The Journal of the Institute of Hospital Engineering February 1983

HOSPITAL ENGINEERING

Special Telecommunications Issue

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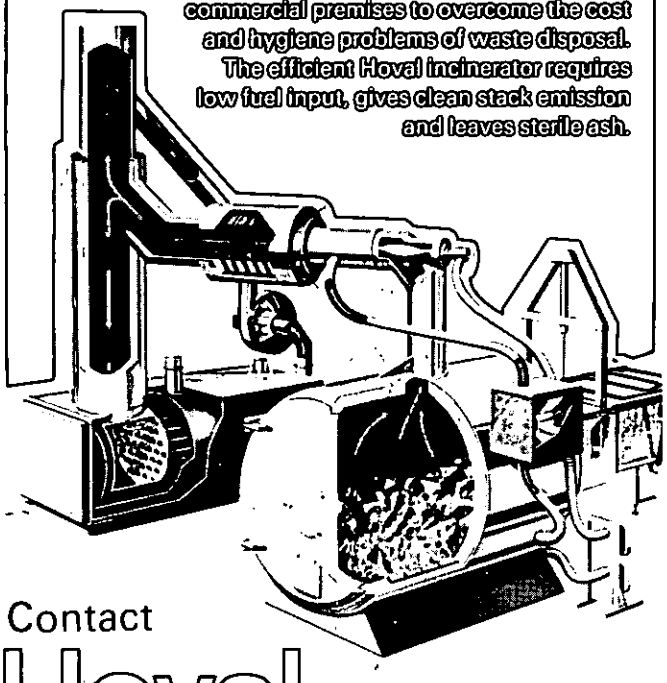

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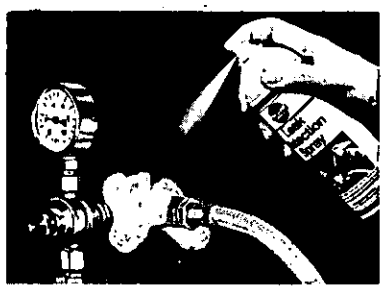

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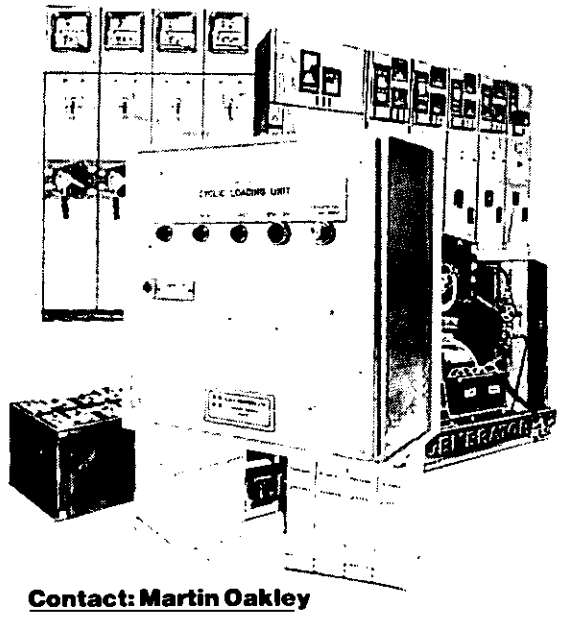

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Telephone:
Portsmouth (STD 0705) 823186

Secretary
J. E. Furness MBE VRD*

Hon Librarian
D. L. Hall Esq., FIHospE MIPlantE
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HOSPITAL ENGINEERING

The Journal of the Institute of Hospital Engineering

Contents

Volume 37 No. 1 **February 1983**

Front Cover: The Norton Telecommunication installation at Joyce Green Hospital, Dartford, Kent.

Institute News

Attendance at Annual Conference

Lucas Scholarship Fund

The introduction of this scheme was very well received and earned a good response in its first year: and will therefore be repeated in the same form in relation to the 1983 Annual Conference of the Institute, to be held at the Hotel Piccadilly, Greater Manchester May 11th - 13th.

Accordingly young members of the Institute (under 28 years old on 28th February 1983) and resident in the United Kingdom or Eire who would like to attend the Annual Conference of the Institute as residential delegates are invited to make written application to:

The Secretary, The Institute of Hospital Engineering, 20 Landport Terrace, Southsea PO1 2RG (Telephone: Portsmouth (0705) 823186). All reasonable expenses will be paid (Conference fee, Conference Dinner Dance Ticket, hotel accommodation and travelling expenses).

APPLICATIONS SHOULD REACH THE INSTITUTE BY THE 28th FEBRUARY 1983.

When submitting applications, candidates should offer full curriculum vitae giving:

1. Academic achievements
2. Practical training
3. Full career details
4. Date of Birth
5. Confirmation that leave of absence to attend the Conference will be granted.

Selection of the award winners will be made by an Assessment Panel appointed by Council.

S. W. Branch

J W (Jim) Barnes, the Principal of the Hospital Estate Management and Engineering Centre, has, for personal reasons, felt obliged to give up his membership of the Committee of the South West Branch.

Jim Barnes' contribution to the Institute over the years has been a quite outstanding one. Apart from service in the various offices at Branch level he, also, of course, served for six years on Council of the Institute. At this time, therefore, it seems entirely appropriate to mark the extent of his participation in the progress of the Institute.

West of Scotland Branch

The Annual Dinner and Dance is to be held in the Burnbrae Hotel, Milngavie Road, Bearsden, Glasgow on Friday 18th March, 1983 at 7.00pm for 7.30pm. Tickets £9.00 per person (dress optional).

New Regional Works Officer

Mr E M Davies has been appointed Regional Works Officer to the South East Thames Regional Health Authority. Previous to this Eric Davies was Regional Engineer to the same Authority and before that, deputy to K J Eatwell as Deputy Regional Engineer, South West Thames RHA.

He has always given in full measure to the activities of the Institute and our congratulations and good wishes to him in his new appointment.

D W O Appointment

Cyril Young, an active participant in Institute affairs over the years, has been appointed District Works Officer to the Canterbury and Thanet Health District. A long move from Carlisle! We wish him well in his new surroundings.

Calorifier competition winner

The competition organised by Heat Transfer Ltd to find the oldest heating or domestic hot water calorifier still in operation within the control of a United Kingdom hospital has been won by Mr I S MacDonald, Senior Engineer at the City Hospital in Edinburgh. The units in his charge are a steam-heated, 60 gallon Royles Horizontal Storage Calorifier and a Royles Standard Pattern Vertical Steam Non-Storage Calorifier which were supplied in 1902. As winner Mr MacDonald can now select the Charity to which he wishes to present his £250 prize.

Of the entries received, more than 70% were for Royles manufactured calorifiers. Of the remaining returns the companies either no longer exist or have ceased Calorifier production in their own right. 45% of the returns were for calorifiers more than 50 years old.

The result pleased Heat Transfer Ltd. who took over Royles Ltd. in 1980, and are anxious to reassure Royles customers that a full spares and service facility is being maintained. Queries should be addressed to Mr Jack Holt at Royles Ltd, 5-7 Lostock Road, Davyhulme, Manchester, M31 1SU. Tel: 061-747 0110.

DW/142 — Ductwork Specification

DW/142 which supercedes DW/141 was published by the Heating and Ventilating Contractors' Association (HVCA) in November 1982 and is already being accepted in place of it's predecessor as the authority for the construction and erection of sheet metal ductwork. In excess of 1,000 copies have already been sold and as the Hospital Authorities, in their search for low pressure, low leak air distribution systems, were partly responsible for motivating HVCA towards the production of a more 'energy conscious specification', the document should be on every Hospital Engineer's bookshelf.

The principal differences from DW/141 include the following:

1. The Designer must be more precise in his instructions to the ductwork contractor;
2. A medium pressure range has been included;
3. Air leakage limits give the full pressure range which have generally been brought into line with Eurovent;
4. The application of sealant to all longitudinal seams is now mandatory, if leakage limits are to be guaranteed;
5. The information and illustrations provided have been extended in many areas.

At the evening meeting after the AGM of the London Branch on the 22nd March it is hoped to include among the speakers a member (perhaps two) of the DW/142 Drafting Panel. (See *Forthcoming Branch Meetings*).

The specification costs £20 (inclusive of postage) and can be obtained from HVCA Publications, Old Mansion House, Eamont Bridge, Penrith, Cumbria, CA10 2BX. (Remittances should be forwarded with orders). Discounts are available for orders in excess of 10 copies. For information contact HVCA's Duct Work Group Secretary, Ronald J Miller, CEng MIMarE, on 01-229 2488.

Water Purification

The Elga Group will be presenting another series of free, illustrated lectures together with a private exhibition covering all aspects of water treatment at selected venues throughout the UK during 1983.

The lectures, aimed at providing users of treated water with up-to-date information on purification techniques and their application in industry are being held at the following locations:

24 February, Crest Hotel, Cardiff
24 March, Garden House Hotel, Cambridge
21 April, Crest Hotel, Coventry
25 May, Royal Scot Hotel, Edinburgh.

Invitations and further information may be obtained from: Ms. Sheila Pitter, Conference & Exhibitions Manager, The Elga Group, Lane End, Buckinghamshire. Tel: (0494) 881393. Telex: 83516.

New Members

Fellow

BARRINGER, Peter, Yorkshire RHA.
COULSON, Raymond, Jackson Coulson Partnership.
DRAYCOTT, Donald William, Pashler and Partners.
MARREN, John, Taylor Marren and Haslem.
PIERCE, Norman Peter, Pierce Management Services.
WILLIAMS, David Henry, R. W. Gregory and Partners (Far East).

Member

AITCHESON, Paul, Middlesex Hospital.
BADRU, Babatunde Agboola, Equp-Iard, Nigeria.
BARRIE, Ranald Forsyth, Tayside Health Board.
BAYBUTT, Michael, Salford Health Authority.
BRADFORD, Timothy Roger, East Anglian RHA.
CARTWRIGHT, Reginald William, South Glamorgan Health Authority.
DAVIES, Peter Howard, Liverpool Health Authority.
DRURY, Raymond Arthur, Dudley Health Authority.
GISBURN, Peter William Robert, Wakefield Health Authority.
GLOVER, Christopher John, Cramp and Frith.
GOULD, Alfred Ernest, Leicester Health Authority.
GOULDING, Keith, Southampton and SW Hants Health Authority.
GRAY-TAYLOR, George, De Kroon Krige Skarzynski & Ptrs. RSA.
HADDAD, Robert Joseph, City & East London Health Authority.
JONES, Daniel Oliver, Taylor Marren and Haslam.
KIPPEN, John Kenneth, Gt. Yarmouth and Waveney Health District.
MASON, Jed, West Birmingham Health Authority.
MUIR, Brian Peter, Wessex Regional Health Authority.
MUSPRATT, Derek Charles, W. F. Johnson and Partners.
POWELL, Leslie Bernard, Hereford Health District.
RARITY, Graeme George, Radicon Consulting Engineer, Saudi Arabia.
RODGER, Brian William, Radicon Consulting Engineer, Saudi Arabia.
SMITH, Peter John, Harrogate Health Authority.
SMITH, Robert Gordon, Harrow Health Authority.
TURFREY, Stephen John, Cheltenham Health Authority.
WATSON, Michael David, Bradford Health Authority.
WHATLEY, Adrian Edward, Wolverhampton Health Authority.
WOOD, Peter James, Solihull Health Authority.

Graduate

BUNCH, Stephen John, Sandwell Health Authority.
McGRATH, Paddy Timothy, Hoare Lea and Partners.
WHEELDON, Kenneth John, North Birmingham Health District.

Associate

ANDREWS, Colin George, Plymouth Health Authority.
ARIMAH, Dennis C. College of Medicine, Ibadan.
DUNLOP, John Drummond, Forth Valley Health Board.

MAUCHLINE, John Laird, Forth Valley Health Board.
PALMER, Donald Cameron, Forth Valley Health Board.
PINK, Richard Graham, Oscar Faber and Partners.
SOGBADE, Roland Kehinds, Military Hospital, Lagos.
STEELS, Roger, Allenby McCowan Associates.

Upgradings/Regradings

To Fellow

BURTON, John Edward, East Dyfed Health Authority.

To Member

ASHDOWN, Brian Leslie, Tunbridge Wells Health Authority.
BURDETT, Geoffrey, A.M.I. (Europe) Ltd.
COCKSEDGE, Brian Dudley, Central Nottinghamshire Health Authority.
MARPER, Ian, Kettering Health Authority.
McKIE, Stephen, Ayrshire and Arran Health Board.
RIDDELL, Robert, Brighton Health District.

Forthcoming Branch Meetings

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

22nd March	Branch Annual General Meeting followed by a paper on the new HVCA publication on ductwork	Wolfson Lecture Theatre National Hospital Queen Square WC1

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

22nd February	Fire Dectection Systems in Health Care Buildings Mr Northey	West Midlands RHA
22nd March	Annual General Meeting followed by Heating Design for New and Refurbished Buildings G D Braham CEng MInstE	Aston University Warwick Room

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

22nd February	Paper on the New I.E.E. Regulations by NORWEB	NORWEB Offices Hathersage Road Manchester
15th March	Annual General Meeting followed by Paper on Sterilizers	Bolton Medical Centre
	Annual Dinner Dance	Manchester United, Old Trafford.

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

19th March (3pm)	The Electron Microscope	St. Mary's Hospital Portsmouth

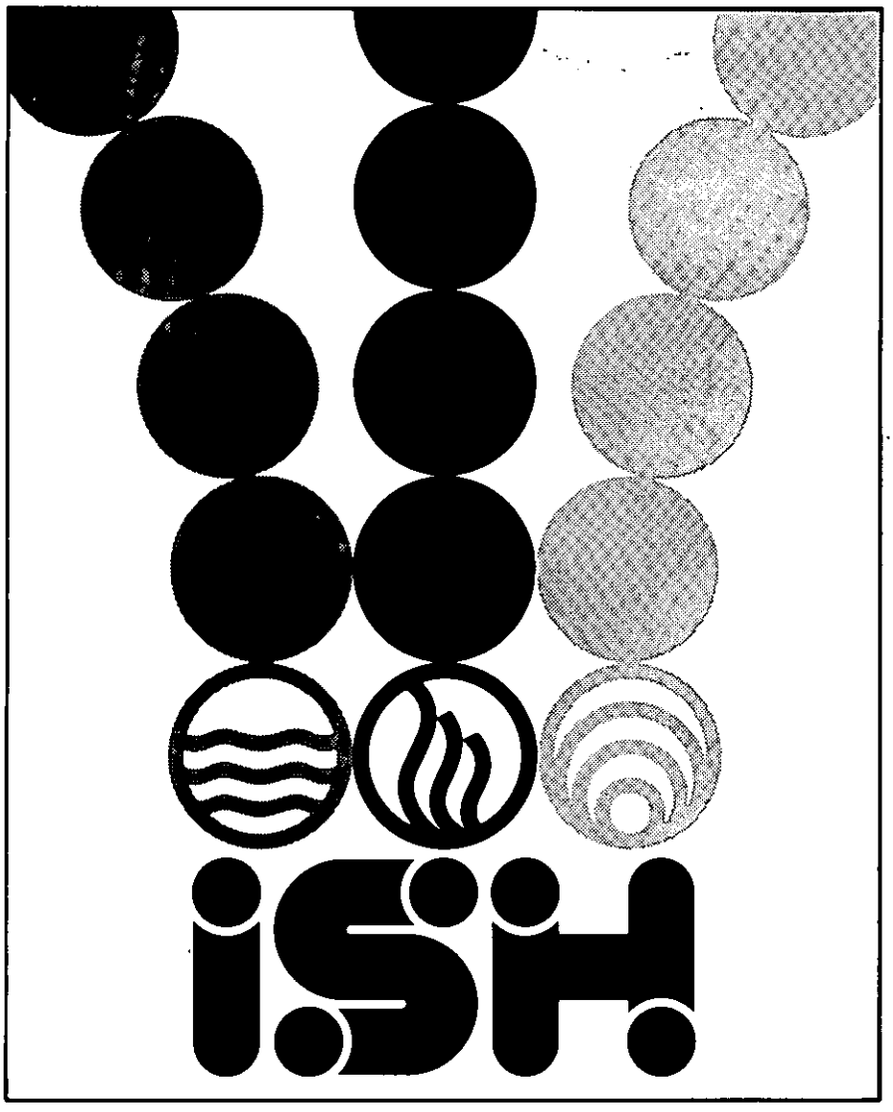
South Western Branch *Hon Sec: A J Graver Cheltenham (0242) 21361*

9th February	Computers for Managing Maintenance Dr M F Green, DHSS	Athol Riddell Lecture Theatre, Medical School Unit Southmead Hospital, Bristol
16th February	Central Computerised Control of Engineering Services at outlying Hospitals and Clinics	New Devon & Exeter Hospital, Wonford, Exeter
21st February	Mr T L Sixt and Mr Snedker Engineering Photography	Bingham House, Dyer Street Cirencester

Welsh Branch *Hon Sec: T Roche Bridgend (0656) 721276*

9th February	Computers for Managing Maintenance	Athol Lecture Theatre, Medical School Unit Southmead Hospital, Bristol
9th March	Design and Commissioning of Air Handling Plant in Hospitals (Part 2) K K Williams WHTSO	Board Room Landsowne Hospital Cardiff

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



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The author, who is a Principal Engineer with the DHSS in Northern Ireland first presented this article as a paper at the Annual Conference in 1982.

Telecommunications in the Health Service

G C McCONKEY CEng MIEE

Introduction

Good communications are essential for the efficient operation of the Health Service. The provision of telephones, paging systems and radio telephones are now taken for granted — but this has not always been the case, in fact not so long ago the allocation of a telephone extension or a paging receiver was taken as a status symbol. This situation remained for a surprisingly long time when telephone traffic was low and extensions few in number but as telephone penetration increased into private homes then telephone usage in hospitals increased in parallel.

Looking at the development of telecommunications in the Health Service during the past fifty years shows how it has become an integral part of the present day hospital. The provision of telecommunication services has developed along three distinctly separate lines, each system being provided to meet a particular need, but with limited connection between each system.

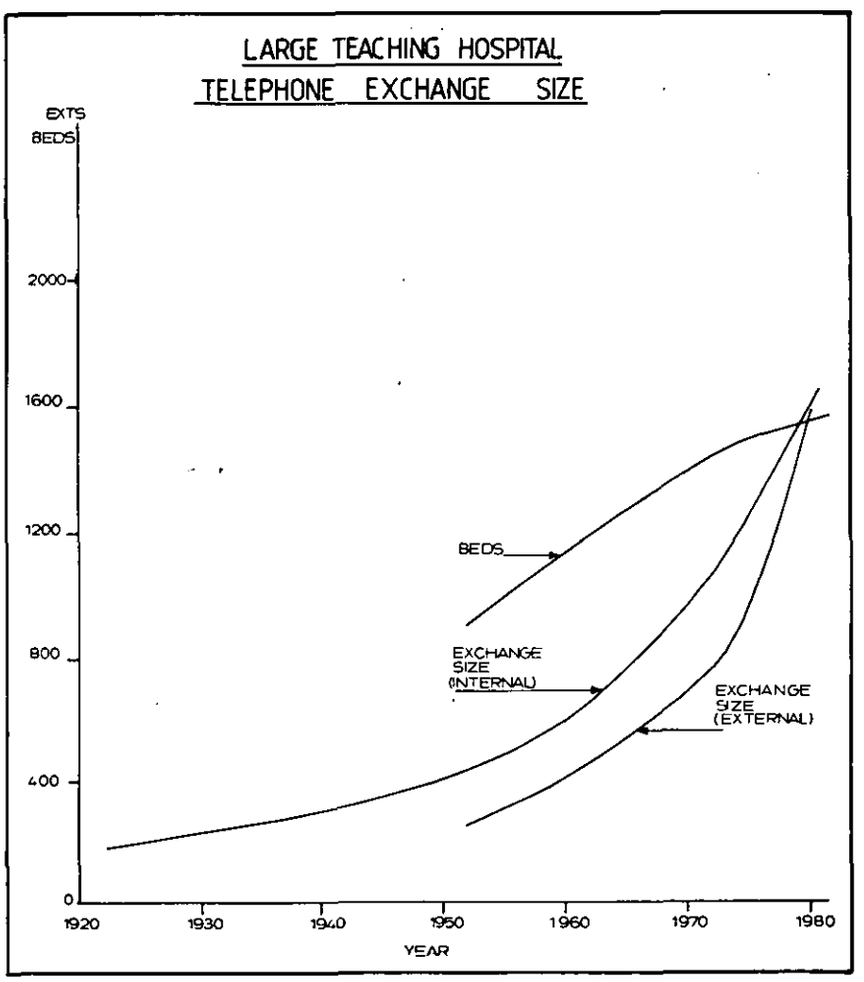
The three systems are Telephone Installations; Staff Location (Paging) Systems; Radio Telephone Systems.

Telephone Installations

Hard wired telephone installations were the first to be installed and have been provided in hospitals since the turn of the century. The records of a large teaching hospital show that the first telephone service was provided free in 1903 by the National Telephone Co. Ltd.

It is also recorded that this arrangement continued until 1920 when the National Telephone Company Ltd was nationalised. In comparison the telephone account for the same hospital site in 1981 was £200,000 of which £84,000 was call charges. The need for communications both on and off site grew at a steady rate and to meet the increased internal telephone traffic a 200-line private automatic telephone exchange of the crossbar type manufactured by the Relay Automatic Telephone Co. Ltd. was installed in 1923.

Figure 1: Large teaching hospital telephone exchange size



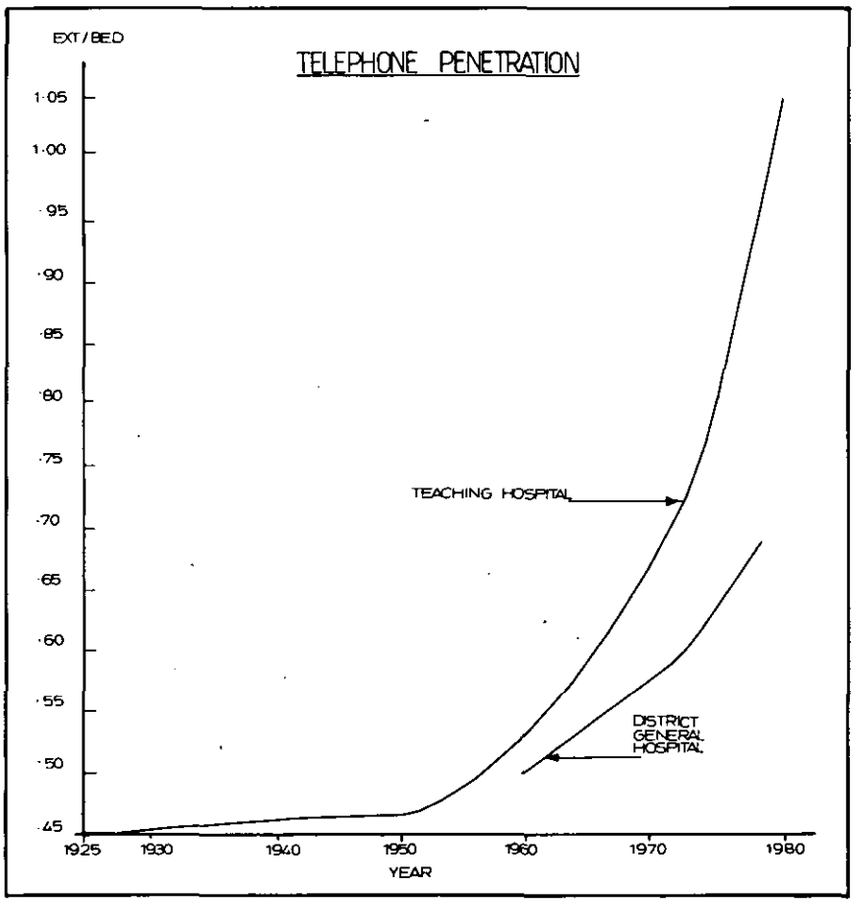


Figure 2: Telephone Penetration

This exchange continued in operation until 1961 when it was replaced by a 600-line Siemens 17 private automatic exchange which used motorised units and 2 motion selectors. During this period the number of hospital beds on the site increased from about 500 to 1,000. In the mid 1950s a three position special enquiry suite was installed and this enabled external telephone patient enquiries to be made to the wards by interconnecting the internal and external telephone systems. The enquiry facility continued in operation until 1980 when the Post Office rented a private manual branch exchange and the internal private automatic exchanges were replaced by an ITT Business Systems P1000 T2 crossbar type private automatic branch exchange. The private automatic branch exchange is equipped for 1600 extensions (1530 connected), 125 exchange lines, 32 private circuits, 9 operator positions and one supervisor's desk and this service serves a hospital of 1542 beds. This growth is shown in *Figure one.*

This growth is typical of the general increase in telephone provision in the health service and *Figure two* shows that during the period 1920 to 1980 telephone penetration in this teaching hospital increased steadily from 0.4 to one extension per bed the increase accelerating around 1960, and is typical of any major under graduate teaching hospital. The present day comparative figures for District General and Psychiatric Long Stay Hospitals are 0.8 and 0.25 extensions per bed respectively.

Staff Location (Paging) Systems

As health care developed during the twentieth century it became necessary to contact urgently staff who do not have a fixed work location eg doctors on ward rounds. To meet this need the staff location system as we know it today has been developed. The first system to be used was of the colour coded lamp calling type. Each member of staff who required to contacted was given a specific colour code and the colour code was flashed from the lamp calling units which were strategically placed throughout the hospital. A general audible signal was emitted at the same time to draw the staff's attention to the call, and there are still a number of these systems in operation.

With the advancement of electrical technology a miniature radio receiver was developed which could be carried by the person in their pocket. In the early 1950s the first radio operated staff location system in the United Kingdom was installed in St. Thomas' Hospital, London.

This system was of the audio frequency type using magnetic inductive loops installed around the perimeter of each building and connected to a high frequency transmitter. The signal being transmitted within the magnetic loop at high frequency.

These systems have their limitations; firstly, in the case of the lamp calling systems the person to be called has to be within the audible range of the signal or within the magnetic loop on the audio frequency systems. On multiple building hospital sites or villa type psychiatric hospitals these systems have considerable limitations, because of the hospital layout — the buildings only are covered.

In the late 1950s/early 60s VHF 'on site' radio paging systems were developed and these have been gradually replacing the magnetic inductive loop systems. In 1968 the DHSS published Hospital Memorandum No. 20 on Staff Location Systems. This document gave design guidance and specified the radio channels in the 27MHz band that were allocated by the then Ministry of Posts and Telegraphs, (now the Home Office Radio Regulatory Division). Where radio interference precluded the use of a channel in the 27MHz band a single spot frequency at 31.75MHz was allocated. The 31.75MHz frequency is exclusive to the Health Service whereas the 27MHz channels are shared with other non Health Service users. From a recent survey carried out by the DHSS about 40% of all the systems in use operate at 31.75MHz.

The VHF radio paging systems operate from 'on-site' radio transmitters and can provide complete coverings of the site both inside and outside the buildings. These systems have been continu-

J K Clark, Main Grade Engineer at the Common Services Agency, first presented this article as a paper at the Institute's Annual Conference at Stratford upon Avon in May 1982.

Telephone Systems in Hospitals

J K CLARK TEng(CEI) AMCIBS FIHospE

Introduction

The provision of telephones in hospitals increased slowly as has been indicated in George McConkey's article, *Telecommunications in the Health Service.* Closer examination might show that the increase would not be represented by a smooth upward curve but would probably be represented by a series of steps — the steps being related to changes in the type of equipment available in both the Public Network and the private sector. Such steps might be the introduction of Automatic Exchanges in the Public Network encouraging more extension users to make their own calls, or the introduction of Private Automatic Branch Exchanges (P.A.B.X) in the hospitals: these systems offering more facilities to the extension user. These changes would also be accompanied by a gradually increasing confidence and dependence on the telephone system as a real effective means of communication.

This time lag between the provision of a system and its full and effective use has always existed. Recent years have produced tremendous changes in the concepts, design and functioning of telephone systems: changes which are not always matched — at least not as quickly — by the attitude of the users or managers of the system.

Basic Telephone systems are often replaced by systems offering much more extensive facilities with little attempt being made to educate the users. Even if initial staff training is given there is seldom a follow-up, in perhaps a year when staff changes would make it worthwhile.

If you doubt this then make a call to a hospital with a P.A.B.X. and ask the extension user to transfer you to another extension — in most cases they will recall the operator to assist instead of using the transfer facility.

It is against this background that even more complex exchanges are being provided and if the maximum benefit of the equipment is to be realised — bearing in mind the capital and revenue costs involved, then attitudes must change.

Type of Equipment

If the attitude of the users is often slow to change this cannot be said of the development of exchanges. While new development has always taken place it has recently accelerated. This development has been most obvious in the P.A.B.X systems, which have steadily supplanted the familiar combination of manual and internal systems (P.M.B.X. and P.A.X).

At this stage it may be worthwhile describing very briefly the basic switching systems used in the various exchanges.

Strowger

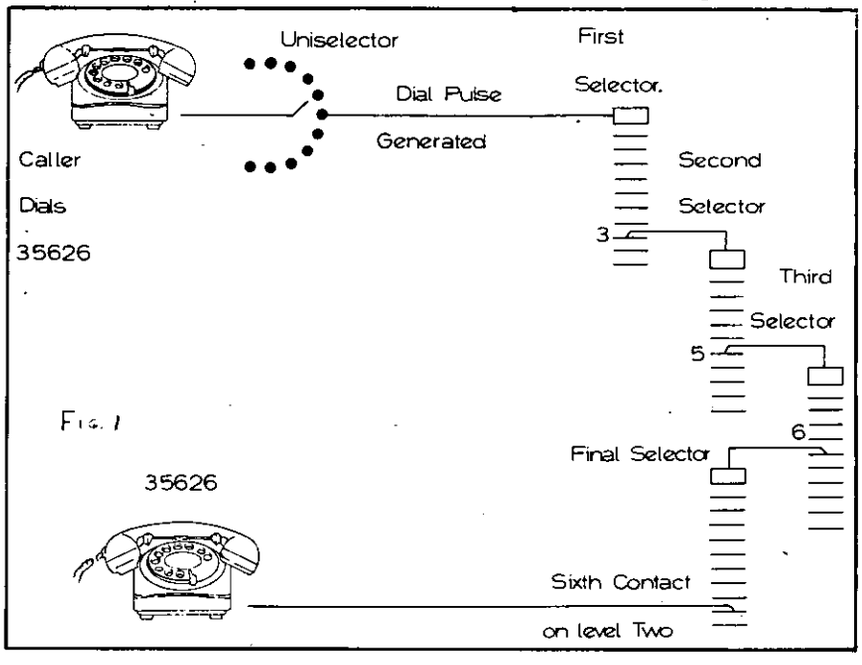
The development of the automatic exchange was first made possible by the invention of the "step-by-step" selector in 1888 and named after the inventor Almon B Strowger. Strowger, a Kansas City undertaker, was convinced that he was losing business by calls being diverted by the operator to a rival business and determined to devise a means of by-passing the operator.

The selector is actuated by the dialled pulses, at 10 impulses per second and can be arranged in groups with uni-selectors to form a large system. While there are a number of variations in use, it remains basically the same and has been proved a very reliable system. There are still more exchanges of the Strowger type in use than any other system.

The system is electro-magnetic, requires fairly heavy operating currents and is relatively slow in operation. It requires regular maintenances and is susceptable to dust.

As shown in *Figure one,* the circuit, once established by the dialled pulses, is held throughout the transmission of both signals and speech. The contacts are subject to pitting and burning with a consequent loss in transmission quality.

Figure 1: Making a call on a Strowger electro-mechancial exchange.



While this is usually acceptable in speech circuits, it may affect the transmission of data.

Crossbar

This system was developed in the early part of this century and although used extensively abroad has only comparatively recently been used in this country. Basically simple in concept it requires a sophisticated control system.

The system seems to take its name from the basic idea of co-ordinate switching where simple relays make the connections in a predetermined sequency, *see Figure two.* The control system is common to a

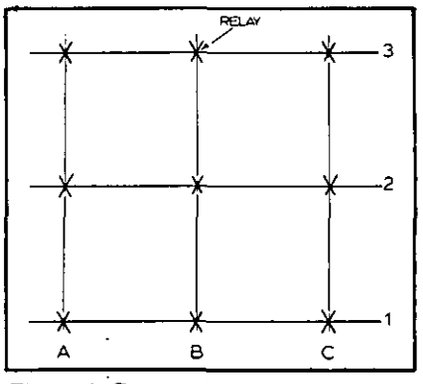


Figure 2: Cross point.

number of modules hence the term 'Common Control'. In this system the control unit establishes the signalling and speech circuits and then drops out of circuit to handle other calls *see Figure three.* Again it is an electro-mechanical system, but with very little mechanical movement and few wearing parts; very fast in action and having separate signalling and speech paths it can provide better transmission quality.

Reed Relay

This is really a variation of the co-ordinate switching using glass encapulated relays. This technique has also been used in Stored Program Exchanges with the reed relays being used instead of solid state switching.

Development

The Strowger system has had a long and useful life and experts keep predicting its ultimate demise, but in truth it has been 'a long time dying'. In 1975 it was estimated that 87% of subscribers in Britain were connected to Strowger exchanges. Strowger equipment will continue to exert an influence on the Public Telephone Network for a long time yet due to its

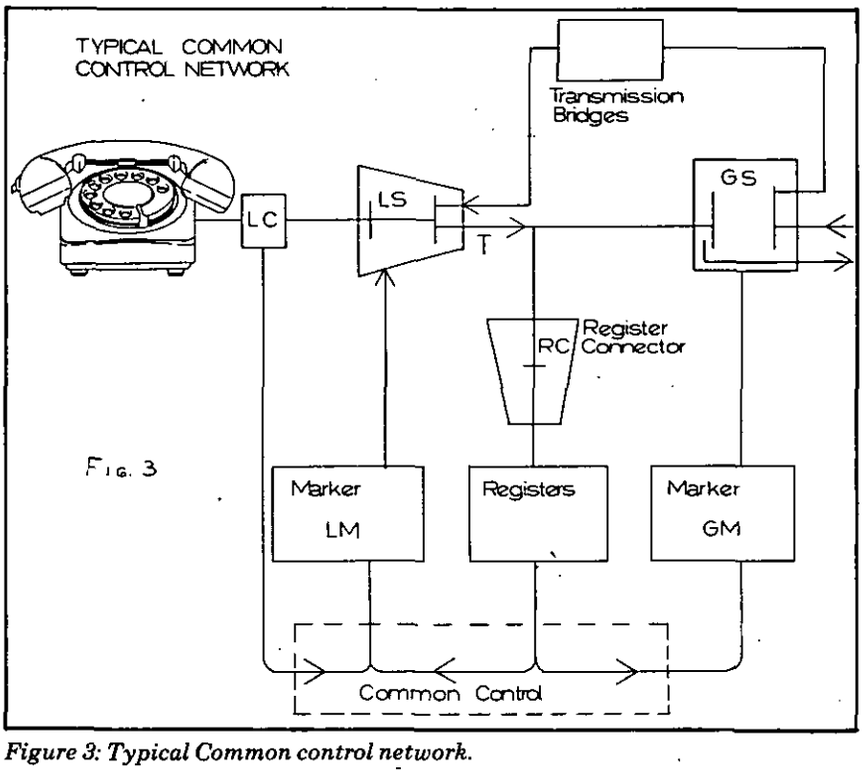


Figure 3: Typical Common control network.

relatively slow speed of operation. This influence will continue until the last of the Strowger equipment is replaced.

Despite variations on the basic theme, eg the automated version, the P.A.B.X number 4, it was obvious that in the move to electronic exchanges the electro-mechanical systems would be among the first casualties.

It may be argued that many hospitals are functioning perfectly well with Strowger exchanges and have no need for anything radically different. This is a very powerful and often quoted argument, but apart from the general trend to electronic switching, the availability of exchanges is largely dictated by the purchasing policy of British Telecom and what is developed by the manufacturers. The private sector is really a seller's market and the demand cannot materially affect the marketing or design of exchange equipment.

The introduction of Crossbar met the need for exchanges with increased facilities but obviously could only have a short market life pending the introduction of electronic exchanges.

In 1979, I submitted an article to H.S.E. Magazine based on this argument and constructed graphs showing the trend and expected availability of each system *as shown in Figure four.*

This caused some controversy at the time, with many claiming that Strowger would be with us 'for some time yet'. It may well be — but not in the form of new exchanges. In the event the graphs of both Strowger and Crossbar dipped much more steeply than predicted, *see Figure five.*

Strowger and Crossbar exchanges may continue giving service until the end of their useful life with spares and extension equipment being available. However, increasing costs and extended delivery periods may have the effect of causing the exchange to be replaced earlier than planned as the costs involved may not be economically acceptable.

There is little doubt that electro-mechanical exchanges have given and will continue to give an effective service. This service and the facilities provided meet the requirements of many hospitals and as suggested, there is a natural reluctance to consider replacing their exchanges with a more complex and costly version. However, there are many situations where the electromechanical exchanges do not meet the increasing demands being made of the system.

These include further user extension facilities, data transmission etc. The new generation

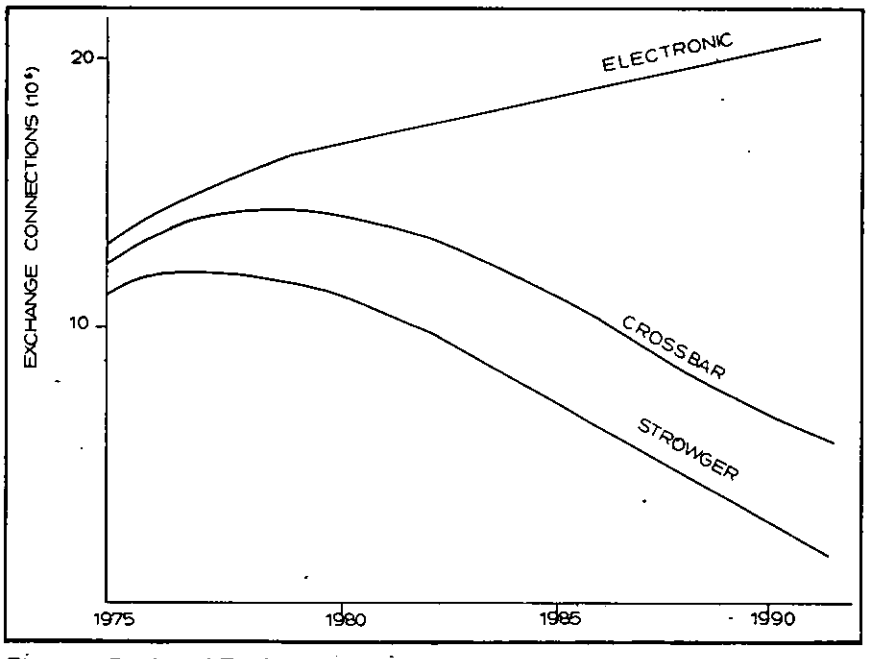


Figure 4: Predicted Exchange Type Trends 1979.

of exchanges of the Stored Program Control type will not only provide a more effective communication system, but will also offer many more facilities which, even if used on a selective basis, can only improve the total communications.

These exchanges involve high capital and revenue costs and the equipment must be used effectively if these costs are to be justified.

Space does not allow an enumeration of these facilities, but the software program will allow them to be allocated on a group or individual basis. Indeed the problem may be in deciding which facilities to omit from the program.

The system manager can arrange a group of facilities which will suit the needs of the extension user and also allow closer managerial control over the whole system.

The whole approach to the provision of an S.P.C. exchange is quite different from the conventional exchange and guidance on this aspect is given in the DHSS publication. "Report on S.P.C. Exchanges" prepared by Working Group No. 7.

Selection of Exchanges

The selection of a suitable exchange has also become more involved: not only because of their complexity but also because of the number of exchanges being offered. Where formerly large P.A.B.X. were offered by only a few companies the position has changed and will continue to change.

At the 'Comm 82' exhibition at Birmingham the Computer Enquiry Service listed 33 companies offering P.A.B.X.s — some small some large many not approved by British Telecom (or the British Standards Approval Board) but it does give some idea of the change in the market.

The prospective purchaser should consider carefully the ability of the supplier to maintain and extend the exchange during its useful life, or run the risk of having an exchange which although having an initially lower capital cost, may have an accompanying short useful life.

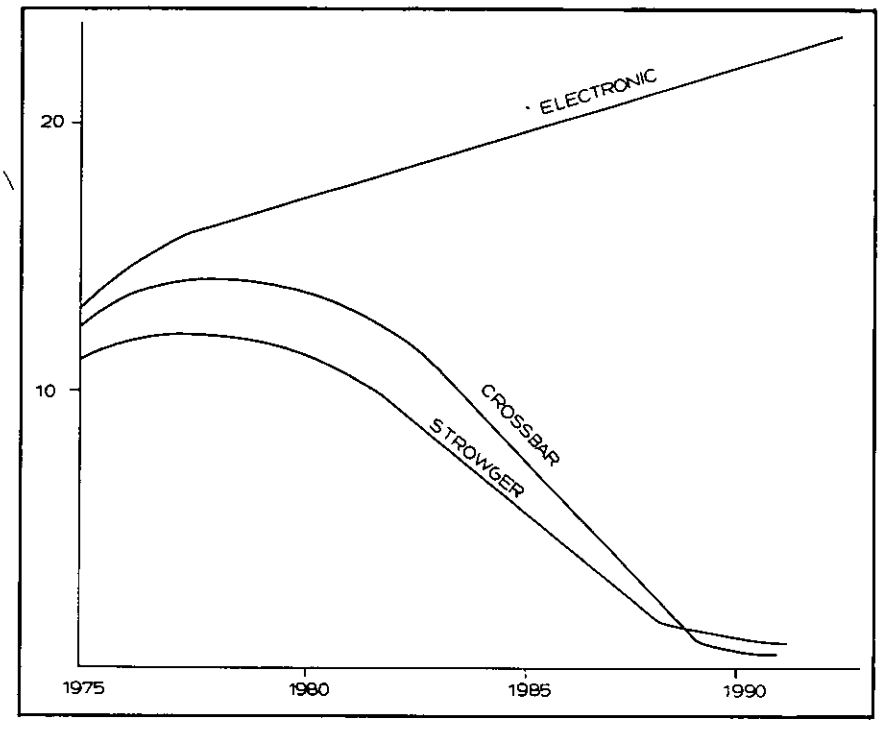
There is also the prospect of British Telecom playing a different role in approving and maintaining exchanges and although this has not been made clear it would suggest that their services may not be as freely available as before.

It would therefore suggest that the purchaser should be even more careful in selecting exchanges as it may not simply be a case of appealing to British Telecom for help and service.

This is evidence to suggest that the wide range of facilities being offered is becoming common to several manufacturers, but there is still a need to be careful in specifying their requirements. Most manufacturers will offer a standard software package which usually includes all the facilities likely to be required in hospitals. Where other facilities are required another standard program or a special program may be offered at substantial additional costs.

The DHSS "Interim Standard Specification for S.P.C. Systems" has been prepared by Working Group No. 7 and has been issued for "use and comment". This document provides for most of the facilities which are required in hospitals.

Figure 5: Actual Trends.



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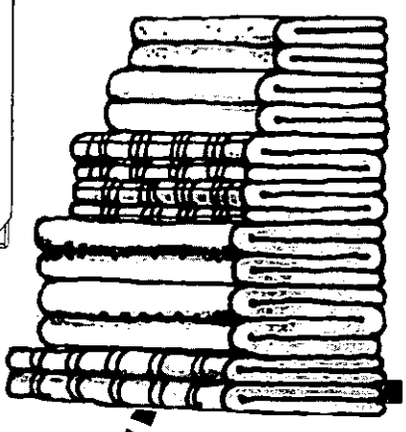

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Costs

The move towards the provision of more complex telephone exchanges has been accompanied by a corresponding and substantial increase in capital and revenue costs.

It is difficult at this early stage to be accurate about cost as each exchange must be considered in the light of local needs and market trends.

In the 'Report on S.P.C. Exchanges' prepared by Working Group No. 7 in 1981, the results of enquiries to manufacturers produced a set of budgetary figures for both S.P.C. and P.A.B.X No. 3 exchanges. Such information as is available indicate that the actual costs of S.P.C exchanges may be slightly higher than shown, *see Figure six.*

As a generalisation S.P.C. exchanges are costing twice as much as a P.A.B.X No. 3.

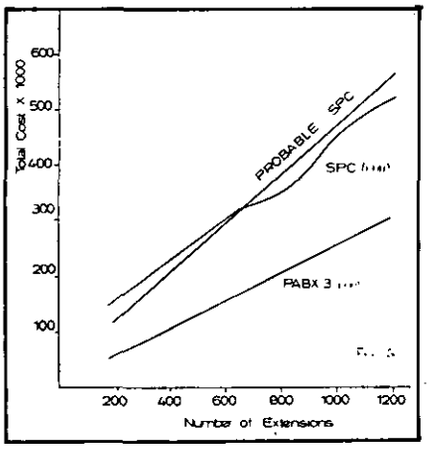


Figure 6:
Comparison of Costs - June 1981

Nor is this increase restricted to capital costs. The connection charges and maintenance charges imposed by British Telecom also reflect the rising cost, *as shown in Figure seven.*

Clearly there are large amounts of money involved in providing and maintaining these exchanges and little prospect of obtaining exchanges of a simpler type.

This emphasises the earlier point that it is more important than ever to ensure that the equipment is specified correctly; that the exchange is operated effectively and efficiently, making maximum use of the capital invested.

Training

When the new type exchanges are installed, they cannot simply be regarded as a replacement for the older exchange. Quite apart from the extensive facilities the use of the exchange must alter. In this the training of staff is important. The operators must be trained to operate the exchange and to maximise on the facilities available.

More than ever a Supervisor is necessary, trained to manage the system, to instruct the exchange on day to day changes and to interpret the traffic analysis information available. Effective supervision is essential; this type of exchange cannot simply be installed and left to work on its own.

Again there is a need for extension users to be educated in the correct use of the system. A need that should be under continuous review, especially in hospitals where there is a high proportion of staff changes.

Each generation of telephone exchanges transfers more facilities to the extension user and there is a need to continually update the information provided so that the extension user may use the system effectively.

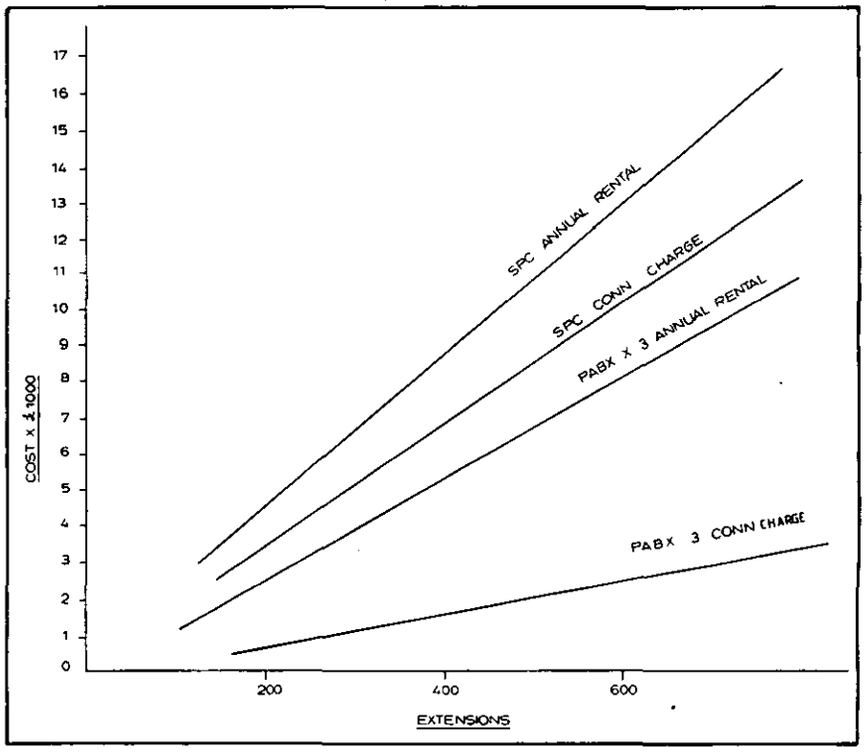


Figure 7: British Telecom Cost Reductions.

Summary

The advances which have been made in telephone exchanges are quite remarkable. Doubtless the next generation of exchanges will be more complex, probably smaller and almost certainly more expensive!

The trend already indicated of transferring facilities from the operator to the extension user will continue with a need to educate the user. The capital and revenue costs now involved mean that the maximum use must be made of the system.

There is no justification for installing an expensive and complex system and then limiting the range of facilities to that of a conventional P.A.B.X. While the capital and revenue costs have risen steeply economy in using the system can only go so far. A much better approach must be to effect economies consistent with efficient and effective use of the equipment for the maximum benefit of the hospitals.

The possibilities are that these new type exchanges, apart from acting as a basic telephone system, will offer integration with other services, such as Transmission of data; Plant and energy monitoring; Coupling to paging system; Message switching; word processing; Linking to radio systems, etc.

A modern telephone exchange providing effective dependable communication and forming part of an 'integrated total communication system' can only be an asset to the main task of the National Health Service, caring for the patients.

The author is the technical director of Drybrough Communication Services Ltd and his article was first presented at the Institute's 1982 Annual Conference in Stratford upon Avon.

CB Interference

D A S DRYBROUGH BSc CEng MIEE

Definitions

What is CB? I quote the regulatory definition given in the Home Office specifications which govern its approval....

"Citizens Band radio, a personal two-way radio system, is available for use throughout the United Kingdom. It operates in the 27MHz and the 934MHz bands....all Citizens Band radio equipment whether hand-held, mobile or base station must be covered by a licence." Citizens Band sets, once licenced, can operate in any of the 40 channels in the 27MHz band or the 20 channels in the 934MHz band. Freedom from interference is not guaranteed; there is no privacy of messages; nor any individual right to the use of any one channel.

What this means is that the proverbial 'man in the street' — and woman too! — can go to the local Post Office and take out an annual £10 licence which covers the use of up to three CB sets, of any type which has been officially approved. These sets can be used by the licensee, by any person in the same household or by any employee for any communications purpose except the advertising or soliciting of goods or services. The only other qualification, which also applies to other services, is that no grossly offensive, indecent or obscene transmissions shall be sent.

With such a wide range of usage it is not surprising that licences have been issued at an average rate of about 9,000 per week since the inception of the authorised band on November 2nd, 1981. Of course, previous to that date there was extensive use of un-authorised or 'illicit' CB sets, mostly manufactured to the specification ruling in the USA where CB has been legal since about 1947, though not popular until 10 or 15 years ago. Many of these sets appear to be still in use in the UK. As they do not operate in the same band as the authorised sets, and generally have different types of modulation, they do not interfere with the authorised sets very much, but remain the source of severe problems for other services, notably paging, which operate in the same band. The frequency relationships are shown in *Figure 1.*

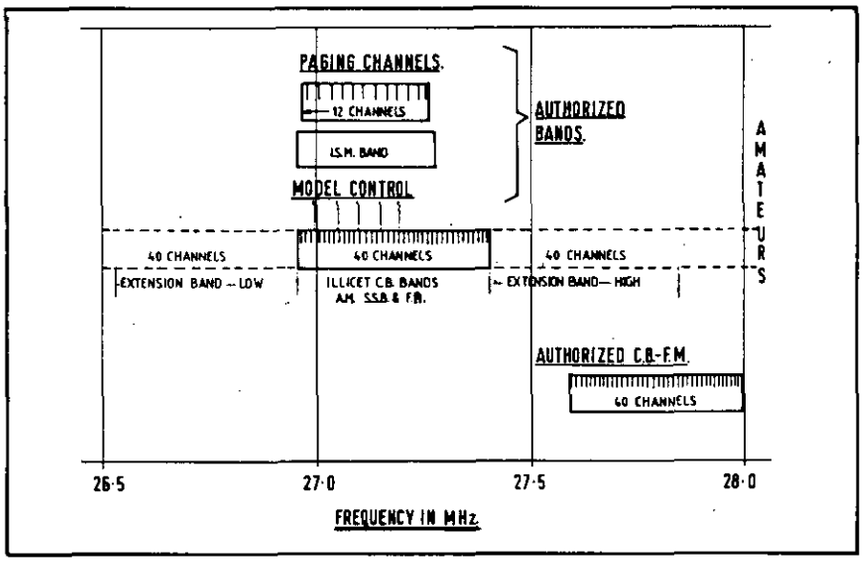
It is also possible for CB sets in other countries as far away as the United States itself to cause interference in the paging band, especially when they use high power and large aerials.

Two Home Office Specifications govern the performance of authorised CB sets, MPT1320 for 27MHz and MPT1321 for 934MHz. These specify mainly wanted and unwanted output powers and include tests at varying temperatures and supply voltages. The limits are quite tight, and if maintained in the field, represent a reasonable performance standard for what is intended to be a low-cost system. Receivers are less strictly controlled in performance than transmitters and so may show wider variations between and within types.

Activity

Reliable estimates of CB activity are hard to come by, partly because the CB population is spread irregularly over the country and partly because the number of illicit sets cannot be known. However, assuming that the present licensing rate is likely to continue for some time at the same level, that each licence covers, on average, 1.5 sets and that there were

Figure 1: Frequency Allocations.



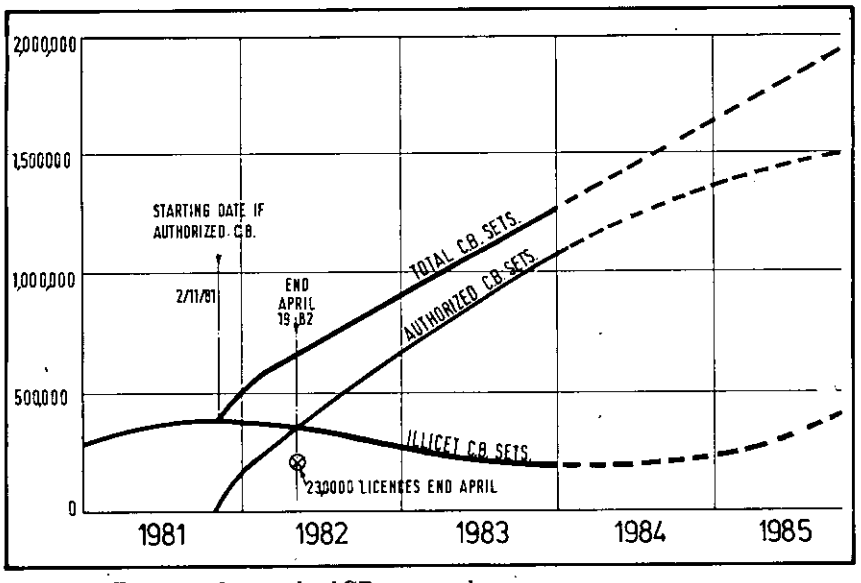


Figure 2: Estimated growth of CB set numbers.

about 350,000 illicit sets in use in November last year, the picture of present and future numbers of sets is shown in *Figure 2.* The total number of sets in use would then reach one million early in 1983 and two million, 500,000 of them illicit, by the end of 1985. The number of illicit sets is shown to rise after 1983 because the authorised bands will, by then, be overcrowded while the illicit bands will be less full.

At present, the vast majority of CB sets operate in the 27MHz band but conjestion may also force greater use of the 934MHz band in the not too distant future. These sets should cause much less trouble to Hospital services.

Perhaps a more enlightening picture of this CB activity results from considering the numbers of sets which might be audible at a given receiver in a high density area such as Greater London. I estimate from the curves that, by 1985, there will be, in every square kilometre, about 240 authorised and 80 illicit CB sets. Taking an average range as 10km, this would mean that about 1800 authorised CB sets could be audible, if active, in every channel while about 200 illicit CB sets could be heard in each of their 120 channels.

Communicators are always fighting a battle to establish strong, clean and easily intelligible signals in the presence of noise and interference and the mass of CB signals represented by these figures would effectively be equivalent to a large increase in noise level over the 27 to 28MHz band and beyond. This would reduce paging ranges considerably, perhaps to less than half present ranges. Luckily, all CB sets are not in use at any one time. The average daily count might be only about 10% of the possible maximum but there could be peaks at high activity times, such as when school finishes in the afternoon! Interference to other services therefore varies widely during the day as well as between days and over the various population densities across the country.

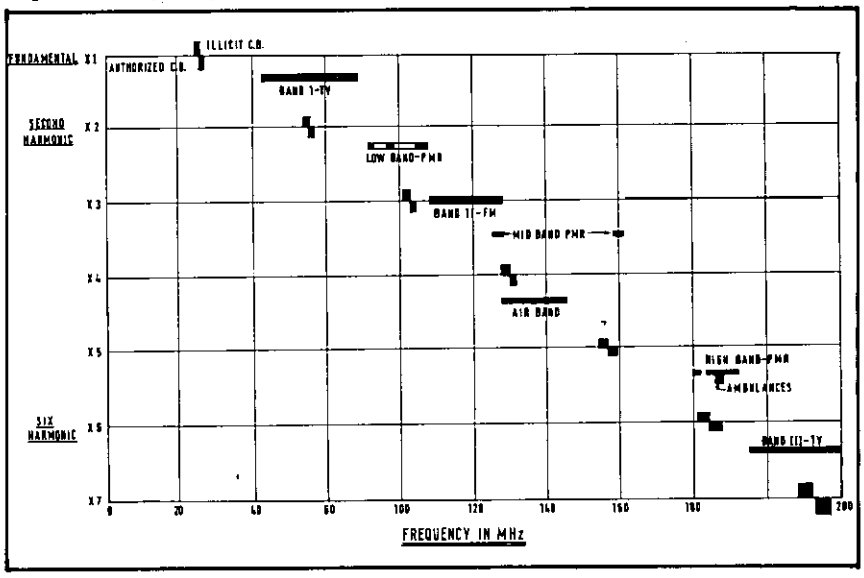
Types of Interference to Radio Communications

Interference to radio communication services can arise in various ways. Some are immediately obvious, as when intelligible speech is heard along with a wanted signal, and some are not so obvious, as when a pager misses a call due to the swamping or distorting effect of a strong unwanted signal in the same channel.

Interference can also be caused to systems operating on different channels from the CB set. All transmitters produce outputs other than the wanted, or fundamental, output. Some of these are harmonic outputs; that is their frequencies are two, three or four times that of the fundamental, and these are shown in *Figure three* together with some of the services which might suffer interference from them. As mentioned earlier, unwanted transmitter outputs are quite low, by specification, and so interfering ranges are not large, perhaps 70 metres to a fairly sensitive ambulance set operating on the 6th harmonic frequency of a law-abiding CB set.

All receivers overload for high-level input signals. This can show itself as the production of combination, or intermodulation, frequencies. Some of these may be sum or difference frequencies such as between a CB signal and a long or medium wave broadcast signal, producing an interfering signal in the paging band. Many other modes are possible but in most cases, at least one of the combining signals has to be high level, such as might be produced by an authorised CB set at ranges less than about 100 metres. This interference can include the modulation from both combining signals, such as CB chatter plus broadcast programme material, or else whistles

Figure 3: Frequency relationships.



and nastier noises, especially when the wanted signal is also present.

It is also possible for false paging calls to be generated by appropriate interference tones or whistles but such calls are fairly unlikely at present. However, there is a growing trend for CB users, seeking some freedom from unwanted calls, to fit selective calling devices which could use the same tones and code make-up as paging systems. False calls may therefore become more frequent as the CB channels become more congested.

What can be done to reduce the adverse effects of CB operation on Hospital radio communication systems? Well, apart from restricting the use of CB sets within hospital and ambulance grounds, little can be done to reduce the actual levels of interference. Action can be taken, however, to improve wanted signal levels where essential and perhaps to repeat critical messages more frequently to ensure that at least one call gets through. Some forms of interference to ambulance receivers can be reduced by fitting a filter to the aerial input circuit to exclude the fundamental 27MHz signals from CB sets.

Interference to Hospital Equipment.

Some hospital electronic equipment deals with very low level signals and so makes use of high-gain amplifiers which, if not properly designed and manufactured, could be susceptible to interference from CB signals. Fortunately, the environment in which such medical equipment is normally used was already expected to include diathermy machines which generate strong outputs in the same general band as CB sets and so the medical equipment has, in general, been well protected against all signals in that band, now including CB.

In tests on a large, but not exhaustive, selection of samples of medical electronic equipment the only significant interference from close-in CB sets was found when a blood pressure transducer was used in an ECG set-up. The trace on the monitor for blood pressure bounced up and down as the CB transmitter was switched on and off.

Despite this largely negative result it is recommended that screeing should be provided and well maintained on all possible equipment leads and all contacts in connectors, etc, should be checked frequently to make sure that they remain clean and not therefore capable of detecting or rectifying strong CB signals to produce unwanted interference.

The Use of CB by Hospital Services

At around £50 to £90 per mobile or portable set, including aerial, microphone and loudspeaker, a CB set, at least the popular 27MHz type, is a cheap form of communication which

can be reasonably effective, given low occupancy of the channels when its use is required and some operating 'know-how' on the part of the users.

It is not possible to choose a particular channel, say channel 30, and expect always to have clear communication between sets. It would therefore be necessary to nominate to the users a series of channels which would have to be scanned when the first, second, etc, were occupied. One alternative would be to monopolise a channel in the required local area by making very frequent transmissions in it so as to discourage other potential users — not cricket, but possibly quite effective! The use of selective calling at an extra £30 per set approximately would give relief from listening to unwanted calls.

Great care would be necessary before setting up any system to make sure that no interference would be caused to local paging, ambulance and medical equipment. This would be reasonably certain if the proposed system were spaced at least 150 metres from the perimeter of a paging system, about 100 metres from ambulance traffic routes and 50m from any medical equipment. Field trials should always be carried out to make sure that there is no interference of any significance not only to hospital services but also to other page users in the locality.

Summing Up

CB radio is a growing source of interference to paging and ambulance radio systems, to the extent that in about a year's time, with one million CB sets operating, one highly important 'crash' call could be lost on average every 70 days, reducing by 1985 to one crash call lost in about 18 days on average. False calls are not a problem at the moment but may become important if there is widespread use of selective calling by CB users.

The Hospital Services may be able to use CB for some non-critical communications but only after careful planning and site trials.

This, the second article by the author was also presented at the Annual Conference when he summed up the section on Health Service Telecommunications.

Micro-electronic technology in Health Service communications

G C McCONKEY CENG MIEE

The preceding papers have detailed developments in telephone, staff location and radio telephone systems and some of the problems in operating such systems. In the future these systems will be integrated in a much closer manner and the new technology using microprocessors and digital technique could be employed to provide a base for integrating all forms of telecommunication.

The Department of Health is aware of the need to properly evaluate the use of micro electronics technology in the health service and have set up a working party to look at the electronic communications in hospitals. The first part of the study which took the form of an Organisation and Method study by the General Management Services Branch of the Department has been completed and a report published. The report details the major communication needs within a hospital. The second part of the study is to look at communications systems that could be used to meet these needs and the Department has requested Inter-Authority Working Group 7 to carry out this exercise in conjunction with the original steering group.

The basic communication needs that have been highlighted are for a Service Request System and a Voice Communication System.

Without pre-empting what the Working Group might come up with as answers, some of the following could be envisaged:

Telephone Exchange/Computer link
Paging System/Exchange Coupling
Radio System/Exchange Coupling

The telephone system is the hub of any such integrated network and a block diagram of these various interconnections is shown in *Figure One.*

The technology to provide these

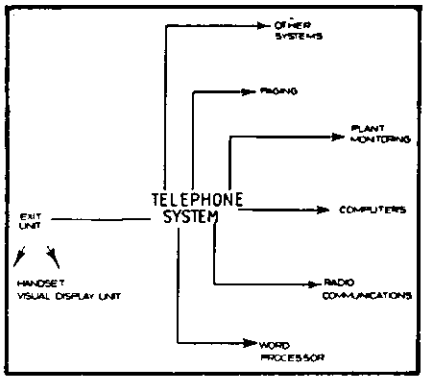


Figure 1: Telephone communications Network block diagram.

links and coupled systems is already available but until the Stored Program Control Exchange becomes operational in the hospital environment and the telephone extension instrument provided with more facilities such as a visual

display unit and a printer then the maximum advantage in providing these links cannot be achieved. It could be envisaged that all communication could be achieved without 'hard copy' by the use of the computer memory and the storage of information could be assessed by each terminal.

Such things as meals requests, lab reports, maintenance work could be requested by using the telephone handset and the VDU. The computer programs being arranged for listing and categorising these requests. The telephone directory can also be held on the system.

The telephone extension user could talk directly to a mobile radio which can now be provided with a memory facility to store messages if the called party is not local to the radio when the message is received.

Small telephone systems up to 100 extensions capacity with individual microprocessor controlled telephone handsets are already available. These systems are linked by a common cable with the facilities available to each handset being programmed as we know it and it can't be very long into the future before these systems expand into the larger capacity exchanges required for the health service.

The uses are endless but the mind boggles at the chaos that could reign if the Health Service does not accept this challenge and provide the right grade of staff to manage such systems and give them such training as needed to obtain the maximum benefit at minimal cost.

I have not touched on satellite communication or the national information systems such as Prestel, Oracle etc but they too could be used in the health service of the future for interconnection of hospital communication systems and for providing information required nationally.

It is hoped that these papers have 'whetted your appetite' to the potential of telecommunications in the future but all these facilities can only be provided at a cost and therefore it is essential that the communication needs of the service are clearly defined before sophistication is

The author is semi-retired, but has been in the industry for many years. The article first appeared in 1982 in Heating and Ventilating Engineer.

Urgent Communication

J GREEN

Introduction

The need for clear communication between people is never greater than in conditions of sickness or disability, when the capability, or the opportunity, is reduced. A whole technology has grown up around this need, and is only now coming within the scope of the new breed of building services engineers.

It has its main outlets in hospitals and in sheltered accommodation, and the first fact to be appreciated is that in its external features it is as simple as it can be, goverend by the ergonomics of the unfit.

Activiation of a system by a patient requires nothing more complex than pulling or pushing a switch. And that switch is situated where it is most nearly to hand. In a wc for instance, where a patient in trouble is likely to be keeled over, the accepted position is 450 mm (18 in) from the floor, and the same distance in front of the pan. But in a bath it is a cord pull hung from the ceiling.

For the more normal circumstance, the patient in bed, there is more than one acceptable solution, and a state of evolution. We still have the pear push switch on a flex lead, or the more complex hand unit, which includes controls for radio, bed light and perhaps other functions, also on a flex. Both are quite vulnerable to damage, and the latter is somewhat costly to repair or replace. These two methods are therefore being overtaken.

Two systems most in use nowadays contain all the advantages of mobility with little risk of damage. These are

1. the locker unit
2. the swinging arm.

In both cases the practice is to supply the complete services unit, radio etc. In addition the more forward-looking include a jack plug, to which a flexed pear push may be connected if the patient is almost immobile. The locker position fulfils the requirements of simplicity and mobility because the patient has continual access to the locker unit for his normal needs—drinks, books etc—and because the locker is itself mobile. A manufacturer's tip about this is to restrict absolute mobility, by chaining the locker on a leash a little shorter than the flexible services cable.

The swivel arm must be firmly attached to the wall, and adjacent to a service conduit which will carry all manner of low voltage and other services. Charing Cross hospital is an example of a modern swivel system.

Having done something to show the essential relationship between the system and the ultimate user, we can look behind the pear pushes and the rest, at the systems themselves. And there are three kinds of hospital system, labelled non-speech centralised and decentralised speech.

Non-speech systems, those which

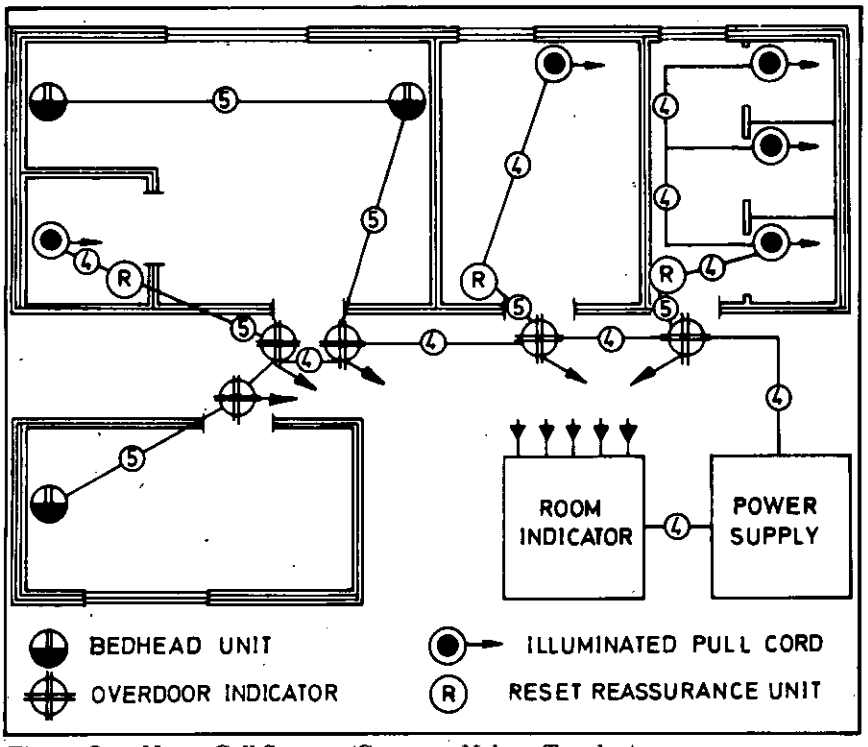


Figure One: Nurse Call System (Courtesy Nelson Tansley).

installed where it is not really needed. rely mainly on buzzers and lights, tend to be characteristic of public sector hospitals (NHS). The preference of hospitals in the private sector for decentralised speech may be traced to the American influence over many of them. Centralised speech is less common, though the success of the installation at Charing Cross hospital should induce others to give it serious consideration.

The requirements of sheltered accommodation are not greatly different from those of an ordinary hospital, but staffing usually is. It would be unreasonable to expect a warden on perpetual call to attend in person to every call, unable to know, from light or buzzer, whether it is serious or otherwise. Enlightened authorities therefore install speech systems, but some realists argue that this could fail, old folk often being disinclined or unable to make a lucid statement—if they were ever able to do so.

Simple or non-speech systems

At its simplest these can be wired with a pair of cables per zone, to give voltage only — of the order 25-28v, which is safe in 'wet' areas. The central functions, of buzzer and/or zone light, indicate the originating zone.

The number of wires used is proportional to the amount of information required. For instance it takes an extra wire to identify the room, flat or bed within a zone. to include staff calls as well as patient calls requires one extra looping wire per zone. Systems are marketed which identify the individual calling point by cables which loop in and out. These depend upon sophisticated decoding circuits in each position to be identified. Need for this amount of complication is questionable.

The wire is normally telephone cable, 0.6 mm per conductor. Since it is a very small part of the total cost, usual practice is to allow a few extra cores in a new system, convenient for future use. It is of course good practice to require wiring systems to have their own conduit or trunking.

Two further details of the simple system call for comment but not for explanation. At the patient's end the system acknowledges his action by lighting a 'reassurance' lamp. At the receiving end the group and/or individual lamp lights and buzzer sounds. Staff calls for assitance are somewhat similar, but lights usually flash and audible signals are more urgent. Calls are usually to be cancelled only at the point of origin.

Centralised speech

In an interesting pamphlet entitled 'A philosophy on nurse call systems' a leading systems supplier Cass Electronics describe centralised speech as coming nearest to fulfilling the criteria of the ideal communications system. It claims with a high degree of justification that two way speech saves time, at least. There is a central switchboard, always manned, which permits nearly instantaneous reaction to calls, filters out the less urgent (What's the time?') and directs those requiring specialised attention straight at the appropriate specialist. This person, usually the nurse, may be anywhere in the ward, knowing that if needed she will be summoned.

In the Cass Teletracer centralised system the patient has a small bedside unit, usually on a swivel arm, with coloured push buttons and a microphone. The multiplicity of buttons is to deal in a single unit with radio etc as happened with the old hand unit. The central board, receiving the call, will if necessary call up the right person by energising his or her pocket page receiver, a bleeper.

A system of this kind can be arranged with more or less complication, by arrangement, but planning should attempt to be as forward looking as possible. It is far cheaper to incorporate the skeleton of some future extension during the original installation.

Cost comparison shows the centralised system to be the most expensive apparatus cost. It is not unusual to meet the acountancy argument that it requires continuous shift manning but this is a superficial view which takes no regard for the facts of hospital life. Everything about nurses, their training, the nurse/patient ratio, requires that the exclusive business of nurses should be to nurse. If they are anchored within earshot of their patients, alert for signs of unrest, taking time to sort out the serious from the trivial summons, they are in danger of diluting their usefulness, wasting their time, and reducing their special kind of productivity—which all adds up to costing the NHS more. A careful review would often show how the dearer system can save money.

Decentralised speech

This is the half way system, the advantages of speech added to the simple signalling system, but lacking the advantage of the centre. In essence the caller is able to activate a

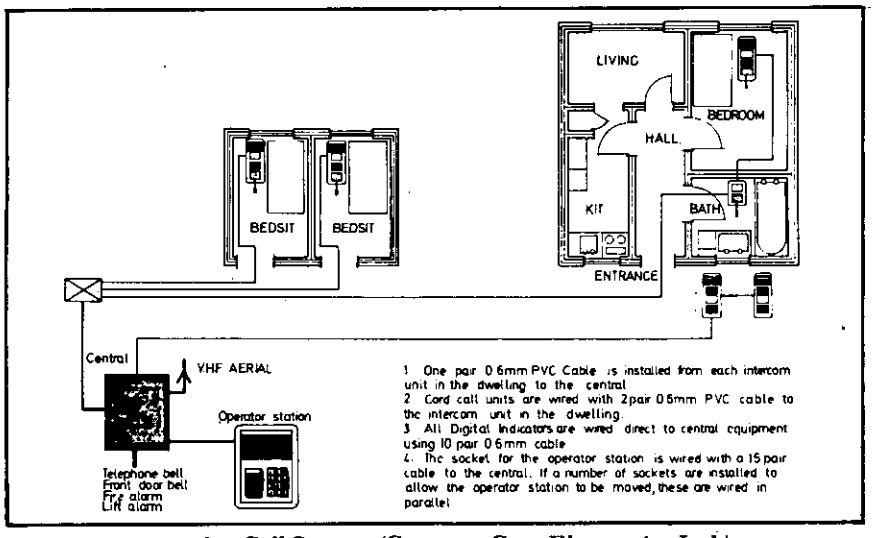


Figure Two: Warden Call System (Courtesy Cass Electronics Ltd.).

station, where the call is acknowledged and the answerer will operate a two way speech unit. Though this may sound very much like a central unit, it could involve many more people in a hospital.

As well as its physical characteristics, its utility is somewhere between the two extreme systems. But it must be argued that it is better than half way to a full centralised system, for response to lights and buzzers is as uncomplicated as a Pavlovian reaction, and only speech can show opinion, or shades of meaning, or answer questions.

Sheltered Housing System

We have already noted the practical difference which exists between hospital life and sheltered housing. If the appointing authority has no more noble motive than to safeguard the survival of its warden or similar official, it will choose a speech system. For that reason the Com-D system, made by Cass Electronics, may be quoted as typical and suitable for the expected conditions.

Action for the caller remains at its simplest. He or she pulls a call cord or presses a button switch and receives an immediate reassurance lamp signal. The warden receives the call as a bleep on a pocket receiver, and goes to an answer station. Here the caller's room number is shown, and two way speech can be commenced at once. In the warden's dwelling or office the aural indication is wall mounted, usually as a chime, and the caller's number displayed as well. There is a further benefit in time and effort saving, in that the warden may initiate a call to a resident.

A typical schematic drawing is shown here, using the Com-D system; and the inclusion into the system of telephone and door bells, and alarms, indicates both the potential comprehensiveness of the system and the desirability of ensuring that the designers handling building services is fully briefed concerning the possibilities.

These notes are intended as an elementary introduction to a subject which, though specialised, is likely to crop up more often in the future. They aim to show too that it is designers, planners and those who direct them who are more nearly concerned than contracting installers. Though the situation may change, particulary if communication systems become more run-of-mill and consequently assume a package identity, they are not at present readily installed by general fitters. Nor are they pieces of hardware to be bought off the shelf. The expertise and experience of the manufacturer are properly to be regarded as integral with the goods, before, during and after the sale. At planning stage he can advise on what best suits the need, and any peripheral issues. He can often install, and will service, with greater facility and economy than is to be expected from less specialised staff.

Product News

Supervision of Standby Power Supplies

G.B.S. Harrison are now manufacturing a Cyclic Loading Unit which is applicable to installations which require a high level of security of supply. Fault trip discrimination in main supply substation supplies to hospitals is important to prevent total loss of power when a local fault occurs; failure of the battery supply to the switchgear protection equipment could have disastrous effects in these circumstances. Operating theatre emergency lighting is another situation where battery capability is important.

Standby generators rely upon secondary cell supplies to start the diesel engine and a faulty battery could greatly prolong the restoration of power to an intensive care or a psychiatric unit and so give rise to difficulties in these areas.

Improvements on both secondary cell design and application has gone a long way towards alleviating some of the problems associated with secondary cell supplies, but frequent manual checks are necessary to ensure a low failure rate; even frequent checks do not always highlight an inability of the battery installation to deliver the required current due to either a very small increase in circuit resistance resulting from insecure connections or a loss of capacity of the battery.

Electronic heating system controller

P P Controls Ltd of Hounslow, Middlesex, have introduced an electronic control unit as part of their Centratherm Range. The control units are built up by means of plug-in units which they claim will allow

greater flexibility prior to, and after, installation.

The functions offered are Optimum Start/Optimum Stop; Compensated control of the boiler or fixed temperature control; Compensation control of the mixing valve; Automatic control of the heating pump; Temperature control of NWS; Automatic control of HWS primary pump; HWS priority selected, if required, to close the mixing valve and stop heating pump whilst cylinder is re-charged; Control the HWS within the time switch, or even switch the boiler and HWS pump on demand 24 hours a day; Wind compensation; Solar compensation and High/Low limits to flow temperatures or boiler return temperatures.

For further information contact Stewart Young of P P Controls Ltd, Cross Lances Road, Hounslow, Middlesex, TW3 2AD. Tel: 01-572 3331.

Log book for the FEM

Neotronics hand-held Fuel Efficiency Monitor (FEM) has now sold over 7000 units worldwide and to make boiler efficiency recordings easier, the company has introduced a special log book for users.

Priced at £7.80 each, the new log books are suitable for recording oxygen, temperature, efficiency and carbon monoxide measurements on a set of 12 specially designed, 4-colour coded monthly graph papers. To facilitate correct coding, the log books are supplied with 4 appropriately coloured pens and other aids for combustion logging.

In addition, the log book may be used with the newly introduced Portable Combustion Optimizer, or the C0 101 Carbon Monoxide Monitor. The book will provide a clear record of boiler behaviour and efficiency on a month basis and can be checked against fuel consumption records to ascertain that optimum conditions are being maintained.

Having recently ordered 113 FEM's for use in prison boiler plants, the Home Office has now follwed this with an order for log books for use with each instrument.

The FFM itself is a hand-held instrument that provides a digital readout of boiler efficiency, based on a sample of the flue gas. It measures differential temperature, oxygen content of the gas and computes the result of efficiency all within a minute. The FEM can be used on oil, gas or solid fuel boilers.

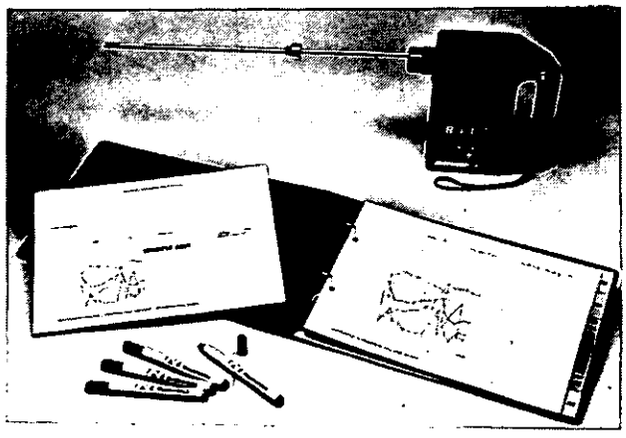
Further details are available from Neotronics Ltd, Parsonage Road, Takely, Bishop's Stortford, Herts. CM22 6PU. Tel: Bishop's Stortford (0279) 870182.

Waste heat recovery unit

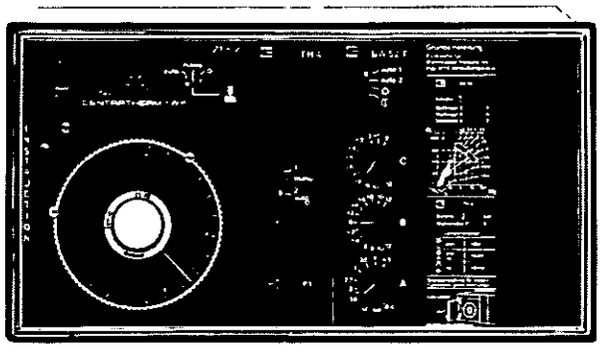
Weathermaker Equipment Ltd claim that with an estimated payback time of only two years, their Enco 2000 waste heat recovery unit is hoped to find increasing application by users of large chilled display cabinets, particularly supermarket operators. Enco will also recover waste heat from commercial air conditioning systems.

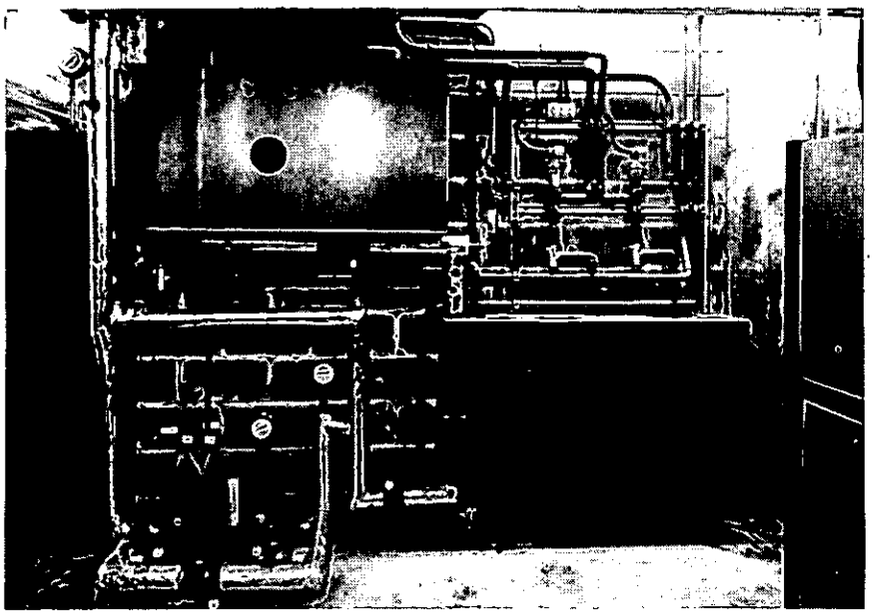
Marketed exclusively throughout the UK by Weathermaker Equipment, the Enco 2000 has recently qualified for listing in the National Water Council's directory 'Water Fittings'. It is the first mechanically cleanable recovery unit of its type and application to qualify for listing.

Fuel Efficiency Monitor Logbook.



The Electronic Heating System Controller ZG55.





The Enco 2000 waste heat recovery unit.

Instead of dispersing the heat taken of large chilled display cabinets through a conventional refrigeration system and condensing unit, heat can be transferred, via an Enco 2000, to domestic hot water thereby saving the cost of separate LPHW generation. Estimated payback is 2 years or less depending upon installation size and hot water demand.

There are eleven models in the range and each is designed to raise stored water temperature through 55 F degrees at rates from 170 to 870 gal/hour. Above these rates multiple units are used.

Equipped with removable headers for safe mechanical cleaning, the Enco 2000 offers advantages to users, in that it can be restored to full design efficiency after a short maintenance interval. Operation at high water temperatures tends to form scale and most units already on the market have no facility for its removal.

Additionally, to prevent cross contamination of water and refrigerant, a vented double wall between the two systems exists. To achieve this, the outer copper tube surface in contact with refrigerant has an exclusive helical roll-formed extended surface which creates a turbulent-swirling path for the refrigerant to follow, thereby increasing heat transfer capability. Also compressor operating costs are reduced with increased efficiency through the additional sub-cooling obtained.

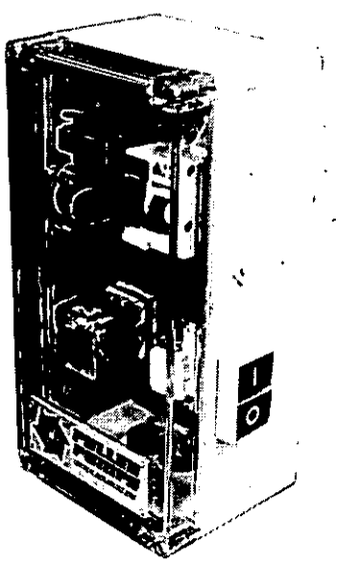
The helical vent passage formed between the inner copper water tube and the outer copper refrigerant tube permits immediate visaul determination should a water or refrigerant leak occur.

Further information from Weathermaker Equipment Ltd, Priory House, Marsh Road, Alperton Lane, Wembley, Middlesex HA0 1ES. Tel: 01-991 2000.

Food alarm unit

Pullen Pumps Ltd have introduced a flood alarm unit. Designed to provide warning of danger water levels in unattended plant rooms, basements, underground storage tanks or any part of a building subject to flooding, the unit not only sets off an audible alarm signal but can also shut down pumps and valves automatically to prevent further spread of water.

Flood alarm unit for unattended plant rooms



The unit's relay system is housed in a compact splash and dust resistant polycarbonate enclosure fitted with a transparent cover. A miniature circuit breaker protects the circuitory and a 'power on' neon light indicates that the alarm is switched on and active. A safe alternating voltage is applied to one or more probe cables such that, should any probe set become immersed in water, a flood relay is energised, switching line voltage supply to a remote audible alarm.

Two push button switches on the side of the enclosure provide a 'test' feature for checking correct functioning of the unit and a 'mute' facility for stopping the alarm bell, siren or warbler. A neon light in the top of the muting relay shows that the alarm is in a locked off condition. Once the water level recedes from the probes the flood relay and alarm muting relay reset automatically.

A further facility is offered via a normally energised slave relay which releases immediately a flood occurs or, for extra protection, whenever the flood alarm unit has tripped out, or is switched off.

The slave relay contacts provide a means of shutting down equipment such as motorised valves and pumps immediately a flood occurs.

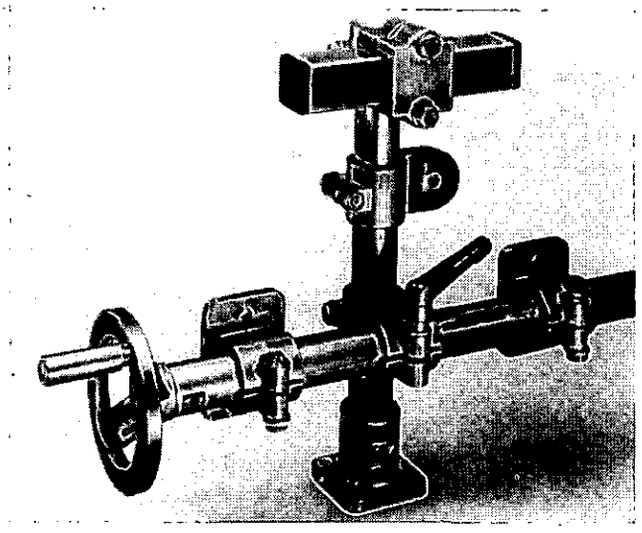
Further information is available from Mr Hunsley, Pullen Pumps Ltd, 58 Beddington Lane, Croydon, Surrey. Tel: 01-684 9521.

Adjustable tubular construction system

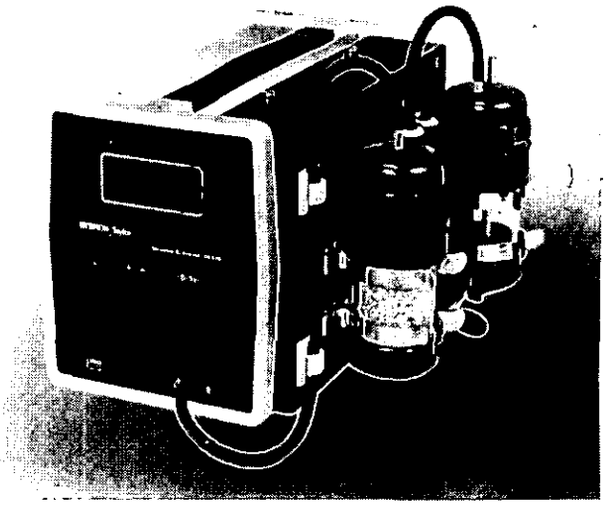
Precision Aids Limited of Camphill Industrial Estate, West Byfleet, Surrey, have been appointed the UK distributors for the West German made RK Tubular Adjustable Construction System.

The RK idea is a new approach to the problems of constructing precise custom designed structures which can be used over and over again.

By assembling square and round tube sections in sizes from 12 mm to 60 mm using a comprehensive range of clamps, brackets, lead screw adjustable sections and bases, it is possible to build infinitely variable structures, frames and supports.



Adjustable tubular construction system.



Portable flue gas sampling system.

The RK range is intended to bring flexibility, fast assembly and re-usability to industrial applications, testing, packaging, bottling, labelling, production, experimental research and all areas where precise, adjustable, quickly assembled structures are required.

For further information, contact Charles Calori, Precision Aids Ltd, Camphill Industrial Estate, West Byfleet Surrey. KT14 6EW. Tel: Byfleet (093-23) 53231. Telex: 8813487.

Portable flue gas sampling system

A new sampling system for semi-continuous monitoring of flue gas oxygen levels is available from Servomex for use with their 570A/580a analysers.

The system comprises a moisture catchpot, pump and drying tube. The lightweight unit is powered by the internal batteries of the portable analyser and will operate continuously for periods in excess of ten hours before it becomes necessary to recharge the batteries.

The system continuously extracts a representative sample from the flue which is dried prior to passing in to the analyser. For analysis over a period of time, a facility is provided which enables the oxygen level output signal to be fed to a suitable chart recorder, thus allowing full boiler or process heater characteristics to be determined.

A choice of models is available. The 570A has a digital display and is accurate to 0.1 percent oxygen, whilst the 580A analogue meter version offers a lower cost alternative with three switched ranges of 0-10, 0-25 and 0-100 percent oxygen.

More information is available from Taylor Instrument Limited, Analytics Division, Crowborought, East Sussex, TN6 3DU. Telephone: Crowborough (089 26) 2181. Telex: 95113.

Fire resistant wall covering

A new range of fire resistant wallcoverings has been introduced by Rectella International, after more than two years of research and development.

Until now, fibreglass wallcovering has needed two or possibly three applications of paint which incur high labour costs and which can double or even treble the overall original costs in order to provide a pleasant finish.

Flamcoat, as the new Rectella product has been named, already has a selection of printed design backgrounds and the company believes it is the first decorative paper backed glass fibre wallcovering to come onto the world market.

Flamcoat's woven effects make it an attractive quality textile wallcovering, with the highest fire resistant standards.

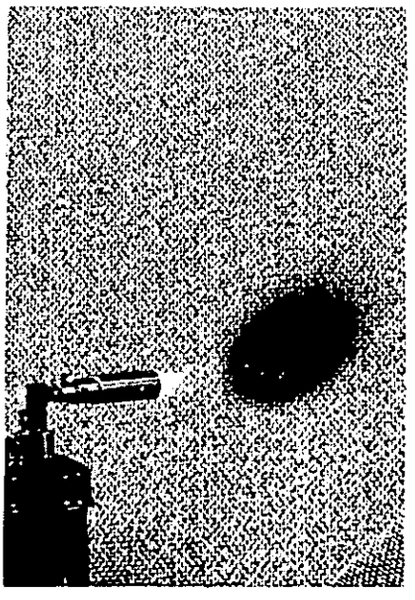
Flamcoat products include such advantages as its strength, stability and moisture resistance. It is easily sponged down and will not burn or support combustion. It is also resistant to a wide range of chemicals, will not rot and will not allow bacterial growths or moulds.

The range of prints is now available in widths of 91 cm (36 ins) in roll lengths of 25 and 50 metres. (27 yds and 54 yds), Full hanging instructions are included in every roll. Rectella recommend the use of their own brand adhesive — Weavebond 007, which is applied to the wall, not the paper.

Fire resistance specifications which apply are Fire Propagations: BS476: part 6: 1968: CLASS 0 according to Section 15 of the Building Regulation1976. Surface Spread of Flame: BS 476: Part 7: 1971: CLASS 1. Flamcoat also complies with the Greater London Council fire regulation for decorative combustible wall linings.

Further information is available from Andrew Brett, Turner Wallcoverings, 32 Grosvenor Street, London W1. Tel: 01-491 7056

Testing flame resistant wall covering.



Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

To place a classified or display advertisement in this journal contact:

Kate Trombley

Hospital Engineering, 48 Southwark Street, London SE1 1UN.

Tel: 01-403 6166

MIDDLESBOROUGH COUNCIL OFFER FOR SALE BY TENDER THE FOLLOWING:-

1 No. Manlove Disinfector size MRE. & Clayton Steam Generator

The above equipment is offered for sale on the understanding that the Purchaser will be responsible for its disconnection and removal from the site.

A brief specification of the equipment together with the forms of tender may be obtained from the offices of the Environmental Health Department, P.O. Box 68, Vancouver House, Gurney Street, Middlesbrough, Cleveland, or by telephoning Middlsbrough 245432 Ext. 3928. The completed Form of Tender must be returned to the Borough Secretary, P.O. Box 99A, Municipal Buildings, Middlesbrough, Cleveland, TS1 2QQ, not later than 5.00 p.m. on 4th March, 1983.

NORTH THAMES REGIONAL HEALTH AUTHORITY

STERILIZER ENGINEER

49,225 – £11,270 inclusive of LW (under review)

The Regional Engineer requires an appropriately qualified engineer to fill this post providing a central advisory service to Region and 16 District Health Authorities.

The successful applicant will be responsible to an Assistant Regional Engineer over the whole range of duties such as analysing of engineering problems and producing solutions with particular reference to Health and Safety, Medical Gas installations, etc. For those duties concerned with sterilizer engineering advice the post-holder will be personally accountable to the Regional Engineer.

Applicants must have at least an ONC in mechanical or electrical engineering.

The post is based at Paddington although it is anticipated a large part of the working time may be spent out in the Region.

Benefits include 20 days annual holiday (plus 10 public holidays); interest free season ticket loan and subsidised restaurant.

For further information about the post please telephone the Regional Engineer, Mr A. J. Milligan, Ext. 531.

Application form and job description may be obtained from the Personnel Department, North Thames Regional Health Authority, 40 Eastbourne Terrace, London W2. Tel: 01-262 8011 Ext. 143. Please quote reference 4064.

Closing date 18th February 1983.

New Hospital New Opportunity

Our specialist 88-bedded private hospital is planned to open in the Summer of 1983 and the custom designed building is nearing completion in London's West End. We are now recruiting key personnel who will be closely involved with the commissioning team and outside contractors in the final planning and implementation of operational systems.

This Hospital Engineer appointment is at Head of Department level and candidates should have well defined management and budgetary control abilities. The emphasis however will centre on practical day-to-day involvement particularly in planned preventative maintenance.

Salary and benefit package fully reflect the importance of this vital position.

For an engineer that can grasp this rare commissioning opportunity with commitment and enthusiasm there are excellent prospects for advancement within the group.

For further information or an informal discussion please telephone or write to Mr R. A. Staker, Chief Executive, Commissioning Office, c/o Garfield House, 86/88 Edgware Road, London W2 2EA. Telephone: 01-723 3645.

The Portland Hospital for Women & Children

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