS



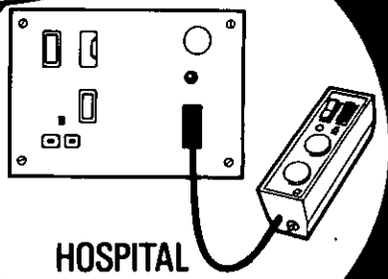


Approved for connection to B.T. Network

WARDEN CALL AND COMMUNICATION



INTERCOM SYSTEMS



HOSPITAL CALL SYSTEMS

Localised service. Our service department provides installation and maintenance service throughout the UK. If you desire the best equipment, the best long-term value for your investment and the best advice you can obtain, start by specifying the company with the professional know-how and service capabilities to do a complete job for you. Every Cass Installation is guaranteed for 10 years based on our standard service contract.

Cass Electronics Limited

Head Office and Service Centre
Crabtree Road, Thorpe, Egham, Surrey TW20 8RN
Telephone Egham (STD. 0784) 36266 Telex 934593

CASS
Cass Group p.l.c.

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.

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

NORTH WEST HERTFORDSHIRE HEALTH AUTHORITY

St Albans City Hospital
Normandy Road, St Albans, Herts

Engineer

This post is based at the St Albans City Hospital, a busy general hospital in the process of major redevelopment, and we are seeking an enthusiastic engineer with a sound engineering background. The successful candidate will be responsible to the Senior Engineer for day to day operational maintenance of the hospital and other Health buildings within the unit including the supervision of engineering staff:

Applicants must have served an engineering apprenticeship, hold ONC in engineering or equivalent, have acquired a thorough practical training and relevant experience.

Salary £7292-£8225 per annum plus bonus allowance currently 15% plus Fringe allowance (pay award pending).

Informal enquiries welcomed by the Senior Engineer, Mr J Warburton. Tel. St Albans 66122 ext. 320.

Application form and job description from Personnel Department ext. 301.

Closing date 15th October 1984.