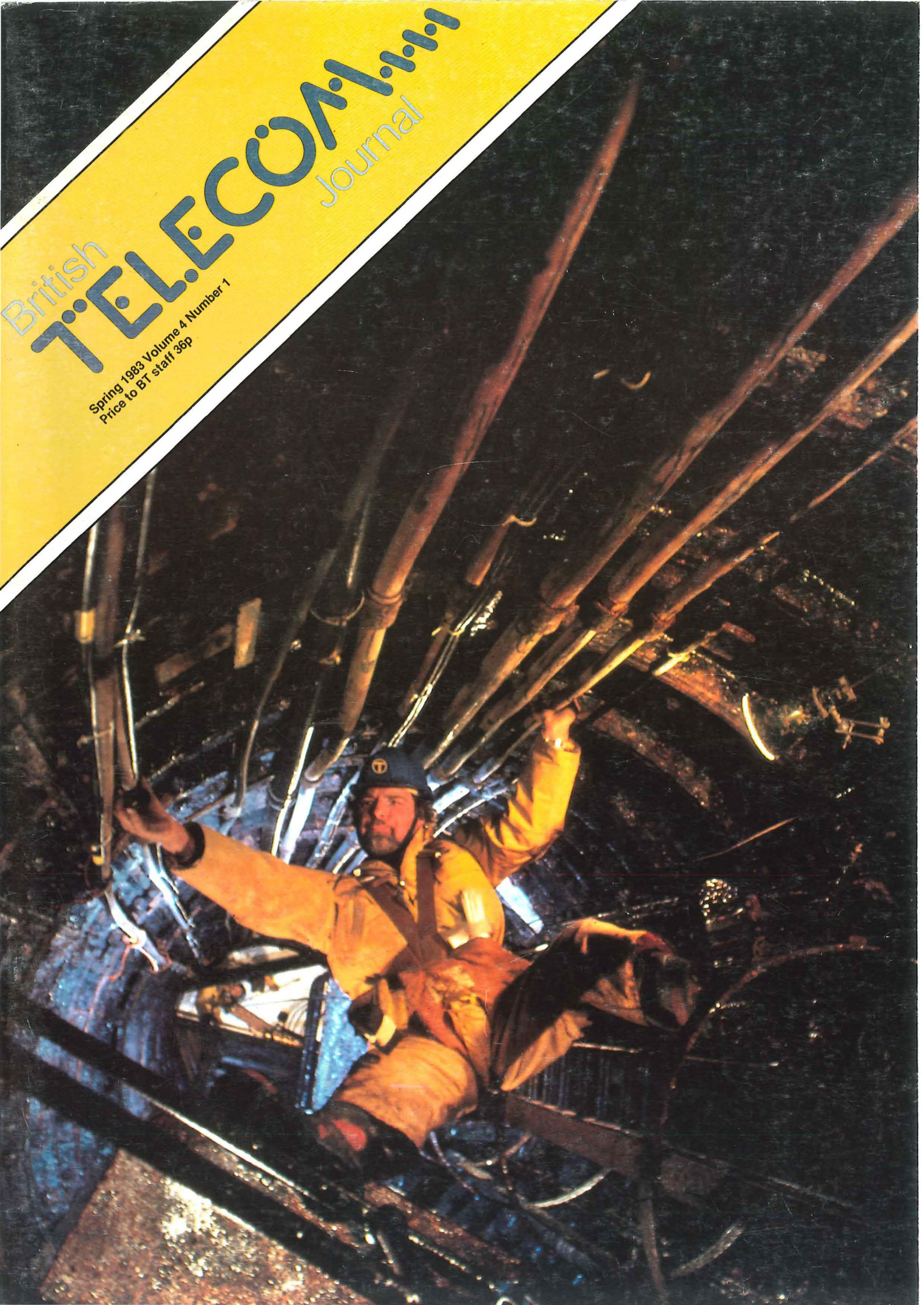

British TELECOM Journal

Spring 1983 Volume 4 Number 1
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To find out more, contact: Transmission Division, Plessey Telecommunications Limited, Beeston, Nottingham NG9 1LA. Tel: Nottingham (0602) 254831, Ext. 3542. Telex: 37201.

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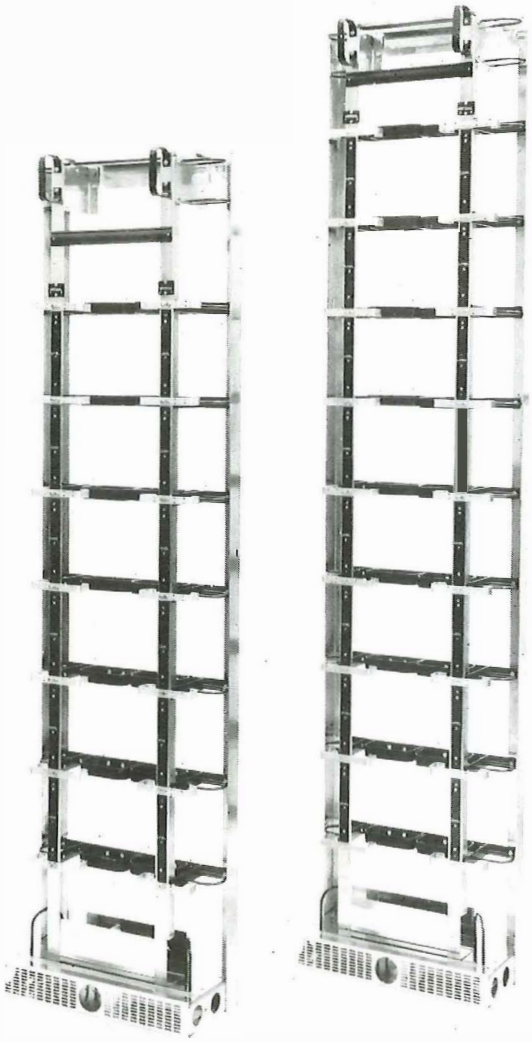

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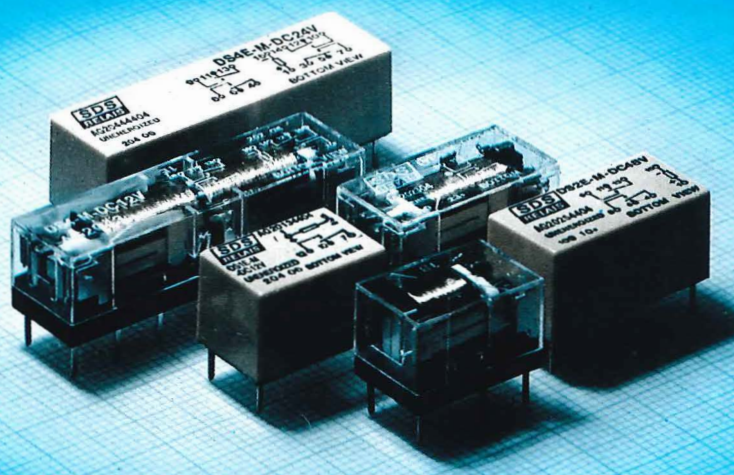

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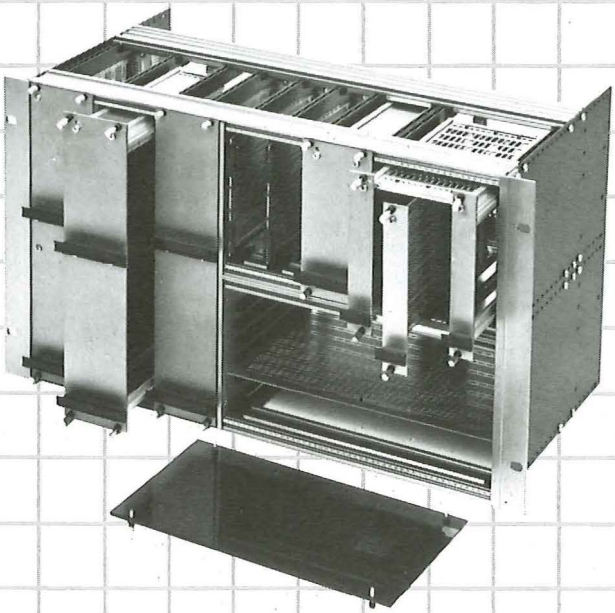

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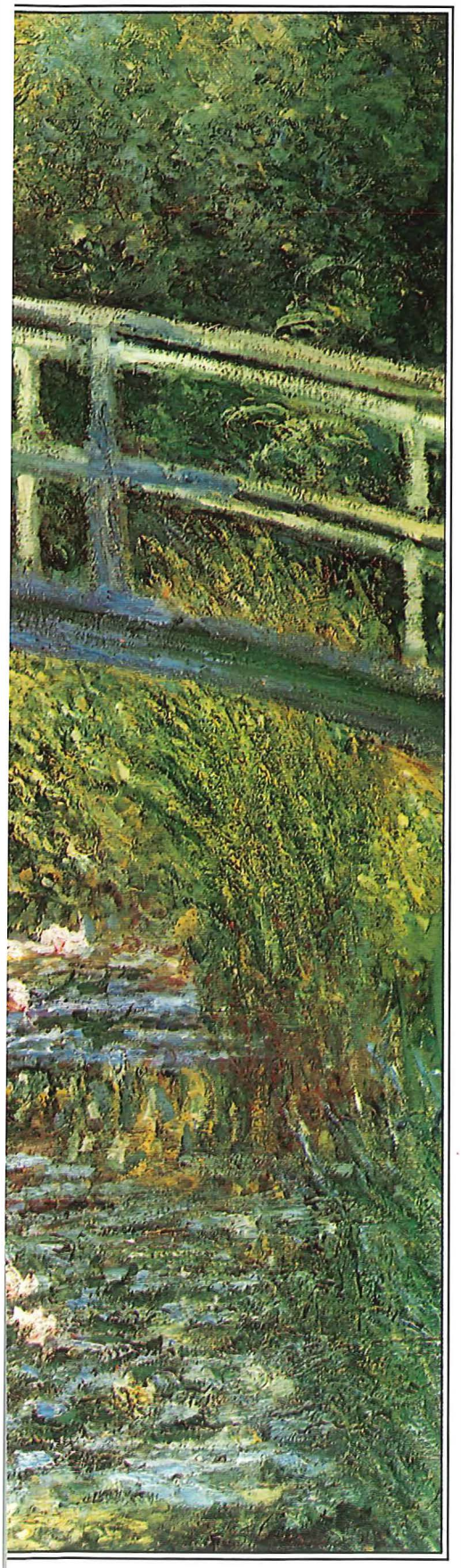

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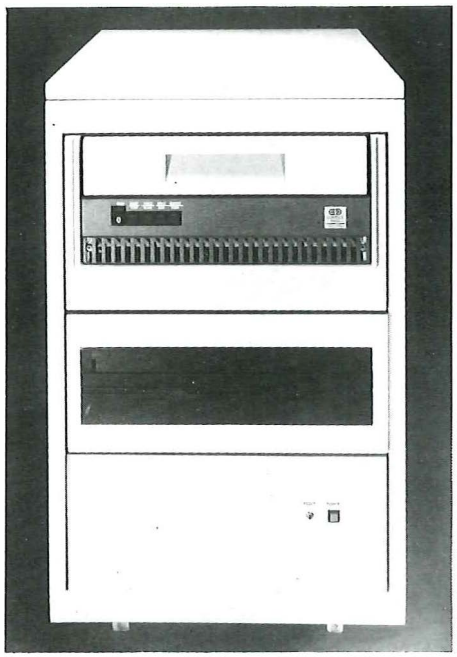

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Unlike single-CPU timesharing multi-user systems (e.g. MP/M, OASIS, MVT-FAMOS etc.) where system throughput degrades as additional users are added, the ACCRON-MPS system has no CPU degradation at all. Since each user has its own self-contained processor and memory you can now have minicomputer performance at micro computer prices.

It's Expandable

You can start with a single-user floppy disk system and (field) upgrade it to multi-user by simply adding a Service Processor running DPC/OS and more User Processor boards as and when required. Large capacity hard disks, magnetic tapes and more printers may be added at any time without any hardware or software redundancy.

CP/M Compatible

Use of the industry standard CP/M operating system means that a wealth of readily available, reasonably priced, system and application software will run on your ACCRON microsystem without any modification. Upgrade to multi-user, where simultaneous access of shared data files is required, is easily supported by the inclusion of simple file or record locking routines.

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NEWTONS Laboratories prides itself in offering you the largest choice of microsystems presently made or distributed in Britain. Three distinctive ranges, based on 5-inch, 8-inch or 14-inch magnetic media, utilizing both sealed (winchester) or removable cartridge disk techniques are supported and available NOW! In addition, the ACCRON offers a full blown, industry standard, 9-track reel-to-reel magnetic tape subsystem. So you can store, retrieve and process vast amounts of data using standard 800 or 1600 BPI magnetic tapes that can also be used to interface with most major mainframe computers.

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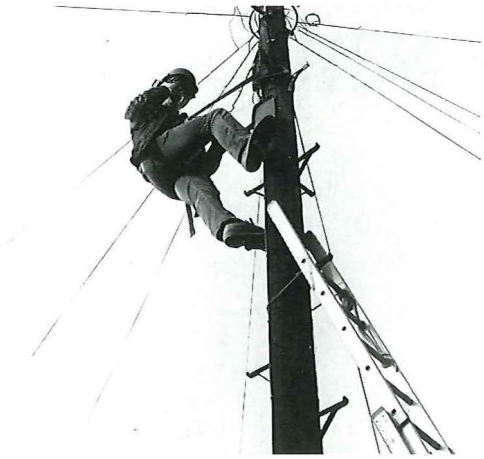
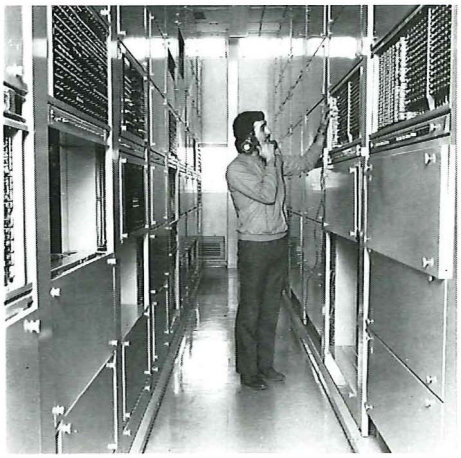
HOW EUROPEAN PTT's AND PHONE COMPANIES WILL FIND FAULTS BEFORE THEIR CUSTOMERS DO





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4TEL automatically tests every line every night: and provides powerful diagnostic testing for fault finding, every day.

The Series III 4TEL System includes:

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- New testing features designed for the needs of European PTT's.
- Testing from the field with computer generated voice response.

Fast Measurements

Using distributed microcomputer control, 4TEL measures at unrivalled speed and accuracy – 600 measurements a minute. In a service area with 100,000 subscribers, that means more than 2.5 million measurements in six hours.

Right First Time

In the daytime, 4TEL's line testing and line diagnostic capabilities allow faults to be distributed to the right faultsman first time. On each line test 4TEL is able to distinguish the nature and severity of the fault. 4TEL's powerful fault location capabilities then lead him quickly to the vicinity of the fault – capabilities made possible by eight years of hardware and software development.

Savings

Substantial savings can be made by achieving accurate fault distribution, avoiding costly cable repairs by early fault detection and preventive maintenance and the elimination of wasteful pair changeovers when faults cannot be found by conventional methods.

Centralised Testing

Installing 4 TEL means that the entire Repair Service Control operation can be centralised and effective in controlling field personnel.

Accurate test information is displayed on a screen or printer in the RSC in plain language so that it can be acted on immediately. A faultsman can not only be directed to the fault, but he can verify the repair while he's still on the scene.

4TEL immediately permits major improvements in quality of service through more efficient responsive and preventive maintenance.

4TEL from Teradyne, one of the world's leading manufacturers of computer controlled test equipment, has been field proven in rural and urban environments and is testing millions of lines now.

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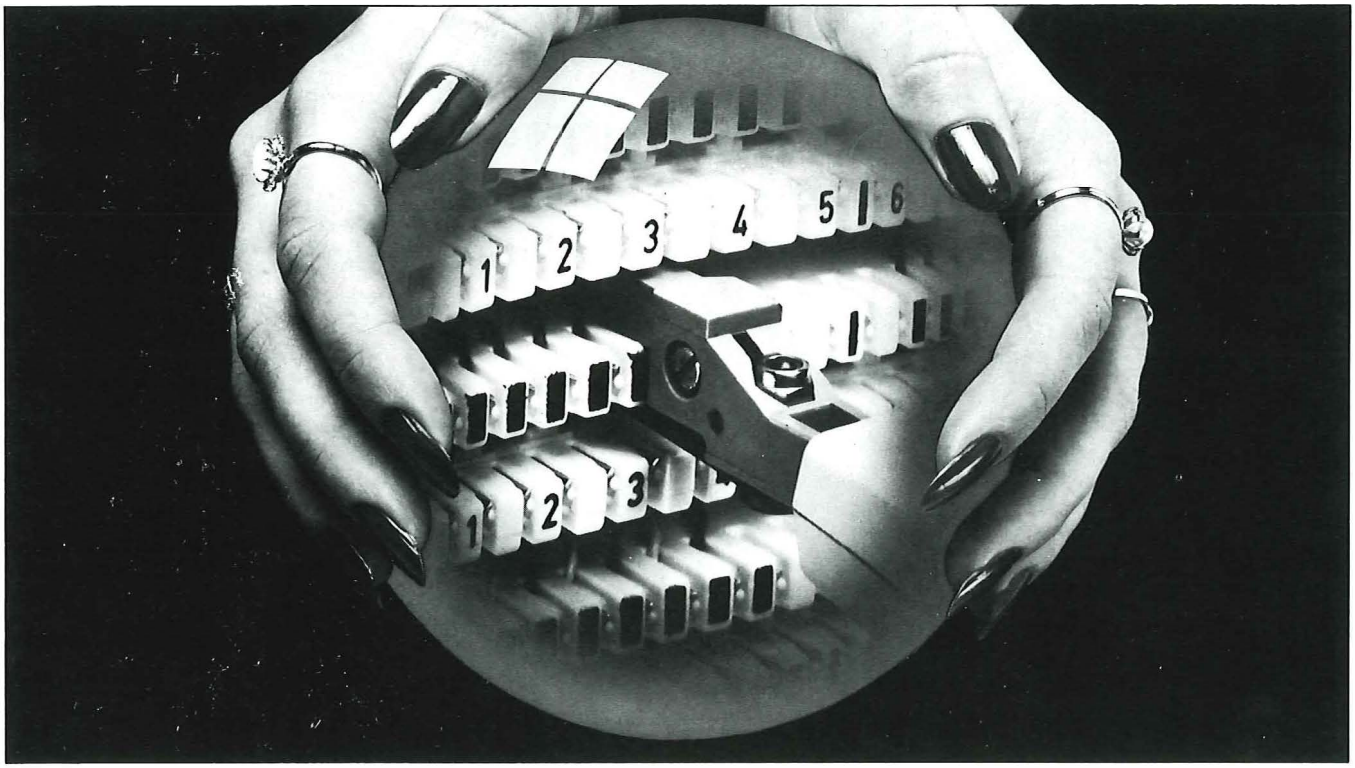
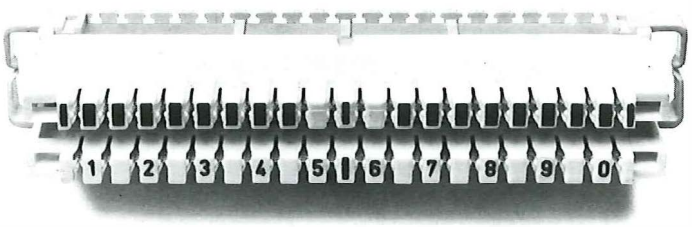


FUTURE NOW



Even modern telecommunications systems often use connexion techniques that are expensive, clumsy and labour intensive.

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Not with the KRONE-LSA-PLUS Quick Connexion System.

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British Telecom Journal
Spring 1983 Volume 4 Number 1

Published by British Telecom to promote and extend knowledge of the operation and management of telecommunications.

Cover: British Telecom 'spiderman' engineer Gordon Smith is lowered in a bosun's chair 60ft down a tower service duct on a bridge at Kingston-upon-Hull to install an optical fibre cable alongside the more traditional web of pipes and wiring.

British Telecom Journal costs 36p per issue for staff. For external subscribers cost is £10 for two years including post and packaging. Full details on page 38.

Problems of supply

The recent speech by chairman Sir George Jefferson about British manufacturers' inability to supply equipment on time throws into sharp focus the problems faced by British Telecom in its bid to compete vigorously in the market place.

Since then, British Telecom has acknowledged that although the UK market is a target for overseas competition, the organisation remains confident of protecting its own interests and meeting any foreign challenge.

Sir George, speaking at the Telecommunication Engineering and Manufacturing Association (TEMA) annual dinner in London, said that British Telecom had suffered a £100 million shortfall in its capital programme because of delays in equipment supply.

Performance obviously varied from firm to firm and product to product but the overall position was far from satisfactory. On the subject of telephone supply Sir George told guests: "We made a positive decision to pass the initiative for design to industry. We supported them with very large orders but we have not had the goods. I have heard a lot about teething troubles and a lot about chip supplies but those are your problems, not ours."

Sir George went on: "Had it not been for our own Factories Division's ability to raise its production of refurbished telephones by almost one million at extremely short notice, and for the welcome production of smaller and newer sources of supply, the situation over the last nine months would not have been just difficult . . . but quite disastrous."

As far as exchange equipment production and installation was concerned, performance had improved in recent years but it was still not satisfactory. Of some 250 orders completed in 1982/83, nearly 60 per cent were delayed, on average, for just over three months. On the transmission side it was a similar story. The 12-month moving average statistic at the beginning of this year showed a delay of more than five months for all jobs completed and in some cases it was up to three years.

But this did not have to be the case. Industry could rise to the challenge when pressed and its efforts in delivering all the digital transmission equipment necessary for British Telecom to open its X-Stream services on schedule had been greatly appreciated.

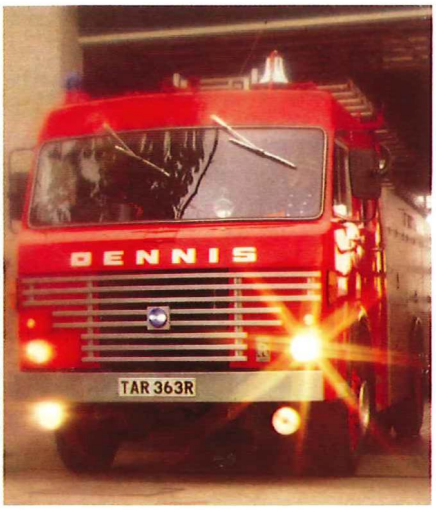
Looking back over the last 12 months, Sir George said the period had been one of 'bewildering change'. New suppliers were now competing with the more traditional ones and the trend to open up the markets would continue. Help had been given to raise the standards, capacity and supplier capability of a number of smaller firms.

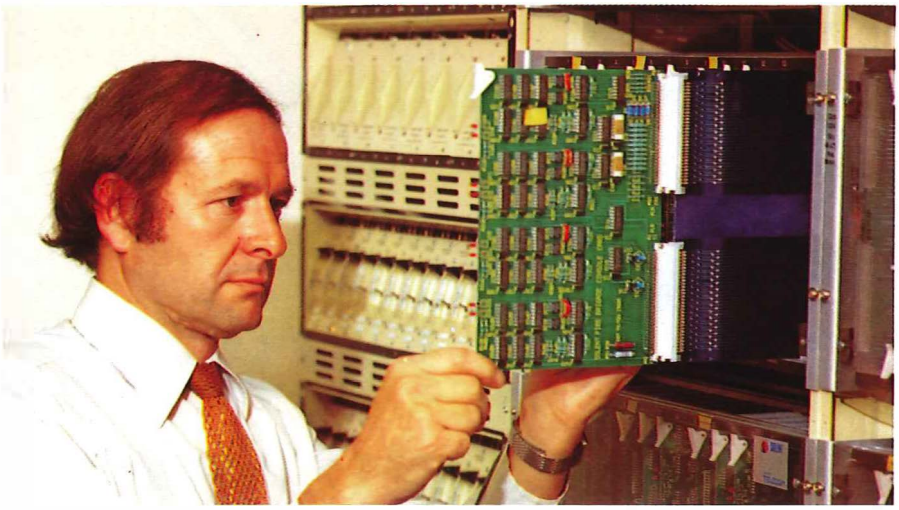
He concluded: "British Telecom and the Industry are natural partners. It is an important relationship. If the British Information Technology industry is to survive ... it needs a strong and powerful British Telecom as the flagship of the British Information Technology Battle Fleet."

British Telecom now feels that Sir George's criteria for success will be met.

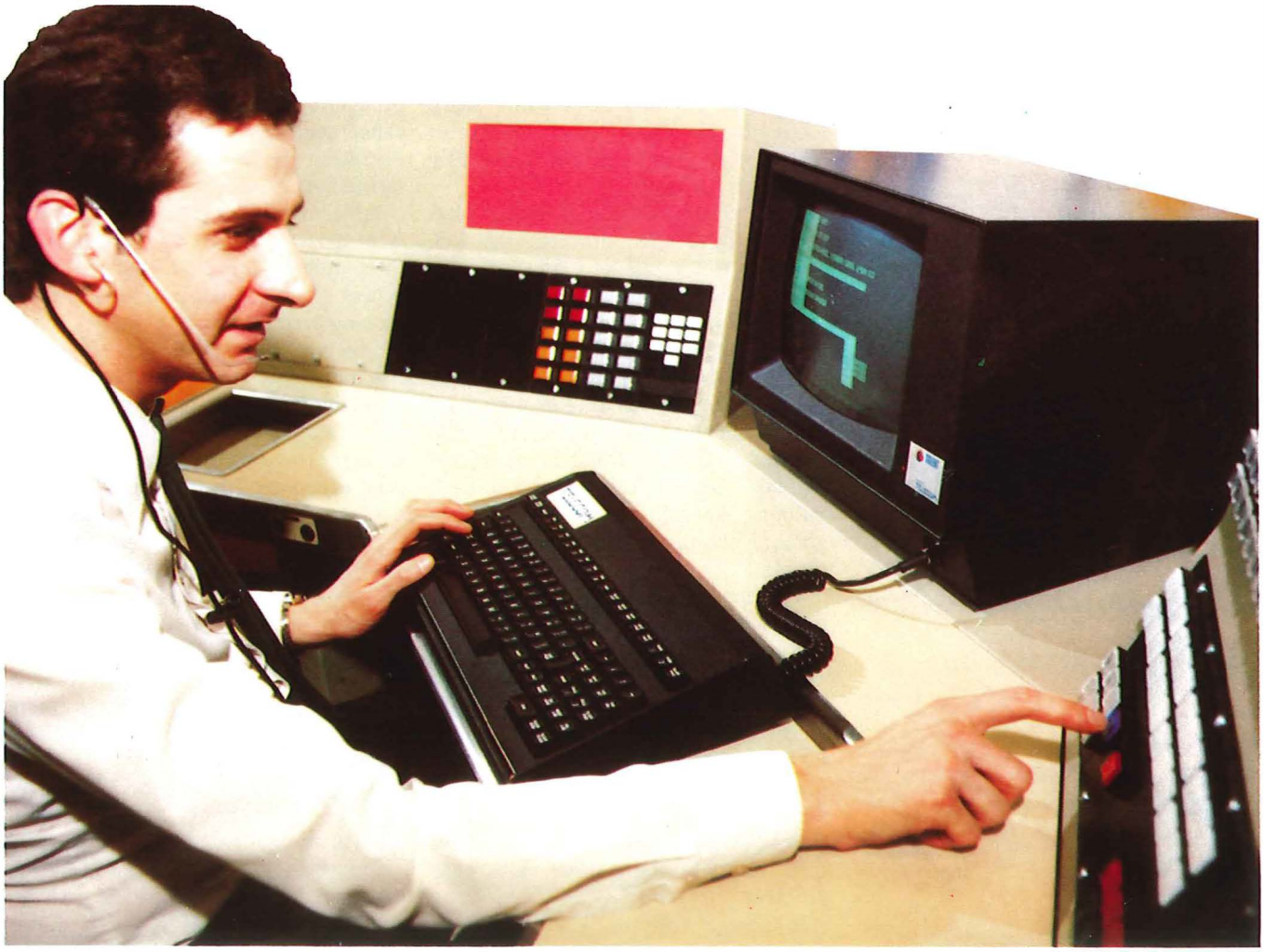
Maurice Newman

Helping the





Coventry Area technician Roy Hewitt checks a printed circuit board used in the Solent call out system at Northamptonshire fire brigade headquarters.



A control operator at a county fire brigade headquarters uses the Solent key panel to mobilise a remote fire station following an emergency call.

fight against fire

British Telecom has a long tradition of providing specialist communications for the emergency services and the latest in a long line of systems based on the most modern technology has been ordered by many county fire brigades. Known as Solent, it was designed to meet Home Office specifications. Solent's flexible design also enables it to meet the needs of other services such as security firms requiring modern methods of controlling remote electrical equipment from a central control point.

Solent – already in use by the Northamptonshire Fire Authority – enables the selective operation of up to eight different switching functions (triggers) at each of a number of remote locations. These functions can be used to ring selected bells, operate a radiopaging system for firemen, open doors, switch on or off electrical equipment and lights and even operate traffic signals. The control operator can speak to the remote station either by telephone or by a public address system at the station and can send a printed message to a simple receive-only teleprinter.

All communications are made over point-to-point private circuits connected to the control in a star configuration and, in the event of failure of any circuit, the equipment automatically switches over to allow standby working over the public switched telephone network.

In a typical fire emergency, calls from the public are routed to county headquarters where the control operator will record details on a visual display unit (VDU) while the caller is on line. The operator can then immediately alert the appropriate fire station by a single press key operation and select which trigger signals are to be sent to that station.

The outstation equipment automatically returns an acknowledgement signal for every one transmitted by control. The operator can then send the incident report via the VDU to the remote station teleprinter so that the firemen have a printed record before they leave the station.

As well as catering for emergency calls, Solent can provide ordinary communications between headquarters and outstation and connections to a PBX or call connect system may be made subject to transmission and signalling acceptability. Emergency calls always take priority.

In all emergencies, reliability is the key factor and this has been built into Solent. All lines are continuously and automatically checked when not in use and any failure of line, equipment or power is immediately brought to the notice of the control. Standby power supplies can be provided at both control and the remote station. Connection to a tape recorder for all spoken messages can be provided at control.

Although Solent was designed initially for fully manual control which is adequate for some brigades, others are now requiring computer-based information retrieval often with full command and control mobilising facilities. These computer systems are compatible with Solent.

For simple information retrieval systems the Solent VDU can communicate with a database providing information on what type and number of fire appliances should attend, the nature of the premises at which an incident occurs and the availability of crews or fire appliances. Larger computer systems provide automatic line selection, message transmissions, and updating databases from fire station equipment responses which release the control operator from detailed control.

Since Solent is a microprocessor-based system, it can readily be configured to meet the varied and unique requirements of many services and is a further example of how British Telecom is responding to the needs of specialist customers.

Mr M. S. Newman is a head of group in National Networks Special Services and is responsible for marketing the Solent call out system.

British Telecom Journal, Spring 1983

Prism - shaping a new system

Amanda Gray

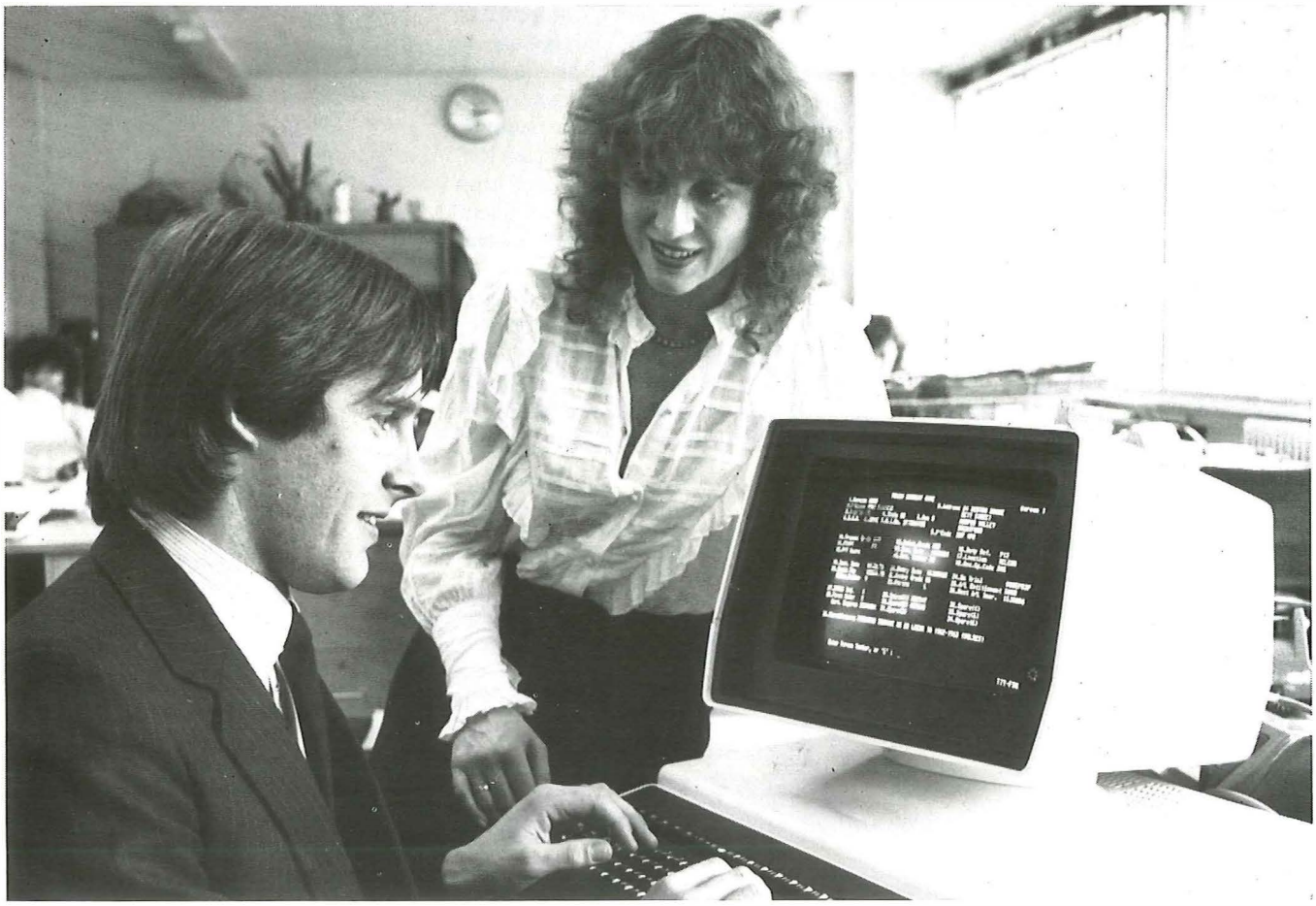
A new staff information system known as Prism is being introduced by British Telecom to speed planning and decision making.

British Telecom's staff are a great asset and a valuable resource which require careful and effective management. But personnel record and information systems are increasingly unable to cope with the needs of the changing business environment. A computerised staff statistics system (Stem) was introduced in 1972 to provide summarised manpower information mainly for use at headquarters level. But Stem has few advantages for local users, did nothing to replace the great variety of paper records in personnel offices and is not versatile enough to provide the statistics needed immediately by local personnel groups.

The need for a new system was illustrated by the independent interest shown by many local users in the small business computer personnel systems which other companies were introducing. To avoid duplication of effort and problems of incompatibility, Personnel Services Department (PSD) co-ordinated research into a suitable locally-based system which would also fulfil regional and corporate statistical requirements with minimum manual effort and maximum efficiency. This has led to the concept of Prism – personnel related information system for management – which has been on trial in Bradford Telephone Area before going live earlier this year.

Prism is a major new development for British Telecom within the field of personnel information. Although it will provide minimal corporate and regional databases, emphasis is on the needs of local users. Personnel units will have 'on-line' immediate access to their own system by using their own dedicated

Author Amanda Gray trains clerical officer John Heaton in the use of the new Prism system.



minicomputer. This means that personnel records, often duplicated and dispersed throughout the unit, will be brought together in one place.

Information will be input to the computer, viewed, interrogated, amended or deleted by means of visual display units in personnel groups, removing the need for paper records in many areas of personnel work and improving the quality of that work. Use of the system means that line management will have ready access via their personnel units to up-to-date and comprehensive information on their manpower resources and current manpower position in a form which local managers can use easily for planning and decision making.

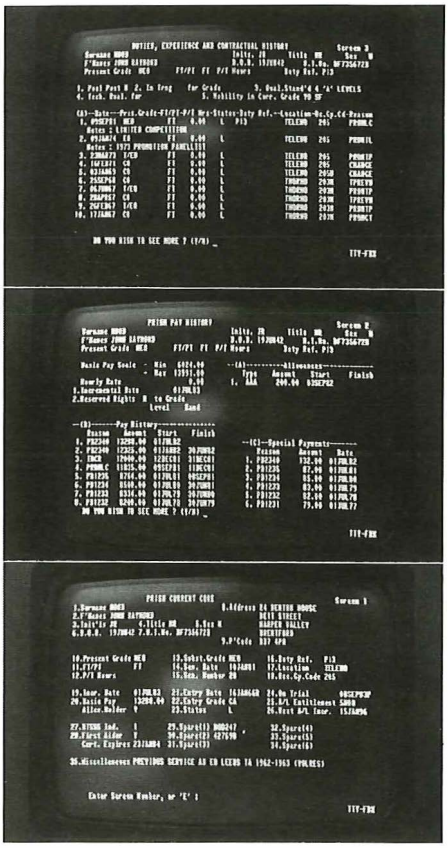
Prism is a modular system, consisting of a central core of information on individual staff linked with interactive modules such as training and education, travel and subsistence, sickness absence and management appointment unit/staff development. Core, and training and education modules have been tested in Bradford and will form the basis of the national system which will also provide regional and corporate databases with information without more local manual effort. Other modules are being developed and will be added to the system.

Although Prism provides a standard package for personnel information, users will have discretion on how much detail they hold on their own system. Adoption of Prism is not mandatory, but units choosing a different computer system will have to provide data in the right format and timescales specified by headquarters manpower intelligence units.

One of Prism's greatest advantages is its 'query language' – the facility which enables staff in personnel units to carry out *ad hoc* interrogations for themselves. Because 'English', the query language used in the system, is versatile and easy to use, specific programs for standard reports have been kept to a minimum. Throughout the development of Prism, suggestions and opinions have been sought from areas, regions and HQ user departments, and the British Telecommunications Unions Committee has been consulted.

Security is inevitably of major concern to management, staff and unions alike. Prism is equipped with several levels of security, including an inbuilt password system which will restrict access to information held on the computer as well as limiting an individual user's ability to view, create, amend or delete data. Pass-

Ken Limbert, higher executive officer, checks the latest print-out from the Prism central processor unit in the computer room.



Three of the ten 'screens' of Prism information held on file.

words will be created and assigned locally by the Prism system manager in each personnel unit.

Access will be restricted to personnel units where VDUs will be located and the system ensures a security of information probably better than the existing manual records. The system incorporates a variety of 'datavets', which will automatically check, where practicable, the validity of an input or amendment. The computer also lists each day's transactions which can then be checked by personnel managers.

A built-in feature is the ability to print out full information about any individual who wishes to check the accuracy of his own record and to be aware of details held about him. This enables them to check the accuracy of their own record and to be aware of the information held about them. From the details provided, individuals can benefit from improved planning of staff development and training that will be made possible.

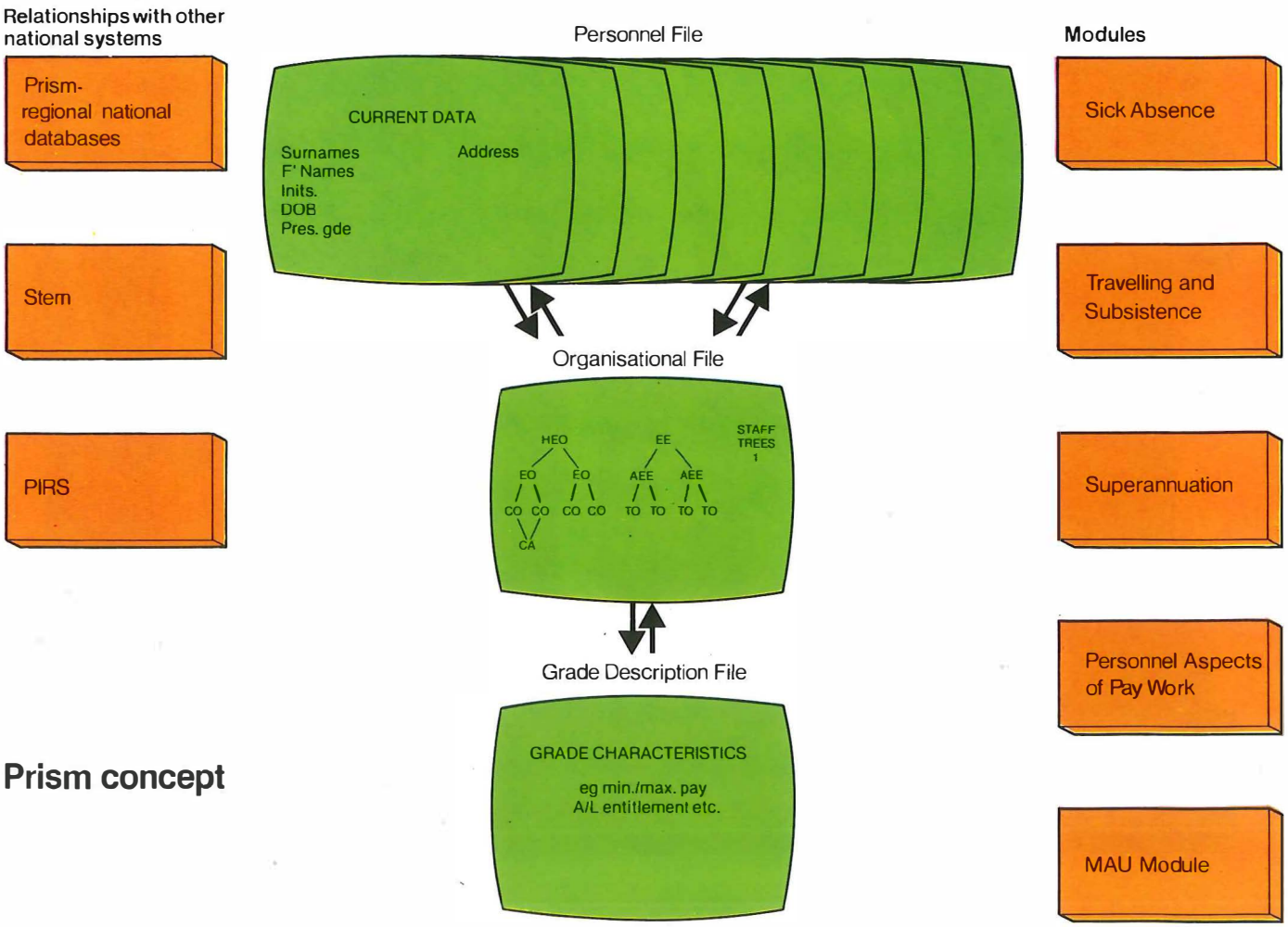
Following the Bradford trial, Inland Division began to phase in Prism nationally, aiming to have the first site installed in every region by autumn, with the first package of core and training and education modules. Implementation in Inland Division should be completed by summer next year with other units following. PSD is co-ordinating the nationwide introduction which is to be carried out by trained teams in each region and in Headquarters user departments. The teams will instruct their own local personnel units in the use of the system and will help units to move from manual to computerised record-keeping where required.

With wages and salaries alone for staff amounting to more than £1,950 million in the last financial year, the Prism personnel record system is a valuable contribution to the efficiency of British Telecom – providing line managers with readily available information. It is they who increasingly have the responsibility of making the decisions that will keep British Telecom ahead of the game. In the end, instant access to manpower information via Prism means a better service for everyone. Ⓣ

Ms Amanda Gray is an executive officer and a member of the British Telecom North East Prism project team.

British Telecom Journal, Spring 1983

Prism concept



Co-operation the key

With increasing use of new technology for British Telecom's main exchange equipment programme, many small suppliers are having to face new problems, not least that of product obsolescence. Here **David Aminzade,** sales and marketing director of Rathdown Industries based at Ascot in Berkshire, describes how British Telecom helped his company upgrade its products and technology.

Rathdown Industries – now a part of the Unitech Group – was formed in 1959. It manufactured such items as piston and carburettor springs for the motor industry, screening cans and chassis details for the television industry and meters for the gas industry. Back in 1970, Post Office engineers, prompted by the company's gas meter on display at a trade exhibition, asked whether it was possible for Rathdown to make a five-digit subscriber's private meter. Most of British Telecom's installed base at that time was four-digit meters which were proving unsuitable for the high levels of traffic generated, especially in exchanges servicing the business community.

In ten years, Rathdown supplied four million meters to British Telecom at prices attractive enough for supply companies to also buy from Rathdown for their main exchange programme. In all, Rathdown made six million meters from 1971 to 1981 and became an integral part of the telecommunications industry.

By 1979, however, it was realised that demand for this product would decline rapidly. The following year would see the exchange replacement programme nearing completion and main exchange suppliers with a reducing workforce were under pressure to pull in so much business as possible. And competitive pressures meant that British Telecom needed to know more about its tariff structure than could be provided by simple meters.

Because the £4 million turnover from this product in 1980 was predicted to fall by half in just one year, Rathdown needed to accentuate its programme to identify new product opportunities to survive and began a planned programme of retrenchment. It looked to British Telecom for a possible solution. After much hard work, an opportunity arose from British Telecom's programme to improve the reliability of the microphone in the 700-series telephone.

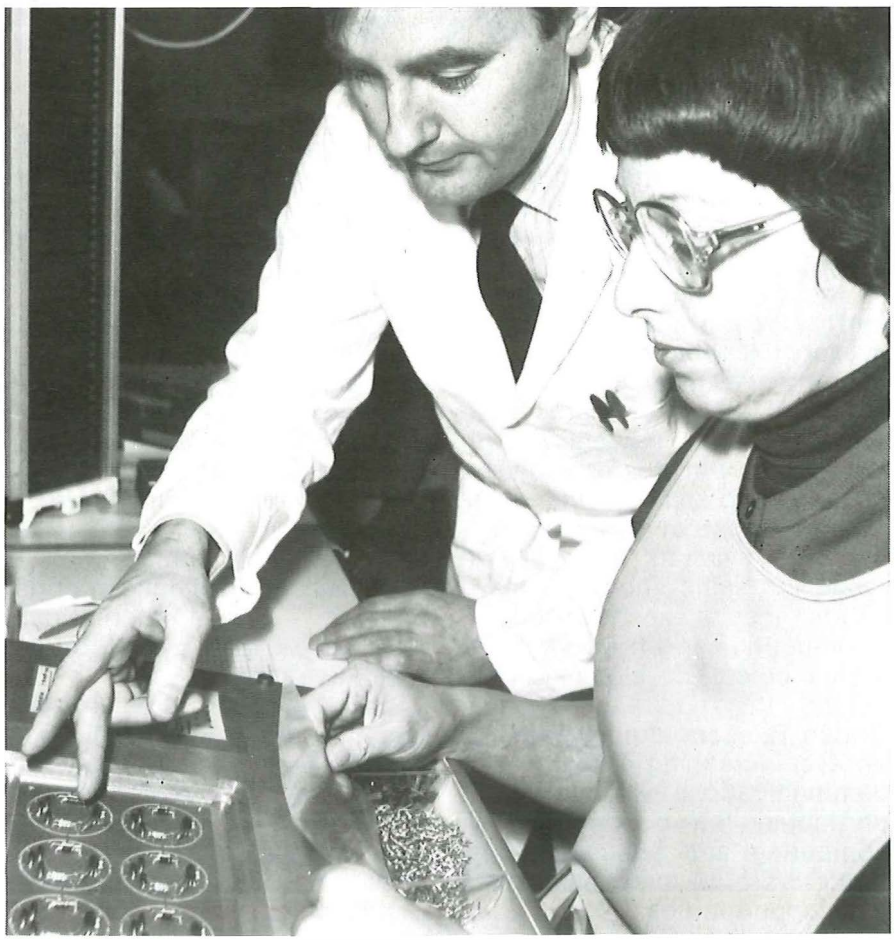
Field reports had shown up the high maintenance cost of the carbon microphone and so British Telecom begun the hunt for a low-cost alternative to carbon. An intensive worldwide search of the latest technologies resulted in a short-list based on an electret device designed by British Telecom Research laboratories and a moving coil transducer designed by AKG of Vienna.

With British Telecom help, Rathdown and AKG got together to discuss the opportunity, which eventually led to a contract being awarded to Rathdown by British Telecom to supply a moving coil version of the new high-reliability transmitter known as a microphone 21A.

First deliveries were made on time in July last year enabling Rathdown to recruit 90 extra staff and to invest in further marketing and engineering resources, providing a platform for just one company from which to face the challenge of the 1980s.

British Telecom Journal, Spring 1983

In under six months, Rathdown Industries changed from supplying parts for Strowger electromechanical equipment to creating a modern assembly line producing the microphone 21A – an essential component in today's telephones. Here Pearl Sommersett checks procedure with production supervisor Jim Doel.



Areas of change

More power and responsibility to local managers reflecting British Telecom's determination to adapt to the changing circumstances of a new communications era . . . this is the main aim of the major reorganisation now taking place in every telephone area.

The changes mean that business activities become more cost-effective and managers will increasingly put greater emphasis on marketing and customer satisfaction. As part of a team consisting of individuals with a wide range of skills they will have shorter lines of executive control.

Competition in an era of rapid technological development lies behind the need for change. British Telecom already supplies an ever-increasing range of new communications services and, in particular, the convergence of computing and telecommunications presents new challenges and opportunities. The market place has changed so radically that to provide an immediate response to customer needs, British Telecom must be able to take decisions as close as possible to the customer.

Area reorganisation is helping to meet these challenges because a centralised organisation cannot respond as quickly or as flexibly as a decentralised one. It was for this reason that Chairman Sir George Jefferson announced in June 1981 the first stage in the exercise – the establishment of four main new divisions in British Telecom – Inland, International, Enterprises (see page 15) and Major Systems.

The changes in area structure began in April. From a study of services that customers wanted, it was necessary to re-define existing Area divisions and to establish new customer-orientated business units. Changes in staffing philosophies have meant that management specialists are now working in mixed groups, rather than within their own disciplines of, say, engineering, sales or administration.

In the past, for instance, sales, traffic, installation and maintenance divisions were all involved in completing a complex order such as that for the provision of a Monarch 120. The risks of delay were not only frustrating for the staff involved, but more importantly, to the customer.

So the key to area reorganisation was to look at the way jobs are structured from the customer's viewpoint. The result of this brings together staff into different groups, each dealing with particular types of customer needs, and each able to see how it is contributing to the area's overall results.

At the root of the reorganisation are profit centres. They are geared to compete in particular markets; to respond to customer needs; account for their own products and in time maybe to even set their own prices. Area general managers will continue to work to regional directors and will be responsible for their area's performance as a profit centre.

With more opportunities to apply for jobs, existing constraints of the hierarchical system are giving way to a search for greater commercial aptitude and awareness needed for many of the new jobs. By providing real responsibilities and the chance to see real results, staff will in future get greater job satisfaction, and will be expected to ensure that the work they do is cost effective.

Areas have three main units – local communication services, consumer products and business systems. Support groups include press and public relations, customer complaints, administration, pay, finance, accommodation, personnel, catering and billing.

Local communication services will have three managers – for networks, exchanges and customer assistance. The network manager will be responsible for everything from the local exchange to the customer, including using, maintaining and ordering cables and equipment, quality of service, selling lines to customers and managing British

Telecom participation in any joint cable ventures. Connection and rental charges will make up the income. Ducts and local distribution plant will be assets.

The exchange manager will be responsible for local exchange services and circuits between exchanges which are not in national network services (NNS). Income comes from locally-dialled calls, transfer payments from through traffic for NNS and BTI and System X star service revenue.

The customer assistance manager deals with operator services and directory enquiries. Income is a portion of operator call revenue, operator service charges.

The second major unit is responsible for consumer products and here the manager supplies, prices, sells and forecasts demand for consumer products – telephones, call-makers and small business systems. Income is from sale of apparatus and prime instrument rentals. Assets include rentals and equipment.

Finally, the business system Manager will be the major contact for large businesses, acting as project manager for services and products, liaising with major account managers and NNS for very large customers. Income is derived from sales and rentals and payments for work done for NNS and BTI.

British Telecom Journal, Spring 1983

The main business of British Telecom relies on the skills of area staff.

Below:
Area policy is formulated at regular board meetings.

Reading Area assistant executive engineer and telecommunications historian **John Duncan** begins a short series of articles with the story of the Electrophone.

SONG, MIRTH & MUSIC.

BY WIRE TO YOUR HOME

See Next Page.

Long before radio and television became popular forms of home entertainment, telephone subscribers were able to tune in to their favourite music via the Electrophone – an instrument comprising earphones held together by a steel band. Performances from theatres and halls in London and other large towns and cities were transmitted live over the telephone network and musical evenings became a popular social event in homes up and down the country.

The story really began more than a century ago, when German scientist, Phillipp Reis, succeeded for the first time in transmitting music with a device made from, among other things, a violin and a sausage skin. Seventeen years later, Alexander Graham Bell patented the telephone and by the 1890s, this had become popular enough for a national broadcast service to be introduced.

Look in the Oxford or Grove's dictionary of music and you will not find a reference to the Electrophone instrument, yet for decades the Electrophone service brought pleasure to thousands of music lovers throughout Britain. Queen Victoria delighted in listening to concerts on the Electrophone in the privacy of her own home and, at Windsor Castle, in May 1899, to celebrate Her Majesty's 80th birthday, a special treat was arranged. Electrophones were turned on in the Grand Corridor, where the Queen invited her family and friends to hold the prong-shaped instruments to their ears, and listen to excerpts from concerts in London. On the following evening, Gounod's opera, Romeo and Juliet, was relayed from Covent Garden for the Royal party.

A long handle held the earphones in place and when not in use the phones hung from hooks on a small wooden table, supplied especially for that purpose, and which was included in the rental.

Two tariffs were available for electrophone hire – £10 and £5 per year. A customer on the £10 rate was given receivers for four persons, instead of two as in the lower rental. The facility operated only at weekends, when most of the telephone trunk lines lay idle.

It was in 1861 that Philipp Reis first succeeded in sending music over wire from his workshop at his home to a house about 100 metres away. Although Reis published a number of papers on his invention, and was invited to demonstrate its powers to the Emperor of Austria, and King of Bavaria, it aroused little interest among European scientists many of whom dismissed it as a mere toy.

Although Reis's instrument could transmit music – ". . . chords and melodies can be transmitted with marvellous fidelity," wrote one newspaper – speech, which consists of a complex series of tones necessary for articulation, posed more difficult problems for the primitive device.

Unlike Bell's apparatus, Reis's machine was by no means manufactured to a commercial standard. His transmitter consisted of a sausage skin stretched

For 2d (less than 1p) a night, subscribers could be connected to a variety of London theatres and from the comfort of their Edwardian drawing rooms, were provided with an evening's entertainment.

Phillipp Reis

tightly across a hollow wooden tube, the tube itself being whittled out of the bung of a beer barrel. A dab of sealing wax held two tiny platinum electrical contacts to the stretched diaphragm. When sound reached the membrane, the metal contacts opened and closed rapidly sending electrical waves along the wires to the speaker some distance away, where the electrical signals were converted to sound.

Reis found that a violin made an excellent amplifier and when set up, produced a high-pitched sound, similar to a toy trumpet. A steel knitting needle was positioned vertically on the belly of the fiddle, above the sound post, and even layers of finely-insulated wire were wrapped around the needle in helical fashion. The two incoming wires from the transmitter were terminated at each end of this coil.

By 1882, the telephone was firmly established as a popular means of public communication. It was now that the possibility of creating a national music broadcast service appealed to promoters and businessmen. In London, the first practical demonstration to transmit music came in 1883. In the lounge of the plush Hotel Bristol in London's West End, 120 Electrophone receivers were installed and for five nights, music was transmitted from the nearby Comedy Theatre.

During the great Electrical Exhibition at Crystal Palace in 1892 a music room was opened to the public, and kept going for six months. More than 60,000 customers were registered through the turnstiles, paying 3d (just over 1p) before 8 pm and 6d (2½p) after, to listen for ten minutes to relayed concerts from London, Liverpool, Birmingham and Manchester. At first, the activities of the Electrophone service were restricted to the metropolitan area but spread as it became more popular.

Improved methods of broadcasting rapidly developed. The best results were obtained by using four transmitters spread evenly across the footlights. Instructions issued to installation engineers warned that transmitters must not be fitted near to the drums or trombones of the orchestra.

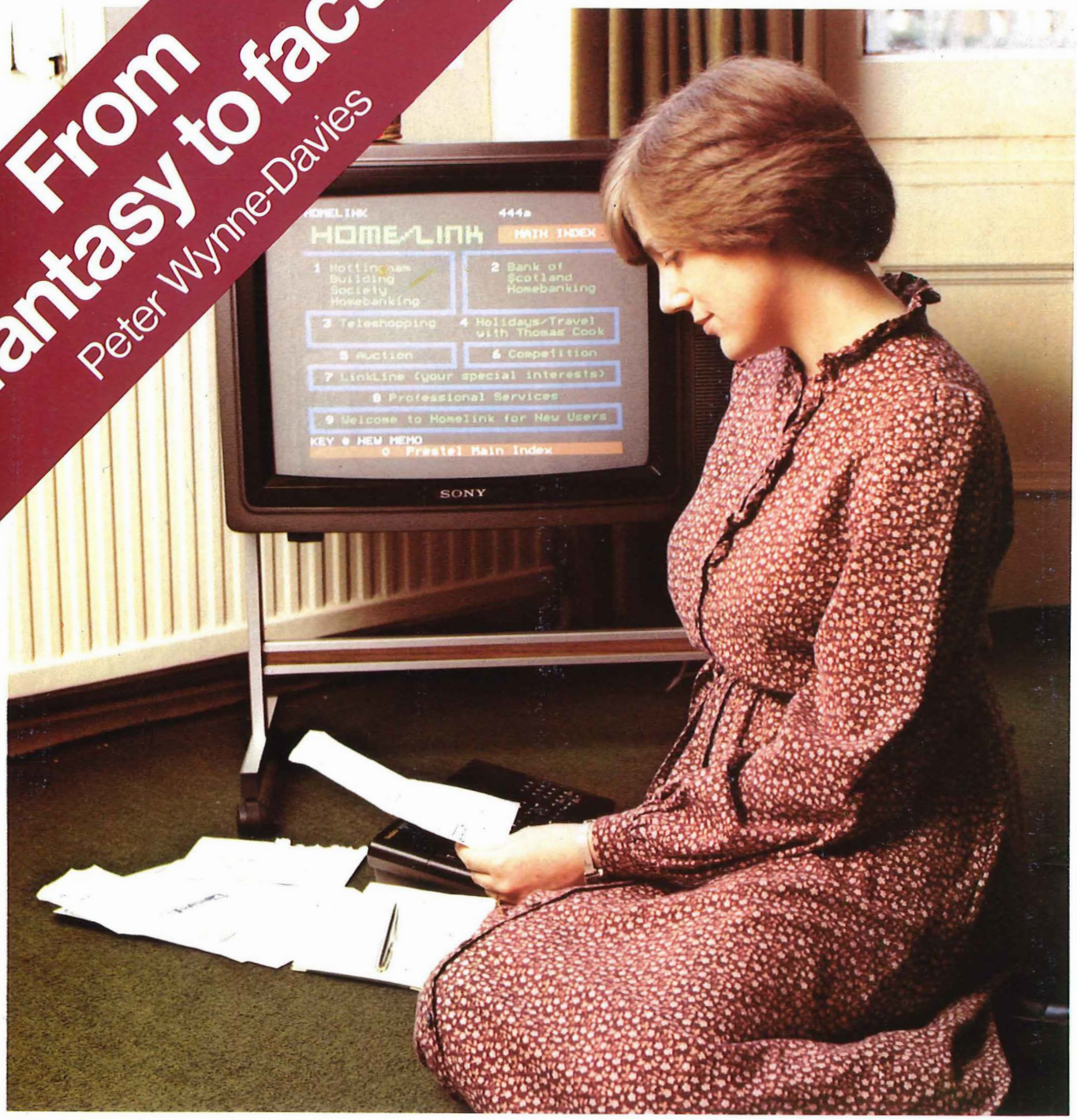
A customer wishing to have a hearing called the local telephone exchange. In turn the operator connected the subscriber directly through to the Electrophone Exchange, in London's Piccadilly. The operator would then ask the caller what he would like to hear, then make the connection with that particular music line. An evening's concert cost 2d (less than 1p).

Demand for the Electrophone service increased steadily, even throughout the 1914–18 war, but the 1920s heralded the death-knell for the service with the introduction of the radio. In 1926, the service was discontinued, and the instruments recovered. The last known Electrophone table, with four receivers was taken from a house in Bournemouth in 1938.

British Telecom Journal, Spring 1983

From fantasy to fact

Peter Wynne-Davies

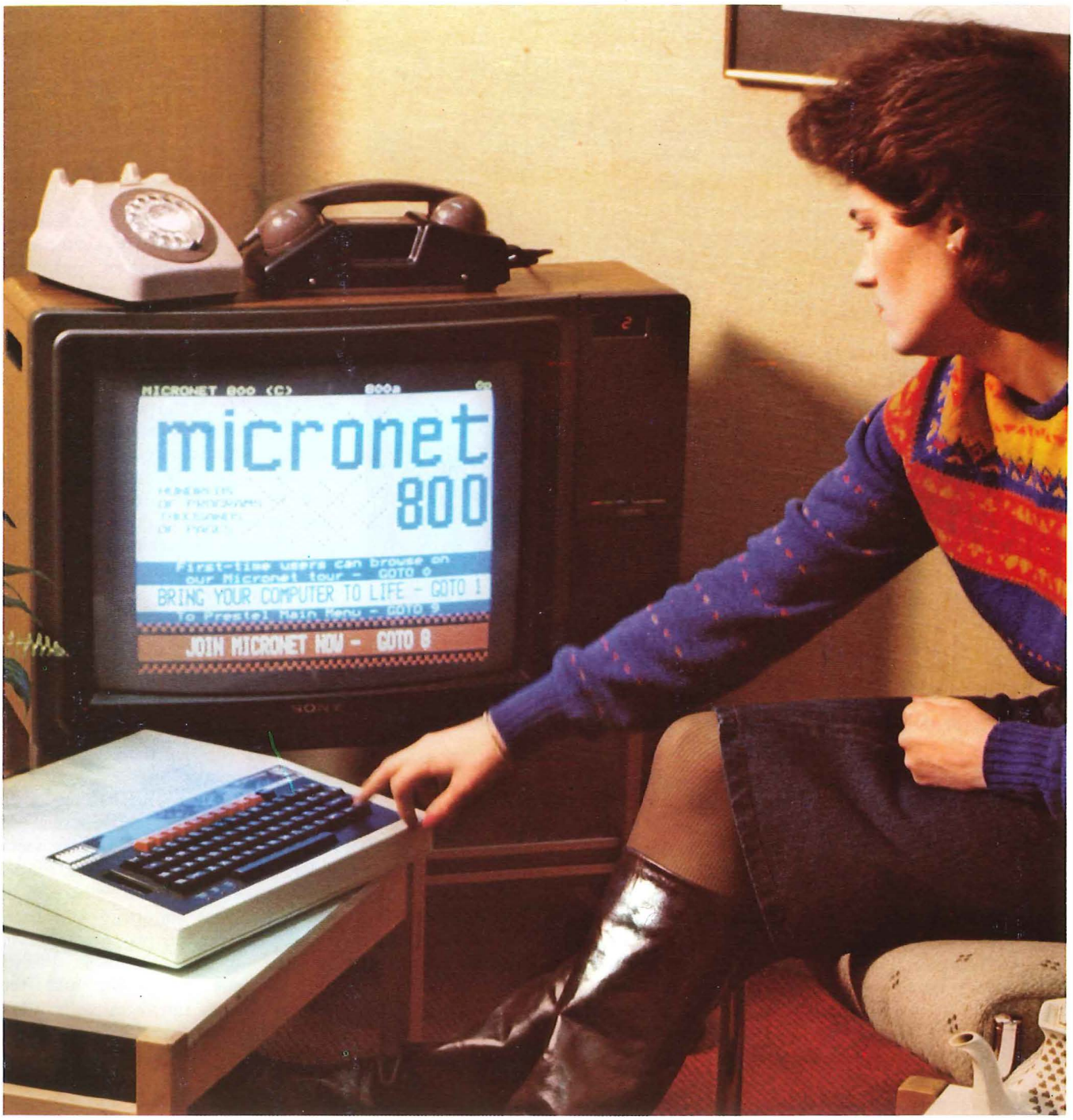


With the use of a special adaptor, Homelink customers have access to a wide range of banking facilities as well as being able to take part in on-screen competitions and auctions.

Twenty years ago the idea of banking and shopping from the comfort of home by using a television set connected to a telephone line was little more than a schoolboy fantasy. Today, thanks to Prestel, British Telecom's viewdata service, it is fact.

In marketing terms, Prestel has undoubtedly been unique. Continuously changing and developing, the product was, and is, extremely hard to define. As much of the editorial influence on the content of the information was beyond centralised control, the presentation of Prestel to the residential market has in the past posed very real difficulties.

The strategy pursued by Prestel in the business field was, however, both simple and successful – that of initially marketing specific information services to key business areas with defined and



Prestel's Micronet 800, launched earlier this year, is the largest service of its kind in the world and provides more than 2,000 programs on a wide range of subjects for the growing number of microcomputers.

special needs. The case of the travel industry, where 80 per cent of travel agents now use Prestel, is a good and telling example of how Prestel can become indispensable in a business context. Other areas that were invaded with degrees of success were the Forex and commodity worlds – once again business activities where the demand for information was very clear and well defined.

But the hurdle of gaining mass public acceptance of Prestel was still to be overcome. The initial perception of Prestel was invariably one of elation as the range of the service's 250,000 pages of data became apparent and then disappointment at Prestel's failure subsequently to answer questions of the most finite detail. The early perception of Prestel as some sort of super teletext service provided in a negative way the exit route from the marketing maze. The formula was that the British public would not buy Prestel simply for its information, but would do so for a joint package of information and interactive services.

The first defined move towards a full range of interactive services aimed directly at the ordinary man was the Homelink system. Banking and the problems associated with the transfer and disposal of money is a chore that is almost universal. The increasing use of automated tellers outside banks indicated that the electronic system brought directly into the home would have enough appeal to ensure success. At a time of increased automation in a traditionally conservative industry and as the traditional roles of both building society and bank become blurred, Prestel launched the most ambitious home banking scheme in the world – Homelink.

Together with the entrepreneurial Nottingham Building Society and the

Already, 80 per cent of travel agents use Prestel regularly in their businesses.

Bank of Scotland, Homelink offers its customers a wide range of financial services which until now had either to be done in person at a branch or by traditional means such as the writing of a cheque. Through Homelink pages, bank and building society accounts can be securely seen on a Prestel screen, money transferred electronically and the most mundane of fiscal tasks such as the paying of the telephone bill can be performed. The Homelink user can transfer funds on-screen in his own home from his building society to his bank and vice versa and even issue or cash cheques if he wishes.

And, as an incentive to think electronically, Homelink customers can take part in a range of competitions and auctions, again on-screen. In short, the system gives customers a bank and building society branch at home. The major benefits are obvious but for those who are infirm or handicapped, Homelink gives an easy way of performing the more difficult tasks of everyday life.

The Homelink venture is a multi-million pound exercise and benefits for Prestel are far-reaching. An increase in residential use of the service over a three-year period by 100,000 terminals has obvious financial ramifications but it also breaks the chicken-and-egg mentality that has dogged Prestel's development from the beginning. From the building society's point of view, Homelink is money well spent. Instead of opening 100 branches over the country at great cost in terms of property and personnel, the Nottingham Building Society, by investing in bricks of silicon rather than mortar, has achieved a greater growth in their investor base.

Prestel's other major initiative this year is to promote home usage. This revolves around another piece of technology that has sustained major growth over the last three years – the microcomputer. More than half a million micros are now in use in this country and all require programs before they can function. The broadcasting of computer programs over viewdata and teletext systems – known as telesoftware – is not a new idea but Prestel's Micronet 800 service, launched in February, is the largest telesoftware facility in the world. Together with East Midlands Allied Press, a publisher of computer magazines, Prestel provides a library of some 2,000 programs on a wide range of subjects – from the obligatory games to complex educational and business programs.

Most microcomputers can be connected to Micronet 800 using a simple modem and associated software. Having selected the program required, the pages are simply called up on Prestel and the screenfuls of software then activate the microcomputer. What appears as a meaningless jumble of letters and numbers on the screen are the commands of life for the micro and the delivery of telesoftware is potentially the most dramatic leap forward in the whole micro industry.

As well as supplying more lighthearted programs, Micronet 800 provides plenty of scope for educational purposes. Schools can link in with other schools and educational users around the country to swap ideas, techniques and even programs that they have written themselves. Business users are equally well catered for with special closed areas of Micronet that can be used for private business communication.

In short, Prestel's move towards a residential market marks another evolutionary stage in the service. What was originally perceived as 'a world of information at your fingertips' has become a series of very specialised information services allied to a growing series of important interactive facilities. Until early this year Prestel meant the supply of fast updated information for travel agency users but with the introduction of Skytrack, Prestel's airline reservation service, there is a move towards interaction.

Linking up the Prestel customer through a series of computer systems to US-based airline computers may seem technically advanced and it is. But for the end customer the interactive benefits of Prestel are that simplicity and user-friendliness are the two keystones of complete commercial success. Prestel will continue to evolve and the introduction of interfaces with other networks – notably the telex network – are no longer test bench dreams. The interconnection of, first private computers with Prestel, and later this year with overseas viewdata systems, will form part of what is the next evolutionary stage.

The technology that allows a Prestel user to send a message instantly to a friend at the other end of Britain, book a theatre seat, pay a gas bill and work out a complex educational problem all without leaving the fireside chair appeared Orwellian in approach in 1963. Twenty years later the technology and its real benefits appear more benign.

Mr P. Wynne-Davies is Public Relations Officer for Prestel.

British Telecom Journal, Spring 1983

A major Enterprise

Recent years have seen major changes in the structure of British Telecom. Currently there are four main divisions – Inland, International, Major Systems and British Telecom Enterprises – and in the next few issues *British Telecom Journal* will be looking at the role of each one as the business responds to the commercial and technological challenges it now faces.
The first article looks at British Telecom Enterprises (BTE) set up 18 months ago to market new products and services, develop existing ones and to exploit fresh business opportunities.

The basic telephone service is the central and dominant product of British Telecom, but because of its immense scale, its operations have to be broken down into separate geographical regions. But British Telecom also embraces a variety of more specialised national businesses, such as the provision of private automatic branch exchanges (PABXs) on firms' premises, its range of telephone instruments, telex machines, Radiopaging, Radiophone, Prestel, and Yellow Pages. All these activities are already open to competition, or will become so shortly, and before the creation of BTE they were managed and operated through the same regional chain of command which ran the basic telephone service.

Although the activities are small in comparison with British Telecom as a whole, with a turnover of hundreds of millions of pounds a year rather than billions, they are large by normal standards and have great growth potential. It was felt that if they remained part of the organisation of the basic telephone service they would tend to be overshadowed by it. The aim now for BTE is to promote these businesses by providing a degree of independent management, while retaining close links to British Telecom as a whole.

Like British Telecom itself, BTE is divided into four main parts which correspond to the four main markets in which BTE operates:

★**British Telecom Consumer Products:**
Telephone instruments, answering machines, callmakers, and related equipment which can be sold by mass marketing methods.

★**Merlin – British Telecom Business Systems:**
PABXs, telex machines, teleprinters, modems, and integrated office systems.

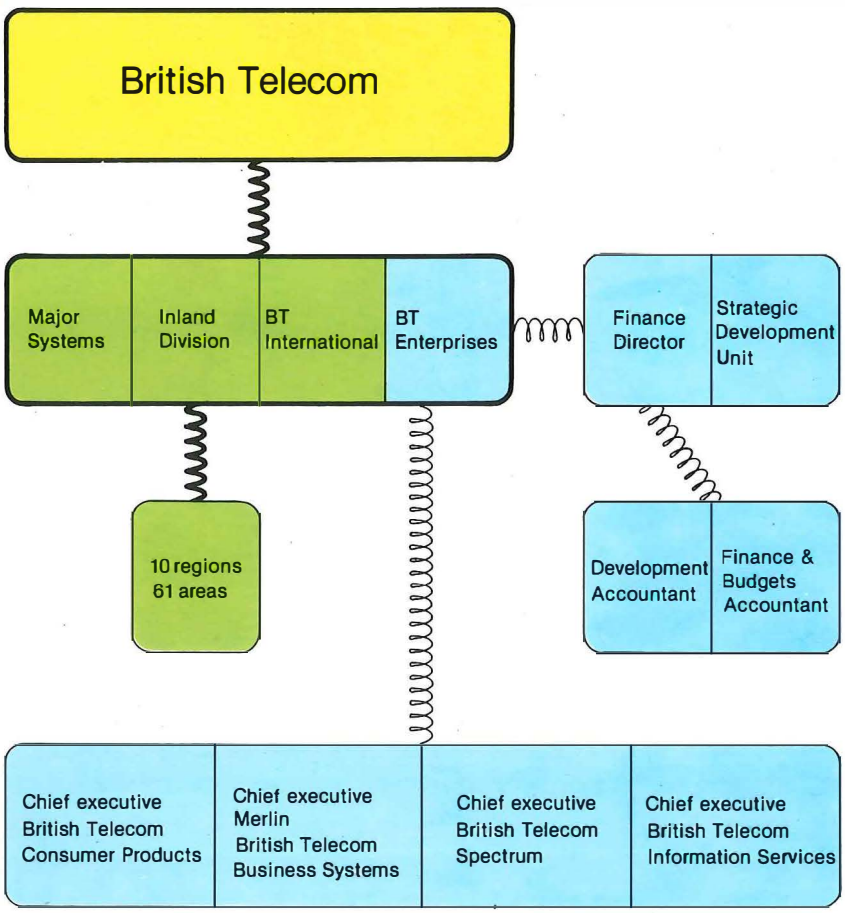
★**British Telecom Spectrum:**
Radiopaging, Radiophone, Telecom Gold, Telecom Tan and other specialised services.

★**British Telecom Information Services:**
Prestel and Yellow Pages.

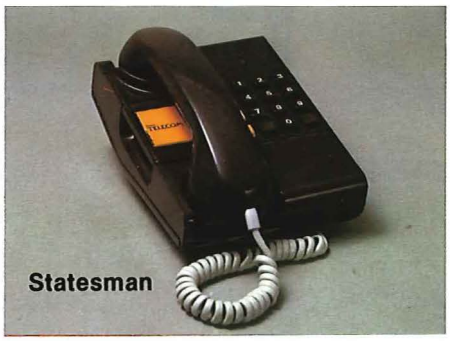
BTE is operating in fully competitive markets, and its objective is the normal commercial one of achieving profitable growth. This objective will be pursued within the cash flow constraints laid down by the British Telecom Board, and each major capital investment will have to meet Treasury criteria for financial return. The intention is that BTE should stand on its own feet financially, as should each business within it.

Although an integral part of British Telecom, BTE will have its own set of accounts, and will be run as a profit centre. The pursuit of profits however, is ▶

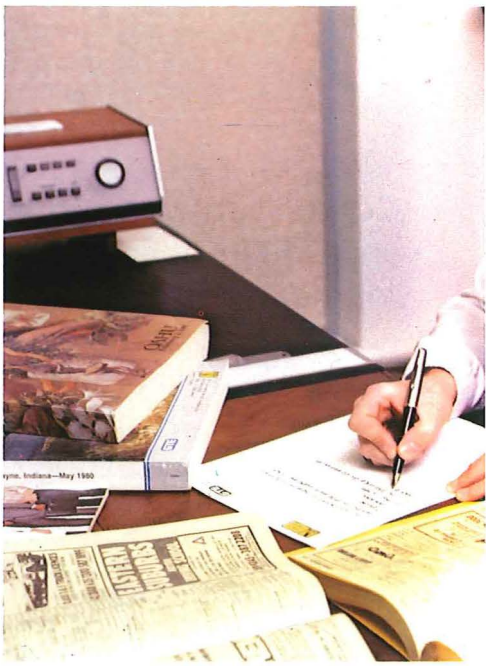
British Telecom Enterprises and how it fits into the organisation

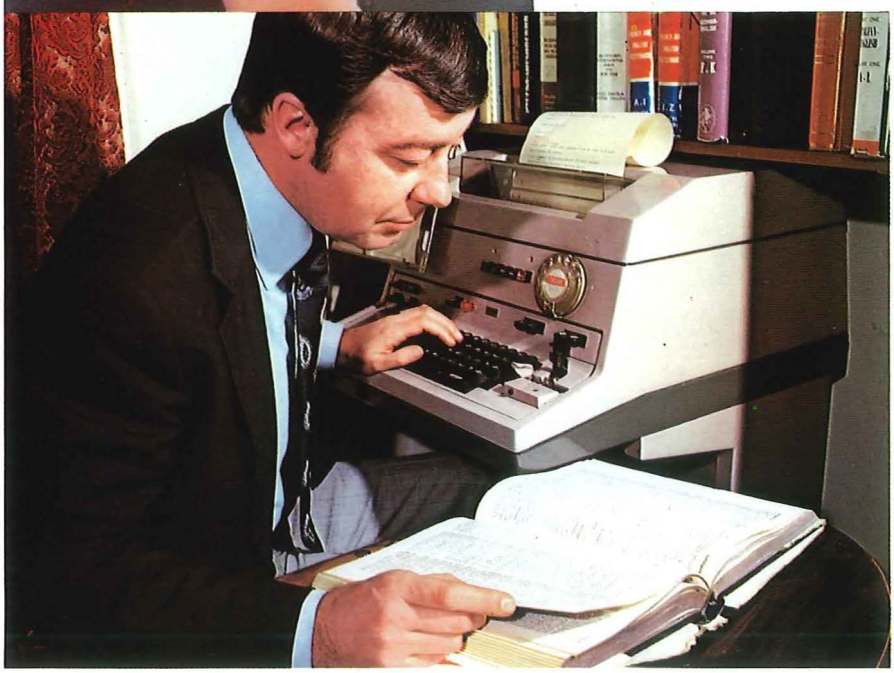


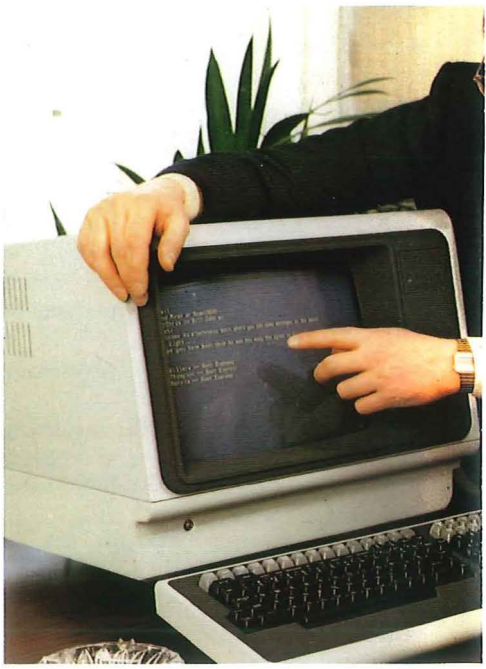
Ambassador



Viscount





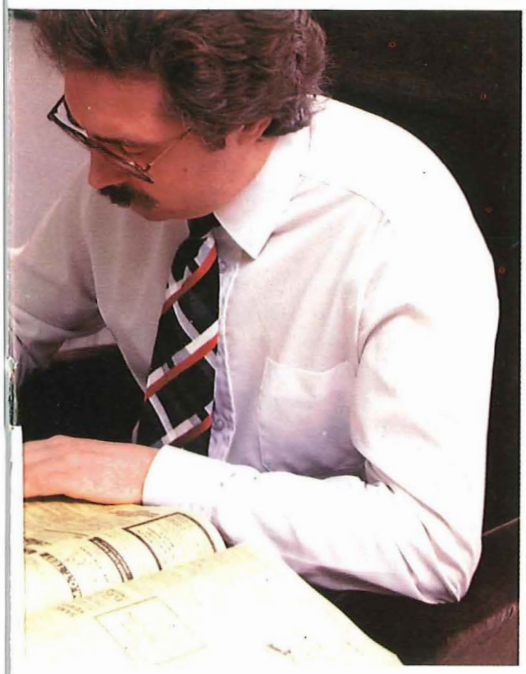


Above left:
Ambassador, Statesman and Viscount are three of the most popular phones available from British Telecom.

Left:
British Telecom's national radiopaging system allows the man on the move to be contacted virtually anywhere in the UK.

Below left:
The number of telex connections in the UK is expected to exceed 100,000 by the end of this year.

Below:
The simplicity of the electronic mail service is demonstrated to a customer.

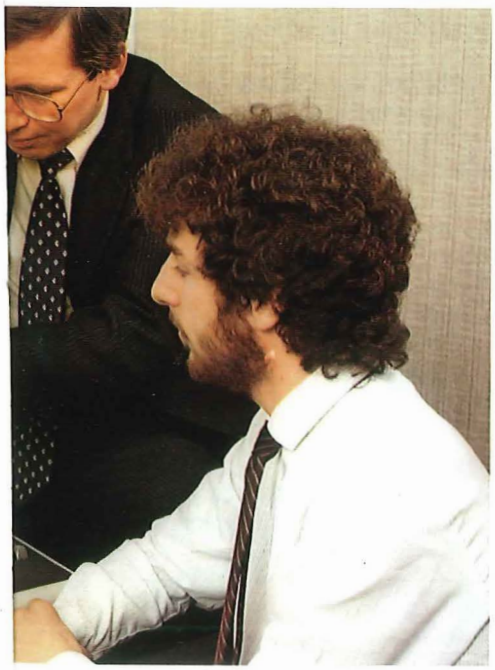


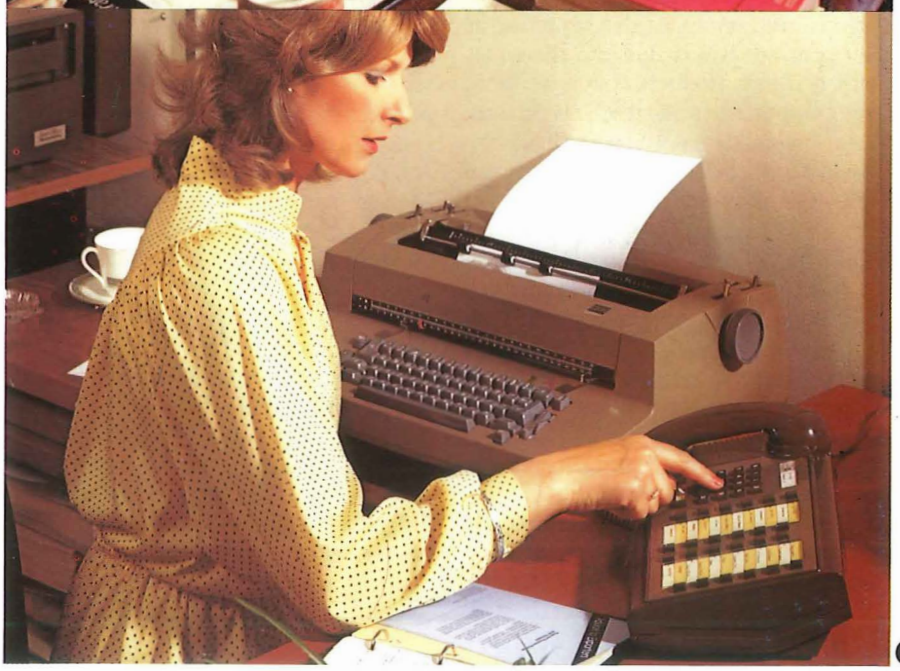
Above:
Display presentation of British Telecom's Yellow Pages directories is compared with similar publications from around the world.

Above right:
Most of Britain's major conurbations are now covered by British Telecom's Radiophone service.

Right:
A vast range of information can be brought into homes and offices by British Telecom's Prestel system.

Below right:
Herald is one of the modern switchboard systems now on offer from British Telecom.





not in conflict with either good service to the customer or good conditions of employment. BTE sees itself as a business whose future profits depend on providing excellent service to its customers and excellent conditions of employment for its staff.

British Telecom Consumer Products acts as a marketing distributor of telephone instruments and other small attachments, such as answering machines and callmakers, to the British Telecom Inland Division and to British Telecom Merlin. Its aim is to extend its business by direct sale of 'plug-in' telephones through mail order, and by acting as a wholesale supplier to retailers in the private sector.

The total UK market for telephones – currently around four million a year – is expected to grow substantially. The change to electronics is dramatically reducing lifetime costs, and is making a wide variety of terminal features available. Low cost, high reliability and increasing plug and socket connection will tend to move the market towards disposal rather than repair, and will go a long way to streamline installation.

There will also be a growing residential and small business market for more complex telephones providing intelligence, memory, and display facilities, which will converge with the home electronics market. Consumer products will also provide a range of decorator phones with fashion styling or fun appeal.

Merlin – British Telecom Business Systems – is the marketing arm for business customers' premises equipment. With ever-increasing convergence between conventional telecommunications, data systems and business systems generally, Merlin's products and systems are getting harder to define as they continue to expand into the wider market. Many products now work more like computers, and there is greater accent on software designed to make the best use of them. Today's terminals can remember numbers, remind operators of calls, send data on the public switched telephone network – all in a fraction of the space needed by older equipment.

Merlin has a special role in meeting competition in its newly-liberalised markets. Its mission is to improve British Telecom's share as well as to lead the technological revolution in its field.

In the same way Ford Motor Company co-ordinates its main dealers as trading partners, Merlin, with its branded products, orchestrates the local business trading programmes of the telephone areas. These products include private exchanges – a competitive Merlin range stretching from very small and larger electonic switchboards in what used to be the monopoly sector, but now also embracing very large PBXs in the major switch market, previously closed to British Telecom.

Then there are telex terminals like Puma and Cheetah as well as datel devices that can accept teletex and visual information from customers. Merlin has also started direct trading on equipment that calls for special sales and services equipment. Plans are well advanced for launching the first of these products during this spring and although this side of the business will be growing, it will always remain complementary to the role of British Telecom telephone areas.

British Telecom Spectrum is responsible for 'value added services.' These customer services are critically dependent on effective use of telecommunications. They may do this by providing communications services which are more specialised, or more elaborate, than those provided by the basic telephone network; by performing, on a bureau basis, existing activities (such as order-taking, telephone selling, or telephone answering) which would otherwise be carried out by a customer's own staff.

The largest service within British Telecom Spectrum is Radiopaging, which allows a person to be alerted when away from the telephone. Calls to pagers are dialled direct, using a signal which alerts only the required pager, causing it to 'bleep'. This is followed by some prearranged action, such as phoning the office. Reception is possible throughout virtually the whole of the UK, and the pager is designed to be carried easily in an inside pocket or on a belt. The system is much the largest of its type in the UK, and is one of the largest and most advanced in the world.

The Radiophone service also provides telephone communication to thousands of vehicles in the UK. An automatic version of the service was launched in London in 1981 and this allows customers to dial directly from their vehicles, throughout the UK and abroad.

Telecom Gold is an electronic mailbox service, which was launched in March last year. It already has more than 1,000 users. Telecom Tan is a computer-assisted answering service, based in Bristol. During 1983, Telecom Spectrum will launch Telecom Red (an alarms business), Telecom Silver (credit card verification), Telecom Telemarketing (telephone selling), Talkabout (a group conversation service), and Telecom Sapphire (radiophone mobiles).

British Telecom Information Services runs Yellow Pages and Prestel. It is using these as the core for a growing business in the fields of publishing, information, and advertising – on paper and in electronic form. This year a new business is being launched jointly with Spectrum called British Telecom Cable Interactive Services with the aim of selling interactive services to cable operators drawing on the existing business within Information Services and Spectrum.

Yellow Pages were launched in 1965, and cover the whole country with 67 volumes, produced annually. They are used by eight out of ten adults, and have become established as a major classified advertising medium. British Telecom is responsible for all aspects of these directories, and contracts out the obtaining of advertisements to ITT World Directories (UK) Limited and GTE Directories Limited. Each year, about 250,000 advertisers use Yellow Pages.

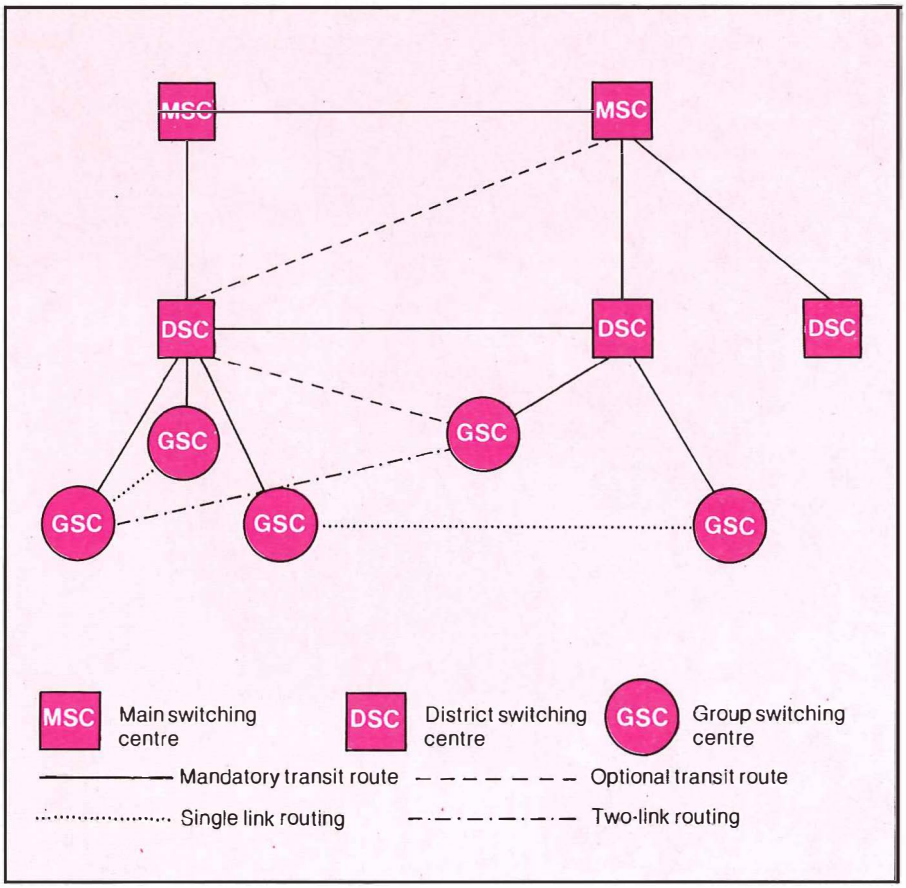
Yellow Pages also launched two new products last year – Europages, a business-to-business directory for importers/exporters in the EEC and Commercial Names and Numbers, a mailing service for direct mail agencies, advertisers and market researchers.

Prestel, British Telecom's world viewdata service linking special television sets and terminals to computer by telephone line is also increasingly used for electronic mail, ordering goods, and other transactional services. There are 25,000 sets in the UK and around the world connected to the Prestel world service, which holds 200,000 pages of information, supplied by 580 information providers.

BTE is a sector of industry which is booming even in recession, and which is teeming with new products and services. Already telecommunications is a vital part of everyday life and in the next 20 years it will become even more apparent, as it extends its applications into shopping education, medicine, transport, publishing, banking and manufacturing.

The challenge for BTE is to seize these opportunities, and turn them into profitable business in the face of fierce competition from the private sector. Of great importance to BTE will be its contact with its customers, improvement of its financial information systems, and its increased productivity. It is equally clear that BTE brings very great strengths to the competitive market: its unrivalled technical knowledge of telecommunications, its skilled staff, and its enormous customer base. BTE's aim is to produce growth rates and profit margins comparable with leading firms in its sector.

A computerised traffic routing and management system (Trams) has been developed by British Telecom's Data Processing Executive to keep track of routing changes and to forecast main network traffic during the transition from analogue to digital network.



Main network configuration.

As planning for System X and its digital network progressed, it quickly became evident that maintaining control during this transitional period was going to be difficult. The existing analogue main network, which consists of group switching centres (GSCs), district switching centres (DSCs) and main switching centres (MSCs) together with their connecting routes, is being replaced by the new digital network.

Because of this, traffic routing from originating GSC catchment areas to destination national number groups (NNGs) is continually changing. As a result, traffic on the mixed analogue and digital network will rise and fall annually in a way which cannot be forecast normally. The solution was to develop a computer system to help.

Since the countrywide introduction of STD it has been possible to dial from any local exchange to any national number group. The call is routed first to a GSC on the junction network. This is not considered by Trams. From the originating GSC, the call uses the main network and its path can either be relatively straightforward or highly complex. It can go direct to the GSC which is the parent of the NNG and is known as single link routing. If a single link routing does not exist, a two-link routing may be employed and this would use a third GSC as a tandem. If this is not possible, the transit network is used. This is a three-tier hierarchical network whose top level is fully interconnected.

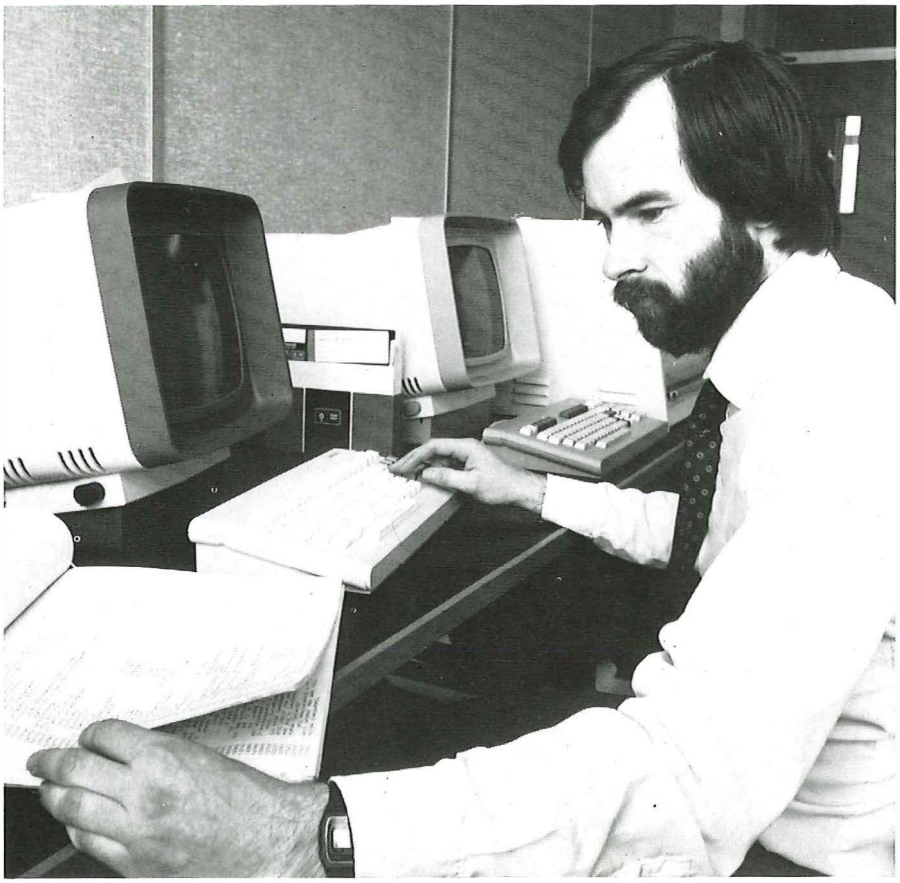
As well as the mandatory links shown in the diagram, there are also optional ones such as GSC to non-parent DSC links. The routing from originating unit to NNG is therefore not straightforward and can use many tandems. There is only one routing path for any one GSC-to-NNG routing so there is no dynamic routing for individual calls. But with about 450 GSCs and 750 NNGs there are clearly many routings. Trams will detail all these, as well as the destination NNG and tandems.

Full STD has meant far fewer routing changes and although the network is fairly static, there are still some changes, details of which are held by Trams, resulting mainly from the run down of the transit network.

The other important facet of the problem is traffic. Details of originating traffic from a GSC on the main network is held by Trams. Less is known about where the traffic is going, but destination analysis will provide the percentage distribution to each NNG and every GSC. Trams will also hold information about this traffic distribution and by multiplying the originating traffic by it, traffic on a given routing can be calculated. Because growth in originating traffic is held, anticipated traffic on the routings is known. Distribution of traffic is assumed to remain constant from year to year as call

Jim Sawyer

TRAMS ON LINE



Author Jim Sawyer checks a Trams program on a small business computer.

destination patterns do not change significantly. But if overall traffic volume varies – the total originating traffic can easily be amended and updated routing traffic derived.

If existing routings were to remain fairly static there would be little need for a computerised system to record them. But the whole of the existing analogue network is to be superseded by digital working by 1992. The digital network will overlay the analogue which will wither as digital grows and takes over. The first main network exchanges are to be brought into service this year and this schedule of work represents the most formidable ever planned for the main network – far more demanding even than the introduction of full STD.

The shape of the digital network will be much simpler than the analogue but the two will exist side by side for many years. As it is vital to know what demands will be made on both networks at every stage, analysis of traffic on individual routings is the best way of providing this.

The digital network can be considered as a two-tier network similar to the existing three-tier transit network. The top tier consists of 60 digital main network switching units (DMSUs) and these will be fully interconnected. At first, this was all that was planned for the main network and would have meant all local exchanges being connected directly to one of the 60 DMSUs instead of the 450 GSCs as at present. It has since been decided, however, to concentrate local exchanges on digital principal local exchanges (DPLEs) which can be said to form the lower tier of the hierarchy and roughly equate to GSCs.

Trams has been designed to hold details of existing analogue routings, ultimate digital routings and all intermediate routings to be implemented in the transition period. During this time, regular assessments of traffic flow will be carried out and this information will be used in analysis programs to control the introduction of the digital network.

The system consists of three main files:

★ *The routing file* which contains details of the originating unit of each routing together with the destination NNG, traffic carried and the tandems employed to complete the routing.

★ *The route file* which contains details of all routes connecting main network exchanges. This data is used to check the validity of a routing. If a routing is designated, say, to go from Bristol to 0532 (Leeds) via Birmingham, there must be routes from Bristol to Birmingham and Birmingham to Leeds.

★ *The event file* allows for bulk updating of routing changes. The opening of new digital routings are dependent on many things but one of the most important is the availability of its routes, and routes are dependent on the opening of exchanges. An 'event' is the opening of an exchange or a route, and a date is associated with the event.

Trams data has been collected from a number of sources. Information on analogue routings and traffic has been transferred from the transit network computer system and route details have been copied from the annual schedule of circuit estimates (ASCE). Ultimate digital routings and transitional routings have subsequently been generated automatically by Trams. This has saved a great deal of manual input and it is also hoped to generate the transitional routings which use a mixture of analogue and digital units.

Mr J. Sawyer is a systems analyst in Data Processing Executive's System X section but was formerly in long lines section where he was responsible for designing Trams.

British Telecom Journal, Spring 1983

Keeping pace with the many changes now taking place throughout British Telecom is vital for those responsible for staff development and attitude. Because of this, a completely new approach to training has resulted in the introduction of two very different training courses. In the first, **Bernie Stewart**, head of the training, surveys and projects section in Occupational Psychology Division, explains the philosophy behind his new training initiative. Called the '3Ls' course, it is an experience he describes as a . . .

Deep in the heart of the Northamptonshire countryside, Wadenhoe House has provided an ideal setting for the first of the '3Ls' courses.

. . . new focus in training

Improved interpersonal skills and a notation technique which helps people to greatly improve their memory recall and significantly increases their reading effectiveness and learning efficiency are the bases of the 3Ls course – a title derived from its objectives: learning to learn, learning to listen and learning to liaise. The course results from a radical change in training approach and outlook and takes a new look at the 'core' skills needed to conduct staff training in the whole of British Telecom.

For several years a major function of Occupational Psychology Division has been to help trainers evaluate their effectiveness. A disturbing result of this work was the discovery that apparently excellent courses sometimes produced less effective results than they might have. However well thought out the courses are, highly competent tutors can still fail to get the message across. Even more disappointing was the extremely low level of change in the behaviour of course members after leaving the course.

Given the financial and operational cost to industry of training, this discovery is clearly serious. Yet the root cause is beguilingly simple – people are sent on courses with the objective of learning but are never taught how to learn. Indeed, most people during years of formal education at school or college spend many hours being taught to read, to write, arithmetic, the arts and the sciences. But no matter what the subject learning success will have been largely determined by memory processes aided possibly by note taking and the effectiveness of study techniques.

It seems obvious that the first prerequisite of successful training is not

just to teach people how to learn and benefit from formal training but also from their job experiences. Having established that many people do not know how to get the best out of training, the basic skills needed for success become glaringly simple. They are learning, listening and liaising.

About 90 per cent of the information a human being receives arrives via two senses – seeing and hearing. In practice this means responding to printed information presented visually and information heard in interviews and meetings or over the telephone. It was for these reasons that helping people learn how to process and analyse complex information and helping them learn the skills of listening were identified as key objectives. 'Listen' then becomes more of a meaningful instruction.

Liaising skills – such as required in day-to-day contact with others are often assumed in the same way as listening and learning. But who is ever taught to:

★ Ask questions?
★ Get information from others?
★ Analyse social situations?
★ Get others to listen?
★ Get agreements?
★ Present arguments?
★ Criticise arguments constructively?
★ Build and maintain relationships?
★ Cope with conflicts?

The skills of learning, listening and liaising are totally interrelated. All the work carried out in this field shows that these learning skills need to be linked and unified. Learning is a skill which is dependent on listening for information and is seldom, if ever, applied for its own sake. Learning should be a conscious process aimed at improving communications with others, always taking the opportunity to learn from that liaison. Listening is the opportunity to learn every time information is presented and is the key to good liaising skills.

The course emphasises practical experience with formal lectures kept to a minimum. Skills are introduced by basic instruction from tutors and are developed by exercises and discussion. They are also introduced, practised and built on gradually rather than on a one shot basis. So an exercise to practise a newly-introduced skill will also mean that course members have to use other skills acquired earlier in the course.

Learning and listening skills come first. Once discussed, the principles of using them with the skills of liaising are presented, and are then explored, practised and developed in a series of role-play and real life negotiation and problem-solving exercises where a balance is kept between one-to-one,

British Telecom psychologist and '3Ls' tutor John Luff (right) runs through mind map theory with two students, Peter Williams, a tutor at the Bournemouth sales college and headquarters accountant Eddy Barrett (centre).

Kath Sullivan, a Manor Gardens, London management college tutor, completes the workbook provided for every student.

3Ls – course aims

Learning

- A better understanding of how one functions psychologically.
- Greatly improved recall based on a totally different approach to memory, creativity and note taking.
- Better information-handling techniques including far faster reading speed.
- The ability to analyse and learn in interpersonal situations.

Listening

- An understanding of the skills in listening.
- Feedback on one's level of listening ability and techniques for improving listening.

Liaising

- A framework for analysing, preparing for and understanding interpersonal situations.
- Techniques for improving performance in such situations.
- Detailed practice and feedback in using liaising skills.

Situations are assessed and closely monitored by tutors. Here principal psychologist Bernie Stewart records student reactions on videotape for later discussion.

small-group and inter-group situations.

Every effort is made to ensure that the course meets the needs of individual course members. Extensive use is made of video play-back, tutor feedback, and self-analysis questionnaires, all of which are aimed at maximising the course members' awareness of their styles, approaches, and techniques.

Similarly, each course session is accompanied by a guide where members record their experiences. As part of the learning to learn process, the guides also contain exercises linked to handouts asking course members to respond actively to what they are seeing or hearing by reviewing it instantly.

By the end of the week-long course, students should have developed a better understanding of how he or she functions psychologically and should have acquired greatly improved recall based on a totally different approach to memory, creativity and note-taking; better information handling techniques including far faster reading speed and the ability to analyse and learn.

By now it may be clear that the traditional role of 'instructor' is not appropriate for those who tutor on 3Ls courses. Indeed the 3Ls course is designed to help people to be more aware of, and to develop, themselves. Course members are encouraged to review critically their experiences and to learn actively from them.

The course aims to help the student learn for himself and develop his own practical skills.

Training for 3Ls tutors requires an in-depth understanding of the theory behind the skills needed and incorporates practical experience in helping people to learn them. Tutors are trained to act as 'partner-guides' who, by providing advice and answering questions, help the course member to learn.

A panel consisting of British Telecom Management College trainers are working with Occupational Psychology Division as the first stage in integrating the 3Ls course into mainstream training. Opportunity is being taken to take a fresh look at the philosophy of core-skills training and the way it is programmed and presented.

Anyone who has to handle complex information or has in any way to deal with others is welcome to apply for the course. It is run for a wide range of people – from engineers to personnel management, auditors to contract negotiators.

The course has included basic grade technicians as well as some of British Telecom's most senior managers. This mixture adds breadth and depth to the discussions, learning, sharing and insights which are so important on an interpersonal skills course. Demand is already high and where there is sufficient interest from a particular unit, it may be possible to provide a special 'one off' course to meet demand.

"You cannot teach a man anything . . . you can only help him to learn". Perhaps the 3Ls course may have learnt something from Galileo . . .

On course with micros

On the basis that a well-informed manager is better able to make a decision on the use of new computers and computer systems, the residential telecommunications management college at Bexhill in Sussex has developed a two-day course to introduce managers to the concept of computers as a management tool. Here Bexhill tutor **Trevor Havelock** and senior tutor **Mike Vernon** outline thinking behind the course.

The mighty microprocessor is now beginning to make its impact felt in the office, in industry, and now even in the home. The business world in particular has been turned upside down by the introduction of new technology, and the potential value to managers is only beginning to be tapped.

It was with this in mind that some Telecommunications Management College tutors decided in the late 1970s to look at the possibilities of incorporating basic computer knowledge into management development and training. Main frame computers were already being widely used throughout British Telecom, and personal computers – known throughout the

Part of the course concept is to provide regional workshops. Here, BTL Rodwell House tutor John Brock (right) and Ted Brittain from Bexhill give local students some 'hands-on' experience.

organisation as small business computers (SBCs) – were beginning to spread. Tutors at TMC realised that this reflected the revolution in the computer world and would have an ever-increasing effect on general management throughout British Telecom.

Acknowledging the impact all this would have, TMC ordered an SBC from Data Processing Executive which was duly delivered early in 1981. A Casu super C, the computer was soon put to use by the graduate engineers among the Bexhill tutors. Once they had got to grips with the equipment, they were soon teaching the other tutors how to use it. The new computer came complete with a supply of programs which were suitable for classroom demonstrations.

Before long, course sessions had been modified to include reference to the SBC. It was soon clear that while a few students were familiar with the machine and its possibilities, some had never considered the use of a computer as a management tool. Others said that although there was a computer in their office, they did not know how to use it. In some cases, staff were using a machine but did not understand what was happening. The need for a special short course to introduce computers to managers was becoming all too clear.

One of the first tasks of the newly-set up team at Bexhill was to analyse the full range of training needs. This meant speaking to students passing through the college as well as to senior managers coming to the college as visiting speakers. By experimenting with commercially-available programs as well as with others designed and supplied by Data Processing Executive and students, the

Some software demonstrated on the course

Wordstar – This general purpose word processing package produced commercially by Micropro was chosen for three reasons. One, many people have heard of word processing and are curious; two, it is a very friendly program, and three, it is a good example of a commercially-produced program with documentation.

Calcstar – A spreadsheet program that can be used to explore the 'what if' capability of the computer. Again, it is produced commercially by Micropro and is available through DPE.

DB – This is a database package produced 'in house' by MSCU to sort, select and print records from a database. Although not as friendly as the other two it demonstrates the 'filing cabinet' capability of the computer.

Statsys – Another in-house package produced to handle statistics and which is capable of performing all normal statistical functions as well as plot simple graphs and histograms.

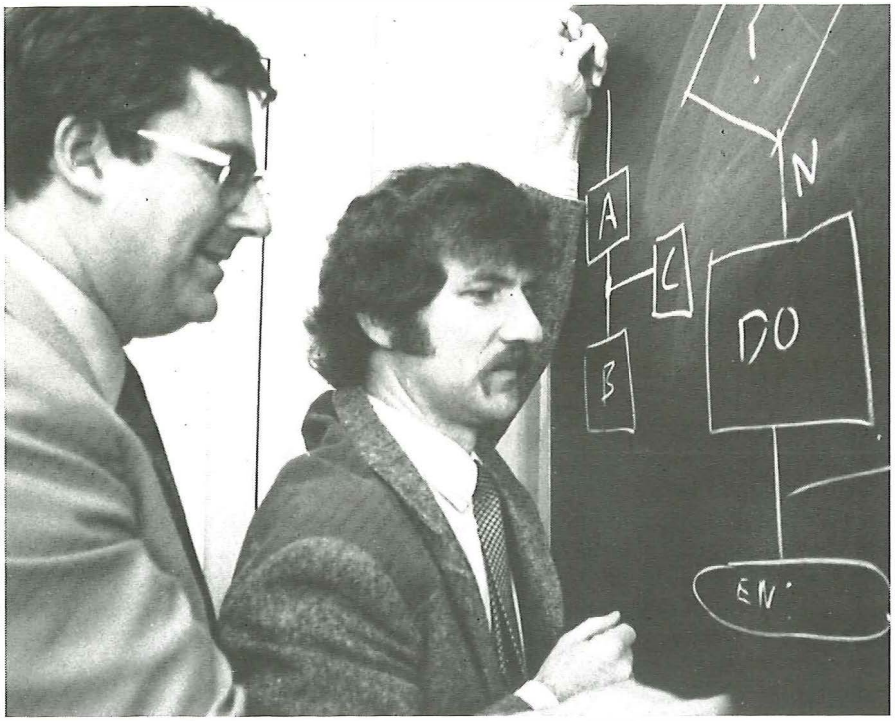
Crit – A program designed to analyse a critical path network and which can be used to explore that 'what if' capability.

Rapid – A financial package capable of performing cash flow calculations, either simple or with differential inflation.

Datastar – This useful package can generate forms and retrieve data – useful to demonstrate the onscreen form capability of a VDU.

Datamodeller – Produced within British Telecom, this spreadsheet program is similar to Calcstar but with rather different characteristics.

Any other package can be designed to meet local needs when the course is run as a workshop.



Trevor Havelock (left) and Mike Vernon work on a flow chart to help develop a special computer program for the course.

The computer course team run through the course syllabus. From left: Graham Higgins, Mike Vernon, Trevor Havelock and Ted Brittain.

format of the proposed course began to develop into a mixture of teaching by discussion and practical experience for students.

The team prepared a series of handouts to supplement the sessions which were to form a handbook of background material. This was to be backed up by practical exercises devised to reinforce the learning process. Proposed practical sessions incorporated commercial and British Telecom-supplied software containing sufficient data both for demonstrations and for experiments. Packages were chosen mainly for their wide application but also to demonstrate the flexibility and scope of the modern microcomputer.

The first course – given the name Computer Module A – was held at Bexhill in June last year, and comprised a broad group from management including two tutors from TMC Manor Gardens. Not least of the surprises was the quantity of latent knowledge held by students who considered they knew nothing about computers. Most had some idea of what a computer was and what it could do, while others had experienced problems as users, and were therefore in a position to discuss ways of avoiding them in future. This discovery led tutors to adopt learner-centred teaching methods, and this proved a way of making the course more enjoyable for everyone.

Once students had got over the initial hurdle of using a keyboard, practical sessions were found to need only minimal intervention. In subsequent courses, tutors have helped by introducing some simple games and for practical sessions they guide small groups of students who will put their course experience to practical use once they return to their offices. Here, specific application problems are dealt with by highlighting common points for discussion at the end of the course.

Bexhill was subsequently contacted by the Cardiff Area training officer wanting a large number of places for staff involved in the computerisation of their maintenance control groups. As part of the concept for Module A was eventually to run it in co-operation with regional training centres, it was agreed to run a three-day course at the Cardiff-based Coryton regional training centre. More recently, a successful one-day course was held in Reading Area, proving the versatility and flexibility of the Module A course.

At about the same time, talks began with British Telecom London training centre at Rodwell House. High on the list of priorities was Module A, and before long, BTL staff were at Bexhill. This was followed by a series of three courses held in BTL West Area run jointly by BTL and TMC tutors. Their success prompted BTL staff to run Module A themselves, and the project is expanding throughout the organisation.

British Telecom managers throughout the country have demonstrated exceptional interest in Module A which seems to have captured the imagination of staff working in many different fields. Its very flexibility means that specific needs can be met by tailoring the course to meet the individual needs of a particular unit, whether in a British Telecom area, region or department.

With computers gaining ground in nearly all professions, an efficient manager cannot afford to ignore this new tool at his disposal. It is hoped that Module A will help managers and indeed all staff to gain confidence in the value of the office computer which, left to handle many of the routine and often mundane repetitive work, helps to provide greater opportunities for innovative and creative management decisions.

This, the thirteenth in our series on overseas administrations, looks at the continuing growth of telecommunications services in Norway.

Despite having a larger land area than the UK, Norway – the land of the midnight sun – has a population of only four and a half million. But it does have a penetration of 53 telephones per 100 population – slightly higher than that of the UK.

LAND OF THE MIDNIGHT SUN

In 1880, Alexander Graham Bell visited Norway to demonstrate his new invention, the telephone. The demonstration, in the town of Drammen, consisted of a telephone conversation between an insurance company manager and a bank manager. The bank manager subsequently turned to the audience and said: "Well gentlemen, it's a pretty toy, but it will never have any practical importance".

But some of his countrymen did see a commercial opportunity in this new method of communication and later that year, two local exchanges were opened in Drammen and Kristiania.

Exchanges like these, however, did not provide a full national network and by 1896, the Norwegian government opened the first public exchange, installed trunk lines and took over responsibility for telephone service to Sweden. The last private telephone company was not merged into the Norwegian Telecommunication Administration, known as Televerket, until 1974, although the system has always been strictly controlled by the government. Televerket is charged with the task of supplying efficient public telecommunications services based on guidelines drawn up by the Storting (the Norwegian parliament).

The basic organisation of Televerket is very similar to British Telecom, with 28 areas making up six regions – Oslo and Lillehammer in the east, Arendal in the south, Bergen in the west, Trondheim in the north and Lodingen in the far north. For many years the administration has been facing criticism about the efficiency of its service, particularly the size of the waiting list and manpower productivity. To overcome these criticisms, Norway has adopted policies which have involved changes to organisational and management methods.

To promote financial efficiency, the regions are regarded as semi-autonomous and to attain greater manpower efficiency, a new system involving management by objectives and extensive delegation of authority has been implemented. The policy is to keep staffing at the 1982 level of about 18,500 full-time employees, and recruitment of telephone technicians has been stopped.

Rapid changes in telecommunication technology and the high wastage of highly qualified technical manpower in Televerket, mainly because of the lower public sector wages, have led to new problems. The administration is attempting to pre-empt this by seeking to introduce a more attractive wages policy and by improving and upgrading training programmes for all levels, including post-graduate courses. Manpower productivity did improve both in 1981 and 1982 with more than 500 redundancies in 1981 because of system automation.

Although financial productivity has also become important, Televerket is not to be a profit-making enterprise. But in 1982, a £39.2 million profit was recorded, representing a return of about 20 per cent on capital, a substantial increase over 1981 when a £1.9 million profit was made.

Televerket is financing more and more of its investments and repayments, and this year the level is expected to reach 64 per cent. Operating revenues increased by 24.3 per cent to £371 million in 1981, partly due to tariff increases, and partly to a substantial increase in traffic and orders for new telephone connections.

The telephone system grew by 119,000 connections in 1981, reflecting the result of the policies directly aimed at improving the system. The waiting list is running at about 46,000, although this is a substantial reduction on earlier years and Televerket aims to reduce the list to none by 1985. Telephone traffic has grown with the system but has also grown because of greater system automation. Subscriber trunk dialling is now available to 90 per cent of connections with full automation expected in 1985.

Automation of the system has purposely been slow, not because of technological or financial problems, but so that resultant job losses could be spread over a long time. Five per cent of exchanges in Nor-

...THE WORLD OF TELECOMMUNICATIONS...

Maintaining overhead lines is a cold and lonely business in the Norwegian winter.

The Oslo Teleshop provides an ideal window for the administration's wares.

Norwegian technicians at work hauling in a new cable by the roadside.

way are rotary, 90 per cent crossbar and four per cent relay, and the first of the ten computer-controlled exchanges now in service was opened in 1975. Televerket is currently putting out to international tender an order for digital exchanges for 500,000 subscriber lines, to be decided at the end of this year.

A new telephone set, which resembles British Telecom's 'Statesman' is now being introduced as the standard instrument. Called the 'Tastafon', it has a keypad, adjustable loudness control, ringing tone and listening strength, and when connected to a computer-controlled exchange, provides facilities for automatic alarm, call transfer and abbreviated dialling.

Quality of service provided by Televerket is good with 75 per cent of faults cleared in eight hours, and 80 per cent of calls to the operator answered within 25 seconds. Operator services include calls for emergency, called number interception, operator assistance, transferred charge calls and directory enquiries for which a charge of 7p is levied.

The tariff structure in Norway is quite different from that of British Telecom. Until 1981, new subscribers had to pay a connection charge and loan fee each of about £143. This system has now been discontinued and replaced by a standard connection fee of £143 inclusive of VAT. Quarterly rental depends on the number of subscribers in the local area, varying from £8.80 for up to 250 subscribers in the local area, to £20.17 for over 100,000. There is no difference between rentals or connection fees for business and residential customers.

Call charges are just 7p for a three-minute local call. There are several kinds of calls depending on distance. Overall, as might be expected with such a small system, Norwegian subscribers tend to pay more for their telephone service than UK subscribers. It is cheaper to make both local and long-distance calls on Saturdays and Sundays and from 17.00 hours in the afternoon until 08.00 hours in the morning, Monday to Friday.

Norway has a wide range of other telecommunication services, some of which are highly advanced systems catering for the special needs of Norwegian subscribers. Growth in lines and traffic on the 8,000-strong telex system is high, and a Phonetelex service was opened in September 1981 enabling message transfer between telephone and telex subscribers.

Other current developments include a teletex service which starts this year, and a recently-opened data network, directly connected to Denmark, Sweden, Finland and West Germany, provides facilities for transmission at 600, 2,400, 4,800 and 9,600 bit/s with duplex transmission available. Serving 42,000 customers, the mobile radio telephone network is the largest in Europe. Although the network should be fully automated by 1985, the system is currently manual, with south Norway already fully automated and linked to the Nordic network enabling direct dialling to about 150 other countries. Radiopaging is scheduled to be introduced by 1985.

Since 1979, a viewdata system called Teledata has been on trial and full introduction is planned this year. Initially the service is to be offered to trade and industry, but may include residential customers after 1985. It is intended to use the data network for transmission of data, at 1,200 bit/s, from databank to user.

Satellite communications have been in use since 1975 when the Norsat domestic satellite communications system, the first in Europe, was established using Intelsat IV and the coastal earth station at Eik. The system was primarily set up for ship and offshore communications between Norway and the North Sea oilfields. But a new earth station has been opened at Eik, the first fully automatic in the world and is used for communications with ships having a satellite terminal on board. Eik coast station is part of the system of the international satellite organisation Inmarsat, opened last year.

Televerket has its own research and development establishment which often works with other industry and external research institutes. Current research projects include optical fibre development, as well as digital switching and satellite communications.

As well as providing an up-to-date developed telecommunications network, by co-operating with other Scandinavian countries, Norway has been able to give a broader range of services more economically than would be possible on its own, and by reacting quickly and practically to criticism, has improved its efficiency and service to give better value for money.

The authors – **Mr P. H. Dabbs, Ms C. M. C. Aust, Mr D. A. Long** and **Mr I. Sarwar** are all members of the international comparisons group in the Service and Performance Department of BTHQ. They acknowledge the help of **Mr Gunner Falck-Ytter** from the Norwegian administration.

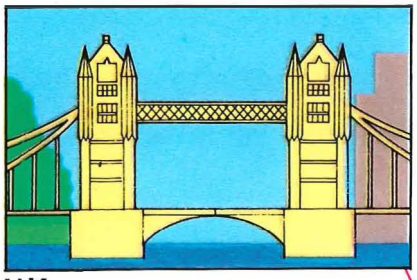
British Telecom Journal, Spring 1983

Telephones around the world

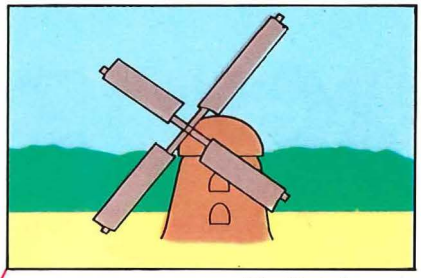
Here is the annual international comparison of telecommunications statistics showing the 11 countries with the highest number of telephones at 1 March 1982, together with the percentage growth (in brackets) during this year.*

It is estimated that more than 75 per cent of the world's telephones are in use in these 11 countries which account for about 15 per cent of the world's population.

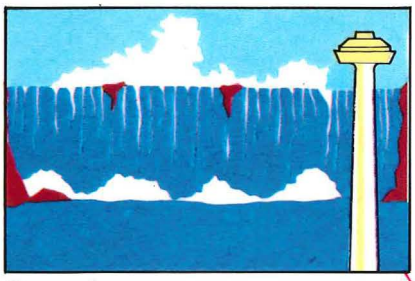
Sources: CEPT book of telecommunications statistics and individual country reports.



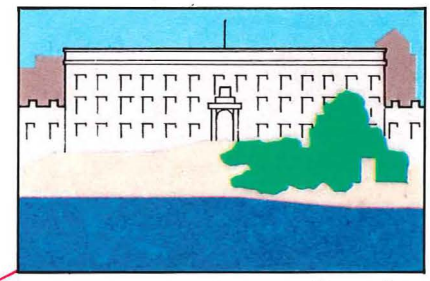
UK
28,376,000 (2.1)



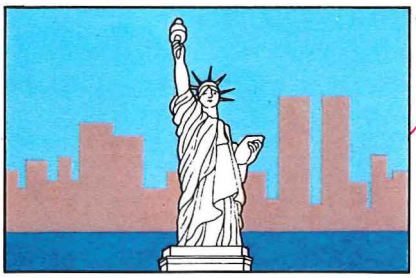
Netherlands
7,697,000 (5.4)



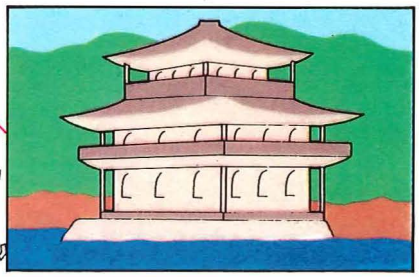
Canada
15,842,000 (—1.6)



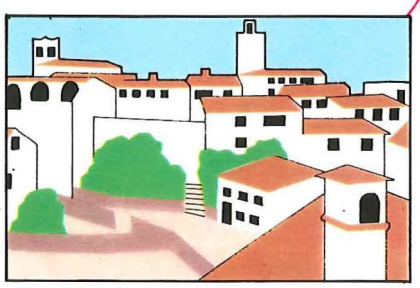
Sweden
6,889,000 (4.0)



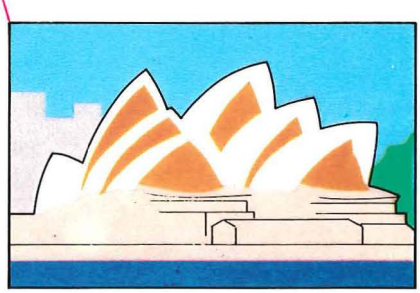
USA
181,551,000 (0.8)



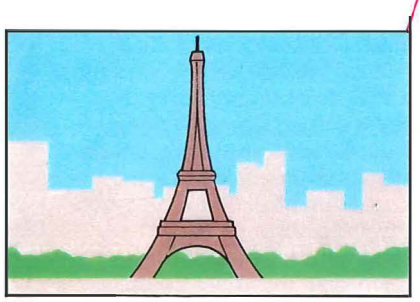
Japan
58,680,000 (4.3)



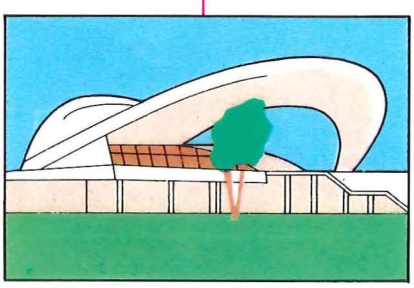
Spain
12,385,000 (4.6)



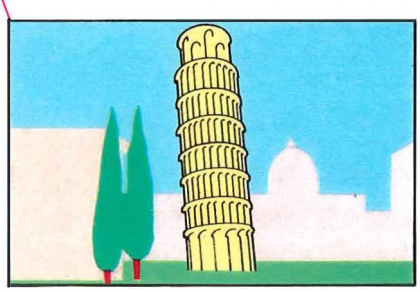
Australia
7,684,000 (4.8)



France
26,940,000 (9.1)



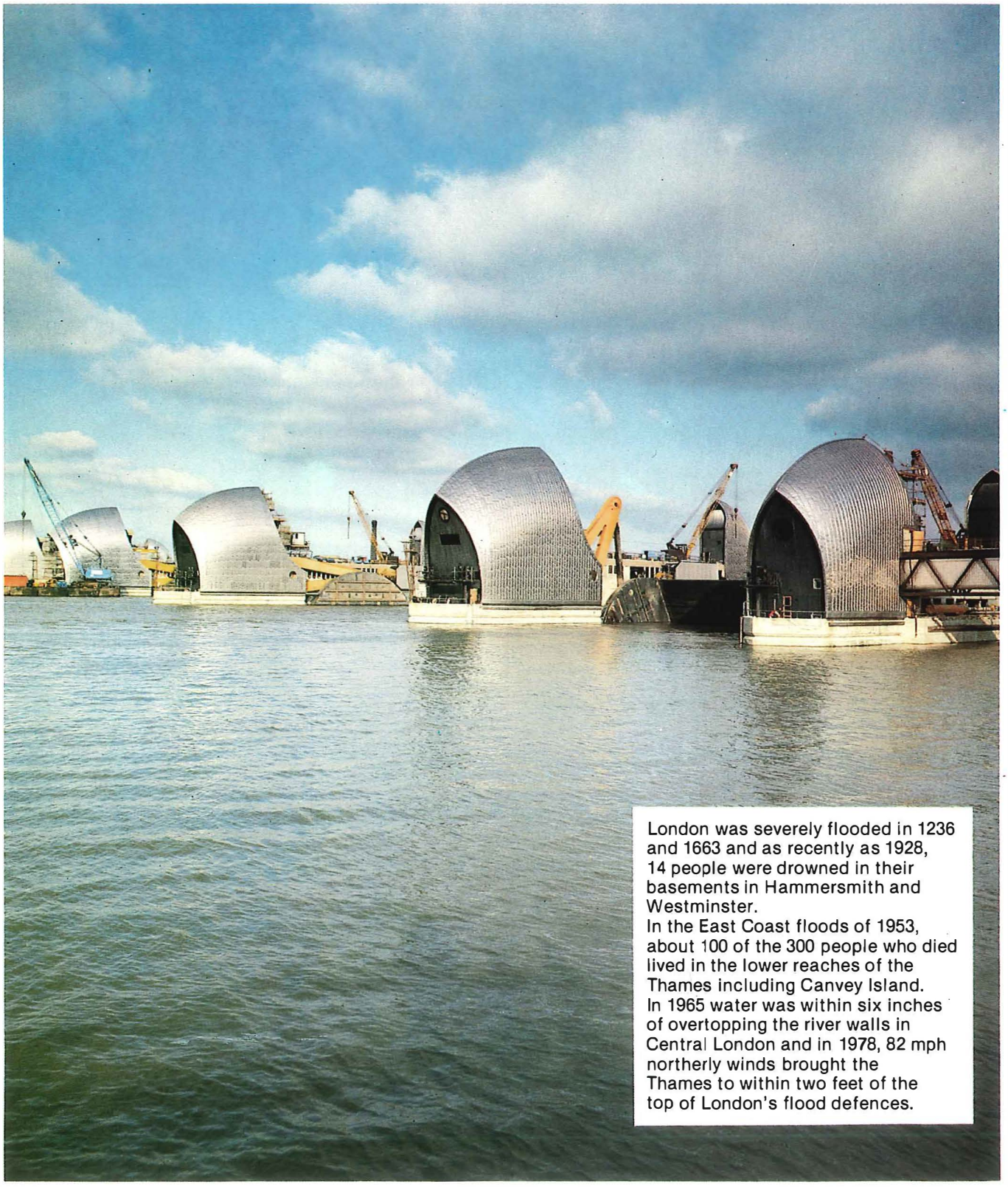
W Germany
30,122,000 (5.5)



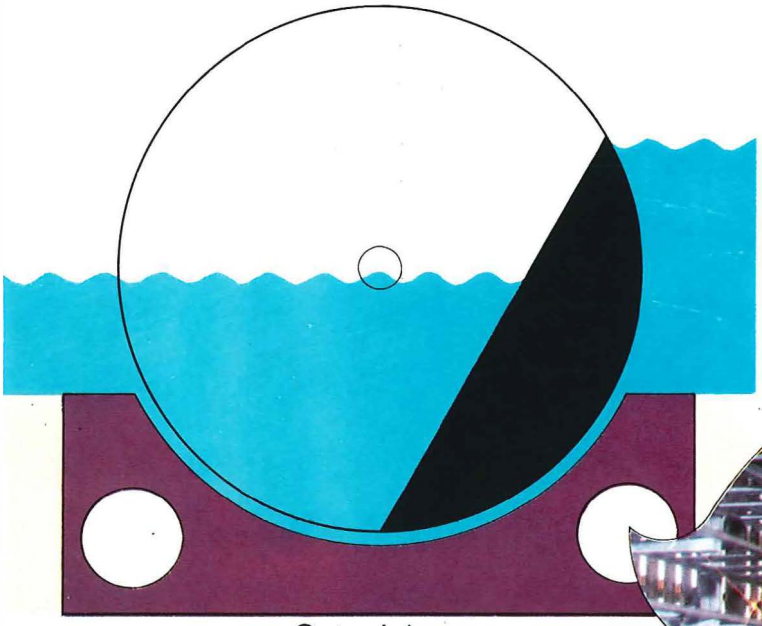
Italy
20,452,000 (6.1)

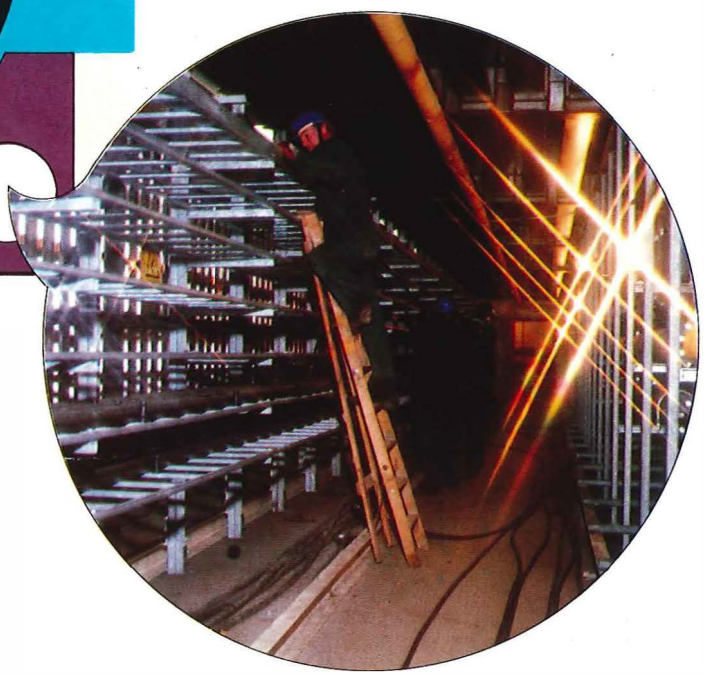
* *Figures for the USSR were not available at the time of publication*

Vital links across the Thames



London was severely flooded in 1236 and 1663 and as recently as 1928, 14 people were drowned in their basements in Hammersmith and Westminster.
In the East Coast floods of 1953, about 100 of the 300 people who died lived in the lower reaches of the Thames including Canvey Island.
In 1965 water was within six inches of overtopping the river walls in Central London and in 1978, 82 mph northerly winds brought the Thames to within two feet of the top of London's flood defences.





A team of engineers from British Telecom London's East Area haul the first 100 pair cable into one of the two access tunnels running under the Thames.

Early in February, London was saved from a potential multi-million pound disaster. For the first time ever, the mighty steel gates of the newly-installed Thames Flood Barrier were raised in earnest against the awesome combination of a North Sea surge tide and a winter high tide. Throughout the eight-year £435 million project, British Telecom London has maintained and provided telecommunications services vital to the efficient operation of the barrier now astride the river at Woolwich Reach.

With London sinking by one foot every 100 years, today's tides are two feet higher at London Bridge than they were in 1883. The main threat comes from a combination of winter and surge tides which could at any time have devastated up to 45 square miles of London and one million homes. Parliament and Whitehall could have been under three feet of water and the Isle of Dogs under eight feet. Communication services would have been badly hit with up to 25 exchange buildings flooded, and services to customers connected to another 22, severely disrupted. Around 250,000 customers would have lost service and nearly everyone else in London would have been affected in some way.

The Thames Barrier is the only one of its kind in the world and is designed on the rising sector gate principle. It consists of a series of separate movable gates built side-by-side across the river. Each is pivoted and supported by a 20-metre high concrete pier which houses the hydraulic operating machinery and control equipment. When not in use, the barrier gates rest in curved recesses out of sight under water allowing the free passage of river traffic between the piers.

Private circuits provided by British Telecom link the barrier control centre on the South Bank to the Storm Tide Warning Service at Bracknell in Berkshire and GLC engineers will use these to decide when the gates need to be closed.

Providing communications for the barrier has been a major project for London South East Area, and staff in the Bromley-based customer works group and circuit provision group have been working closely with their counterparts north of the river in London East Area.

Communications planning began in 1978 and, wherever possible, alternative routing for the private circuits has been provided. To facilitate this, two cables have been provided to Greenwich and three to Albert Dock. The Albert Dock cables will pass under the Thames in two access tunnels set in a preformed concrete base. The cables are protected by gas pressurisation from units at Greenwich and Albert Dock exchanges with a further support unit at the Barrier to overcome pneumatic resistance. Altogether about 30 kilometres of cabling have been installed for the project which is expected to be opened officially later this year.

A London South East special services team liaised with engineering consultants Rendel, Palmer and Triton to devise the fail-safe network of private circuits which include telemetry links with tide gauges positioned at strategic points along the Thames. Other circuits will provide emergency telephone links with the London Fire Brigade, another smaller barrier at Bow Creek and local water authorities. Circuits will be used to carry information about the water level on each side of the barrier.

British Telecom customers in London can feel safe in the knowledge that this comprehensive new telecommunications network, will provide the means to carry the information needed to avert one of the greatest threats to the capital – an approaching surge tide.

British Telecom Journal, Spring 1983

Supervisory scheme success

Gregory Coombs

Within the next ten years advanced optical systems are likely to account for more than half the trunk network. A supervisory scheme for high capacity routes has been developed at British Telecom Research Laboratories, Martlesham.

Author Gregory Coombs uses an oscilloscope to monitor the data signals on the supervisory system.

Technical Officer Dave Gosling adjusts the supervisory system timing while Gregory Coombs looks on.

In recent years, British Telecom has encouraged industry to manufacture and install optical links by offering proprietary optical line contracts (POLs). These unique systems are to be installed in the network in advance of detailed specifications thus allowing valuable experience to be gained in this rapidly advancing field of optical telecommunications.

Now that optical systems are becoming established, an opportunity has arisen to standardise at the sub-system level to simplify future procurement and maintenance policies. It is planned that the first tranche of standard 140 Mbit/s optical fibre systems will be ordered for the trunk network this year ready for traffic next year.

An essential part of any transmission system is a supervisory facility which provides a monitor of performance and hence an early warning of system failure. The supervisory sub-system should ideally be economical and simple to implement and independent of the traffic carrying element of the overall system. For future high-capacity optical fibre systems, a supervisory scheme is proposed which is based on a sequential polling technique similar to the arrangement used for British Telecom 140 Mbit/s coaxial cable systems.

A research team at Martlesham has been

developing a supervisory system which utilises the traffic-carrying fibre as the transmission channel for both interrogation commands and supervisory information. The technique does not impair the main traffic signal and it is estimated that a saving of 100,000 km of twisted copper pairs could be obtained. A feature of this system is the integration of most of the supervisory functions associated with a dependent repeater into a single-chip microcomputer.

As well as meeting all operational requirements it promises to be the heart of a very flexible low-cost supervisory system. The diagram below depicts the envisaged arrangement. The link comprises terminals at each end of an optical system containing dependent repeaters. Regenerative repeaters operating in both directions of transmission are sited in a single unit and are appropriately known as bothway repeaters. Because of the nature of the optical receivers used in these systems, it is necessary to code the 140 Mbit/s digital data so that the low frequency energy components of the signal are removed.

The optical supervisory technique makes use of the spectral shaping of the traffic data produced by the line coding equipment to effectively frequency division multiplex the supervisory information with the main channel (traffic) data.

The supervisory information is amalgamated with the main channel data by current addition at the laser and is processed at the receiver of the next regenerator. This allows the supervisory system to operate independently of the main traffic path and is therefore applicable to optical fibre systems operating at other transmission rates.

In addition to shaping, coding the digital data provides a means of detecting errors in the main traffic path. A low power circuit in the repeater sends error signals to the local microcomputer supervisory unit for processing. These are then relayed back to a terminal on request. The terminal uses the information to indicate the quality of the main traffic data at that point in the route.

In high bit-rate monomode optical systems the optical source will be a semiconductor laser. A characteristic of the laser is that its operating current needs increasing with time to maintain the required output power. Monitoring this current allows the supervisory control at the terminal to predict when these devices will reach the end of their useful lives. This highlights the type of monitored information which can be used to programme for remedial maintenance, minimising service disruption.

The supervisory control in a dependent regenerator, although highly sophisticated with a broad range of duties to perform, has been greatly simplified by the novel use of a single-chip microcomputer. The cost of an entire control unit will be insignificant compared with the cost of a repeater.

Because of the programmable nature of the microcomputer, advanced features have been introduced into the supervisory control at each bothway repeater. These include:

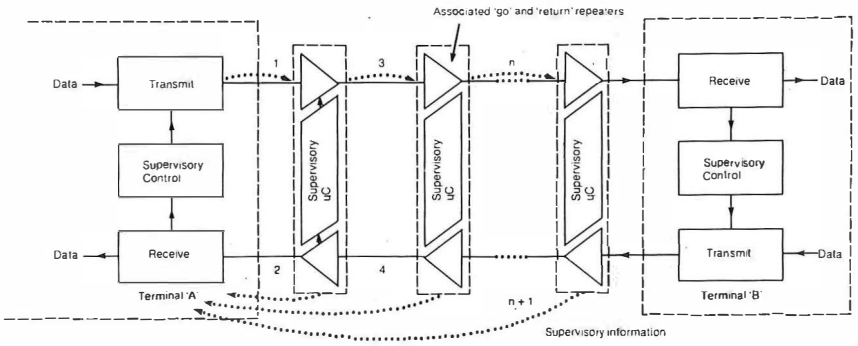
- ★ The regeneration of supervisory data from other bothway regenerators enroute to the terminal.
- ★ Modulation of supervisory data.
- ★ The use of redundant supervisory data for interrogation commands to the system.
- ★ Acquisition of analogue and digital information.
- ★ Protection of transmitted data by means of parity-bit insertion.

The supervisory interrogation commands and returned information are processed by a computer system located at each terminal. The computer uses the incoming data to derive the binary error ratio (BER) of the dependent repeaters in the system. This is the principal indicator of faults in the optical system. Other supervisory facilities are easily implemented using this approach and can be simply altered by modifications to the software.

The technique which uses the traffic-carrying fibre as a channel for supervisory data meets all important operational requirements such as continuous in-service performance monitoring and the ability to operate without the presence of main traffic data. Continuous monitoring of system health, as well as providing advance warning of impending faults also provides valuable information for future development. This is particularly important for emerging technologies such as those used in optical systems.

A 140 Mbit/s monomode optical fibre transmission system with full supervisory was demonstrated to British industry last year over an optical cable installation between Ipswich and Martlesham with repeaters spaced at 30 km.

With the successful conclusion of this new work, it is anticipated that British Telecom will gain both economical and operational benefits for its optical fibre networks.



The concept of sequential polling

Terminal A initiates a supervisory scan by sending an interrogation command to the first bothway regenerator (1). The supervisory control at the regenerator responds to the command by assembling local data concerning the health of the optical system at that location.

Data is transmitted back to the terminal on the return fibre (2) and the interrogation command is passed-on to the next regenerator (3).

In this way, all the regenerators in a system may be interrogated. Either terminal may be used to initiate the supervisory scan.

Mr G. P. Coombs is an assistant executive engineer at British Telecom Research Laboratories, Martlesham, working in a group responsible for digital systems in the trunk network.

British Telecom Journal, Spring 1983

MISCELLANY

National Networks boost

British Telecom is setting up a specialised services group within its National Networks organisation to give business customers fast, personal attention and provide them with total communications packages.

Key to many of the new services is digitalisation, and a new trunk network linking Britain's towns and cities is on course for completion by the end of the decade.

This year, National Networks is to introduce a new range of multiplexors for two of its digital private circuit services – KiloStream and MegaStream – and in future, customers requiring a complete network will be able to turn to the new group for the complete package.

Tan is the answer

A new division of British Telecom Enterprises has been set up to provide a complete telephone answering and message handling service.

Tan – Telephone Answering Service – will mean callers can connect directly to Telecom Tan where operators, using individual computer terminals, will handle the call in such a way that callers are unaware that the call is being handled by a bureau. Tan operators answer in the name of that company and communicate with the client's field force either by regular phone calls or by using radiopagers. The service also offers a facility for users who prefer their phones to be answered by a person rather than by an answering machine.

Two sites selected

British Telecom has submitted planning applications for two alternative sites for its third earth satellite station. One is on a former aerodrome at Henstridge in Somerset and the other is at Benjafield Farm near Gillingham in Dorset.

David Withers, chief engineer for British Telecom International said that the sites fully met all the technical requirements and that BTI was keen to fully consult local residents and organisations. A series of public meetings is planned for the area where detailed information about the projects will be made available.

On line challenge

British Telecom's latest Guideline offers customers a wide range of brain teasers. Challengeline has been on trial for three months from February and offers callers a different challenge every day in the form of lighthearted brain-teasers covering a wide range of subjects supplied by Mensa.

From ship to shore

For the first time ever, ships can dial direct telephone and telex calls to almost anywhere in the world via Britain – in some cases at half the cost compared with 18 months ago.

Using a new aerial at British Telecom International's Goonhilly Downs earth station and an Inmarsat satellite 22,300 miles above the Atlantic, ships with satellite terminals can now offer passengers and crew facilities previously available only to London City offices.

Contracts

Action Electronic Developments has supplied 220 metal and live cable detectors to British Telecom Cambridge Area for use by engineers installing equipment in both offices and homes.

Ferranti Computer Systems has received three new orders from British Telecom for 31 terminal controllers, 60 visual display units and 30 printers. The equipment will be used for internal and external works projects.

Fidelity Radio has been awarded British Telecom's first order for cordless

telephones. Worth more than £1 million, the order includes design, development and supply by mid-year.

GEC Telecommunications is to supply call logging equipment worth £4.2 million for a British Telecom project to provide subscribers with itemised telephone bills. The company is supplying two of the four pilot schemes, a London telephone area with eight exchanges and a rural area involving 20 exchanges.

Logica is to supply under a £500,000 contract an image processing system which will be used by British Telecom Research Laboratories for experiments into the digital coding of television signals used in teleconferencing.

Newbury Data Recording has won a £2 million contract to supply 3,600 asynchronous VDU and matrix printer computer terminals. Most will be used to develop, run and test programs for a wide range of management, scientific and technical applications throughout British Telecom.

Plessey Telecommunications has recently been awarded three contracts from British Telecom. Of these, the largest, worth £6 million, is to supply 177 UXD5B rural telephone exchanges until 1986. A new earth station at Goonhilly Downs in Cornwall is the subject of a further £1 million contract to British Telecom International while the company's products and services division has contracted a stake in British Telecom's computer-based call logging system trial in Edinburgh Telephone Area.

Siemens is supplying microwave equipment to British Telecom for use at the Goonhilly Downs earth station.

Simon Engineering Dudley has been awarded a £500,000 contract by British Telecom to supply 27 hydraulic access platforms for overhead working. One of these can lift a working team with tools to a height of 100 feet.

STC Business Systems has received a further £10 million order from British Telecom for more 'Cheetah' teleprinters and associated equipment. Orders from British Telecom for this equipment now total more than £30 million.

Landis and Gyr is to supply British Telecom with more than 8,000 cardphones under a contract worth £10.5 million. The cardphones and cards will be made in the company's factory in Acton where it will create 40 jobs.

Computer link-up

A new research programme, known as Project Universe, was officially inaugurated in London earlier this year. Set up to investigate aspects of connecting computer systems throughout the country by high-speed digital links, the project is funded by British Telecom, the Department of Industry, GEC-Marconi Research, the Science and Engineering Research Council and Logica.

When operational, Project Universe is expected to interconnect about 150 computer terminals linked to local area networks while the orbital test satellite (OTS) provides the link between the computers using small-dish three-metre earth terminals.

Award of excellence

For the second year running, *British Telecom Journal* has gained an Award of Excellence in the Editing for Industry competition sponsored by the British Association of Industrial Editors. The Journal was placed second out of 21 entries in the class for internal magazines with circulations of more than 10,000.

More optical systems

Two new long-distance high capacity 140Mbit/s links were recently handed over to British Telecom by STC at Basildon, Essex.

The 47-kilometre systems between Basildon and Faraday Building in London are the latest in a series of optical systems being supplied by STC's Transmission Products Division, some

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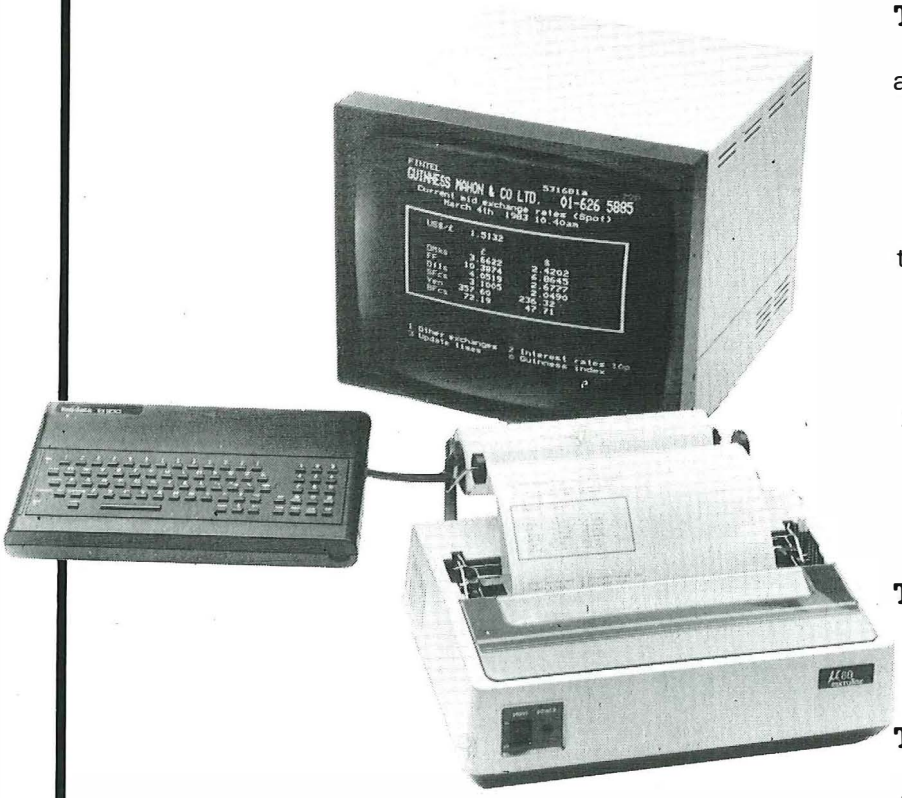

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of which already carry commercial traffic for National Networks.

The new systems can carry up to 1,920 simultaneous telephone conversations and can be used to transmit broadcast quality colour television, sound programme channels and data traffic.

Itemised billing

From next year, more than 250,000 British Telecom customers will receive details in their telephone bills of numbers called, date and time the call started, its duration and the charge.

If trials are successful, there could be similar arrangements for all customers.

Oceans of fibres

Tenders for the world's first intercontinental undersea optical fibre cable, expected to come into service in 1988, have gone to three companies – STC, AT&T and the French firm Submarcom.

The new cable, costing more than £250 million, will run from North America to Europe and will contain two pairs of fibres, each operating at 280 Mbit/s.

With the help of digital circuit multiplying equipment, total capacity would be the equivalent of up to 40,000 simultaneous telephone calls.

- Britain's position as a world leader in developing optical fibre communications has been given a further boost by new agreements under which British Telecom will exchange its expertise with STC to benefit international call users. The two agreements relate to undersea optical fibre communications which will span the world's oceans.

Cable vision

Britain's first commercial consultancy to help cable television operators develop services and win franchises has been launched by British Telecom. It will be known as British Telecom Cable Interactive Services. Ⓣ

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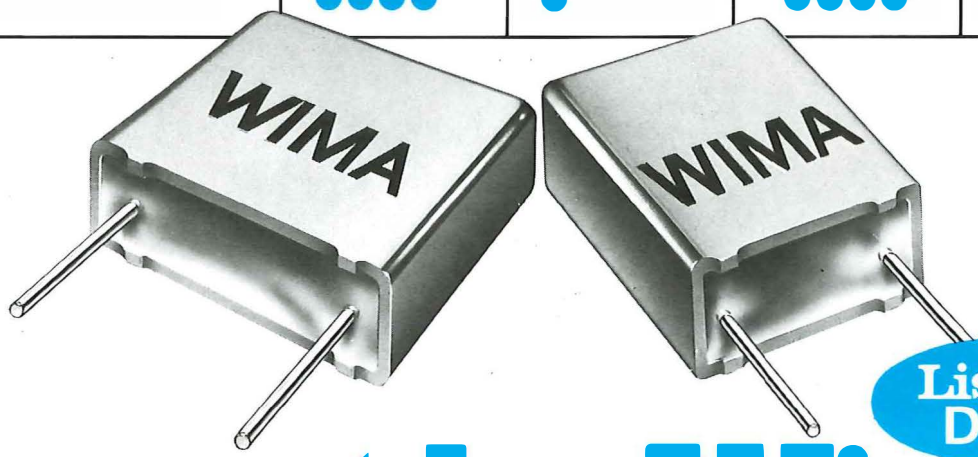
Electrical Stability	●●●●●	●●●●●	●●●	●
Size	●●●●	●	●●●●	●●●●●



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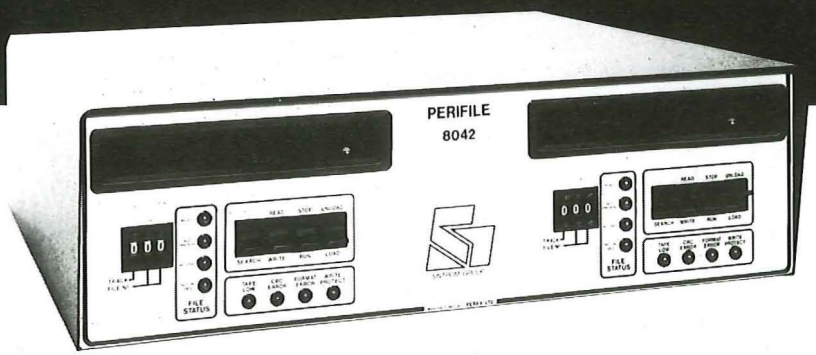

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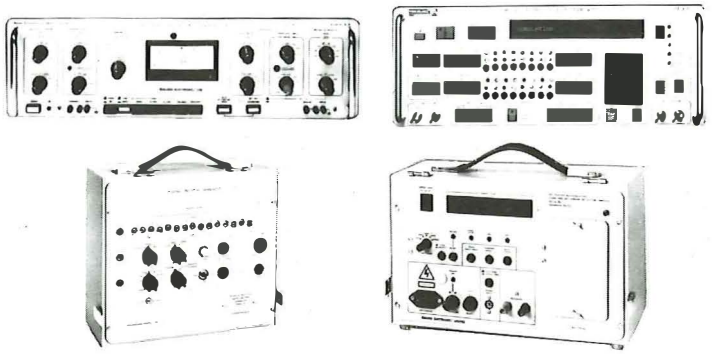
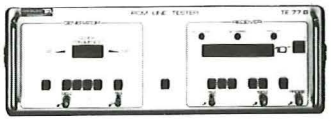


8 Mbit/s PCM



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Why is this? STC lasers feature proven long life with over 70,000 hours real time to date. They feature a package with integral monitor photodiode and fibre tail simplifying their use in systems. They are readily available not from a laboratory but from a production line. They are backed up by the resources of a major development and capital investment programme that looks to the future of the 'wired city,' the submarine fibre optic cable spanning the world's oceans and the landline monomode systems that do away with repeaters.

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Total System Design Capability

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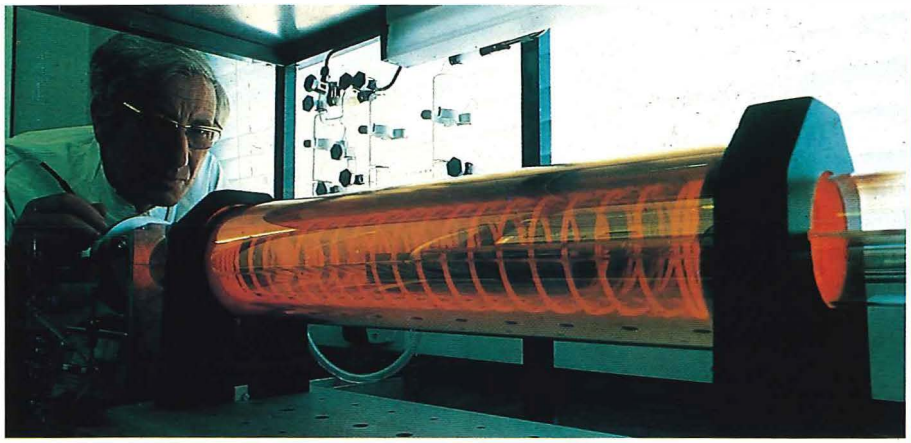

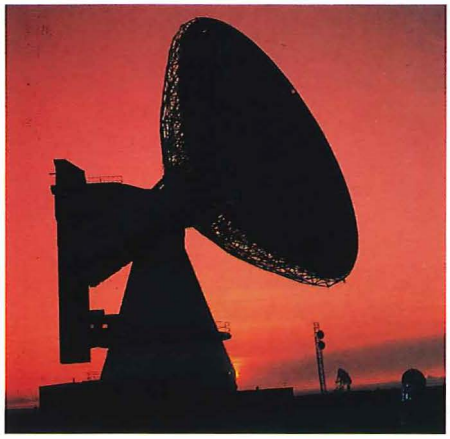

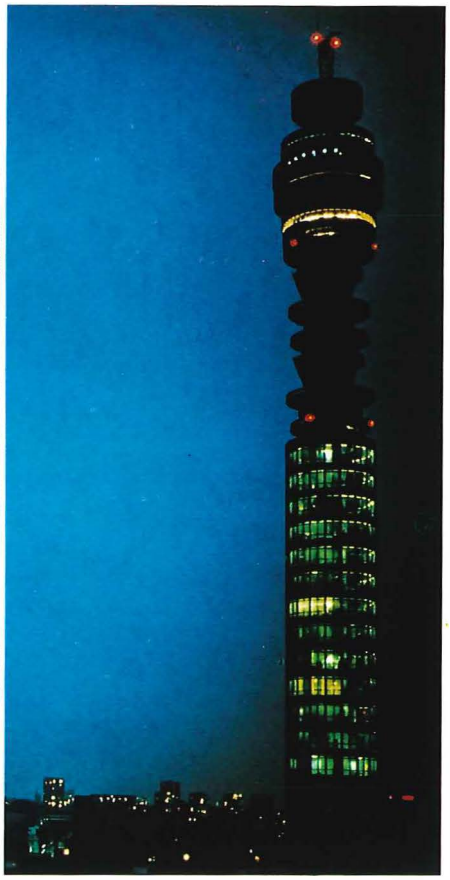

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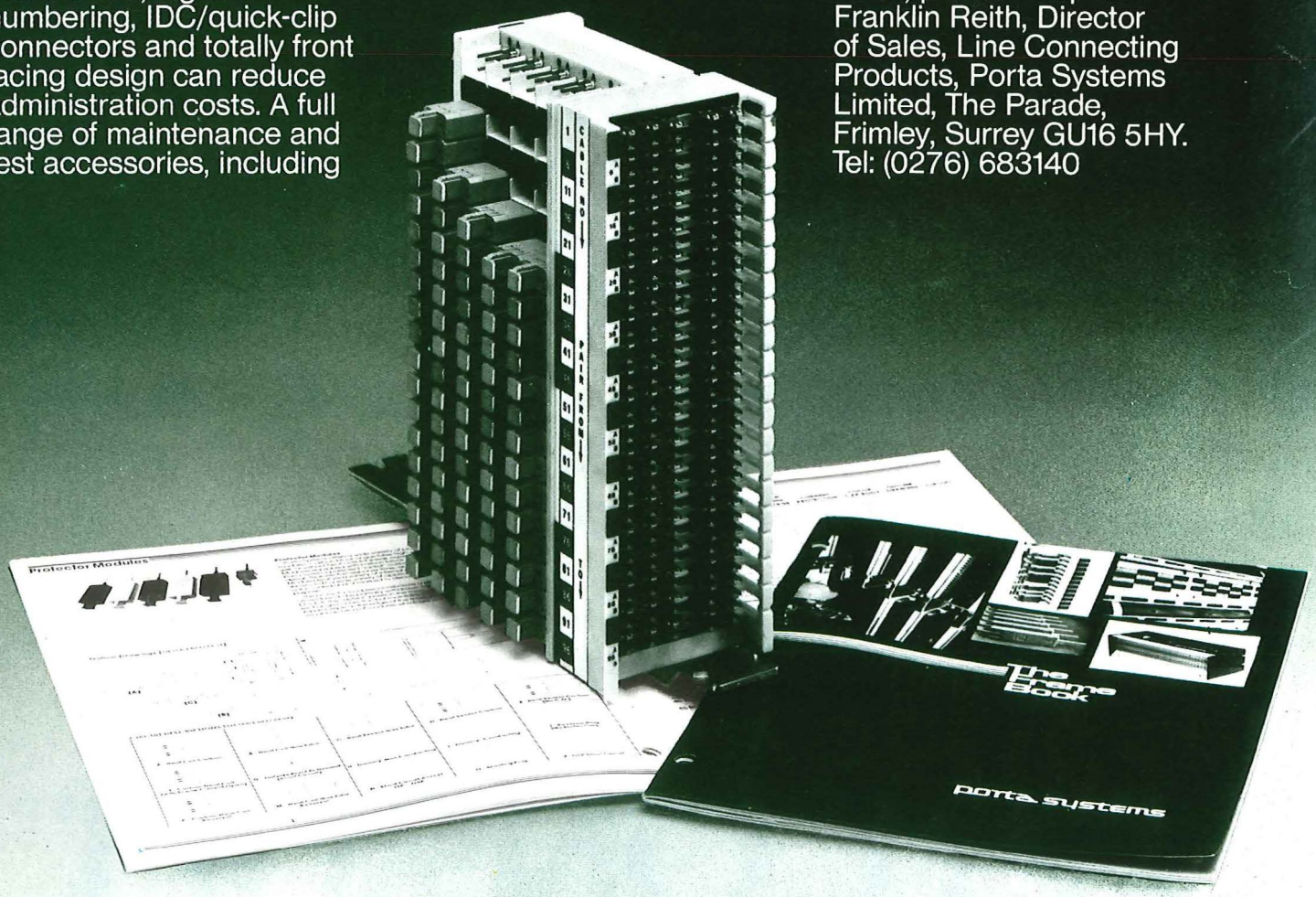

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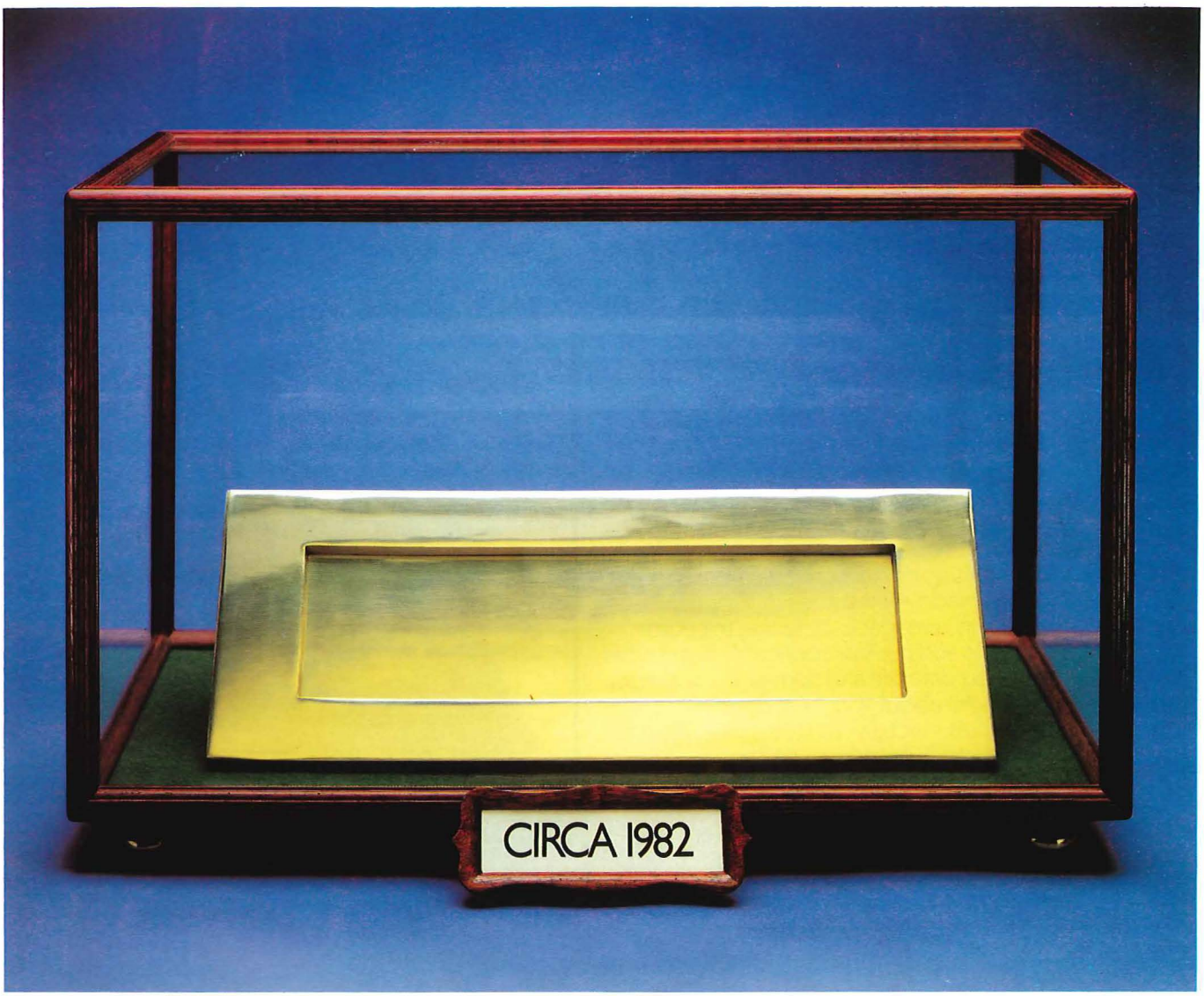

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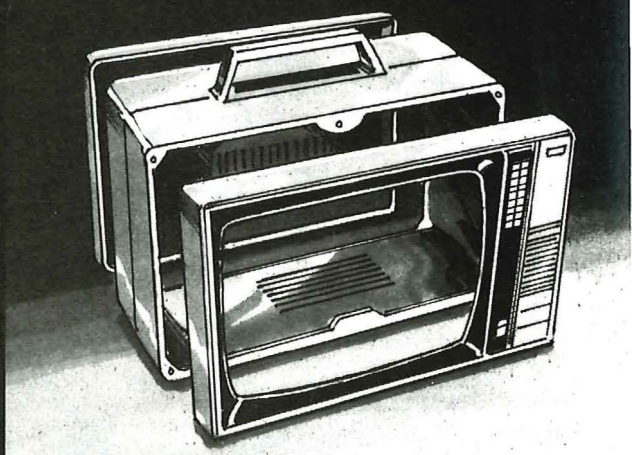

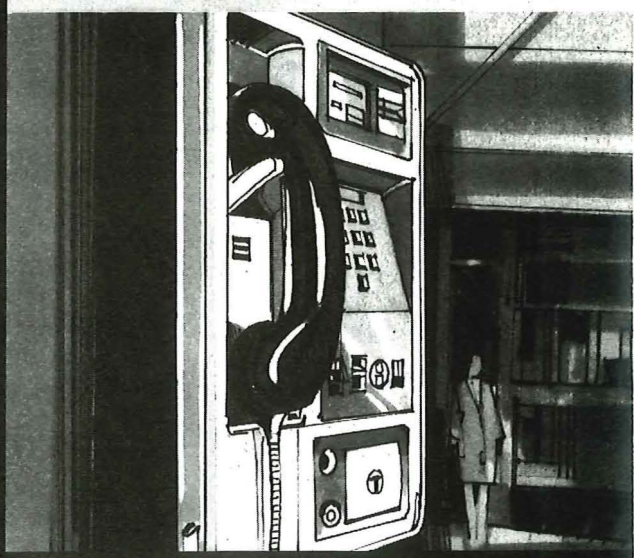

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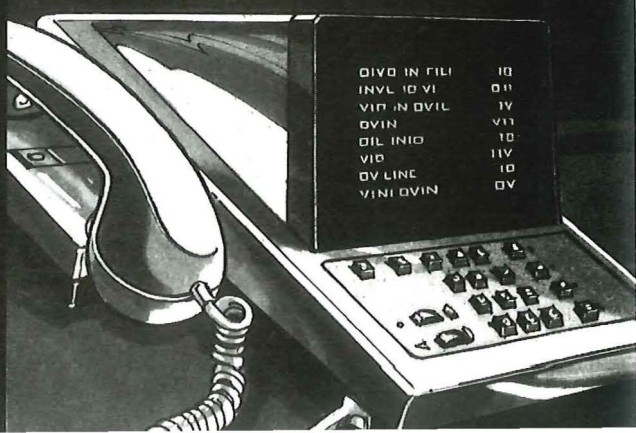

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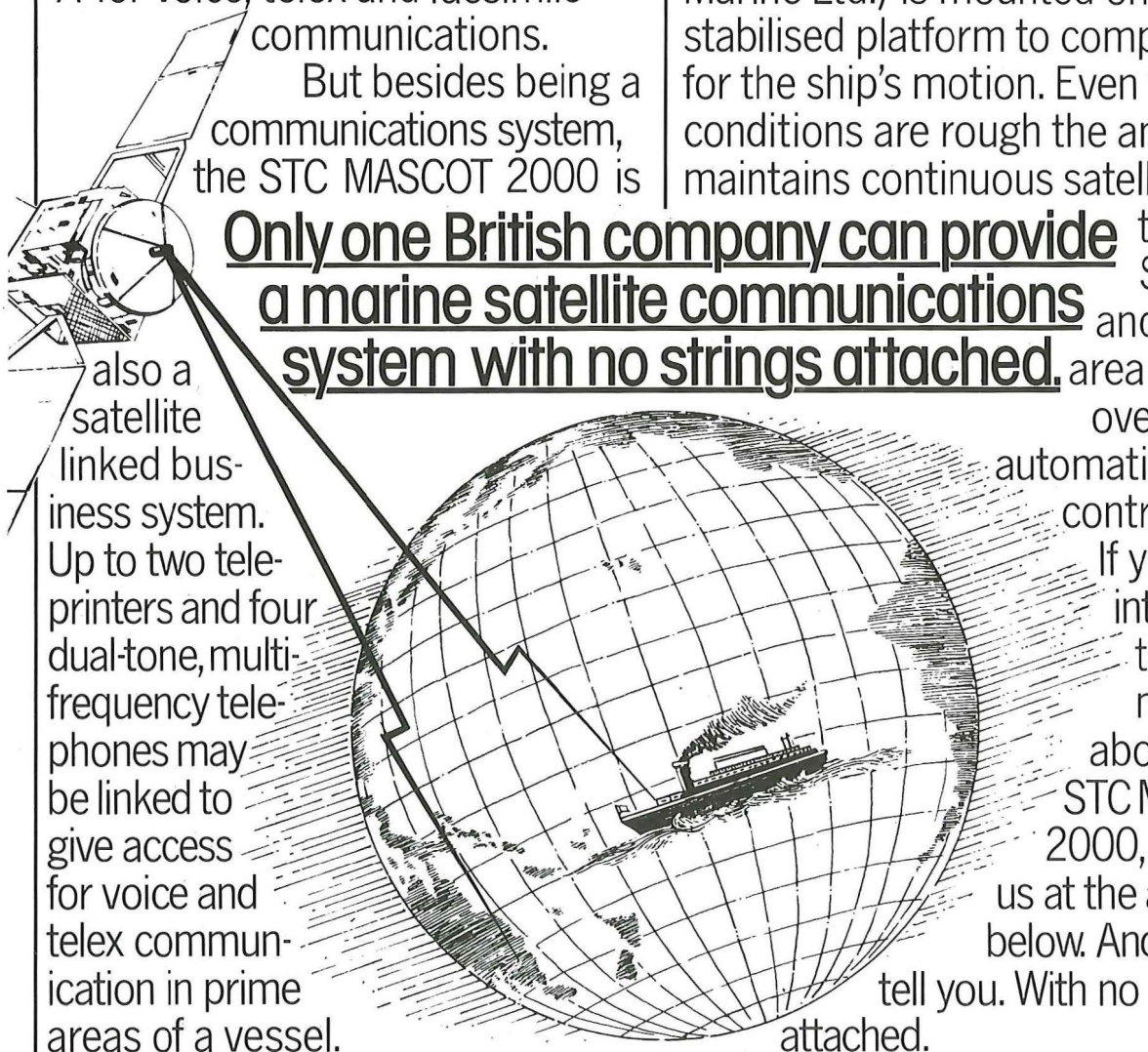
The STC MASCOT 2000 is the first British designed and manufactured ships earth station to get full INMARSAT type approval-standard 'A' for voice, telex and facsimile communications.

But besides being a communications system, the STC MASCOT 2000 is also a satellite linked business system. Up to two teleprinters and four dual-tone, multi-frequency telephones may be linked to give access for voice and telex communication in prime areas of a vessel.



It has interfaces which allow the direct connection of ship's telephone exchanges, gyro compasses, satellite navigation systems and other equipment. STC MASCOT 2000 can also handle 2.4 kbit/Sec. and 56 kbit/ Sec. high speed data which for example – with the addition of a special modem – makes it suitable for the transmission of seismic survey data.

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If you are interested to learn more about the STC MASCOT 2000, contact us at the address below. And we'll tell you. With no strings attached.

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