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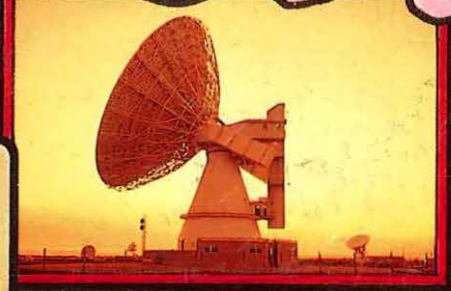
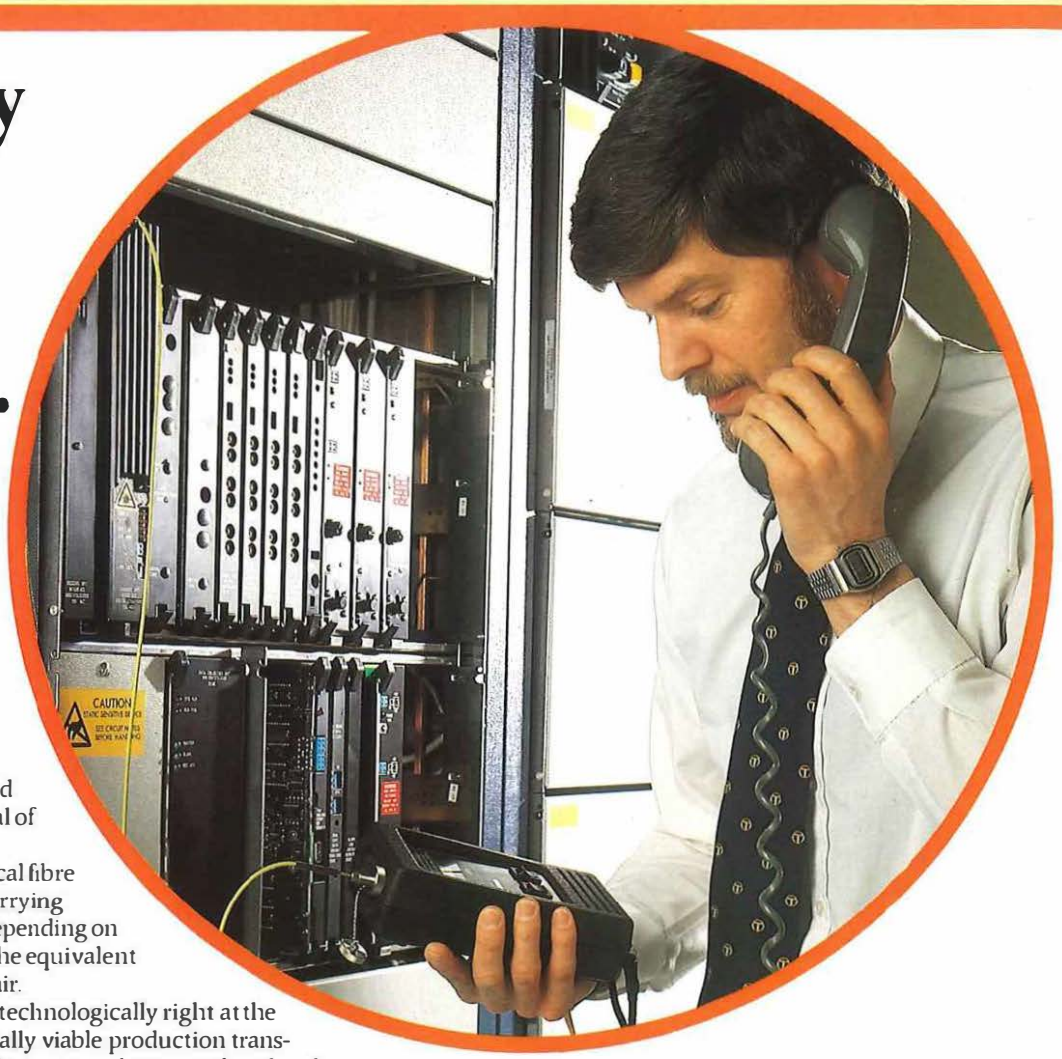


WESTMINSTER CABLE
TELEVISION

PLESSEY INNOVATIONS FOR COMMUNICATIONS

Now Plessey System 565 goes live at home and abroad.



It was in December, 1985, that Plessey Transmission installed its first 565 Mbit/s optical fibre system between Nottingham and Sheffield, a route length of 72 km. Early in the new year this system was cutover to normal traffic.

In March 1986, Plessey System 565 went live in the USA when the President of the United Telephone Company of Florida formally cutover the system installed by Stromberg-Carlson to link several of United's exchanges.

Each Plessey 565 Mbit/s optical fibre transmission system is capable of carrying 7680 or 8016 telephone channels, depending on the multiplexing arrangements, or the equivalent in video or data over a single fibre pair.

Today, Plessey System 565 is technologically right at the forefront of available and commercially viable production transmission systems, while even higher bit rates are being explored and developed for the future.

Plessey is one of the very very few manufacturers worldwide whose 565 Mbit/s optical fibre systems are carrying commercial traffic – right now!

And notches up a string of fibre optic firsts.

Providing for state-of-the-art telecommunications needs like these is how Plessey achieves and maintains its pole position in high-capacity optical fibre transmission systems.

Today, worldwide, over 15,000 km of optical fibre line systems using Plessey multiplexing, signalling, light sources, regenerators, sensors and connectors are already carrying voice, data and video traffic, under installation or on order.

In achieving this, Plessey has notched up a string of firsts.

They include one of the first optical fibre systems to carry normal traffic in the UK; the first long wavelength optical fibre system in normal traffic service in the world; Britain's longest optical fibre link; at the time, the longest operational unrepeatered optical fibre link in the world; and the world's first commercial contract for a 565 Mbit/s optical fibre highway carrying operational traffic.

For further information, contact Mike Hocking, Transmission Systems, Plessey Network & Office Systems Ltd, Beeston, Nottingham, United Kingdom NG9 1LA. Tel: Nottingham (0602) 254831, ext. 3542. International telephone: 44 602 254831. Telex: 37201.

PLESSEY

The height of high technology.

The need for unity

The orange glow and reassuring warmth of coke burning in a brazier on a frosty day is a comfortable image and more in keeping with the picture on the lid of a chocolate box than with the future of a high-tech industry.

But braziers burned throughout Britain during the recent British Telecom dispute which disrupted services to customers and, for a time, created a rift between the company's management and most of its workforce – in particular the engineers who are the human face and practical side of the business.

The dispute went far beyond the issue of pay. Efficiency measures were of paramount importance and these matters had to be carefully negotiated before any settlement could be reached.

In the end, the company was able to introduce important changes to working practices and agree pay increases acceptable to the majority of its workers.

There is no doubt that some customers suffered during the dispute. Equally, the relationship between management and workforce was, at times, severely strained.

But, after 17 days, a peace formula was worked out which, if all the efficiency measures are carried out, will add 12.66 per cent to engineers' pay by June 1988.

During the dispute both factions rallied well. On the union side, negotiations and protests were, in the main, conducted in a sensible and orderly style. Resoluteness, together with a sense of humour, combined on the picket lines and police presence went little further than sharing a communal 'brew'.

Management too, rallied to keep things going as well as possible and day-to-day exchanges at the picket lines were generally calm and reasoned.

Both factions, then, were united in a responsible and mature approach and an acceptable compromise was eventually achieved. The dispute may now be history but there remains an important message to be remembered.

Disputes are rarely two-sided – inevitably third parties are involved and in British Telecom's case a large number of customers were inconvenienced.

In a highly competitive arena, the result can only be detrimental but share prices at least have increased – albeit at a time of Stock Market buoyancy – and this points to continued confidence despite the effects of the strike.

Now that agreement has been reached and that rain-sodden placards and picket line rubbish have been removed, there can only be one way forward – for management and workers to maintain their recently demonstrated steadfast resolve . . . but together and in the interests of the customers.

Cover: Broadcasting has, arguably, made a bigger impact on society and the public's perception of events than Tom Caxton did with his printing press. British Telecom has been involved throughout the development of broadcasting and this issue looks at 50 years of TV; cable television; the role of Goonhilly, and plans to 'privatise' the radio spectrum. Cover design and illustration by Raygraphics.

In this issue

British Telecom Journal is published by British Telecommunications plc to promote and extend knowledge of the operation and management of telecommunications. See page 89 for subscription details.

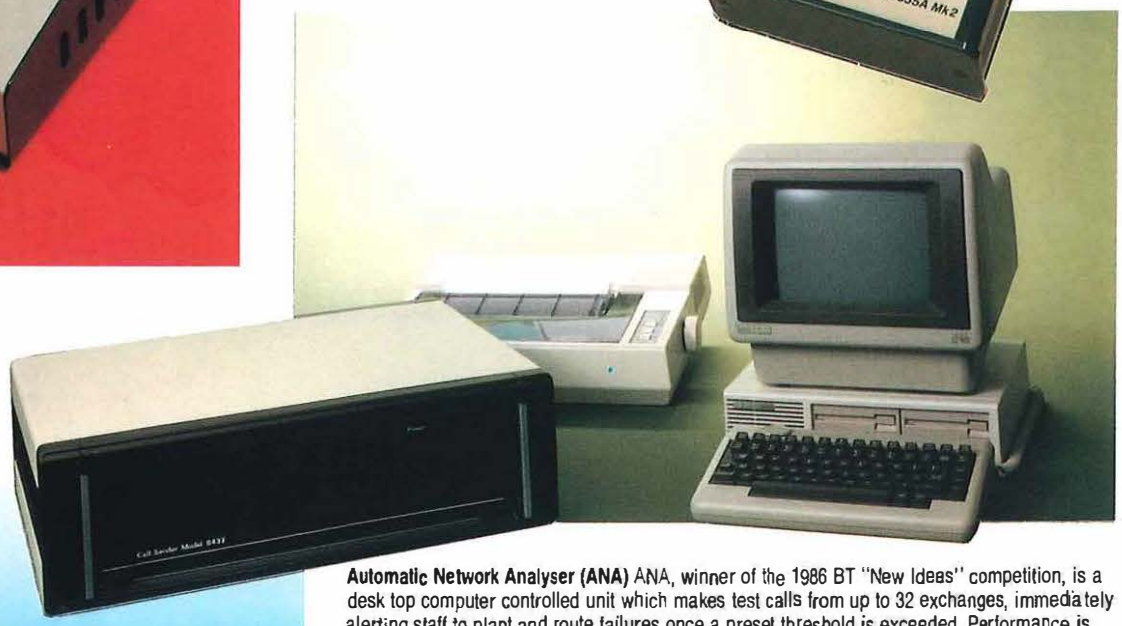
Telecom Products FROM .... ROTADATA

Rotadata MAC Printer Over 4000 printers are already in reliable use throughout BT. Designed specifically for printing, in an intelligible format, call failures and exchange daily cumulative totals for all sequences at MAC monitored units. At £135 it can cost less than a repair to your old printer.

BT Printer 10A: item code 314627

Tester 355A Mk2 Easy to use hand held microprocessor-controlled callsender with number storage and noise detection facilities. The Mk2 version includes, CRAM facility; power down call and fail count information hold; variable dial and ratio speed; differentiates busy tone and EET; plus able to work with 1000Hz tones. Tester £152, Case £25.

BT Tester 355A: item code 314534
BT Instrument Case 25A: item code 334936



Automatic Network Analyser (ANA) ANA, winner of the 1986 BT "New Ideas" competition, is a desk top computer controlled unit which makes test calls from up to 32 exchanges, immediately alerting staff to plant and route failures once a preset threshold is exceeded. Performance is recorded over almost a thousand route codes, yet it is remarkably easy to use. Complete system only £9850.

BT Tester 376A: item code 314626

Eleven-Seventeen RS232/IEEE488 Controller/Interface This unique and revolutionary new product solves the problem of communicating with IEEE488 devices when the desirable or only available computing power is RS232 based. Now any RS232 microcomputer connected to an Eleven-Seventeen enables communication control of up to fifteen IEEE devices, either peripherals or micros.

The unit is also a comprehensive RS232 – IEEE488 interface allowing connection of serial devices to a IEEE bus. Also enables interconnection of parallel bus micros (H.P. or DEC) with serial peripherals or micros (IBM etc). The Eleven-Seventeen costs £325.

For further details contact Rotadata.

Tick boxes and return for full information
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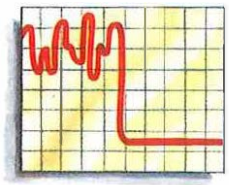
Telecommunication Products
Rotadata Limited, Telecommunications Division,
Liversage Street, Derby DE1 2LD U.K.
Telephone 0332-48008
Telefax 0332-31023 Telex 377468 MEASUR G

MARGAUX MAKES TELECOM BUILDINGS SMARTER THAN EVER

The partnership of Margaux and British Telecom is already working to solve Power and Building Services problems – by making Telecom buildings "smarter".

There are Margaux systems operating in British Telecom sites in London, Manchester, Sheffield, Leeds, Preston, Liverpool Solentand Newcastle. And at the time of writing dozens of other plans are being developed by Margaux's specialist team with Telecom Engineers.

Here are just a few of the ways Margaux is making Telecom buildings smarter . . .



1 Energy Cost Control

The Margaux system has at its heart standalone networked micro-computers, each with an array of sensors to report and act on many different energy functions in the building.

Each micro controls its own building – and reports by exception to a Central Control. This makes it feasible to make geographically dispersed buildings "smarter" – responding to central management.

Light intensity, humidity, power consumption and ambient temperature; electricity usage and fuel consumption – all can be fine-tuned for optimum conditions, and improved performance.

2 Monitoring

Power supplies can be constantly monitored – even down to individual pieces of equipment, and if need be, within them. Costs can be analysed, attributed – and reduced.

3 Maintenance Management

Margaux systems can work alongside AMPERE to record every minute's usage of every item of equipment.

The system can work to pre-set maintenance intervals to trigger maintenance visit requests, scheduled through AMPERE.

Breakdown and failures are immediately reported to a District Central Control Station.

4 Security

Margaux systems can also incorporate a "Man in the Can" – 24-hours-a-day surveillance of the premises to ensure no unauthorised entry. The network and the equipment are both protected.

5 Network Protection

Surveillance can be extended even to normally unguarded spaces within buildings. Electrically locked doors can be fitted and automatically controlled.

Entry to buildings, or parts of buildings, can be restricted to access card holders only.

Access can be limited – through the card reader – to specific doors, specific times, specific periods. With card access integrated into the building management system, you have high flexibility and adaptability.

6 Economic Benefits

Margaux Building Automation reduces your Current Account costs – cuts your Capital Expenditure – tightens up budget control.

Find out how Margaux can help you. Ask us for a presentation and progress report on how Margaux are making British Telecom buildings smarter.

Call Chris Jackman on 0784 31101 or Steve Dillon on 061-428 7356 to find out more.

MARGAUX

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OUR PRODUCTS ARE OUTSTANDING....

ANA awarded First Prize in the 1986 "New Ideas" Competition.

Why are Rotadata Telecommunication Products so successful? Co-operation, innovation and dedication – that's our joint venture promise.

The ANA (Automatic Network Analyser) available as B.T. Tester 376A item code 314626, is the result of a first class co-operative venture. Full product development and manufacture by Rotadata of an original BT Nottingham concept, produced the winning idea in this years annual awards scheme. Proving once again that Rotadata's commitment to close customer cooperation ensures a smooth project and a fully supported product to be proud of.

ANA is a desk top unit operating under computer control making test calls from up to 32 exchanges, immediately alerting engineering staff to plant and route failures once a preset threshold is exceeded. Performance is recorded over almost a thousand route codes, yet it is remarkably easy to use and like all Rotadata products is backed by a complete after sales service. Complete system only £9850.

The Rotadata MAC Printer available as BT Printer 10A item code 314627, also started as a joint development project. Over 4000 printers are now operating successfully throughout British Telecom. Designed around a single chip microprocessor with software developed specifically for printing call failure details and exchange daily cumulative totals for all sequences at MAC monitored units. Translates MAC data into an intelligible format on standard 2¼ in. tally rolls. At £135 it can cost less than a repair to your old printer.

Supply Details
Items are available for supply within British Telecom from BT Procurement Executive M6323D Swindon. Please use item code numbers listed above. Contact Mr. Derek Boxall. Telephone 0793-484221.

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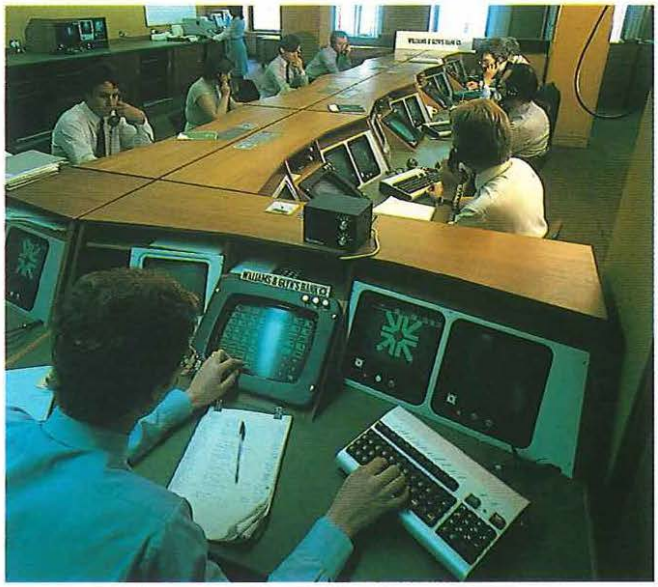

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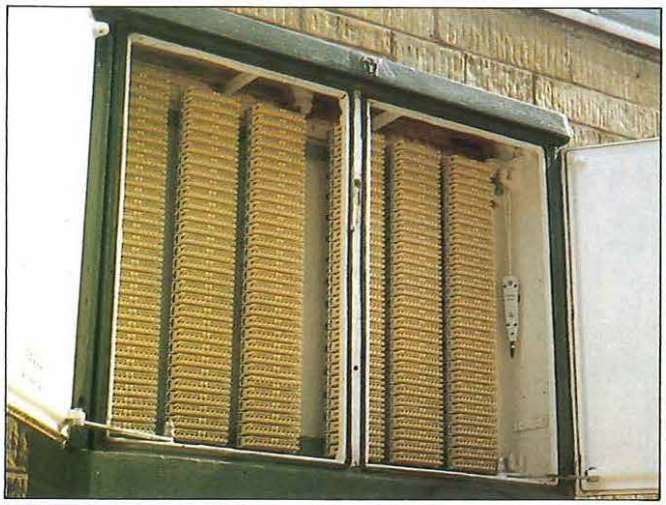
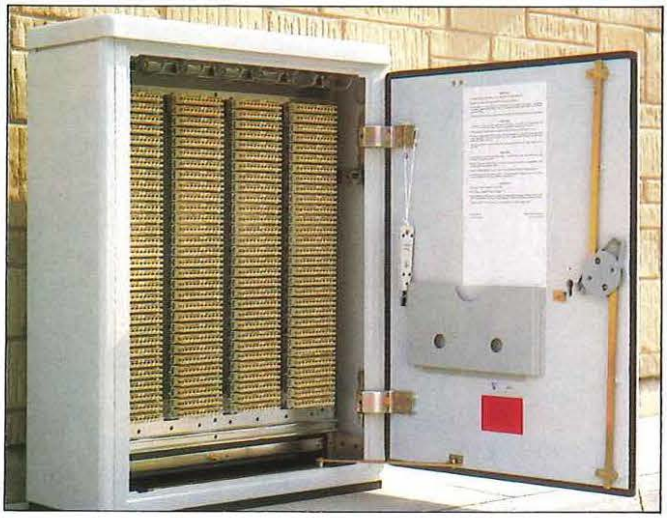
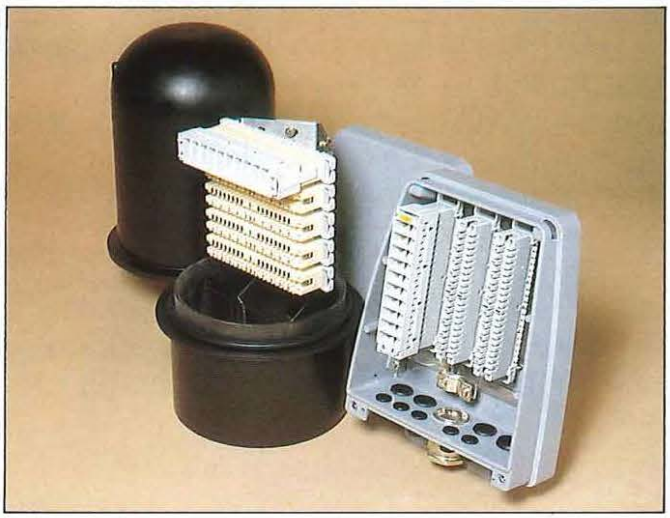
UXD5. British Telecom's new rural digital exchange.

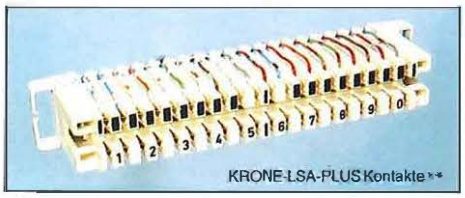
PUMA A fully electronic teleprinter using microprocessors to provide advanced facilities. It has its own memory.







EXTERNAL CHOICE



KRONE LSA-PLUS MODULE

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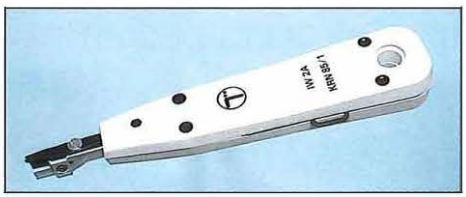

ONE SIMPLE TOOL

As external plant engineers, you'll know that cabinet locations can be the source of a high proportion of faults and line management problems.

Knowing this, you'll be looking for quick, reliable terminations, easy jumpering, test and disconnection access, clear designation and good housekeeping.

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Designed by KRONE specifically for use in external locations, the system has proven its performance in the most testing environmental conditions in the world – from the bitter cold of Norway to the scorching heat and humidity of Africa and the Far East. In the United Kingdom, the system is familiar as the basis of the British Telecom Rapide System, in service since 1978.

The insulation displacement connection – with its unique torsional restoring force – provides a gas-tight connection, requires only one simple tool – the Inserter Wire 2A – to make connections or reterminate, and has an unbeatable reputation for speed and reliabililty.

The system is modular and can be mounted in a wide range of cabinets and enclosures, including:

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The pedigree of the KRONE LSA-PLUS System is well-established, with total availability of all the facilities you could wish for. The way you make the best of it is your choice.

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Tuning in to the stars

Back garden satellite dishes are now available at DIY stores – a technological boost to the growing cable TV industry.

David Hunter

With a sophisticated cable television system that is the envy of the world and back garden satellite dishes now available at selected DIY stores, British Telecom's cable TV baby is beginning to grow into a healthy, self-confident child. Now it is set to take another step forward and is reaching out for the lucrative prize of cabling 1,500,000 homes in Hong Kong. ▷

The control room at London's Teleport – the world's first international earth station to be installed in a city – currently transmits eight television channels to cable TV networks around the UK and Europe.

Britain's cable TV industry now looks at the prospect of a promising future. But it was not always like that. Following the initial euphoria four years ago, when the Government agreed to controlled experiments in cable TV, the history of the industry has been chequered.

Inevitably with new technology, mistakes were made. Some franchise locations had poor marketing potential. Hindsight showed that the network was not always built in the right place, nor was the best package of programmes offered. The City turned its back and the industry, starved of cash, found itself in the classic 'Catch 22' situation with viewers declining to buy because of insufficient top quality programmes, and being denied the necessary resources because of insufficient revenue being generated.

The Government, after exhorting businesses to seize the opportunity offered by an exciting new industry, promptly shot them in the foot, before the ink was dry on the franchises, by slashing the tax allowance on capital investment.

Things are very different today. The industry has reassessed the market more realistically and shaken out the entrepreneurs who mistakenly saw cable as a means to quick profit. The Government's attitude, too, is more realistic. Constraints of the past have now softened; a lighter regulating touch has replaced restriction.

Even the name of the product has changed, though the preferred 'satellite television via cable' hardly rolls off the tongue with the ease of 'cable TV'. Up on the 26th floor at Euston Tower London, where British Telecom masterminds its enterprise, they explain; "Cable was on everyone's tongue two years ago. Now it has lost its magic – satellite TV is much sexier!". Even the controlling division's name has changed, BT Cable being superseded by BT Vision, emphasising the company's wider commitment to the industry.

The cable story began in 1982, Information Technology Year, when the Government offered 12 franchises. British Telecom had taken a stake in the operating companies and was to be the cable provider in five of these successful franchises – Aberdeen, Coventry, Westminster, Merseyside and Belfast. Various problems have delayed Belfast and Merseyside, but the others have been in operation since 1985 and their construction is well advanced.

At Westminster, a sophisticated switched star system, developed entirely at British Telecom Research Laboratories, Martlesham, breaks new ground in interactive communication and is a world first. In addition to receiving nearly 30 TV channels, a wide range of information services is available – including the menu at local restaurants. This special high-tech system, which covers hotels as well as residential property, earned British Telecom a 25-year licence, against the 15 years for the more basic VHF systems.

Experience showed that the small stake taken in the operating companies was inadequate for the control British Telecom sought, and it has now increased its equity share considerably – to managing shareholder in Aberdeen, to 75 per cent at Coventry and to 40 per cent at Westminster. As part of the Coventry deal, the company bought out Thorn-EMI's shareholding at Swindon, and Swindon Cable

TV Ltd is now a wholly owned subsidiary.

The regulatory announcement also enabled British Telecom to upgrade its existing cable system at Milton Keynes by providing more satellite channels and including a local information channel, a popular feature aimed at integrating the cable TV company into the local community. Last year British Telecom also bought the systems at the Barbican in London and Bracknell, and these are now also upgraded with satellite TV channels.

Having put the hardware into the ground and taken a larger investment in the operating companies, the company is now investing in programming. It owns 30 per cent of the Home Video (film) Channel and the Children's Channel and 100 per cent of Star, a channel for screen blockbusters. Recently it bought a 30 per cent share of MTV, the 24-hour American pop music channel which will be available here early in the year.

Investment

It was also the lack of earlier industry investment that led to the birth of another sytem, SMATV (Satellite Master Antenna Television), for hotels and flats, where a medium-sized dish on the building picks up satellite programme signals and distributes them through pre-wired buildings. Intended as an interim measure for areas not cabled, the signs are that it is here to stay and British Telecom has a finger in that dish, too.

BT Vision's marketing of satellite dishes to hotels has now been supplemented by the marketing of dishes to the residential market. Available on the 'store within a store' principle at DIY outlets, British Telecom is now offering customers their own personal back garden satellite dish. The cost, £2,000 only 18 months ago, has already halved and is expected to fall further.

The concept of charging viewers for television is not easy to put across and the sales force continues trying to re-educate a public, used to 'free' TV, to pay for extra channels. This re-education includes persuading them to see repeats as an advantage – another chance to view. Its pitch is that it is selling the customer options and enabling him, with the aid of the programme guide, to plan the family's activities around their viewing. With a choice of some 20 TV channels it is important that such a message comes over with the concept of having 'something for everyone.'

What sort of people are cable customers? Usually they are young families with children; shift workers; people who tend to stay in either from choice or through circumstances. Above all, the majority of them probably own or rent a video-recorder.

The industry sees important parallels between video-recorders and satellite TV. It expects a similar sales pattern, unspectacular in the early years but taking off significantly within the next two years. Video is seen as the key to the cable and satellite market, ownership of a video indicating an appetite for home entertainment. That is the market which the cable companies are tapping, but some think they must act fast before DBS (Direct Broadcasting from Satellite) is with us.

The high-powered satellite used by DBS will allow viewers to pick up signals in small 12-inch diameter dishes. Only two or three programmes will be available, and companies are undecided whether DBS will be a threat, or a sweetener encouraging the desire for even more channels.

About 180,000 homes in the UK are taking satellite TV (almost a third of which are connected to British Telecom cable systems) and the number is growing – up to 12 per cent in the first five months of 1986 and to almost 16 per cent by the year end. Customers pay from £7 a month for a basic package up to £30 for a service of entertainment and information offering up to 20 channels.

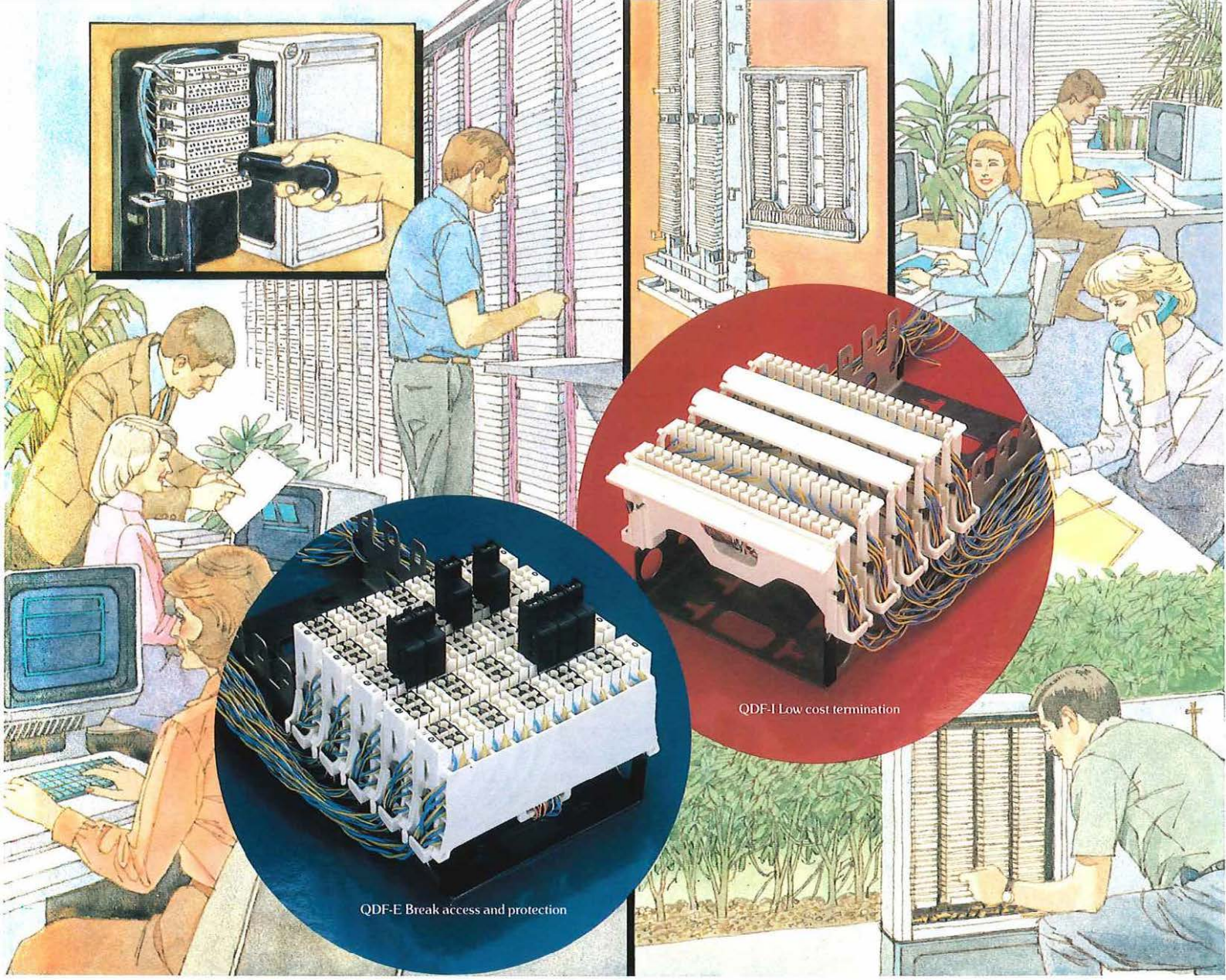
So encouraged are BT Vision by recent trends that resources to complete the second half of the franchises at Coventry, Aberdeen and Swindon have been increased, safeguarding jobs for another two or three years in the process.

In Hong Kong British Telecom, Hutchison Whampoa and Hong Kong Electric are working together on proposals to bid for a franchise to install and operate a cable television network throughout Hong Kong. Hutchison has wide ranging interests in Hong Kong and Hong Kong Electric has considerable experience in the field of civil engineering – an essential feature in any cable system. British Telecom is admirably placed to bring first-hand experience of designing, providing and running cable TV systems to the overall expertise of the consortium.

British Telecom has always been a bulwark of new technology. Few doubt that if it pulled out the cable industry would collapse, but today the company is encouraged by the number of customers it is attracting and retaining, and more resources are now being made available to ensure that British Telecom's investment and position in the industry are maintained. ■

Left: world-wide television – a new medium in which the viewers can aim at the stars.

Mr D A Hunter is head of market services for BT Vision.



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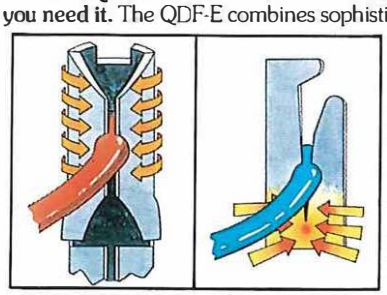

ADC Split Cylinder IDC Conventional IDC

*Patent Pending

The QDF-I* Block: Reliable, low-cost termination. The QDF-I completes the system, with straight-through termination wherever break access and protection are not needed. By combining E and I Blocks, you can **custom-tailor a system** that lowers your wire management costs without sacrificing circuit access or protection.

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Great and small–a winning combination

A Polish-born professor whose pioneering work in materials science has helped put Britain in the forefront of optoelectronic technology, is the latest winner of British Telecom's Martlesham Medal – one of the country's most coveted research awards named after BT's research centre near Ipswich.

Dr Marc Faktor, 56, who arrived in the UK as a teenager at the end of the second world war and began work as a laboratory assistant in north London, was deeply involved in the developments which led to the creation and expansion of optical fibre communications.

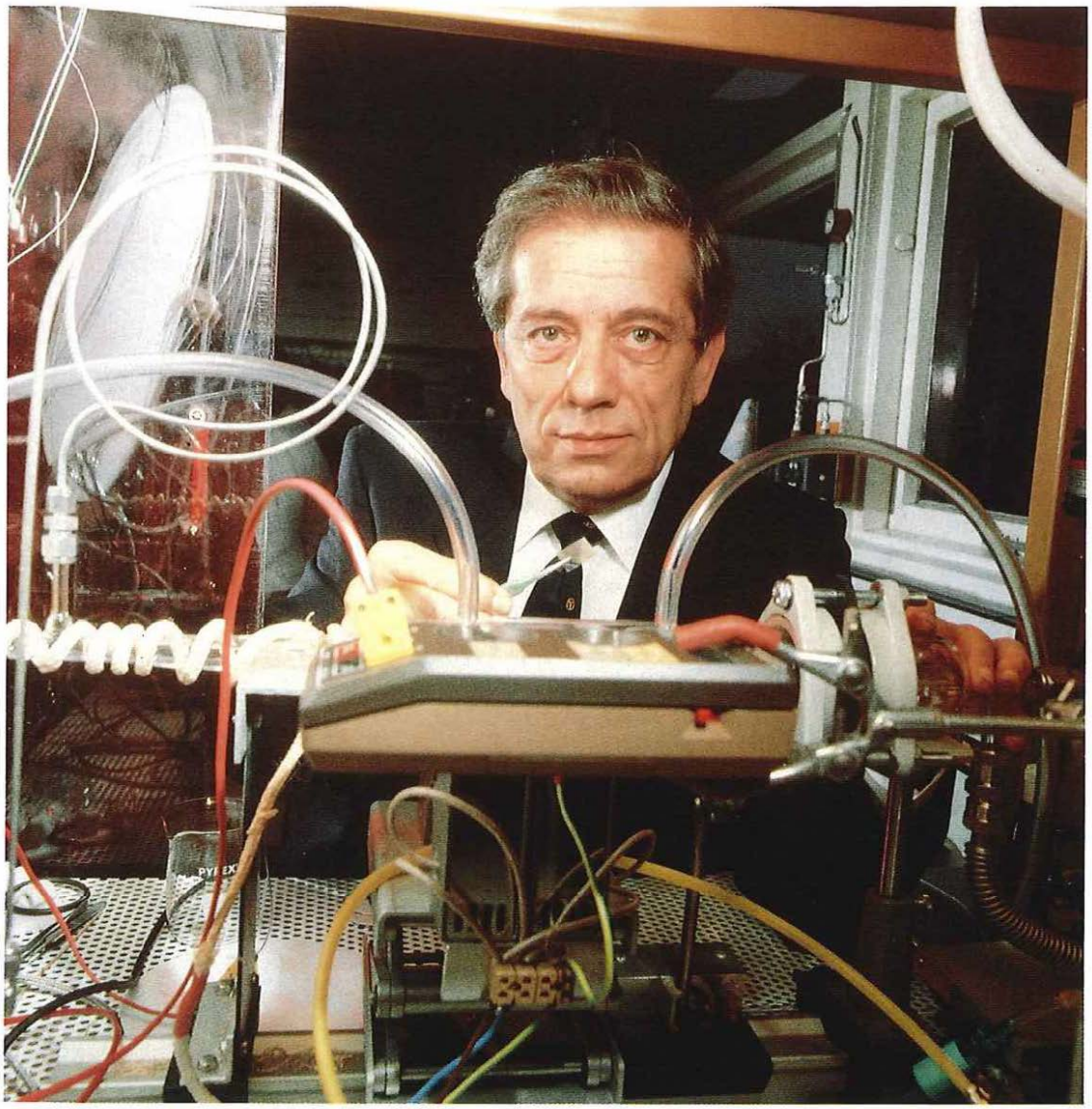
He made major contributions to the technology which enables phone calls, data, text, facsimile, pictures and graphics to be sent as rapid burst of infra-red light along hair thin strands of ultra-pure glass.

Dr Faktor, who describes himself as a 'physical scientist', joined Martlesham's forerunner at Dollis Hill in London in 1958. He soon demonstrated an immense grasp of materials science – both in principle and detail – and his work quickly showed a high degree of originality.

The 'lead time' associated with materials research is especially long, so several of Dr Faktor's contributions are only now central to current telecommunications projects. The joint venture company set up earlier this year, for instance, between British Telecom and Du Pont (BT and D Technologies Ltd) is all set to develop, manufacture, and market optoelectronic components and devices which stem directly from his work.

The worldwide market for these devices is worth more than £350 million now and is expected to grow by 30 per cent a year to more than £4 billion by the mid 1990s by which time optical fibres will have spread extensively to serve both business and residential customers.

Dr Faktor's main area of activity has been with crystal growth and its relevance to the compound semi-conductors for transistors, ▷



Dr Marc Faktor pictured with the core of his contribution to the development of thin-film technology – building up layers of semi-conductor material no more than four atomic layers thick.

light-emitting diodes, detectors and the integration of these services. The high performance lasers and detectors recently produced at Martlesham owe their development to Dr Faktor's early work.

The lasers generate bursts of light from electrical pulses and project them into the fibre. Semi-conductor detectors recover the light at the far end of the fibre and convert its digital information back into electrical form. The lasers consist of crystals the size of a grain of salt made up of separate layers of semi-conductor compounds such as gallium arsenide or indium phosphide and their alloys.

It was Dr Faktor, too, who established at Martlesham the then novel growth technique of metal organic vapour phase epitaxy (MOVPE) in which organic gases containing the materials to be deposited in a series of carefully controlled separate layers are passed over the surface of a 2 cm square wafer held at high temperature in a glass tube.

For successful crystalline growth many factors need to be controlled including gas composition, crystal growth rate and purity of materials. Martlesham scientists have now developed the technique to achieve the consistently high levels of quality and yield essential to producing optoelectronic devices in commercial quantities.

Dr Faktor, now a visiting professor at the Department of Chemistry, Queen Mary College, London University, continues to develop the technique, making what is arguably the most distinctive UK contribution in the field.

During the early 1970s, when the performance of 'directly modulateable' semi-conductor lasers was uncertain, Dr Faktor headed a team which used organic materials as an alternative and established a successful programme of melt growth for crystal cord fibres. Now, with optical systems demanding a more refined signal than pulsed sources can easily provide, interest in this work is currently being revived in laboratories throughout the world, including British Telecom's own research centre.

Previous Martlesham Medal winners

1980 Dr Tommy Flowers, inventor of Britain's first computer and of Colossus, the wartime code-breaking computer.

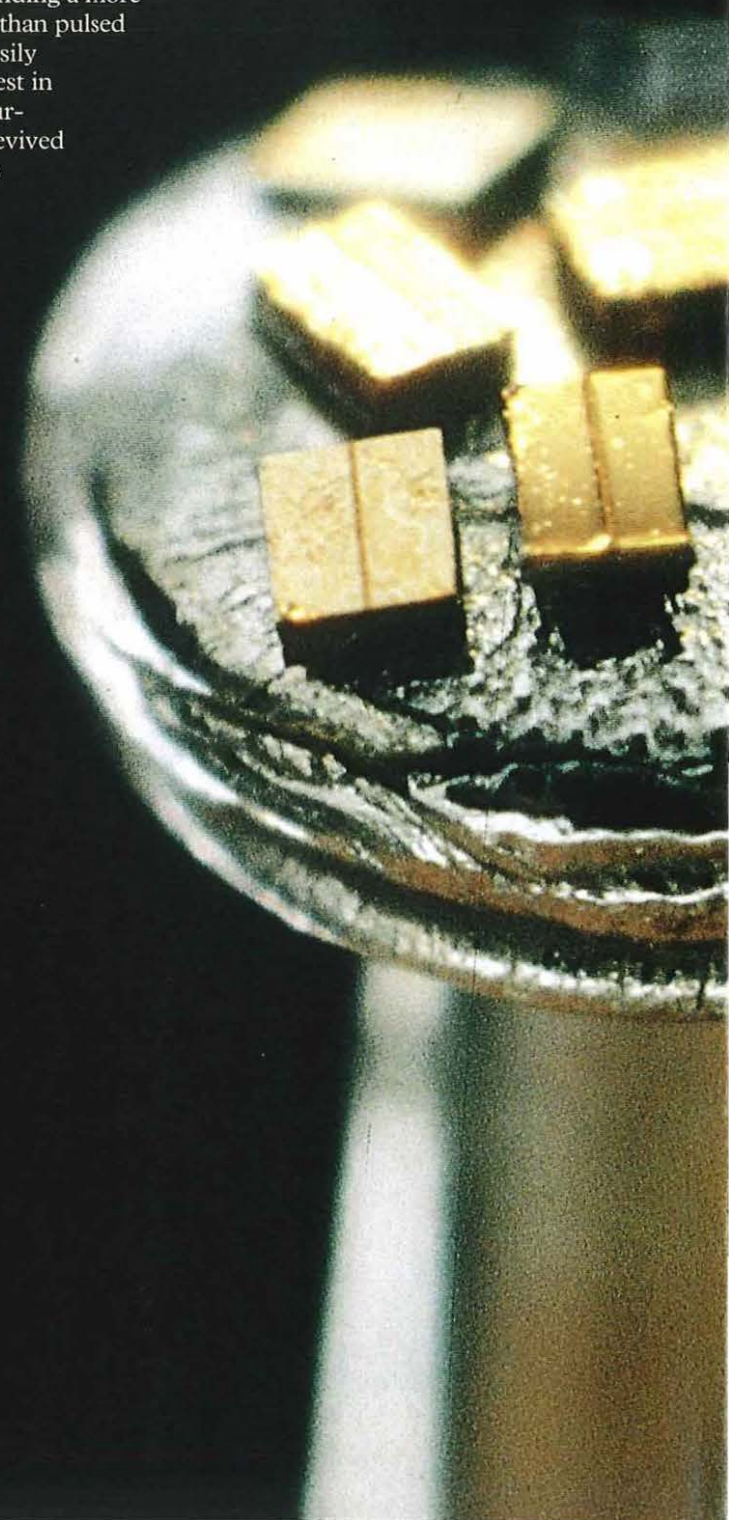
1981 Dennis Baker, pioneer of the first high-reliability transistors used in submarine cable amplifiers

1982 Dr George Newns and Dr Keith Beales, who developed a successful optical fibre production process.

1983 John Martin and Roy Harris, for their System X design and development work.

1984 Charles Hughes, the originator of microprocessor technology in telecommunications.

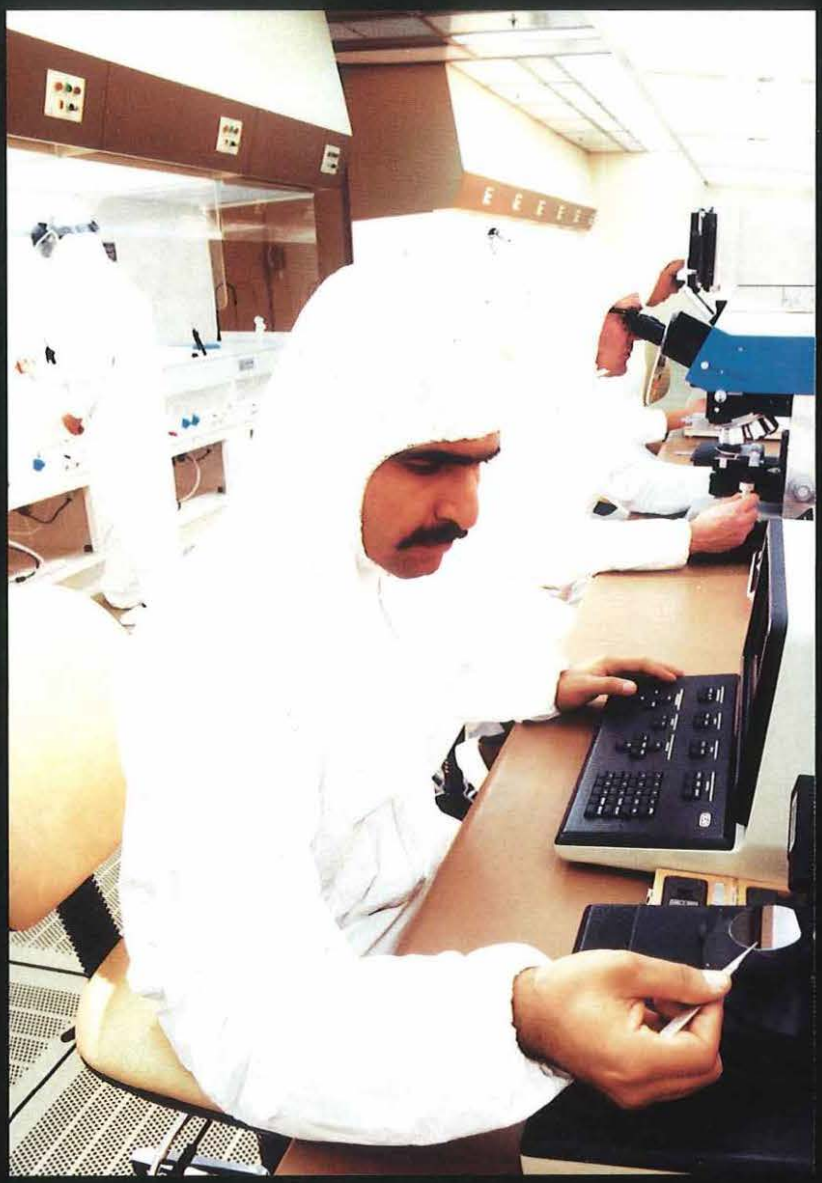
No award was made in 1985.

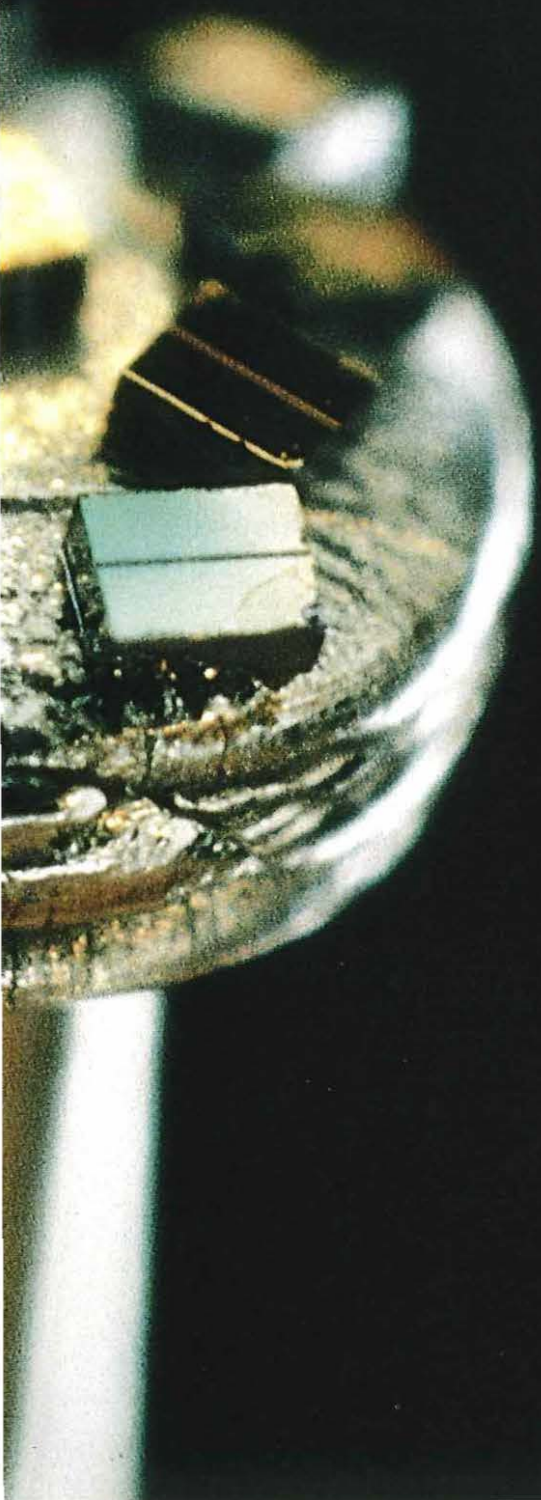


Bottom left: an advanced method, known as metal organic vapour phase epitaxy (MOVPE) used to grow large areas of laser slices with good uniformity.

Right: wafer fabrication is carried out under clean-room conditions and measurements are checked meticulously.

Main picture: the devices at the heart of BT and D's products are small enough to fit several of them on the head of a pin.





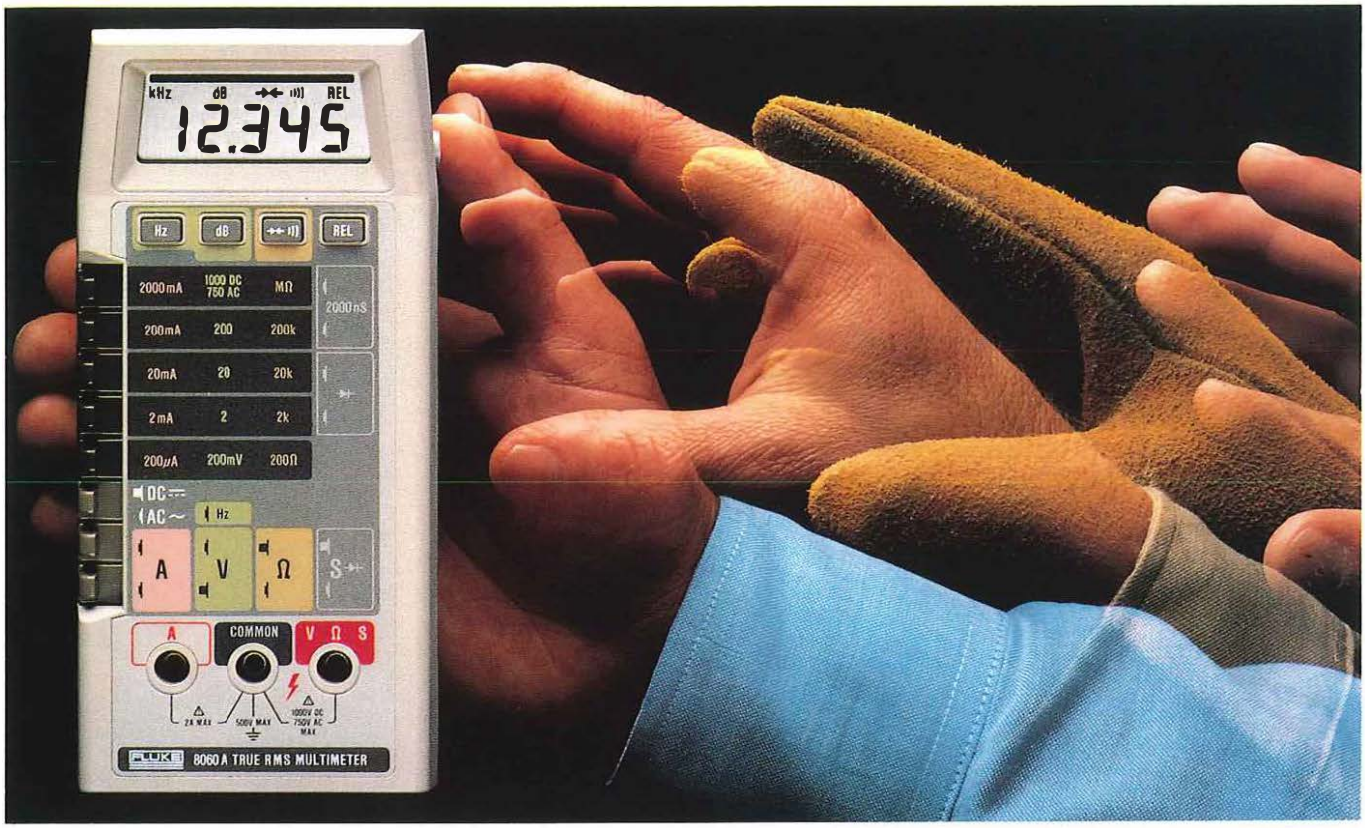
Similarly, research undertaken by Dr Faktor in the late 1960s concerned with depositing silicon nitride and oxynitride layers for use in Very Large Scale Integrated (VLSI) work is now being looked at with renewed interest. Again an organometallic approach was the key.

Crucial to all Dr Faktor's work is reliable data, and he has frequently had to develop a pioneering role to generate the information he needed. His most far-reaching development in this area has been electrochemical profiling of the impurities added to semi-conductors to produce required electrical qualities.

Dr Faktor provided the vital electrochemistry to establish the technique. The British Telecom profile plotter which he developed is manufactured under licence, sold worldwide, and is in its third generation model. The plotter is fully automated and capable of analysing multi-layer structures with no depth limitations.

Dr Faktor was also instrumental in developing an infra-red polarising microscope for use in detecting defects in semi-conductors – as well as playing an important role in many smaller achievements which have added to his contribution to current BT technology. ■

The engineer's choice in handheld DMMs



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BETTER PEOPLE COME FROM

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Managing to communicate

Alison Gurney

Three divisions of British Telecom's Business Network Services have come together to provide a new service for managing corporate communications networks. Called Communications Facilities Management (CFM), the service will address an emerging market estimated to be worth £500 million a year by the 1990s by drawing on the company's experience in planning and operating voice and data networks.

The formation of CFM has happened at a time when information systems and the complex networks supporting them have become an essential commercial feature of the business environment. No longer is the network a simple support system. Today, it is at the very heart of the conduct of day-to-day business.

At the same time, economic pressures are putting the emphasis on cost effectiveness. Financial constraints fall squarely on the shoulders of the communications manager.

In seeking an effective management of the network, the customer can do it himself or go for third party management of his corporate network. This is where CFM comes in.

Capabilities

The objective of the unit is to provide customers with a complete spectrum of management capabilities ranging from consultancy, which includes improving the efficiency of existing voice network systems as well as advising on new ones, through systems design, implementation and network management, to the complete management of

customers' multi-vendor facilities.

CFM will cover existing systems as well as the newer emerging technologies at home and abroad. It will advise of the type of network, single or multi-vendor, install it, commission it and manage it.

The new service is flexible. Some management systems can be purchased outright and support services hired as needed. And CFM by designing, installing, commissioning and operating an entire private network can leave the customer free to pursue his own mainstream business.

British Telecom's CFM Division is made up of three sister divisions, Network Consultancy, Network Management and Network Systems. Its 150 staff specialise in all aspects of the operation, from initial consultancy, through development operation and management to customer support and sales and marketing.

Already the Division is making a multi-million pound investment in UK facility management centres, two of which are open — in London and Ipswich. Another is being established in Manchester with a communications node in Birmingham. And the division has won its first major contract, to help British Aerospace manage its corporate data network.

BT/CFM have laid down a development plan to satisfy customers' needs for managing and evolving their private networks. They are developing a portfolio of integrated network management products and services to give customers comprehensive solutions. All of this, combined with the availability of skilled staff, with expertise in network management, systems design and software management.

Network Systems have in the past developed management systems for System X and AXE10, and Network Consultancy operates one of the largest call information logging services in the country, carrying out short term surveys and processing the results for clients.

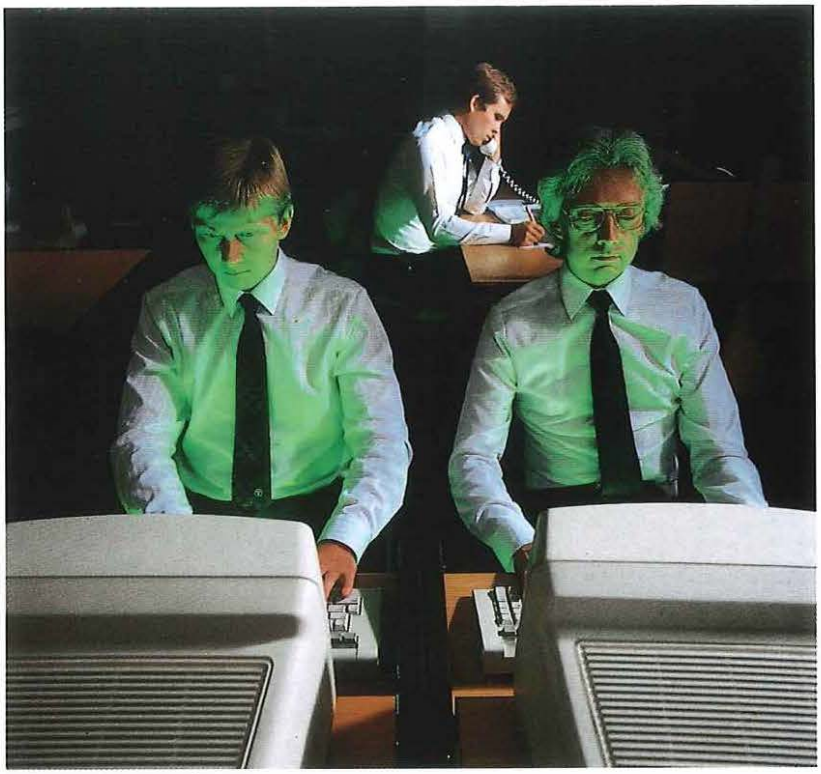
No two customer networks are the same. Networks evolve to suit particular business requirements and management solutions have, therefore, to be configured to suit specific needs.

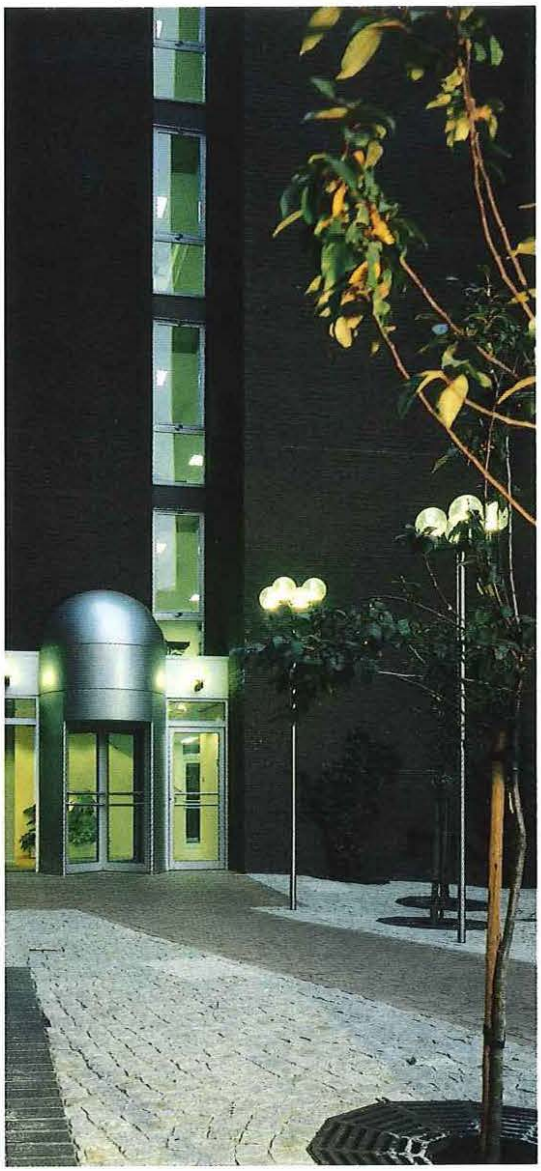
This is where the backbone network of new facilities management centres lend their support. They are purpose built, highly secure control centres equipped with the latest technology.

Individual

They can be on British Telecom's premises, or set up on customers' own premises according to individual requirements. Some customers may wish the control of their network to remain 'in house' using their own or contracted British Telecom staff on their own site. Some may wish to have only 'out of hours' cover provided by a third party, while others would prefer to hand the whole network over to British Telecom.

The Facilities Management Centres operate as a central database and traffic centre and provide inventory management, performance monitoring, call logging, cost allocation and ▷





Opposite, above: customer reception at the Ipswich CFM centre.

Opposite: the terminal room at the Ipswich facility management centre contains 20 terminals linked to four 'super-mini' computers and is used for the development of specific network management systems for customers.

Top: members of the network engineering team use the latest technology to monitor the performance of a customer's network.

Left: the entrance to Crown House, Ipswich, leads customers into a purpose-built facility management centre equipped with everything necessary to enable customers to forget communications problems and to concentrate on their mainstream business.

billing and training for their customers.

Even with the best systems there are moments when customers need advice or practical help and BT/CFM provides this too through its customer support group.

Eventually, first line support will be provided by British Telecom's local engineering groups with secondary support offered by BT/CFM. But until the customer base expands, BT/CFM offers both first and second line support. The districts will become more directly involved as the market expands in their region. No products or services are released to commercial customers until CFM is sure that it can offer the right support. All services and products undergo internal testing before being offered to a customer.

A Sales Support Group is based at British Telecom's Euston Tower in London and provides consultancy services to BT National Accounts and District Sales offices. CFM sales support only becomes involved with customers when invited through normal British Telecom sales channels. It never approaches customers directly.

However, with all the advice and support that CFM can offer it still depends heavily on the corporate designer taking the right decisions in the first place. But not all customers have the resources or skills within their organisations to collect and analyse the relevant data.

Daunting

Here, the Network Consultancy Group comes into its own by providing network design analysis and complementary advice. Without correct design, performance can be seriously affected at all levels. The sheer number of options open to an organisation can make the selection of the correct network a daunting task.

By using the Network Consultancy Service, customers are given professional advice and the information to make decisions for themselves. While some management solutions are simple, the majority are beyond the capabilities of most communications managers without modern technology.

BT/CFM removes this burden, frees customers to pursue the business they know best and at the same time enjoy comprehensive support and advice on their communications network. ■

Mrs A R Gurney is marketing manager for CFM.

Pericom TERMINALS

Everything Right On Line To Raise The Standards Again

There are plenty of terminals on the market. But you've got individual requirements. One way to find a suitable product would be to contact manufacturers offering a wide choice. Another would be to contact manufacturers offering a limited selection of amazingly versatile products. Or you could contact Pericom, and get the best of both worlds.

"Ultimate Compatibility – IBM or DEC environments – full colour"

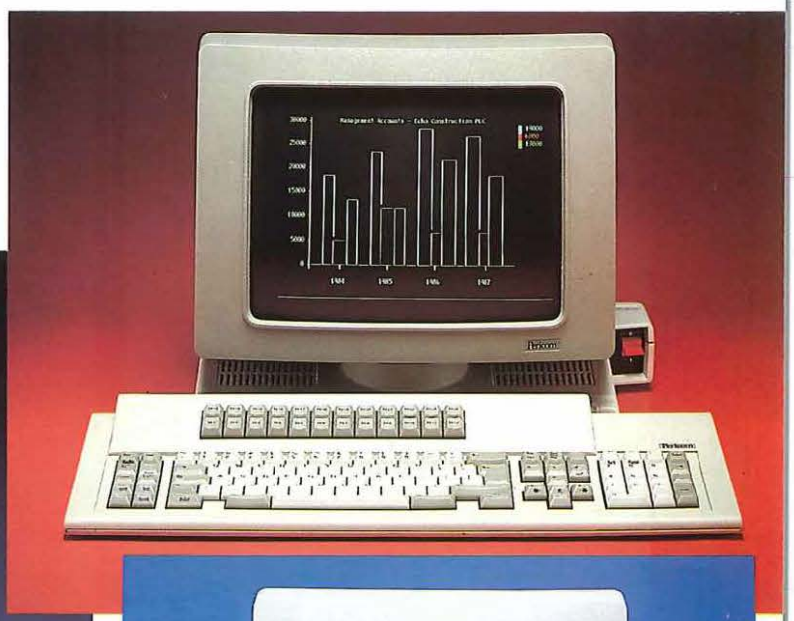
Take our **MC279** for example. Designed for use in mixed mainframe environments, it offers two of everything. **IBM 3179** and **DEC VT220** compatibility, asynchronous and synchronous communications modes, parallel and serial printer ports, 80 and 132 column operation, plus a viewdata option. Its unique keyboard combines the best of the **IBM 3179** and **DEC VT220** layouts – so operators won't have to re-learn new symbols or function key sequences. Another model, the cost-effective **MC179**, shares all **MC297**'s features except **DEC** compatibility.

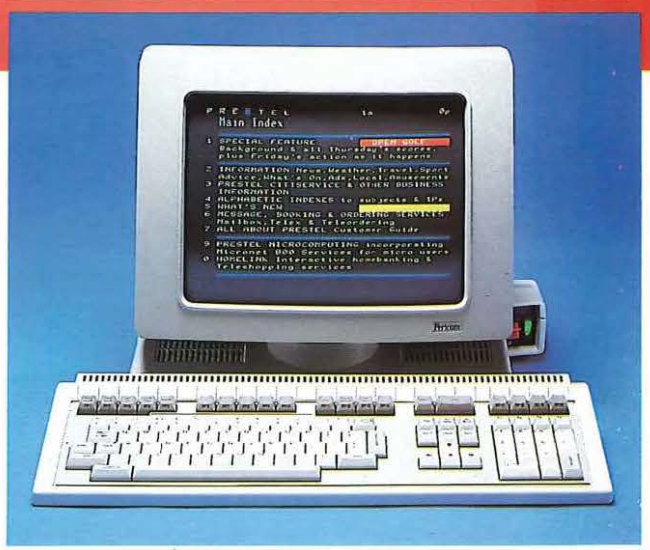
For serious **DEC** and viewdata users, we recommend our **MC200.** This full colour, high resolution VDU features a multipage option which allows up to seven pages to be stored locally. In viewdata mode, this number doubles. You can even compare a couple of separate **Prestel** pages by displaying them simultaneously. Pages can be updated without being rewritten, and hard copies printed in full colour using our low cost, ink-jet, **MX100** printer. Nothing could be simpler. The **MC200** is fully compatible with **DEC's VT220**, but separate protocols can be provided for mixed mainframe environments.

In addition to high performance and flexibility, our products feature the highest ergonomics standards. Flicker-free screens which tilt and swivel into the most comfortable position, adjustable brightness and contrast, and ergonomically designed detachable keyboards are all standard on Pericom products.

"Ultimate Ergonomics – page white monochrome"

But two of our models excel even by our high ergonomics standards. On **MT300** and **MT350**, we've completely eliminated screen flicker, provided a choice of negative and positive 'page white' displays and attained characters of absolute clarity by utilising a 20 x 16 cell. Pixel phasing and overscan techniques combine with ultra high refresh rates to produce a display beyond comparison. These models represent the pinnacle of ergonomic design and easily meet – even sometimes exceed – the most exacting European ergonomics standards. The operator benefits are immediate and employers soon appreciate how ergonomics can lead to increased efficiency, reduced staff turnover and lower absenteeism.





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two innovations from Telspec

CEPTEL

The CEPTEL system is Telspec's solution to the problem of providing Automatic Changed Number Intercept and/or General Announcements.

Employing the latest developments in digital speech storage technology, this highly sophisticated, yet easy to mainpulate system is enjoying widespread use in many British Telecom Exchanges throughtout the network.

The CEPTEL exchange based equipment consists of two parts, the Exchange Control Unit (ECU) and the Line Interface Shelf (LIS). The ECU allows full manipulation of the message and per line parameters for any of the 960 (maximum) local terminations. The recent extended facility of remote working over a dial up line allows the same manipulations to take place for an additional 1440 (maximum) lines remote from the ECU, located anywhere in multiple sites throughout the PSTN.

Each LIS houses up to 80 terminations built up of sub-modules of 8 lines minimum. Each 16 line module (5 per shelf) is totally independent of the rest, with its own control and user-defined vocabulary.

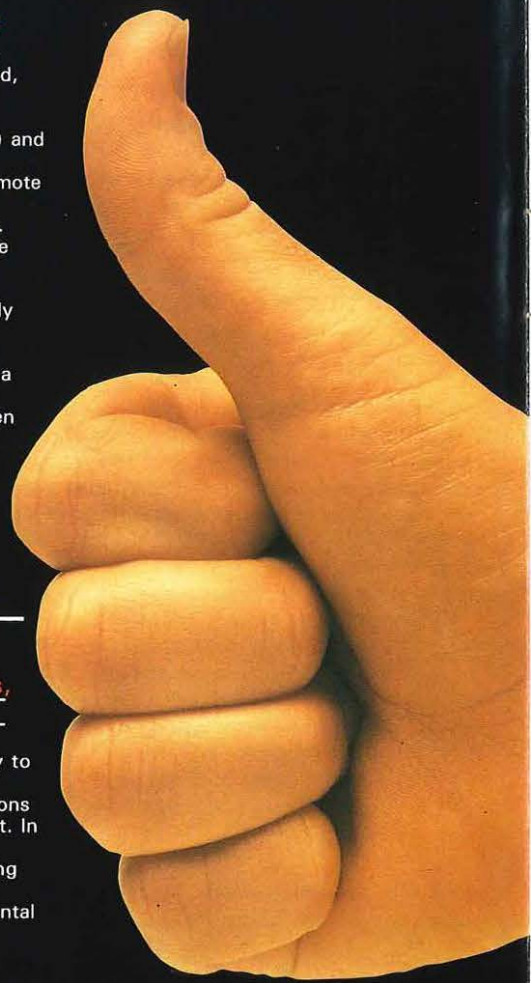
Each module has an on-board battery to provide full memory support, in the event of 50V supply failure, for a minimum of four days.

The CEPTEL Studio Unit is a desk mounted, mains driven, additional system for the user to efficiently produce their own message vocabulary and structured announcements rapidly, using a microphone or tape input source.

A feature of the Studio Unit is the ability to retain the recognisable personality of the voice when digitised, useful for adding a local content to the announcement.

CEPTEL Features

- 2 or 3 wire exchange compatible.
- Comprehensive traffic analysis.
- Automatic self-diagnosis with alarm output and fault report.
- All lines monitorable (local and remote sites).
- Total non-blocking system — all calls answered with no waiting.
- Ongoing enhancement development.



LINE CONCENTRATOR 14/5A Mk. II

The Line Concentrator 14/5A Mk. II is a pair gain system consisting of two units, one housed in the telephone exchange and the other on a pole or in a cabinet.

14 subscribers' lines are concentrated by the exchange unit to four trunks (plus 1 for the data link/power feed). The other end of the trunks feeds a remote unit which distributes appropriately to the 14 subscribers.

A maximum of 4 subscribers at any time have access, hence low usage or low growth applications are ideal. A cost-effective alternative to cable is coupled with ease of recovery and reassignment. In some cases the 14/5A Mk. II may provide a permanent solution to expensive alternatives.

All connections from exchange to subscriber are metallic, and the system is capable of supporting analogue or digital transmission.

This Mk. II system has been designed with considerable attention being given to high environmental reliability and maintenance of near standard line conditions.

Line Concentrator 14/5A Mk. II Features

- Reliable service in hostile environments.
- Quick clearance of customer waiting list.
- Cheaper alternative to cable.
- Constant dc line conditions to subscriber for memory 'phone support, etc.
- Busy tone supplied to subscriber going off-hook when unit has 4 trunks in use.
- Full compatability with the Mk. I units.
- Suitable for 2 or 3 wire exchanges.
- Remote unit available in either an economical sleeve 32A or a hermeticallky sealed metal box for pole or cabinet mounting.
- Comprehensive self-test capability.

CEPTEL

LINE CONCENTRATOR

For further details on either of these systems, or information on TELSPEC Ltd.'s other products, call or write to:

Kevin Hermanson (CEPTEL technical enquiries)
David Barrington (CONCENTRATOR technical enquiries)
David Earl (SALES enquiries)

Telspec Limited

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Manx takes

From 1 January 1987 a new subsidiary of British Telecom took on the running of the Isle of Man's telecommunications system for the next 20 years. Despite a strong challenge from Cable and Wireless, the granting of the Licence to Manx Telecom Ltd won approval from Tynwald, the Manx parliament.

Manx Telecom Ltd is an Isle of Man registered company, at present wholly owned by British Telecom, but the possibility of making the shares available to the general public has been discussed with the Manx Government. Manx Telecom has been established as the trading name of the company and since April 1986 the Isle of Man operation has traded under that name as part of the Overseas Division of British Telecom.

A detailed submission given to the Manx Government contained a number of commitments to the Island and its community, and the establishment of a Manx Registered company complies with the first of these.

The appointment of local representatives of the Island's business and residential community to the Board of Manx Telecom Ltd will enable the Island's residents to have a direct input into the running of the company. Mr Walter Gilbey MHK (equivalent of an MP) has been appointed Chairman, Mrs Pat Corrin, a local housewife, who is well known in the Island's community, and Mr Bob Dowty a local businessman have also been appointed Directors on the Board.

Jim Greenhill, a former deputy director of Marketing in the new re-organised Local Communications Services, has been appointed Managing Director and is now an established Manx resident. With a relatively small staff under his control, he is working hard to meet the commitments given to the Manx Government for the modernisation of the Island's telephone system.

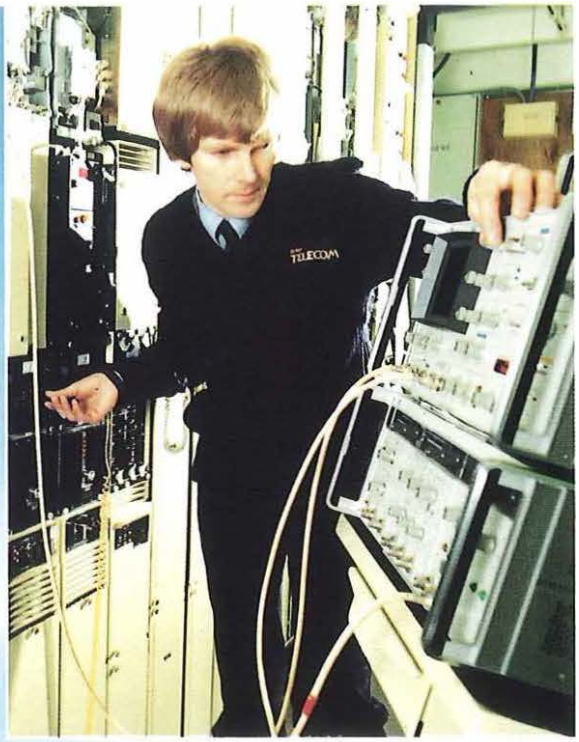
John King, Corporate Director and Managing Director, BT Overseas Division, Michael Armitage, Director of Inland Division for the North and Mr John Allkins, the Financial Director BT Overseas Division represent British Telecom on the Manx Board.

Manx Telecom Ltd will become part of the Overseas Division's strategy for attracting business around the world. With the full support and backing of British Telecom, it will be free to shape the telecommunications services to meet the specific needs of the Manx community on land and at sea. At the same time, it will establish a compact but complete telecommunications system that will enable overseas visitors to view all aspects of a telecommunications operation within a relatively small area.

A programme for linking the Island exchanges with optical fibre cable has already commenced and an optical fibre submarine cable link to the UK has also been planned. All customers on the Island should have digital services available by 1990, by which time all 11 exchanges will have been replaced. Present plans are to implement ▷

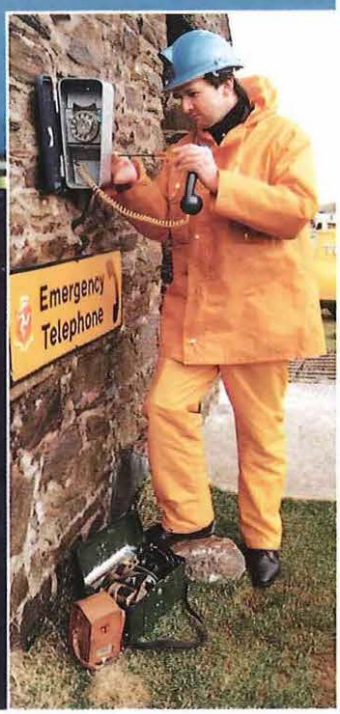
Telecom over

Mike Dee



Above: engineer David Comish tests equipment in the £4 million TXE4A electronic exchange in Douglas.

Main picture: the new radio station at Creg-ny-baa has distinctively-shaped aerials designed at British Telecom Research Laboratories, Martlesham. In the 1940's, the station was the first to use 12-channel VHF radio to provide a link with the mainland.



Free emergency telephones on the mountainside at Snaefell are a special island feature of British Telecom service.

Opposite page (above): monitoring submarine cable on the beach at Port Grenaugh.

(Below): British Telecom engineers laying optical fibre cable on the Isle of Man – the company has laid nearly 2,000 miles of underground cables so far.

Below: engineer Brian Quayle pictured near the famous Laxey water-wheel on the Isle of Man.

an AXE 10 exchange in Douglas and a series of smaller AXE 10 exchanges around the rest of the Island.

The modernisation of payphone equipment was completed by the end of 1986 and Phonecard and Creditcall equipment have already been installed. Video conferencing is available to the Island's customers and negotiations are being finalised for the introduction of cellular radio to the Island within the next few months. The results of market surveys to discover the potential demand for Cable TV services on the Island are shortly to be published and work could start soon.

A commitment has also been given to install a small satellite earth station which will be run by Manx Telecom on the Island. Surveys have been completed and an application for planning permission is being sought for a site in Douglas.

Favourable

The Island competes with financial centres around the world for business, particularly with Jersey and Guernsey, and sees an advanced communications system as an essential pre-requisite for attracting further large banks and insurance companies to the Island. A tax rate of 20 per cent and favourable legislation on tax-exempt companies, leasing and captive insurance makes the Island an attractive centre for many financial institutions.

The intention of Manx Telecom is to provide an even better quality of service for all customers; making available on a continuing basis the very latest customer facilities, helping to reduce running costs and by providing advanced facilities ahead of time, stimulate and encourage business activity on the Island.

Within a framework established by the Licence, the Manx Telecom Board will be free to establish its own tariff structure and set customer prices especially tailored to meet the needs of the Island's community. Manx Telecom aims to become more efficient and use technological advance to improve value for money and make possible lower real prices to customers.

Jim Greenhill is keen to assist in the growth of the economy whilst caring for the environmental needs and special aspects of Island life. He plans to use the Island as a test-bed for new products and services and expects the self contained nature of the Island to enable more accurate and timely feedback to be received from customers at low cost.

He also wishes to develop local training facilities and discussions have taken place with the College of Further Education with the aim of assisting in the training of technological, financial and business skills by, amongst other things, providing the College with the latest office automation and information technology products.

The aim of Manx Telecom is to become a completely self contained operating unit. Functions previously undertaken by British Telecom in the UK are being transferred to the Island. The rapid introduction of new services has involved a large number of British Telecom personnel in the UK, many of whom are able, for the first time, to see a project develop from start to finish and meet people from the other areas involved in the project 'around the table'. Because of the small staff numbers, staff on the Island have to be adaptable and able to consider the commercial, financial and technical implications of a project and deal with specialists from all these areas.

The small size of the operation (under 200 staff and 25,000 customers) has meant that the Island was not suitable for the introduction of Customer Service Systems (CSS) if it was to be run as a self contained unit, rather than through a link to the UK. Manx Telecom had to look to alternative systems and has entered into a joint project with Guernsey's state owned telecommunications company and British Telecom's Overseas Division to develop a Customer Administration System (CAS) suitable for a small telecommunications operation. The system is being developed by BT Applied Technology in Leeds and a DEC VAX computer has recently been installed on the Island by Manx Telecom.

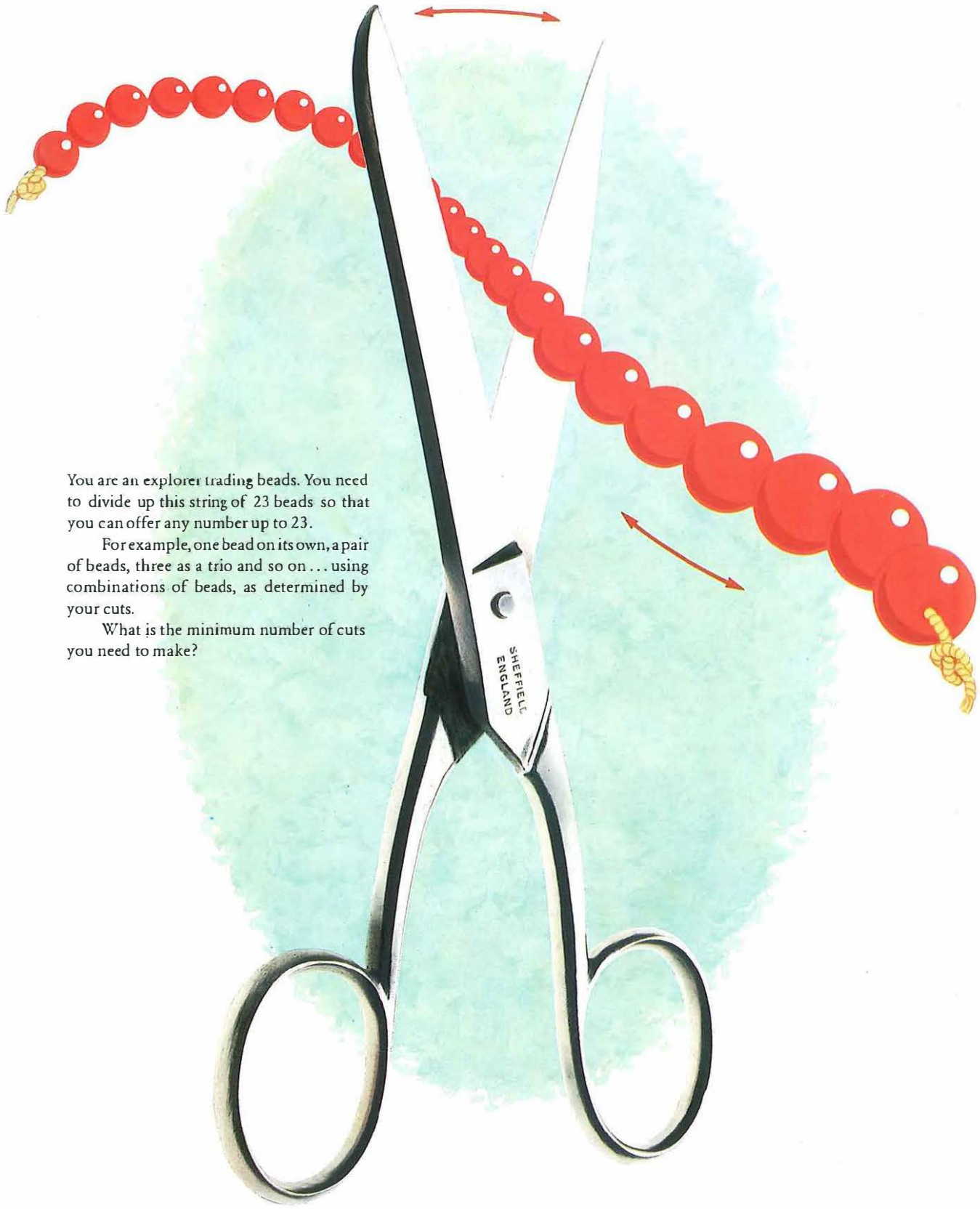
The first stage of the development is the introduction of a self contained billing system. This will be followed later with an order handling system and line plant record system. It is hoped that once this has been implemented successfully in the Isle of Man it will pave the way for the introduction of the system into other telecommunications operations around the world.

Coupled with the introduction of its own accounting systems, Manx Telecom will offer overseas visitors the chance to visit a Telco that is compact yet demonstrates all the up-to-date facilities in its engineering and financial and commercial systems.

The Isle of Man customers are being offered a sophisticated Telecom system at prices geared to meet the needs of the Island's community. This will, hopefully, help strengthen the infra-structure necessary to support a thriving business and financial community. British Telecom will have a valuable operational showcase to help enhance its reputation in the rapidly expanding overseas market. ■

Mr M Dee is company secretary, Manx Telecom Limited.

CAN YOU WORK IT OUT?



You are an explorer trading beads. You need to divide up this string of 23 beads so that you can offer any number up to 23.

For example, one bead on its own, a pair of beads, three as a trio and so on . . . using combinations of beads, as determined by your cuts.

What is the minimum number of cuts you need to make?

Engineers asked "Could we make an RF spectrum analyser that was both portable *and* inexpensive?"

The answer is yes. The HP 8590A combines light weight (13.5kg), ease of use, prodigious performance (10kHz-1.5GHz frequency range) and quality engineering – all at an affordable price.

When a high-speed datacomms network goes down, you haven't got time for fingerpointing arguments. So what's the quickest way to identify the fault?

The HP 4952A protocol analyser provides accurate fingerpointing. It's powerful, fast (64 kbps) and extremely easy to use.

Digitising oscilloscopes are an invaluable tool. But do you really need to compromise between single-shot and repetitive performance?

Not any more. The HP 54111D scope has a digitising rate of 1 Gigasample per second for single-shot events and a bandwidth of 500 MHz for continuous signal capture.

When an analogue data line fails there's often no choice but to take it out of service to test. Surely there's a better way?

There is. With the HP 4948A in-service Transmission Impairment Measuring Set (TIMS). You can now identify faults without disrupting the system. And not just identify, but predict. The HP 4948A also monitors line performance and tells you when throughput will fall.

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✂ Answer: Four. Make a cut each side of the fourth bead and each side of the eleventh. ✂

Privatising the airwaves – initial reaction

The air we breathe is supposed to be sacrosanct and a Government scheme to privatise the air around us was bound to be greeted by some hostile reaction. But the 'air' these days also includes radio transmissions and data information and in that sense is a commodity as much as anything else.

This article looks at a pro-privatisation report, presently being studied by Government and reviews the opportunities emerging in new radio services, though adoption of the report's recommendations would mean British Telecom's spectrum allocation would be likely to be cut. Full deregulation would also pose considerable problems for BT in maintaining quality standards on its fixed terrestrial and satellite links.

The allocation of radio frequencies for all forms of radio communication should be handed over to the private sector, and be run on a profit-seeking basis, recommends a Report commissioned by the Department of Trade and Industry.

The Report by independent management consultants CSP International Ltd., has been linked to a recommendation of the Merriman Committee, which reported to the Home Secretary on the Radio Spectrum in 1983. Professor Merriman – one time Senior Director Development of British Telecom – made a number of recommendations which DTI have since been addressing, including a more open system of radio frequency management, and where relevant, the introduction of cost/benefit analysis in Spectrum Management decisions. Ironically, the Committee felt that Spectrum Pricing could well be impracticable.

British Telecom as a major spectrum user, has been consulted from the outset of the CSPI Study, and has made its views known through the Frequency Co-ordination and Management Group

chaired by Dr John Thompson, BT's Chief Professional Radio Engineer.DTI Radio Communications Division were very keen that any proposals for radical change to the current regulatory system were developed with full knowledge and opportunity for comment from British Telecom, a significant radio user.

Phase 1 of the CSPI Report submitted to DTI in November 1985 was concerned only with Fixed (Trunk and Local) radio services in the frequency range 1–30 GHz., but it did develop the general theme of 'Spectrum Pricing' — the allocation of radio frequencies according to market forces rather than the traditional 'first-come-first-served' basis of Government licence.

Phase 2 studied de-regulation of the Fixed Satellite Service Bands and was submitted in February 1986; Phase 3, concerned with Mobile Services and Broadcasting, has recently been completed but not released for comment to BT. The full report is now being compiled for Government consideration together with DTI recommendations for action.

The Report offers DTI a range of options for Frequency Management extending from its current centralised situation of spectrum planning and licensing to a fully privatised option controlled by market forces. As a minimum, CSPI suggest DTI take a more market-oriented approach, charging licence fees which represent the value of particular frequencies used.

Exploitation

Encouraged however by evidence of more dense exploitation of the radio spectrum in the US, CSPI go further and recommend the creation of a fully privatised market – undaunted by the fact that the FCC has struggled in vain in the US for many years to implement spectrum auctions. A good example of this difficulty of weighing commercial demands against social value judgments has been provided by MDS – Multipoint Distribution Service. This new market in local distribution of Pay TV at 2.5 GHz has consumed enormous commercial and legal resources in attempts to define an acceptable licensing process.

According to Mr Hugh Collins of CSP, their Report recommends that Government effectively gives up detailed control of the whole civil radio spectrum – which it has exercised ever since Marconi first came to London in the 1890's to build the world's first practical radio communications system.

Instead, the Government should hand over control of the radio spectrum to independent Frequency Planning Organisation (FPOs), which would typically be departments of existing professional companies operating radio services, and selected for the role in the same way as the network operator companies now running the UK's cellular radio systems were chosen.

The number of FPOs selected and the frequencies allocated to them would be chosen so as to ensure direct competition between them in allocating individual frequencies to end users. FPOs, which would include British Telecom and perhaps Mercury, would have full responsibility for ensuring that their allocations would meet technical standards to avoid interference and consequently would have to police their sections of the radio spectrum to ensure that they were not being used improperly. In return, each FPO would then be free to allocate frequencies under its control.

According to Mr Collins, the real advantage of the new approach for both existing and new radio users would be increased flexibility and ease of obtaining access to radio frequencies. The private sector FPOs, it is felt, would be much more responsive to users' needs than the current Radio Communications Division of DTI. Under the new market structure, the DTI role would shrink to providing technical co-ordination between FPOs and acting as the international interface for CCIR negotiations.

The Report seeks to overturn the idea that the radio spectrum is a limited resource that needs to be 'rationed' by Government licensing in order to allow fair access. Instead, the Report argues there is no practical shortage of radio frequencies, and that the widest possible access to the benefits of radio communication can be best ensured by the new free market approach.

According to John Thompson however, who has spent considerable effort over two years in discussion with CSPI and DTI attempting to develop a balanced view of Spectrum Pricing, the Report's recommendations are over-simplified and belie difficulties for users of radio communication with respect to quality management. Fundamental to the principle of introducing free market forces, would be the ▷

Below: British Telecom has a quarter of its trunk communications on microwave radio – amounting to some 250 million circuit kms of telephone transmission and 92 per cent of the UK TV distribution network.

planning of one operator's radio links by the Frequency Management Department of its competitor's FPO.

British Telecom has a quarter of its trunk communications on microwave radio – amounting to some 250 million circuit kms of telephone transmission and 92 per cent of the UK TV distribution network. It has a corresponding concern that interference created by the introduction of additional users by an over-zealous FPO using less conservative radio planning rules than those of BT which rest on accumulated years of expertise and sophisticated computer models, would create an unacceptable grade of service over which the operator would have no direct control.

There would be even greater problems of co-ordinating users in the microwave bands (4/6 and 11/14 GHz) which are shared for Fixed and Satellite Services, where UK operators rely on internationally supplied satellites and are severely constrained in frequency choice.

Framework

Indeed, as a general observation (made also by Merriman) a free UK market in spectrum would be impossible within the international regulatory framework of the International Frequency Registration Board of the ITU. Furthermore, says John, many of the economic benefits claimed by CSPI for Spectrum Pricing would be precluded by Government policy.

If, as the Report claims, there is currently no shortage of spectrum, then there is surely no justification for such radical change of a regulatory process which has emerged over a number of years, and which ensures high grade service to radio users, without very careful consideration of consequent effects on both customers and UK industry. This point seems to have been recognised by DTI which has recently initiated an industry-wide review of quality management procedures in the radio industry.

Also BT operates effectively as an FPO already, not only in the management of its own services but some frequencies for 11 GHz digital radio relay are reused over 100 times nationally, and the company is always looking at more efficient modulation systems (see accompanying article on 64 QAM).

Whilst arguing for retention of a regulatory process which works well for terrestrial and satellite fixed services (in the main above 2 GHz), John has much sympathy with the DTI desire to increase spectrum reuse efficiency and to enable a more flexible opportunity for the introduction of new services and technology, particularly in markets which are growing rapidly for various forms of mobile communication.

BT is already playing an active role in the development of further Mobile Services, Cordless Telephone and 'Radio Area Network' products. It is supporting DTI in CEPT and CCIR discussions to define spectrum requirements for these and also various satellite-borne forms of communication for Land, Maritime and Aeronautical communications.

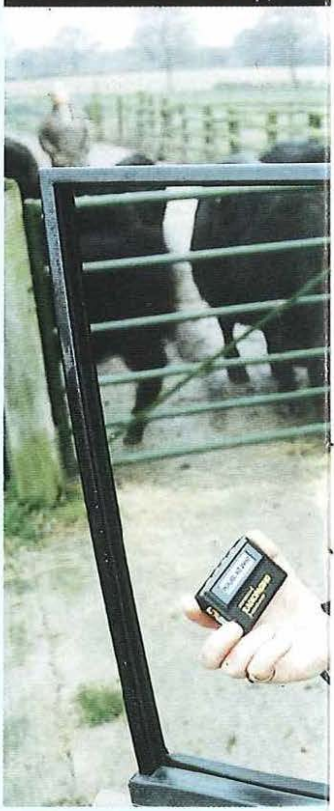
If DTI is constrained from satisfying everyone through its centralised control of the spectrum, then considerable benefit is seen in the creation of FPOs to manage the lower microwave frequencies where technologies are mature and acceptable costs are clearly encouraging the development of such new radio services.

In its formal response to DTI on the CSPI report, BT proposed a trial to test the principle of free market management in a band between 1 and 2 GHz. Such a frequency band avoids the complication of sharing with fixed satellite services and also contains the 1.5 GHz Private User Band for Fixed Radio links where much of the pressure for change to the regulatory process seems to have arisen.

By replanning its lower microwave bands though where necessary reserving frequencies for existing services including off-shore microwave and tropospheric scatter links, BT has indicated the possibility of making spectrum available to extend the Private User Band and to allow a significant opportunity for competitive frequency planning.

The Frequency Co-ordination and Management Group took its present form in 1983 to co-ordinate the views of BT Divisions which operate radio services and act as the main point of contact with the DTI Radio Communications Division. Matters addressed have included the use of Bands II and III for new Mobile Services, quality management for the Radio industry and Network interference from the Orfordness high power transmitter. The FCMG also arranges payment of the General (non Mobile) Radio Licence for BT, which for 1987 is nearly £1 million.

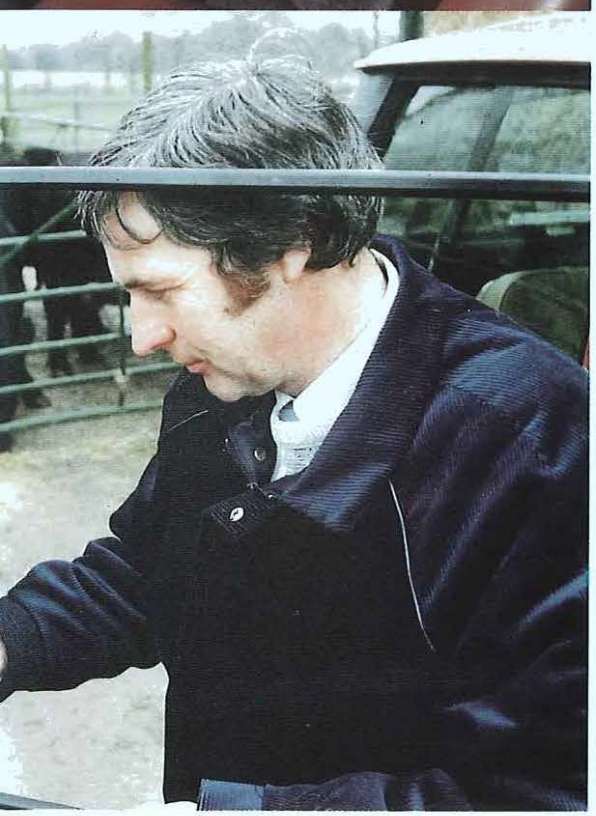
Response from Government is now awaited in anticipation of a well considered and limited move towards spectrum de-regulation which will nevertheless encourage growth in mobile services from today's 900 MHz cellular and lower frequency cordless telephones towards tomorrow's ubiquitous 'cordless society'.



Privatising the airwaves

No need to be 'parochial'

The Report under consideration represents a new challenge for mobile communications.



Fast paging for anyone out in the field is a growing market.

A free-for-all on the radio airwaves could be damaging, but if introduced responsibly could present an opportunity for BT to boost business.

The key to it all, according to Peter Shepherd, BT's Director of Business Planning for Mobile Communications, is that the airwaves should still be 'policed' not just nationally but internationally, and that British Telecom should be ready to utilise its technological advantages to make the radio spectrum more versatile and effective than ever before.

As Peter points out, a Cellnet call can be received equally well in London as it can in Boulogne, so a parochial stance is not acceptable. A European-wide approach is needed, he says, and the role of the Government's Radio Regulatory Division (RRD) will be as important as ever if the scheme gets the go-ahead.

It is essential, says Peter, for British Telecom to be considered not only as a major user of the airwaves, but as a 'Frequency Planning Organisation' as defined in the proposals.

The company has no problems with liberalisation, and already has the majority of fixed-link and mobile communications, but 'cowboys' could damage the existing network, he said.

"We welcome making the radio spectrum available for new services and greater flexibility in the allocation of radio frequencies. But the RRD has a lot of experience in spectrum management and we would not want to see them pull out overnight," he said.

Although British Telecom's allocation of the airways would be cut under the proposals, Peter believes that business opportunities could be greater than ever before.

Efficiency would be paramount and schemes such as the advanced modulation equipment trials (see separate story on 64 QAM) would play a vital role.

Other areas, in which British Telecom is leading the field, include fast paging (at 1,200 baud), the cell sectorisation of cellular radio to promote more effective use, and the implementation of data over radio which will make possible, for example, the sending of a facsimile transmission from a car on the move.

"British Telecom is at the forefront of these technological advantages. Obviously we would prefer to keep all the spectrum we have, but we look forward to new opportunities which would stem from the Report's suggestions," he said. ▷

The microwave tower at Heaton Park, Manchester.

Privatising the airwaves

Big boost for microwave network

British Telecom is to start engineering trials this year of advanced modulation equipment which could increase the capacity of its digital microwave radio network by up to a third.

Four contracts, worth £1.5 million, have been awarded to GEC Telecommunications, STC Telecommunications, the Italian firm Telettra, and to NEC of Japan.

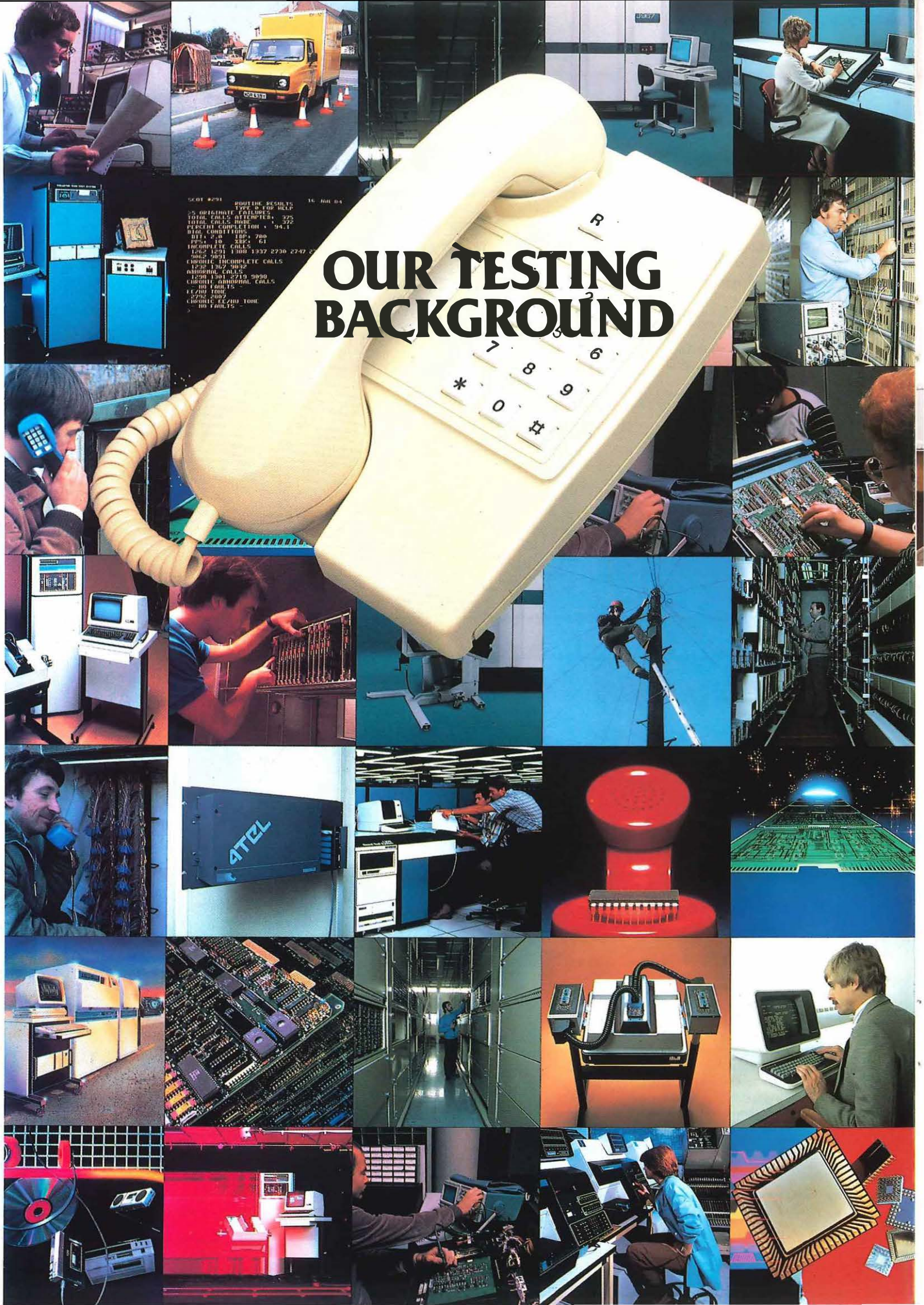
The equipment operates in the lower 6 GHz frequency band and uses a technique known as 64 QAM – quadrature amplitude modulation. It will be installed on three radio links and is due to start operating in summer. British Telecom will then evaluate the performance of the equipment for use in the network on a more widespread basis.

If the equipment operates satisfactorily, its use on the microwave network would enable British Telecom to make more efficient use of its allocation of the limited radio frequency spectrum.

The microwave network – sending radio beams at super high frequency in straight lines for long distances across country – forms a major part of British Telecom's trunk system. The network is being converted to digital operation as part of the company's £1 billion-a-year digital modernisation programme.

British Telecom's present methods of superimposing (or modulating) speech or data in digital form on a radio link enable the company's microwave bands to each carry six digital channels giving a total band capacity of nearly 12,000 simultaneous phone calls.

The 64 QAM equipment will allow eight channels, equivalent to 16,000 calls, to be fitted into one band, increasing its capacity by a sizeable 33 per cent. ■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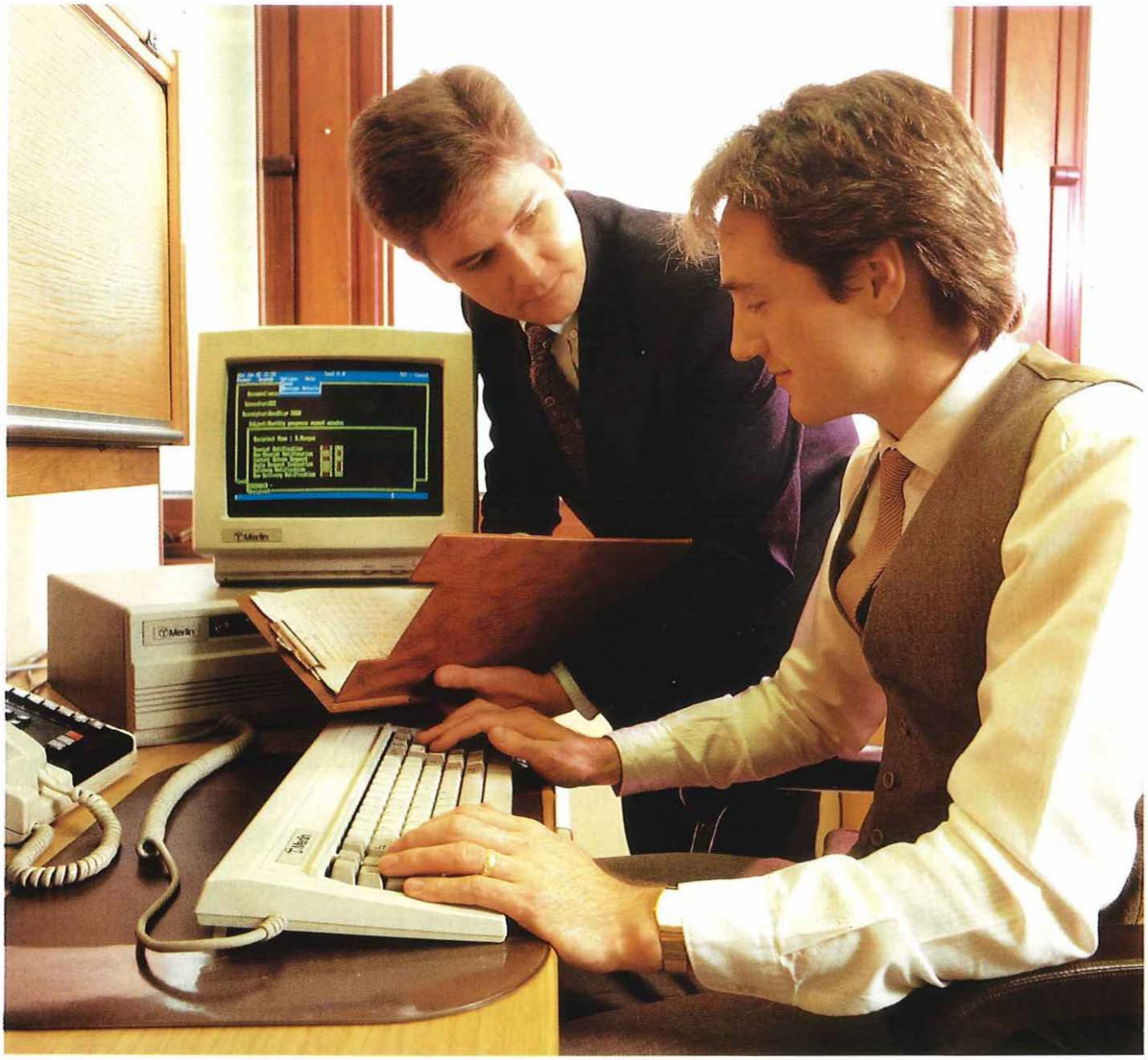


Link boosts electronic mail 'explosion'

Bob Brown

British Telecom is making a major contribution to the rapidly approaching reality of Open Systems Interconnection (OSI) networking by developing a Message Handling Service which is scheduled for commercial launch in the first half of this year.

A Message Handling Service will enable different public and private messaging systems to exchange electronic messages. MHS, for example, could be used to enable existing public electronic mail services such as Telecom Gold, One-to-One and Easilink to be linked together. Electronic Mail ('E-Mail') Services allow people and businesses to rapidly exchange information with convenience and flexibility. The ability to link E-Mail services together would greatly increase their usefulness.

MHS could also be used by companies to interconnect existing messaging systems supplied by different vendors to provide full intra-company messaging facilities, as well as an effective intercompany messaging system.

Over the last few years the use of E-Mail and other forms of text messaging has become increasingly prevalent in a wide range of business sectors. There has been an explosion in the size of the electronic mail community and trends indicate that this is set to continue.

The major influencing factor has been the widespread introduction of computer-based office automation systems and intelligent workstations. However, the development and expansion of messaging and E-Mail for widespread use across all communities of interest has been impeded by the lack of necessary standards.

Left: programmers Tim Cray (seated) and Gary Muchmore working on interfaces, known as User Agents, for the X400 electronic mail system.

In the past, the numerous E-Mail services have been unable to intercommunicate with each other and with other telematic services such as Telex and Facsimile. The solution to this problem has been the formulation of the X.400 Series of Recommendations.

X.400 in simple terms is a generic title given to a series of recommendations, based on OSI produced by the International Telegraph and Telephone Consultative Committee (CCITT), which sets standards for the implementation of message handling systems. They are the first attempt at the creation of an 'Open System' messaging environment.

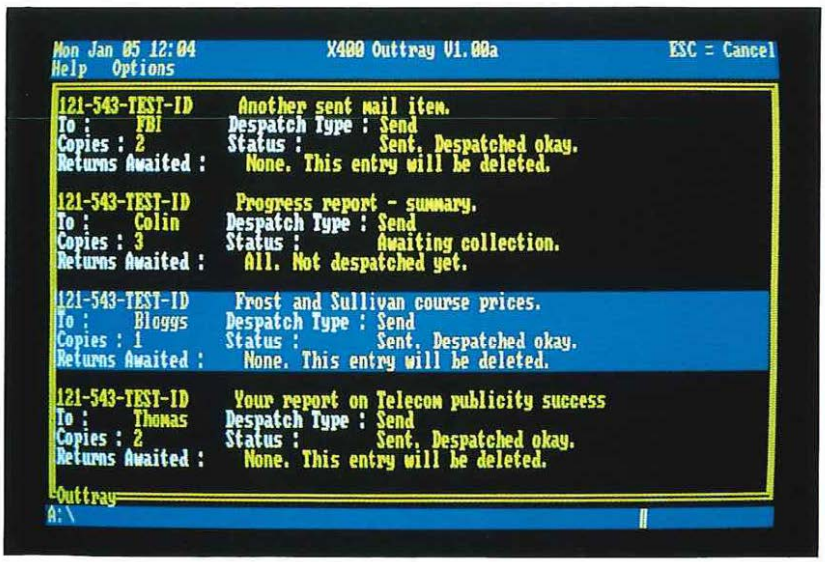
A Message Handling System is basically a switch which processes messages submitted to it by the originator and then delivers them to one or more recipients. A message is assembled in a similar way to a traditional letter and consists of an electronic 'envelope' and contents. The envelope contains the instructions to the message switch and the contents is the communication, which could be a complete document – see diagram on page 40.

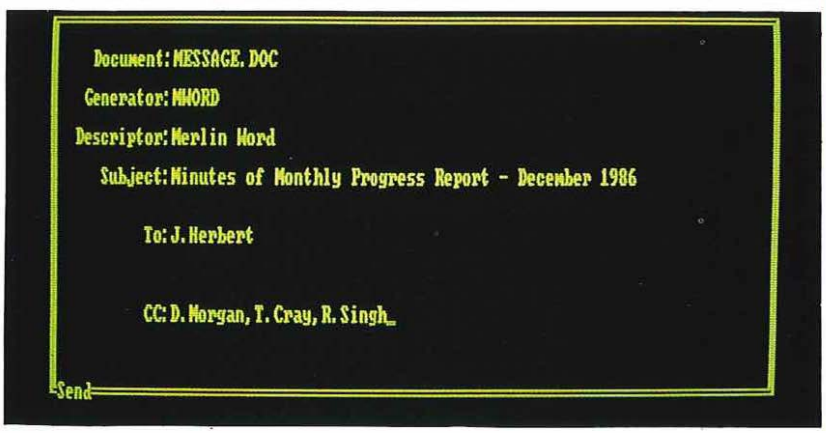
An important feature of MHS is that messages can be delivered direct to the recipient's equipment rather than merely to an external mailbox which the end user has to access. Any necessary conversions of speed, code and document architecture will be performed implicitly by the network and invisibly to the end users.

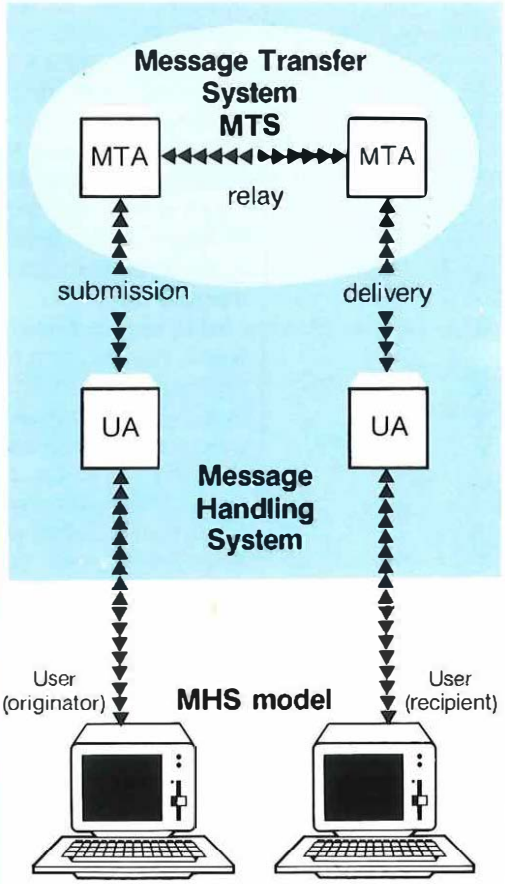
A comprehensive directory service will also be ▷

Below: details on an 'out-tray' screen can give specific information to a number of different recipients.

Bottom: a typical 'send' screen showing basic addressing information necessary to send an item of mail.







How it works

As with all international standards, X.400 is full of jargon but the commonly used acronyms are:

- Message Transfer Agents (MTAs) — the message switches which store and forward messages.
- Message Transfer System (MTS) — the interconnected network of MTAs.
- User Agents (UAs) which provide the user interface to the MTS and can be co-located with an MTA for access by remote terminals. They can also be located within a user's terminal, or be a shared facility for a number of terminals.
- Interpersonal Messaging (IPM) Service in which UAs provide an electronic mail service to users.

The Message Handling Service starts to operate when a UA submits a message to its MTA. This message is 'enveloped' by information needed by the MTS to enable it to deliver the message to the specified UAs. More than one MTA may be involved in the transfer of the message. The address on the 'envelope' is coded in the following order:

- Envelope Delivery Information
- Country
- Carrier
- Organisation
- Department
- Name

An MTA only examines the part of the address which is relevant at that point in the transmission process. Messages are stored and forwarded by each MTA until they reach their delivery address.

available to any registered terminal user making addressing simple and flexible and allowing for an alternative means of delivery while, at the same time, protecting users who wish to be 'ex-directory'.

Another important feature is the use of 'user friendly' naming and addressing known as Originator/Recipient naming which enables recipients to be identified by a name and company rather than by an impersonal national terminal number.

MHS users will also be offered a range of features already familiar to users of E-Mail services. These include notification of delivery or non-delivery, broadcast of messages and unique message identifiers. Users will be offered three priority levels of delivery service to other users or destination systems in the UK within the British Telecom messaging service. The three priority levels permit the user to specify different time limits for delivery.

From the user's point of view, MHS will be simple to use and in many cases, will be 'transparent' simply supporting everyday business applications.

National

MHS will be a national service accessible initially via Packet SwitchStream (PSS) and Telex and available to E-Mail Users, those with stand-alone X.400 UA terminals and others with facsimile and Telex terminals.

E-Mail users with terminals ranging from teleprinters to personal-computers and word processors can all access the service if they can emulate the teletype mode by dialling up over the PSTN using modems and acoustic couplers into a public or private E-Mail service which supports X.400.

The service will deliver messages to Telex and facsimile terminals through specially developed access units. Similarly an access unit will enable Telex customers to access the service and reach users on different networks and services supporting MHS.

Telex interworking continues to be important because the Telex terminal population is estimated at between 1.5 and 2 million worldwide. The number of facsimile terminals worldwide is now estimated to exceed that of Telex and is growing rapidly and it is therefore equally essential to provide access to it.

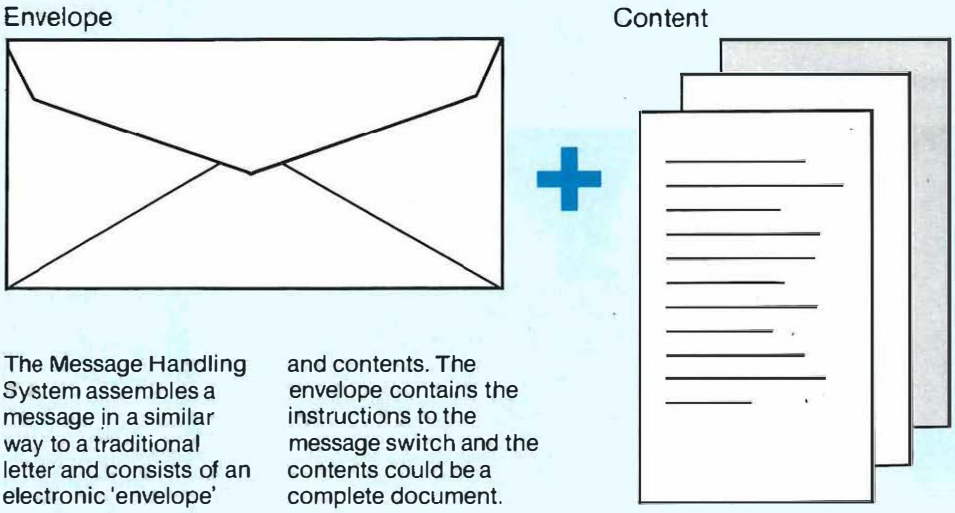
The MHS core network is known as the Message Transfer System (see diagram on previous page) and is currently being developed by Dialcom Inc in Washington which was acquired by British Telecom last year. Dialcom is an international supplier of E-Mail products and services and has licensees in 17 countries throughout the world, including Britain – British Telecom already licensed an E-Mail system for use by Telecom Gold prior to the acquisition of Dialcom as a subsidiary company. Although it is planned to launch the full MHS service this year, engineering trials using interim software releases began some time ago in collaboration with X.400 equipment vendors.

Several industry-wide demonstrations of interworking between public and private X.400 products and services are planned and there will be demonstrations at Industry Fairs and Telecommunications events to stimulate early demand.

A number of enhancements to the MHS are planned to follow its initial launch. One of the most significant may be the support of workstations such as personal computers, which initially will only be able to access MHS through an E-Mail service. A gateway will be provided to the world of IBM systems users and other access units may provide access to the radio-paging service and voice-mail. Industry specific applications will also be developed such as specialised databases and Electronic Data Interchange.

MHS is sure to transform methods of written and electronic messaging and will result in far reaching changes in business communications. Eventually, the whole business community will use the system for exchanging messages to the same extent that the telephone is used today for spoken communication. ■

Mr R S Brown is head of development of the Message Handling Service and wishes to acknowledge the contribution of the MHS marketing team in the compilation of this article.



The Message Handling System assembles a message in a similar way to a traditional letter and consists of an electronic 'envelope' and contents. The envelope contains the instructions to the message switch and the contents could be a complete document.

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QUALITY THAT GOES BEYOND TOMORROW

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Enterprise – BT's mission to modernise

About 60 per cent of British Telecom's business customers will have access to modern local telephone exchanges by the end of 1987, a major conference on British Telecom's network strategy was told.

Under its £1 billion a year network modernisation programme, British Telecom is installing new digital and enhanced electronic local exchanges at the top 500 business exchange sites in the UK. This will give 75 per cent of all large private branch exchange users access to a top quality digital service by the end of next year, rising to 95 per cent by 1989.

Mr Michael Bett, British Telecom's Managing Director, Inland Communications, said that the company was vigorously pursuing its mission to provide telecommunication systems, products and services to meet the needs of United Kingdom customers profitably and responsibly.

"Our policy is to give all our customers excellent service. The network and its performance is a crucial element in achieving

Above: the installation of optical fibre to serve key business sites in the City of London and elsewhere is a major element in British Telecom's network modernisation programme.

Right: Michael Bett.

these objectives," he said.

In addition to the local exchange programme, Mr Bett listed some other major elements in network modernisation. They included:

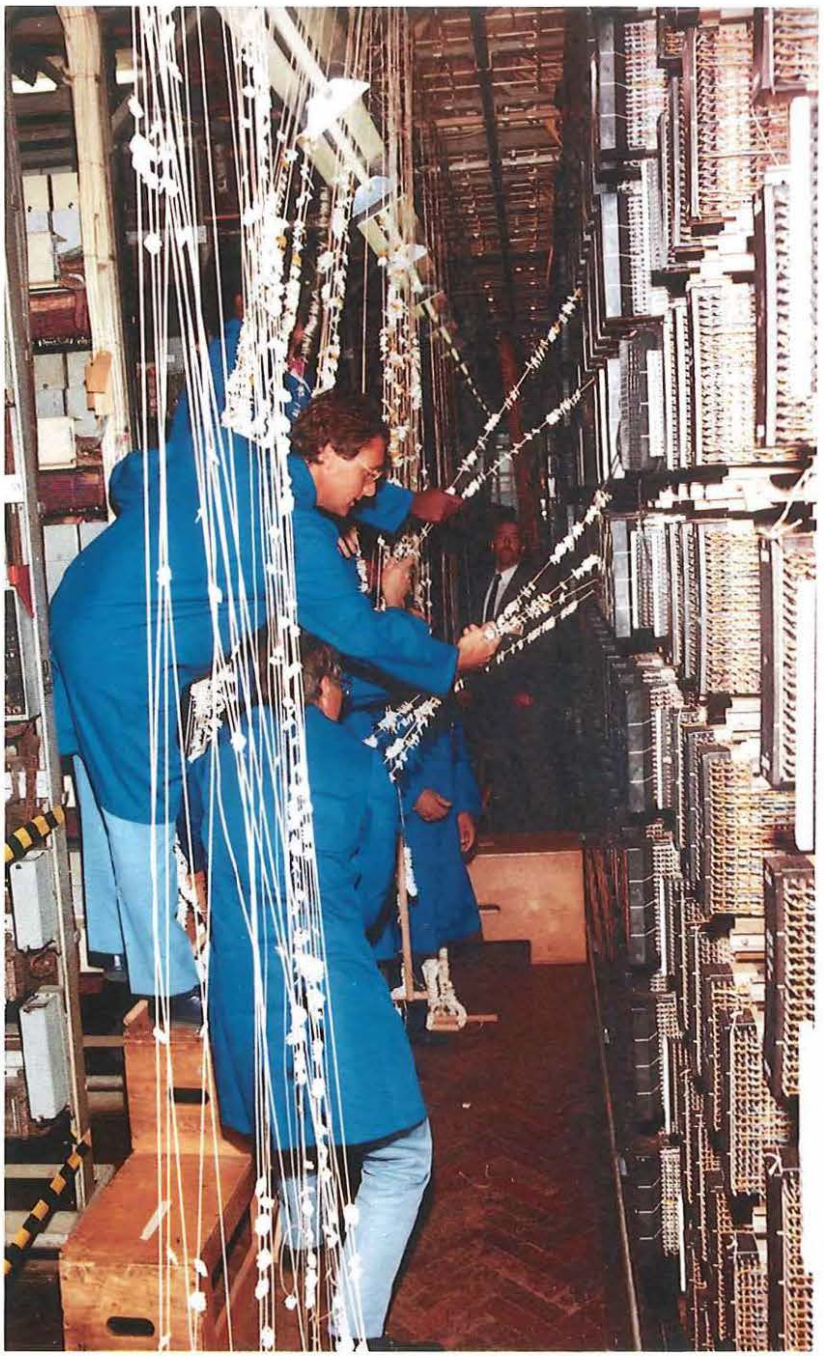
- the Derived Services Network of digital switches, initially handling Linkline
- the modernised trunk network with its chain of System X digital trunk exchanges
- the use of optical fibre in the network, particularly to business sites
- the continuing deployment of KiloStream and MegaStream for private networks
- the introduction of Centrex services, which give customers all the facilities of a modern electronic switchboard without the need to have their own equipment
- the introduction of Virtual Private Networking services, which give users the benefits of their own private digital voice and data network without having to lease dedicated lines.

All represented major changes in the network through the application of new technology, and opened up new possibilities for everyone, from big business to ordinary householders throughout the UK, he said.

"This modern digital network already offers Integrated Digital Access (IDA), whereby customers can transmit far more information than on conventional lines. IDA will give the customers direct access to our present and future services, a capability which already includes the Integrated Services Digital Network – an achievement in which British Telecom is providing the first fully functional ISDN in the world.

"There is, therefore, an impressive commitment by British Telecom to the modernisation of its network, requiring massive capital investment of which some 90 per cent is spent with British industry and represents a direct benefit to the UK economy."

The remotely controlled slow-scan TV system and fast facsimile were, Mr Bett stated, two prime examples of how the network could create opportunities for new and evolutionary ▷



> "Quality in the market place includes the whole operation in serving the customer, from an initial query to the consummation of the query into an effective, timely and efficient product or service. It is perhaps in this area that we will see the full effect of the competitive market."
>
> Michael Bett,
> Managing Director,
> Inland Communications

Above: pulling the wedges on old exchange equipment is a common occurence as the nation switches over to digital technology.

John Tippler.

> A call in the early days from London to Edinburgh took place over wires which weighed 800 pounds to the mile. While you spoke you had 250 tons of copper all to yourself - there just had to be a better way!
>
> In the future there will be very high capacity optical systems and these are already being considered in British Telecom's network strategy. Shall we see a million circuits per fibre in 1995?
>
> John Tippler, Director Networks, Inland Communications

products in the liberalised customer premises equipment market. The integrity of the network supporting such services was a vital part of British Telecom's strategy, so that networks and products as far as possible were 'future proofed' against rapid strides in technology.

Mr John Tippler, Director Networks, British Telecom Inland Communications, outlined to the conference changes in the trunk network.

Instead of nearly 400 trunk switching units, the new British Telecom trunk network would have only 55 digital trunk exchanges. All but one of those were already in service.

By March 1987, nearly 40 per cent of the trunk traffic would be carried in digital form on the network. Within a further two years all trunk traffic would have been loaded on to the digital network.

Development of the new network would need increasingly to take account of the economic factors involved in serving residential communities, especially where the rate of telephone use was low.

Mr Tippler said: "Fibre will quickly find an application to the denser parts of the local loop distribution, with implications for the size of exchanges serving areas. Current research and development is also exploring a variety of new ways of delivering the communications services in the low usage environment."

Looking further to the future, Mr Tippler indicated that very high capacity optical fibre systems were already being considered in British Telecom's network strategy.

Other factors were:

- the application of optical switching
- the ability to 'tap into' very high capacity digital links with smaller parcels of capacity
- the extended use of mobile terminals.

"None of those things seems improbable," said Mr Tippler, "and the prospect of continuing the line of lower cost, greater capability, seems real. It will, however, require the application of considerable resources."

The conference was organised by EMAP International Exhibitions Ltd and sponsored by Communications Management magazine. Attended by senior managers from a cross section of the business world, topics included Network Products and Services, Packet SwitchStream, Telex, Managed Data Network Services, and Value Added Network Services.

> Over the last five years, British Telecom has invested over eight billion pounds in fixed assets - a sum sufficient to buy three Channel Tunnels or to allow the M25 to circle London eight times.
>
> The rebuilding of the network and the modernisation of the associated management procedures are essential to our aim of giving customers a service which is second to none.
>
> Colin Shurrock, Director, Systems Strategy, Business Services

Below right: fast fax machines can send an A4 page in less than a second and are an example of how the network can create opportunities for new products.

Below: a security man checks in visitors and at the same time spots a burglar over slow-scan television – pictures sent over telephone wires. The TV has an automatic movement detector which rings through to security.

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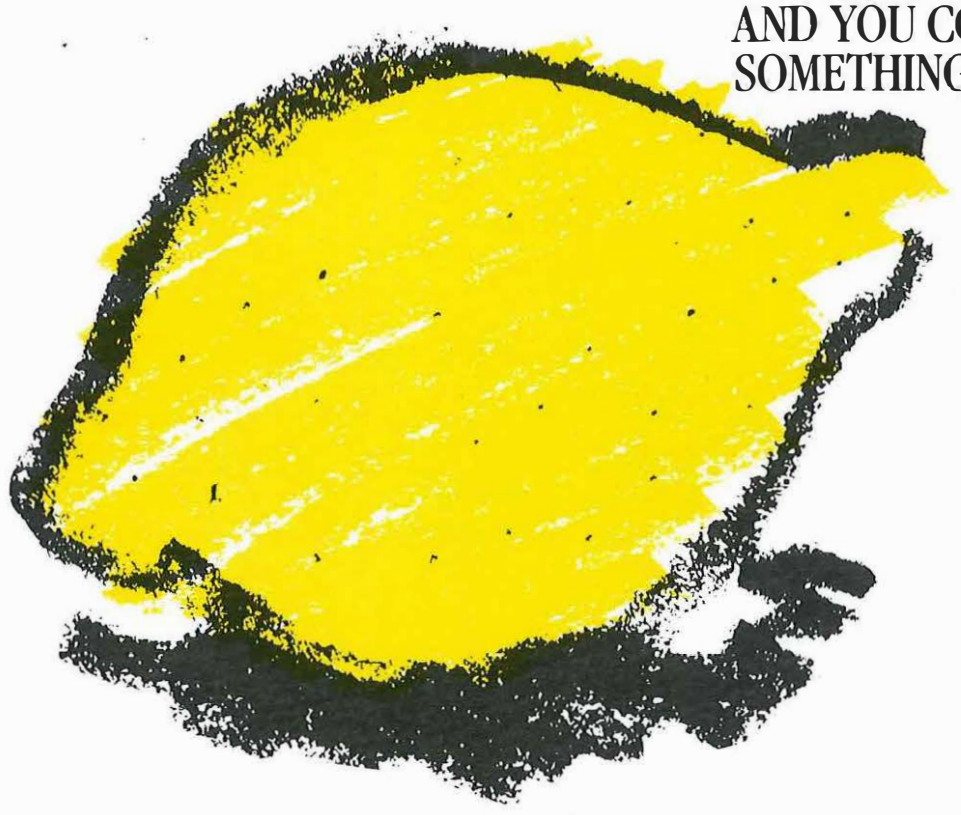

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Half a century of screen success

Liz Angell

Television broadcasting has recently celebrated its 50th anniversary and this article gives a summary of the enormous contribution made by British Telecom and previously the Post Office in the birth and development of a medium which has dramatically re-shaped people's lives.

British Telecom Tower in London is the nerve centre of the broadcasting network with microwave links stretching throughout the country. Its control centre also handles programme items for screening throughout the world.

British Telecom and its predecessor, the Post Office, has been involved in the broadcasting of television since the start of TV on 2 November 1936 and in the broadcasting of radio programmes long before that.

Between 1936 and 1954, the company provided the communications technology to ensure that sound and vision circuits gave faithful reproduction of the source material – be it a studio programme, a live outside broadcast, a news story or an advertisement prepared by one of the facilities houses which supported the broadcasters.

The company's role has been to provide the links between the studios of the broadcasters and the broadcast support industry, and the transmitters that bring television pictures and sound to the viewers' homes.

In this initial 18 year period, with a break for the war, the BBC was the only broadcaster. Less than a year after the inception of television, the first major outside broadcast was made – the Coronation procession of King George VI. The broadcast utilised a balanced-pair cable, linking several places of interest in London, which had been laid just in time for the event on 12 May.

In those days, only the London area received pictures, transmitted from Alexandra Palace. Gradually, as transmitters were built, the rest of the country was able to receive TV pictures.

Television coverage of the Queen's Coronation in London in 1953, therefore, reached a much wider audience but a special method had to be found to serve viewers in Belfast.

The BBC decided to set up a temporary TV station to do the job but it was not feasible to provide a link to Belfast from the nearest transmitter at Kirk O'Shotts in the time available. Signals from Kirk O'Shotts, however, were good enough to be re-transmitted by the BBC's temporary facilities at Glencairn and a receiving station was specially built near the summit of Black Mountain to 'bridge the gap.'

The Post Office was involved in TV from the outset because it already had an established ▷

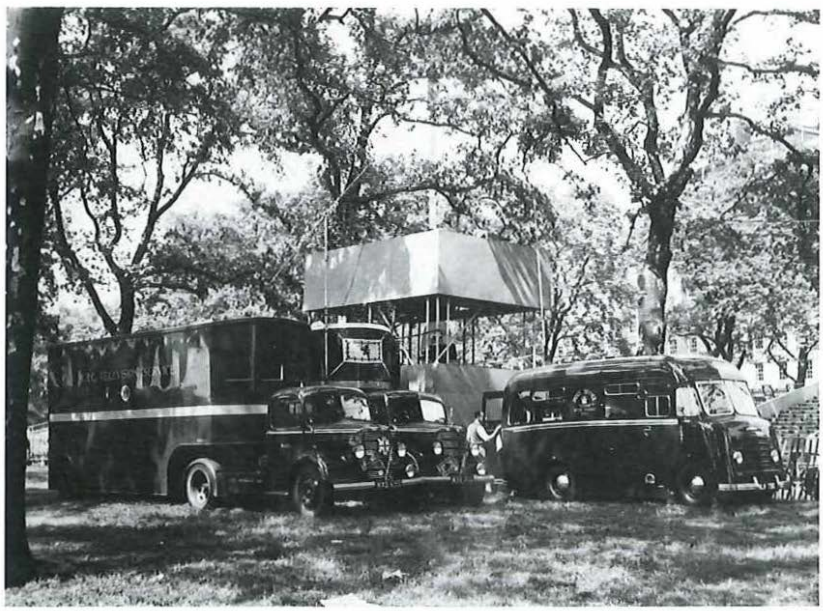
The Queen's Coronation at Westminster Abbey in 1953 stretched broadcasting technology to its limits, but it was another 13 years before major events could be broadcast to a world-wide audience.

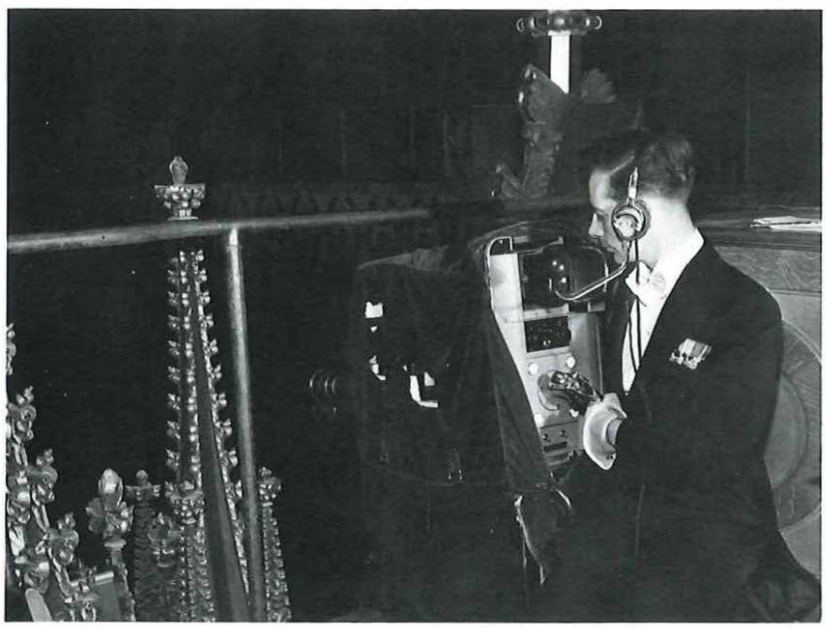
telephony network throughout the UK which could be utilised for the transmission of television, although the bandwidth used was much greater than for telephony. It was also empowered to dig up the road to lay cable and the BBC was not.

In the immediate post-war period, when a number of three-eighth inch diameter coaxial cable systems were being brought into use for multi-channel telephony, an experiment was made to transmit TV signals over loop circuits from London to Birmingham.

Results were encouraging and led to the construction of a one inch coaxial cable between the two cities specifically for TV transmissions. Subsequently, however, it was decided to go back to the three-eighth diameter already standardised for telephony.

Much work had to be done to specially equalise telephone pairs to carry TV pictures of reasonable quality. The problem was that pairs between any two points can comprise short lengths of cable of different gauges.





A method was devised to set the correct equalisation by observing the form of a step-wave transmitted over the circuit. Called the 'empirical wave-form method' it represented a significant breakthrough for Post Office researchers.

The Post Office Research Station at Dollis Hill in London (the forerunner of British Telecom's Research Laboratories at Martlesham Heath, near Ipswich) played a key role in both establishing the means of effective TV transmissions and in constantly improving them to meet the ever-increasing demands of a new and powerful medium.

One example of their fundamental world-beating work was their measurement of the quality of TV pictures based on both electronic measurement and subjective appreciation. The station's pioneering test methods in this and other areas formed the basis of today's internationally accepted standards.

So, throughout the 1950's, the British Telecom broadcasting network came into existence, and now it uses a mixture of cable for short local links and microwave radio, which permitted the setting up of the Eurovision network in 1954, for the longer hops.

In 1955, a second channel, ITV, came into existence, formed by the independent regional programme companies who wanted to show their own programmes, or those from other independents, or national programmes such as the news. These complex requirements meant that the network had to be 'switched' to allow the companies to select their own programming and, for example, to show local advertisements during a nationally networked programme.

Complicated

About 100,000 switches are now made every year to accommodate programming needs. The switching is set up manually and then timed electronically.

When first established, the IBA (then the ITA) operated its own transmitters but the advent of UHF networks in the early 1970's saw a move to site sharing with the BBC.

The next development in broadcasting came with the opening of BBC 2 in 1964. The Report of the Committee on Broadcasting, 1960, had recommended that BBC 2 should open in the UHF band using the new 625-line standard. It also recommended that BBC 1 and ITA should transfer to 625-line transmission with the aim of transmitting colour pictures.

But the encoding system for the colour signal had not been decided and Post Office researchers had to set a standard adequate for any possible system. This meant that new video transmission equipment had to be designed and new radio and cable networks provided between the studios and the new transmitters.

In 1965, transatlantic television was made available through BTI's satellite earth station at Goonhilly and the first of the Intelsat satellites, Early Bird (see separate story on Goonhilly's 25th anniversary on page 53).

The first truly world-wide television event was the final of the World Cup at Wembley in 1966 with an estimated audience of 400 million. The following year saw the first regular colour broadcasts and the coverage of Wimbledon 1967 was the first colour outside broadcast to take place in the UK.

The next major step in the broadcast industry was the provision of circuits for the Channel 4 network in 1982. Because of the structure and demands of the new channel, this led to the rapid growth of the broadcast support industry – companies which provide such things as advertisements, standards conversion and facilities for independent producers.

They require permanent access to the network and many now have circuits to the British Telecom Tower in London so that they can send programmes anywhere in the country. By using the tower's links to BTI's earth stations at Goonhilly, Madley and London Teleport, they can also send programmes abroad.

New companies set up to provide programmes to cable TV franchise operators also have links to the tower, as do many overseas companies who send stories from the UK and Europe to their home countries such as America, Canada, Japan and Australia.

The tower is the nerve centre of the network which has microwave radio links stretching throughout the country. Each channel has its own dedicated links, but a protection channel is also provided in case of failure.

Links are very reliable and are maintained to the highest standards, so they seldom fail. Spare time on the protection channels is used by broadcasters and the support industry to send programmes and advertisements for subsequent broadcasting.

They are also used when there is a large news story and extra material is required – during party political conferences, for example. On a more international scale, the channels were recently used for the Air India jet crash off Ireland because many countries including Ireland, Canada, India and America were interested in the story.

The channels are also used to network outside broadcasts – the pictures and sound are transmitted from the venue by temporary microwave radio or spare cable to the nearest node in the network and then sent on to the required destination through the network.

British Telecom Network Switching Centres also have the facilities for injecting electronic news gathering (ENG) reports into the network, and, for the ease of roving reporters and street interviews, BT provides portable Manpack microwave radio links.

British Telecom played a vital role in the two recent Royal Weddings, and the Commonwealth Games. The wedding of Prince Andrew and Sarah Ferguson was one of the largest outside broadcasts undertaken in this country, and little advance warning was given. It came the day before the opening of the Commonwealth Games in Edinburgh, and over half of British Telecom's outside broadcast links were committed to the Games.

A further 30 links were pre-booked for 13 other events in July including the Frank Bruno World Heavyweight fight, the Turnberry Open Golf Championship and the Silverstone Motorcycling Grand Prix.

The wedding was broadcast to more than 700 million homes in 50 countries. In all, 50 vision, 100 music and 339 control circuits were provided. British Telecom also provided 350 sound and vision circuits from every sports location at the Commonwealth Games.

Preparation

Much preparation had to be undertaken at night to minimise traffic disruption and many BT staff worked up to 20 hours a day to ensure that the work was completed as quickly and efficiently as possible.

But the daily requirements of the broadcasters were also met and BT also provided ten Commonwealth Games bookings, 18 unconnected news broadcasts, six inter-studio connections, used for local contributions to regional programmes, plus three Electronic News Gathering links on the same day.

The massive operation hardly compares with the Coronation of King George VI in 1937 when a single cable was provided; a mobile unit operated three cameras near Hyde Park Corner and pictures were broadcast from a single transmitter over a radius of just 60 miles!

British Telecom still uses coaxial cable in its broadcast network, but increasing use is made of optical fibre, which means that the signal can be transmitted for a greater distance – up to 30km instead of 6.5km – before being amplified. Digital technology for the transmission of pictures will soon be available to meet the demands of broadcasters.

Direct Broadcast by Satellite, with the increasing range of programmes offered, also presents new opportunities for British Telecom as a provider of equipment and services. The company is also a major investor in the growing cable TV market (story on page 9). ■

The wedding of Prince Andrew and Sarah Ferguson last year was one of the largest outside broadcasts undertaken in the UK.

Top: a portable 'Manpack' microwave link in action outside Buckingham Palace for coverage of the Royal Wedding last year.

Above opposite: Post Office outside broadcast equipment in use during the Queen's Coronation.

Below opposite: white tie and tails for one of the cameramen covering the Queen's Coronation at Westminster Abbey.

Miss E P Angell is publicity manager, Broadcast Services.

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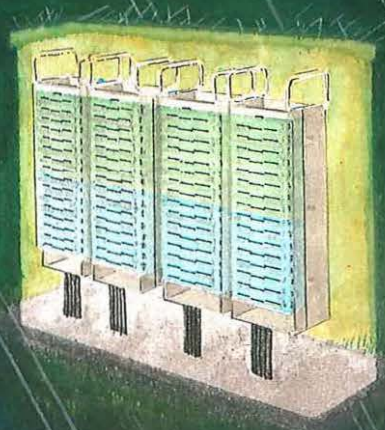

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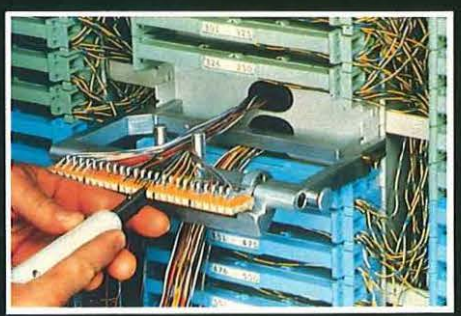

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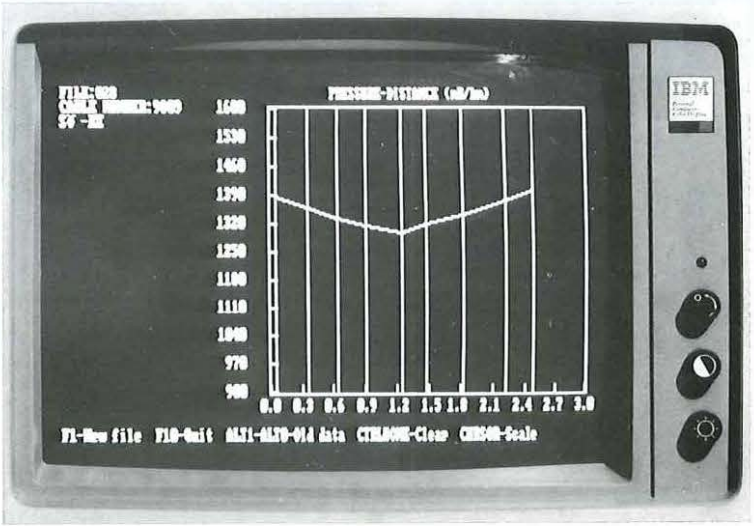

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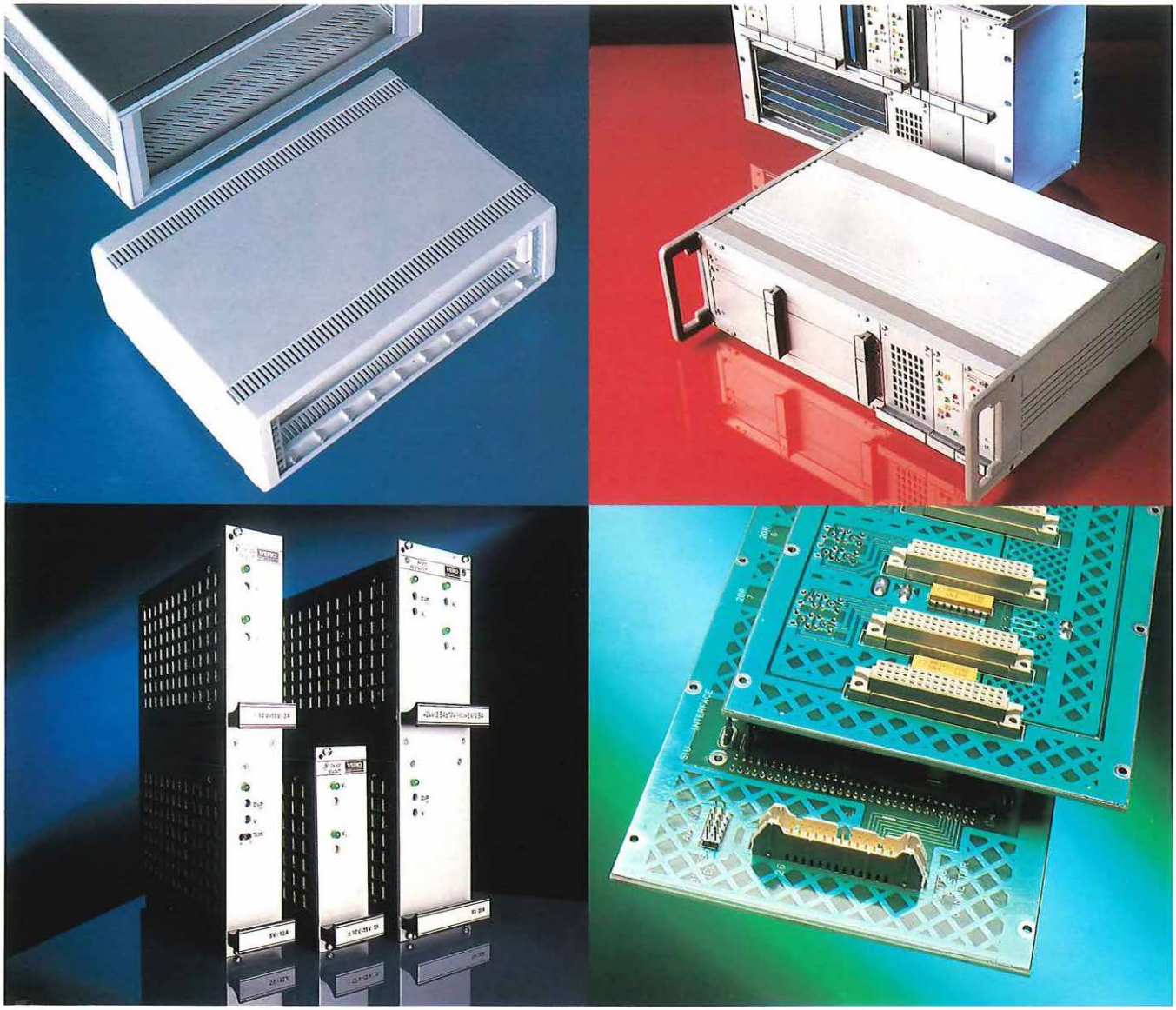

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Still a star at 25!

Shawn Bates

Goonhilly satellite earth station, located on the Lizard Peninsular in Cornwall, celebrates its silver anniversary this year. Most high-tech projects could be considered 'antique' at 25 years of age, but Goonhilly has adapted to today's and tomorrow's needs to remain an important link in the global telecommunications chain.

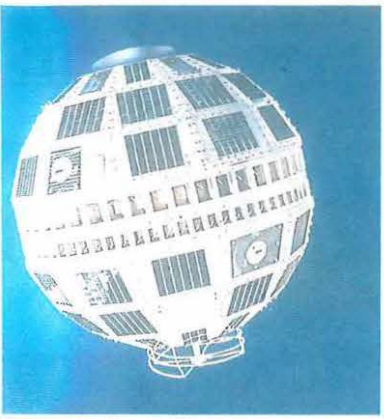
Goonhilly Satellite Earth Station was established in July 1962, when work was completed on Aerial 1. At the time, it was one of just three in the world designed to transmit and receive signals using Telstar, the first commercial communications satellite.

The American aerial at Andover in the State of Maine, and the French installation at Pleumeur Bodou rounded out the trio, and on 11 July 1962, live television transmissions from the US were received in England and France. The age of satellite telecommunications had begun, and Goonhilly played an integral role.

Goonhilly was chosen as a site, as was Andover, to reduce the transatlantic radio path to a minimum. It was then realised that it was but a few miles from the spot where Marconi made his first transatlantic radio transmission in 1901, for the very same reason.

The first TV pictures, however, were of poor quality and many asserted that Aerial 1's parabolic open-dish design and been ill-conceived and that the French and American 'horn' antennas, housed in radomes made of dacron, were the future of satellite communications. ▷

Aerials 5 and 6 at Goonhilly.



The Telstar satellite.

The essentially asymmetric form of horn attennas made protection from winds necessary; hence the radomes. But when radomes became covered with snow or rain they weakened the already minute signals from the satellites.

Goonhilly's ingenious balanced construction was free from these problems and horn aerials in the United States and France were retired from commercial operation long ago but Goonhilly 1 is still operating.

As the world realised that the Telstar experiment had been a success, it sought to exploit the commercial possibilities inherent in satellite telecommunications. The first operational communications satellite in a geostationary orbit, Early Bird, was launched in 1965 by the newly-formed Intelsat organisation.

By 1969, three such geostationary satellites provided global coverage, and commercial satellite communications were up and running. Goonhilly was not left behind and the satellite earth station remained one of the lead runners in that race throughout the 1960s and 70s.

Striving

Once communications via geostationary satellites became possible, Goonhilly wasted no time in striving to increase such capabilities. Indeed, Goonhilly has a proud list of 'firsts' it can point to – it was first to broadcast live TV from Europe to the US; the first to transmit colour TV via satellite; and it was the first European station to conduct tests on telephony by satellite.

The earliest satellite communications conducted through Goonhilly passed through Aerial 1, which at the time of Telstar weighed 870 tonnes. In 1965, an extra reflecting surface was added to make it suitable for Early Bird and this pushed the weight up to 1,100 tonnes.

As the demand for transatlantic TV and telephone transmission grew, Goonhilly grew with it by building Aerial 2 in 1968. Recognition of the demand for satellite communications to the Far East resulted in Aerial 3, finished in 1972. Aerial 4 was added in 1978, to meet ever-increasing demands for transatlantic capacity. As the 1980s progressed, demand for specialised satellite communications grew, and Aerial 5 was built in 1983 to provide satellite links to ships, as part of British Telecom International's contribution to Inmarsat.

Goonhilly grew not just by adding aerials but also by leading the way in developing technologies to increase the capabilities of its large, open dishes.

Aerial 6, completed in 1985, has the largest reflector of all (some 32m) and was also noted for being the first 'dual-frequency' aerial able to both transmit and receive on two frequencies simultaneously. This new capability doubled potential capacity.

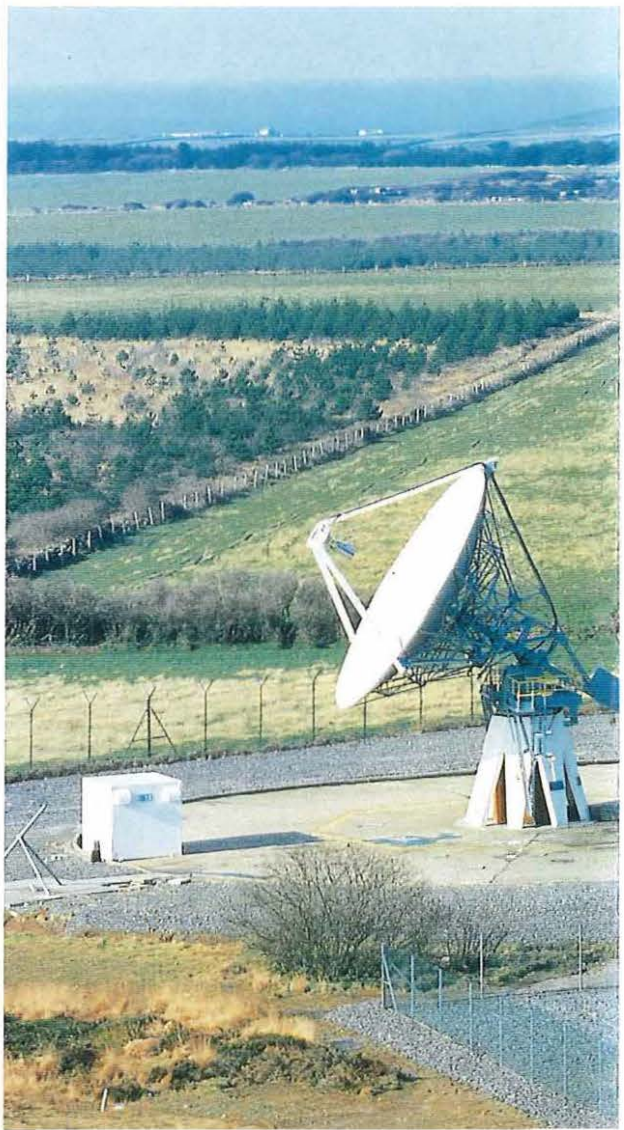
Aerial 4, completed earlier, was also one of the first in the world to take advantage of the 11/14 GHz frequency immediately it became available for business satellite communications.

Indeed, Goonhilly continues to function as a springboard for advances in satellite communications. Aerial 7, built in 1983 and originally used for leased TV circuits, will soon be the link between phones on the ground and air passengers on long-haul journeys. People will soon be able to place a call from the comfort of their aeroplane seat, cruising 40,000 feet above the Atlantic.

Aerial 5, used for Inmarsat links by ships at sea, was recently modified by Goonhilly's own development group. The aerial's operational control and guidance system were totally reworked to increase reliability of service, and to allow easier maintenance.

Goonhilly is now using one of the most advanced new developments in digital satellite communications – TDMA/DSI. Standing for Time Division Multiple Access/Digital Speech Interpolation, the letters represent a great advance in the efficiency of earth stations. With TDMA, signals are grouped and sent by time, rather than frequency. Based on the principle that during the average phone conversation either party is only speaking one-third of the time, DSI allows groups of signals to be sent during the lapses.

Capacity can, therefore, be quadrupled, and Goonhilly 6 has been equipped with a TDMA/DSI system. Some exports believe that by 1990, 30 per cent of Intelsat's global traffic will be carried by TDMA/DSI, as well as all of Eutelsat's telephony.



Right: aerials 8, 9 and 10 at the rear of the station are devoted to experimental projects, including the assessment of new satellite earth station performance. Aerial 10, with its distinctive arm (foreground) is of offset Gregorian design, named after a Scottish mathematician.

Left: TV presenter Raymond Baxter introduced the Telstar story in 1962 and has maintained an interest in developments at Goonhilly ever since.

Goonhilly is also leading the way in developing the new generation of satellite dishes that may eventually supplant the traditional parabolic open-dish aerial. Known as the Offset Gregorian dish, Aerial 10 is based on this design which was originally conceived in the mid-1960's when a number of possible designs were considered.

Having a round dish which is very shallow, the Offset Gregorian has a distinctive 'arm' which has a small reflector at its end, facing the main dish. Signals are transmitted from a feed above the dish and are reflected by the small reflector back to the main dish, which then focuses the signals into space as a parallel beam.

The new design allows for greater precision and efficiency in signal transmission because the support structure of the main reflector is not in the path of the microwave beam, as it is with the parabolic open-dish aerial. These improvements in signal quality indicate that the Offset Gregorian may well be the aerial of the future and Goonhilly is developing the technology to ensure that it plays an important role.

As time passes the new technology flourishes, Goonhilly, and other installations like it, will continue to increase their capabilities and capacity. At present, the only obstacle standing in the way of vastly increased capacity is the ageing of satellite technology. The Intelsat V series, which is the mainstay of the present Intelsat network, is rapidly ageing.

Designed nearly ten years ago, the satellites no longer have the capacity to meet the potential demand that exists for their services. Intelsat VI, which has a much greater signal capacity, has been indefinitely delayed due to the Space Shuttle disaster and the problems with the European Ariane rocket.

Goonhilly is a remarkably enduring tribute to modern technology. Located on the Lizard nature reserve, and surrounded by rare species of plants and wildlife, the earth station has played a major role in the birth of commercial satellite communications. And the Goonhilly of tomorrow will play a key role in creating and maintaining a global, digital, commerical satellite communications network. ■

Inset: an example of an early 'horn' antenna.

Mr S Bates, an American journalist, wrote this article during a period of secondment to the British Telecom International press office.

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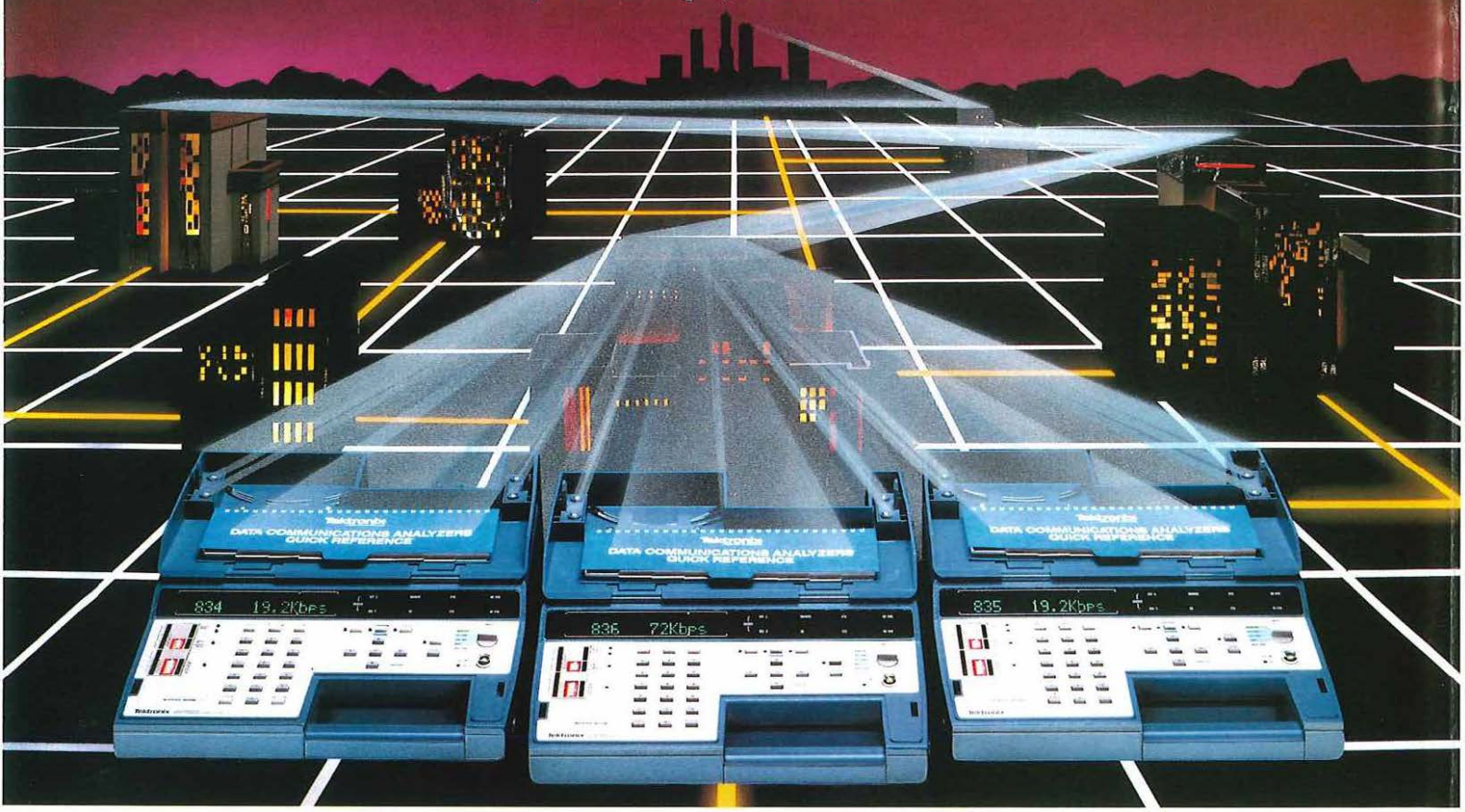

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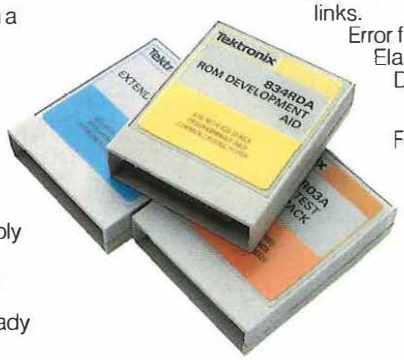

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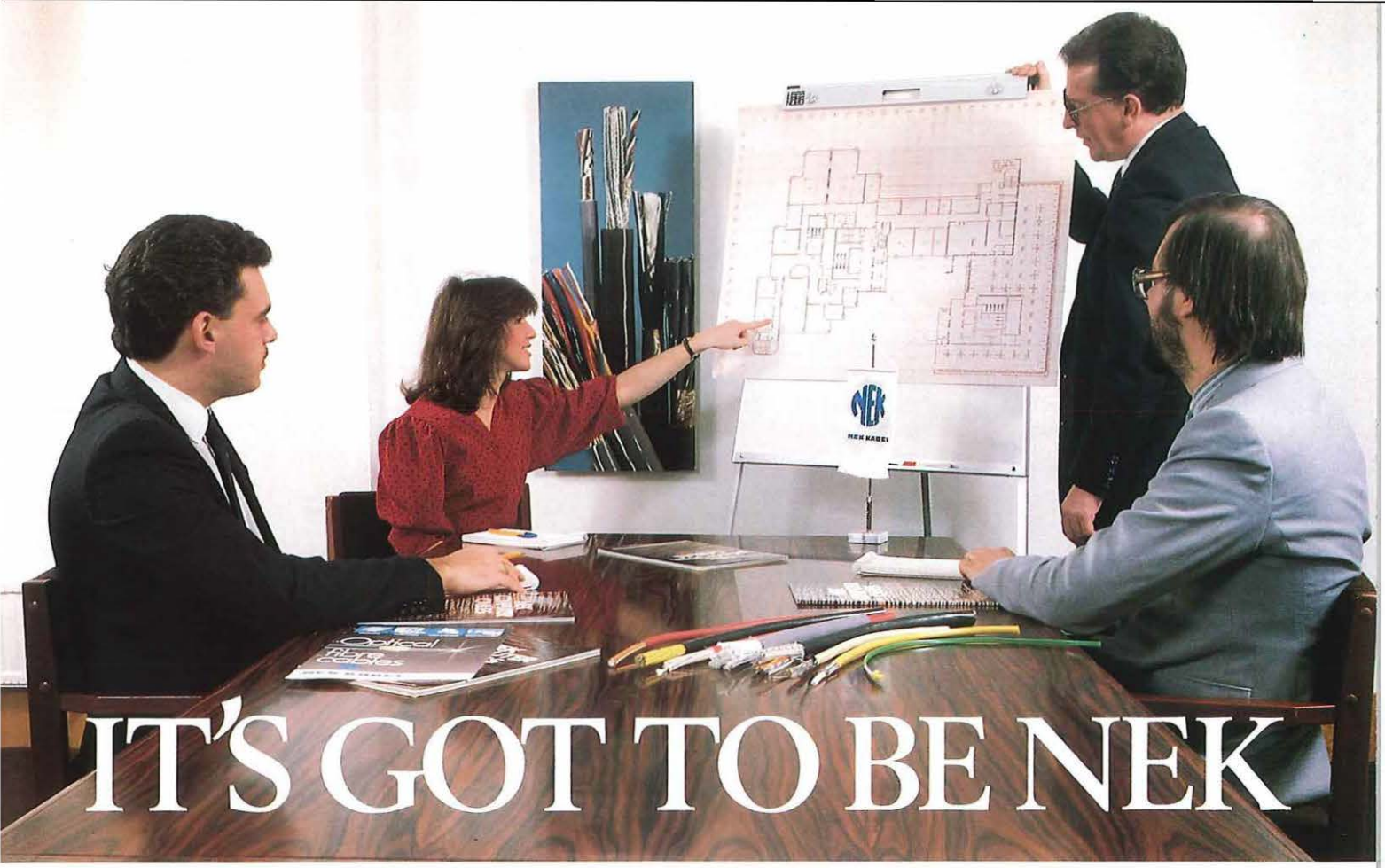

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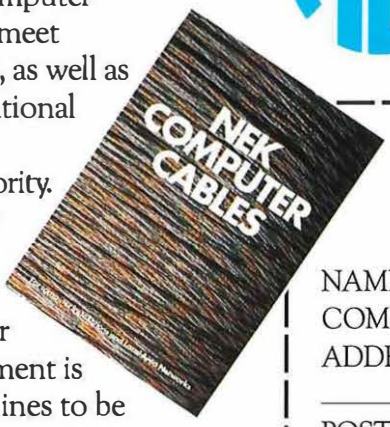


NEK cable: THE RIGHT SPEC.
THE RIGHT QUALITY.
THE RIGHT DECISION.

NEK Cables Ltd., Chepping House, Temple End, High Wycombe, Buckinghamshire. HP13 5DR. Tel: 0494 450371. Telex: 83142. Fax: 0494 450573.

YES I NEED INFORMATION ON NEK COMPUTER CABLES. PLEASE RUSH ME THE LATEST CATALOGUE.

NAME:_____

COMPANY:_____

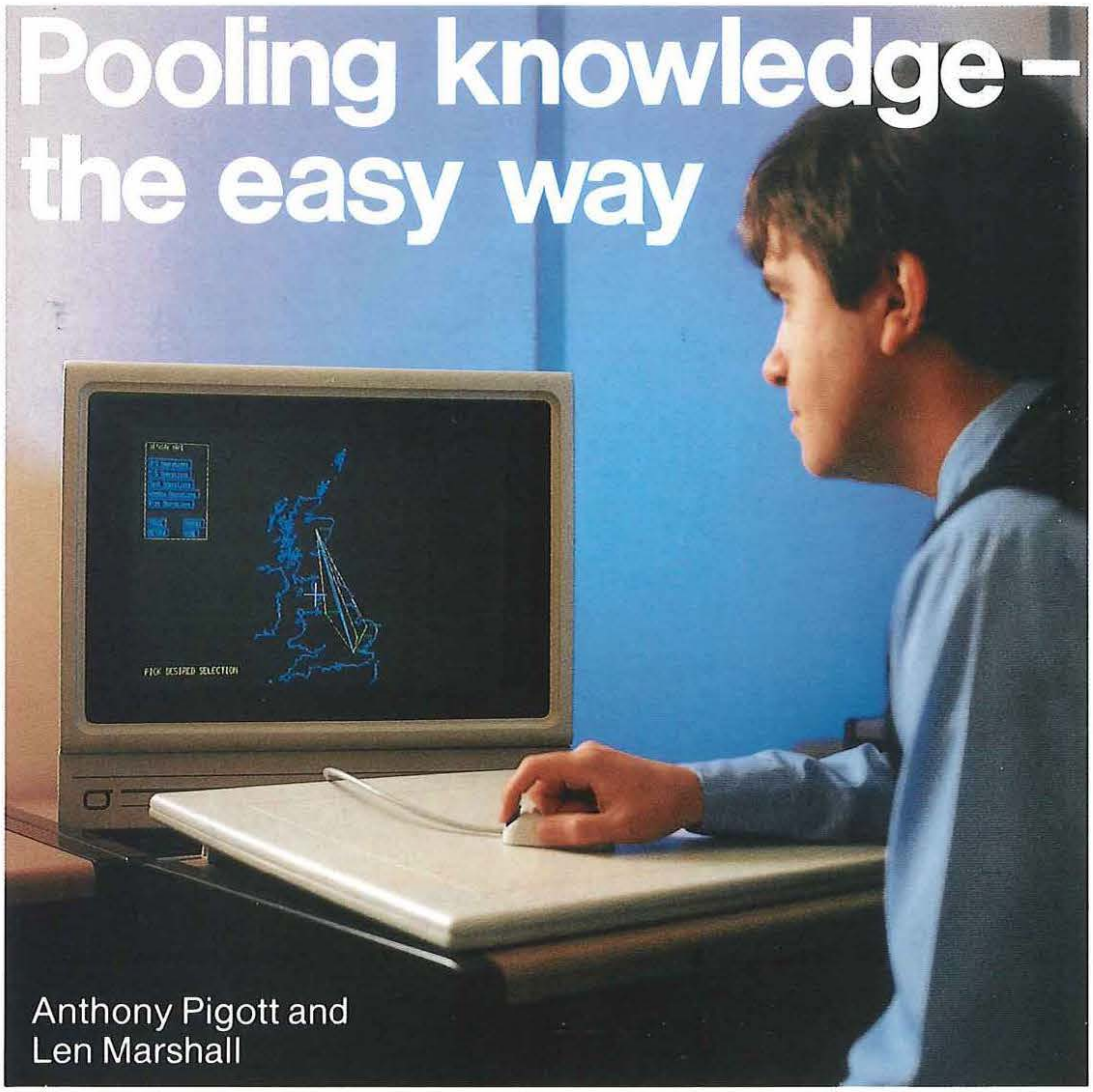
ADDRESS:_____

POSTCODE:_____ TEL:_____

NEK Cables Ltd., Chepping House, Temple End, High Wycombe, Buckinghamshire. HP13 5DR. Tel: 0494 450371. Telex: 83142. Fax: 0494 450573.

Pooling knowledge – the easy way

An analysis of the existing computing facilities within British Telecom's Trunk Network Operations (TNO) has recommended an Integrated Computer System (ICS) to share information between a common pool of users. The system will help network planning and management and will enable the business to keep pace with customer requirements.



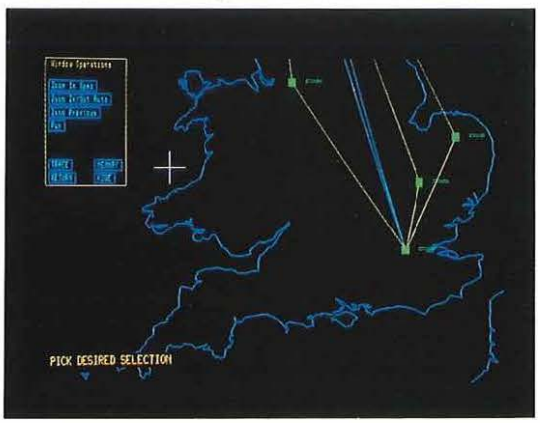
Systems designer Len Marshall uses the 'mouse' to up-date network information on the prototype system at Euston Tower, London.

Anthony Pigott and Len Marshall

Below: nodes and network links can be shown on a map of the UK in a variety of ways to help with the planner's job.

Computing services are provided for Trunk Network Operations by Business Services Information Systems Division. The Advanced Systems Unit has been looking at the potential of graphics facilities as part of the Integrated Computer System because interactive graphics can help users to interpret and update information more easily.

The traditional method of communicating with databases is by typing into a keyboard. Output information is usually displayed at a computer terminal or printed in the form of text and tables. The amount of information produced can be enormous, with the result that it is time-consuming to read and understand.



The process of interpretation can be improved if data is presented to the user in a form, such as a drawing or a graph, which is more readily understood. Information presented on a computer terminal in this manner constitutes a graphics display.

The whole process can be taken a stage further and instead of typing information into a keyboard, the user can interact directly to modify information in the graphics display. These modifications can then be transmitted to update the information in the database – a process known as interactive graphics.

Display and interactive graphics will help TNO users to plan and manage the network more effectively. Initial work has involved identifying the range of users of computer information, across the divisions within TNO, who could benefit from a graphical interface. Many users will have common needs, others will have specialised and sophisticated requirements.

A major activity within the Advanced Systems Unit has been the development of a working prototype network graphics facility. The function of the prototype has been to demonstrate interactive graphics with two aims in mind:

- to develop a design philosophy which is flexible and, as far as possible, hardware independent to meet a diversity of needs at reasonable cost.
- to demonstrate the type of displays and interactions, which can be performed with current technology, on small computers.

Network Display Graphics are one of four relevant graphics applications. They provide an alternative to alphanumeric displays and involve the production of maps or diagrams showing an extract from applications databases. Detail levels can vary from a schematic network display of the whole country to a detailed Ordnance Survey map of an area down to street-level.

Feature

Interactive Network Graphics provide the additional feature of being able to access and update the database by direct interaction with the graphics display.

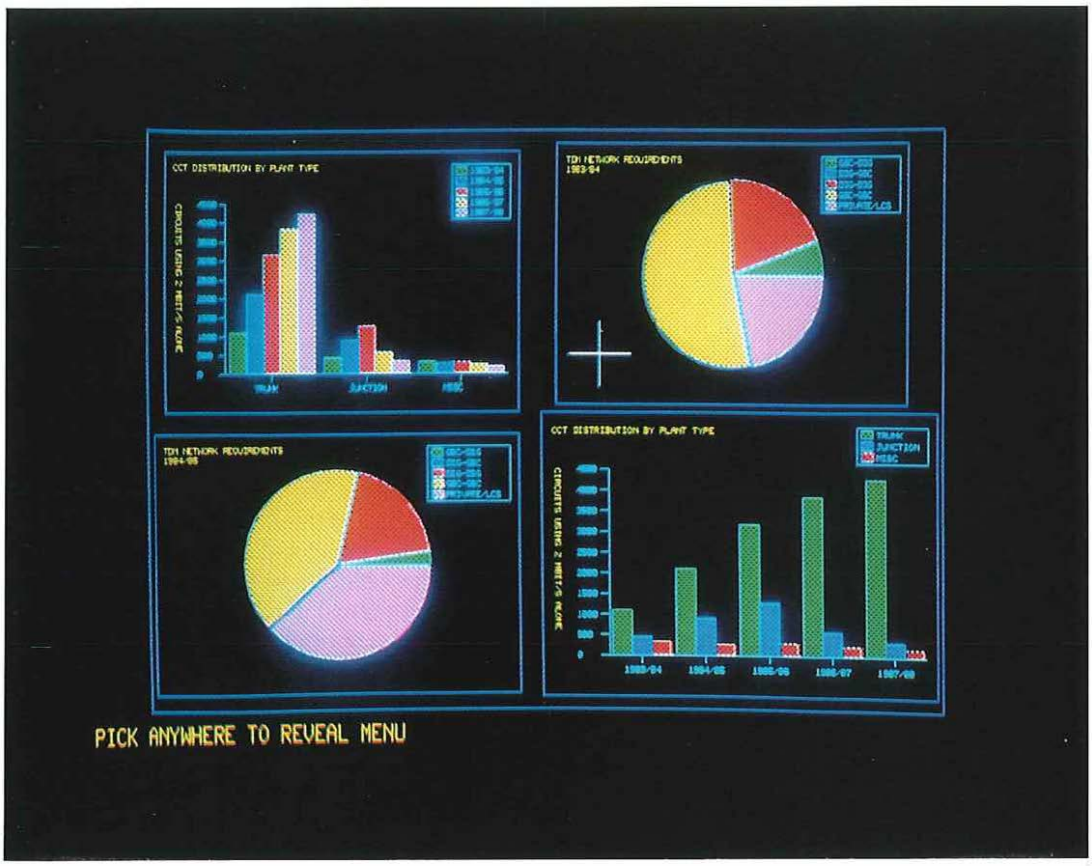
Business Graphics give the ability to produce graphs, bar-charts, histograms and pie charts to display descriptive statistics. They can be used in project management control when block diagrams and critical paths are useful.

Equipment layout graphics allow for equipment in say, repeater stations, to be presented down to rack, shelf and possibly component level.

The improvement of the coherence and the manipulation of the vast amounts of data stored in databases is of primary importance to British Telecom's activities.

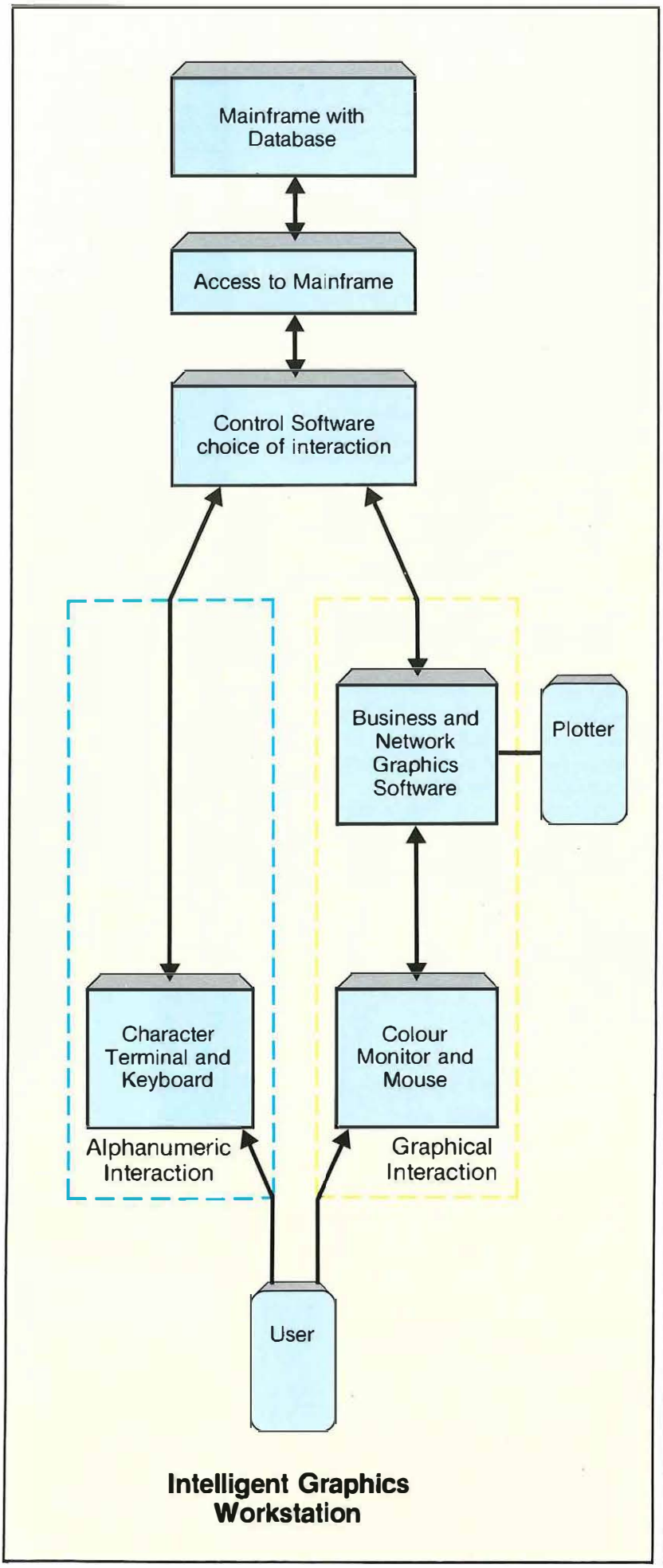
A mainframe approach is one of three possible solutions and consists of a direct link between a graphics terminal and the mainframe where software is required to handle graphics manipulations. The approach has an advantage in that it accesses the database directly, but it can also put significant overheads on the computer processor resulting in a degraded performance for other users.

Stand alone systems do not provide on-line access to the database. Their main advantage is that excellent graphics facilities can be provided ▷



Important planning information can be presented simply and colourfully by the system as this block diagram shows.

Mr A Pigott is head of BT's Advanced Systems Unit and responsible for the provision of advanced computer systems. Mr L Marshall is a systems designer in the unit and involved in the development of interactive computer graphics.



Intelligent Graphics Workstation

and no drain is placed on mainframe performance. But there are problems in maintaining data integrity — it is easy for data to become rapidly out of date and stand alone systems cannot easily provide an on-line updating facility. They are also relatively expensive and inflexible.

The third solution is the use of intelligent graphics workstations which are connected directly to the mainframe database, replacing the standard mainframe terminal.

Like the mainframe approach, the workstations have the advantage of direct access and flexible design places no restrictions on possible applications.

A prototype has been developed comprising a microcomputer running the UNIX operating system which has a communications link with British Telecom's computer centre at Watford. The user is provided with an alphanumeric keyboard and terminal; a high resolution graphics display; 'mouse' and digitising tablet as the input devices, and a plotter.

Using the prototype, TNO network capacity planners can collect and examine all demands for network capacity, assemble them into suitable planning modules, load them on to the current planned network and examine and resolve the resultant shortage.

Immediate

Their work can be best represented graphically rather than in data tables and the system allows interaction with the network display to provide immediate interpretation of routing alternatives. Network statistics can also be displayed in the form of business charts.

Users can:

- display the network superimposed on a map of the UK
- display an area of the network in a specified 'window'
- pan around to adjacent areas of the map
- update routes and display associated text
- display network statistics in the form of business charts
- obtain a paper plot of the screen.

The prototype has been successful in demonstrating the feasibility of the workstation's modular approach which allows the system to be interfaced with other data sources. One example is its ability to display topographical maps using video-map technology and to superimpose network graphics information.

The next stage of development will be to establish more detailed definitions of user needs and the types of tasks they have to perform. Work is in progress to compile a detailed specification of the system (using the prototype as a demonstration tool) and to clearly identify possible benefits.

The development of flexible man-machine interfaces will allow users to make more efficient use of the large amounts of information presented to them and will help them to keep pace with growing customer requirements. ■

The CL680 line test system from Vanderhoff is just the kind of state-of-the-art product you would expect from one of the leaders in the industry. Consisting of one or more master stations and exchange located remote test units, the modular CL680 provides a cost effective means for centralised routine and automated fault testing of customer lines.

Made under licence from Badger — a division of TTI — it's so easy to use it practically runs itself, yet offers as wide a range of tests and facilities as you could possibly wish for. These include:

Automatic tests with call queuing, supported by user assigned diagnostic messages and line termination statements. Parametric single-shot or camp on repetitive tests. Field personnel access with synthesised speech report back. Automatic routing programmes under full user control.

Needless to say, all this means you can identify

The end of the line for faults

faults accurately, reducing maintenance costs and improving the quality of service to your customers.

If you would like to hear more about the remarkable CL680, call Denis Webb on 0203 341111. Or write to him at:

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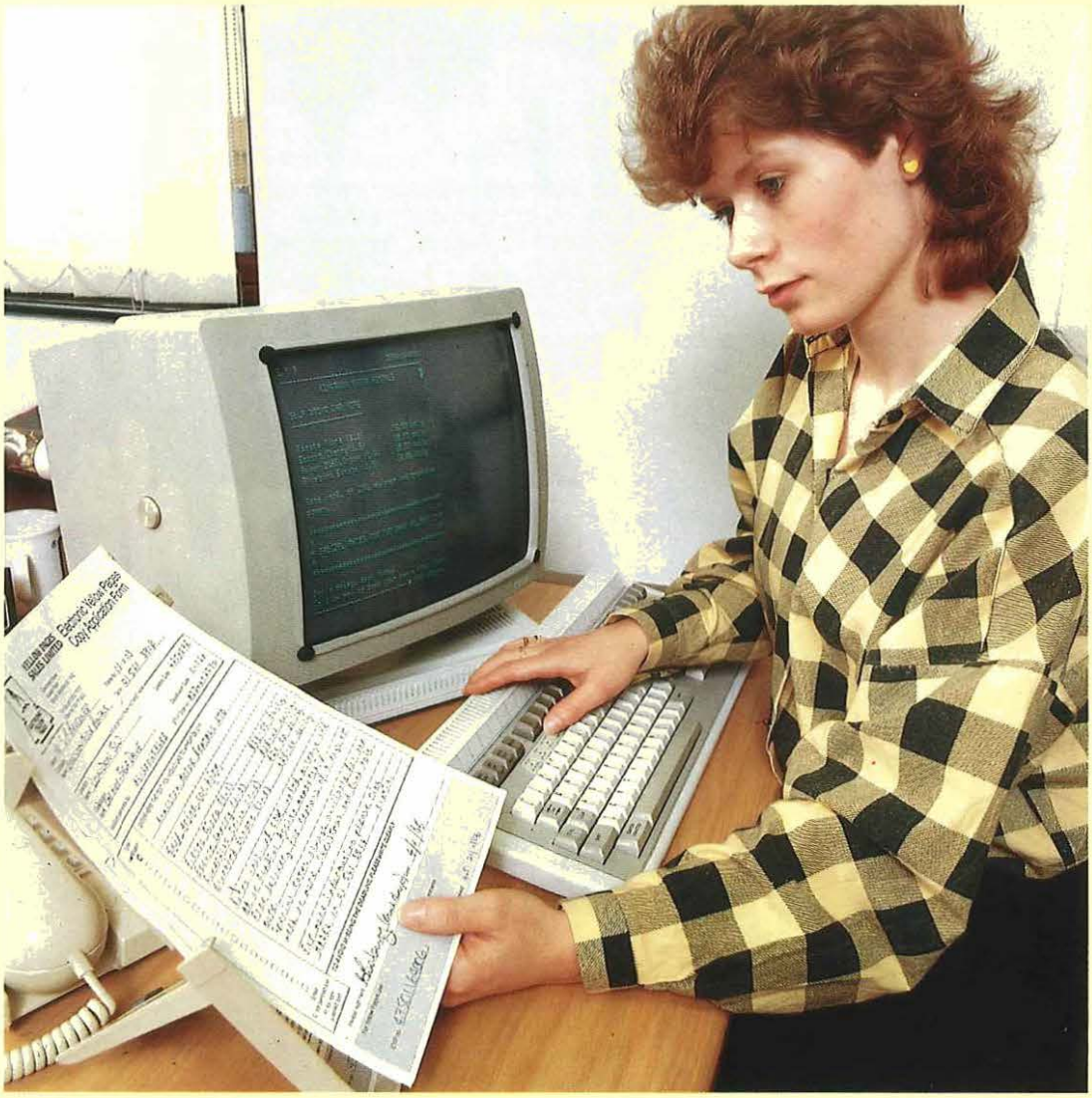
Tel: Nuneaton (0203) 341111. Telex: 311563 VANCOM G

Vanderhoff

In the vanguard of telecom technology

January 1987 saw the launch of a new on-line information service from British Telecom Yellow Pages called Electronic Yellow Pages (EYP) – a classified database containing information on products and services. EYP is not seen as a substitute for Yellow Pages but an enhancement to it for the growing number of customers with access to terminals and it represents the results of over two years of research and development work.



Clerical officer Sue Heathfield keys in an advertiser's copy – 90 per cent of EYP's advertisers do not have their own terminal facilities.

Let our fingers do the talking !

ELECTRONIC YELLOW PAGES

Eddie Cheng

For many years now, a number of electronic publishing 'gurues' have predicted the demise of print with advances in the electronic media. British Telecom Yellow Pages does not believe that this will happen in the near future and is confident that both types of publishing will have different roles to play in order to meet different needs and requirements.

For example, if users know what they are looking for, print could certainly be faster to locate information then electronic. The printed versions are more portable and disposable than an on-line terminal which requires access to a telephone line. Electronic, on the other hand, offers up-to-date information and the ability to hold large amounts of information without a physical storage problem.

As both forms have distinct characteristics, BTYP decided that, initially, the electronic directory should act in synergy with the printed product and not as a competitor or a substitute. EYP, therefore, is offered as an enhancement to the printed product and advertisers are encouraged to participate in the pilot trial of this new medium by being given free allocations of frames on which they can publish information about their services and products.

Opposite page: author Dr Eddie Cheng (standing) and product manager John Spencer discuss an advertiser recruitment campaign.

Once the idea of EYP was conceived, the first task was to define the product and its terms of service. It was decided that the product should:

- be available to a multitude of users
- be free from usage charge as far as possible
- be up-to-date and comprehensive
- be simple, easy and fast to use
- represent 'low risk' for YP advertisers, the majority of whom have no experience of electronic publishing.

Another main consideration was that Yellow Pages is essentially an information medium through which advertisers inform users about their location, products and services and that EYP should be no different from this. The major difference between YP and EYP is the way in which information is delivered and being 'updateable', EYP can easily accommodate volatile data such as fluctuating prices and details of special offers.

Although updated information is important much remains inherently static. A museum, for example, is likely to have the same address for years but its opening times and details of exhibitions on display will vary from season to season. EYP, therefore, must carry static as well as volatile information to be an effective medium.

Structured

One of the most important issues to consider in database construction is the way in which information is presented to the user both in visual format and logical sequence. After months of testing and consumer and advertiser panels, it was concluded that user familiarity was important and EYP should therefore be structured in a similar fashion to the printed product – using the same coverage area and classification headings. Testing also revealed that searching is best served by a mixture of 'prompted routes' in terms of keywords and direct access.

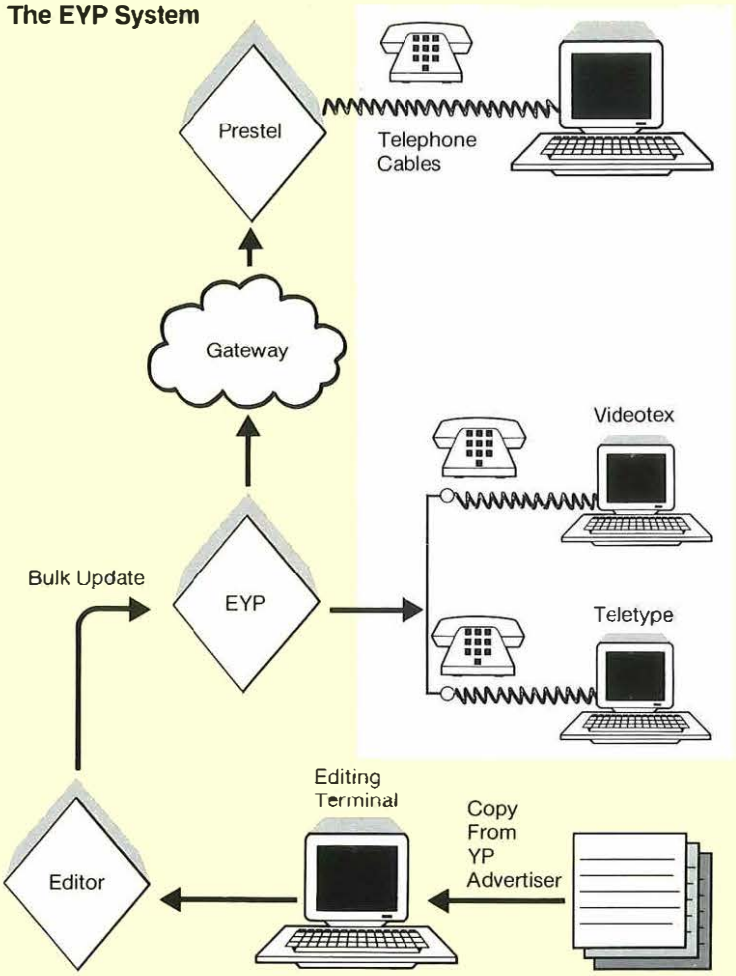
EYP uses two categories of keywords – locality and classification. In terms of locality, all major place names are available as keywords on the system under the appropriate Yellow Pages coverage area. This means that a user identifies the coverage area by entering the location as the keyword and the system will automatically go to the appropriate YP coverage area.

Entering Farnham, for example, will take the user to the Guildford directory area. The system has a major advantage in that the user does not have to know the correct name of the directory which covers the town.

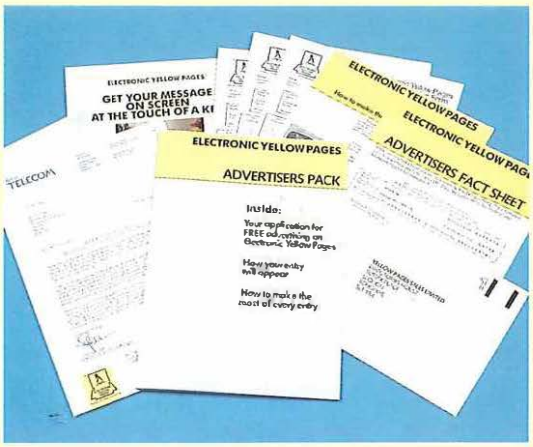
In the process of searching against different classifications, the headings used by EYP are identical to those used in YP. The system also accepts short forms and cross-reference titles. Once a heading has been selected, the service will offer routes to allow the user to extend the search into related subjects and other coverage areas.

To be available to as many users as possible, EYP has to be accessible over the public switched telephone network (PSTN). This ▷

The EYP System



A selection of literature aimed at encouraging new advertisers.



means that the mode of transmission must be asynchronous and ASCII was chosen as the transmission code. The speed of access was also considered and it was decided that the system must support modem speeds at 1,200 baud and below. Once this decision was taken, the next step was that EYP should be able to support teletype and videotex terminals.

Making the 'dual standard' decision was easy, but implementing it was more difficult because videotex and teletype have different display formats and to accommodate both types of terminals, normally means holding two versions of the same information.

After months of testing, it was decided that a simpler solution was to use basic videotex frame formats and commands with the extra control information for teletype superimposed over the frame template. Although this solution requires the two different types of terminals to dial different access ports (telephone numbers) the information only needs to be edited once.

EYP will initially carry information covering the whole of London, Guildford, Reading, Watford and St Albans. Once established, it is expected to extend its coverage and it will eventually offer a national database generating substantial advertising revenue for BTYP. Users within the EYP database coverage area will find full access information published in the back of their 1987 edition of Yellow Pages. There is no charge to use the system other than the cost of a normal telephone call.

Users living outside the initial EYP coverage area who wish to access EYP should contact Helpline (0734 506259) for a copy of the user instruction and their EYP access code. EYP is also available as a Gateway service on Prestel. ■

Dr E H L Cheng is new media services manager for British Telecom Yellow Pages.

TM*

ELECTRONIC YELLOW PAGES

LAUNCHED JANUARY 1987

British Telecom's new Electronic Yellow Pages (EYP) service. It's available by direct dial or via Prestel Gateway.

- Free of user charge†
- Unique keyword search facility
- Easy-to-find information
- Up-to-date and comprehensive

Dial direct or see Prestel page 3813:

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for 1200/75 baud rate (videotex)

Reading (0734) 586255
for 300/300 baud rate (teletype)

Reading (0734) 597231
for 1200/1200 baud rate (teletype)

Further details can be found in this issue or on the EYP Helpline on Reading (0734) 506259

British TELECOM

Electronic Yellow Pages, British Telecom Yellow Pages, Queens Walk, Reading RG1 7PT

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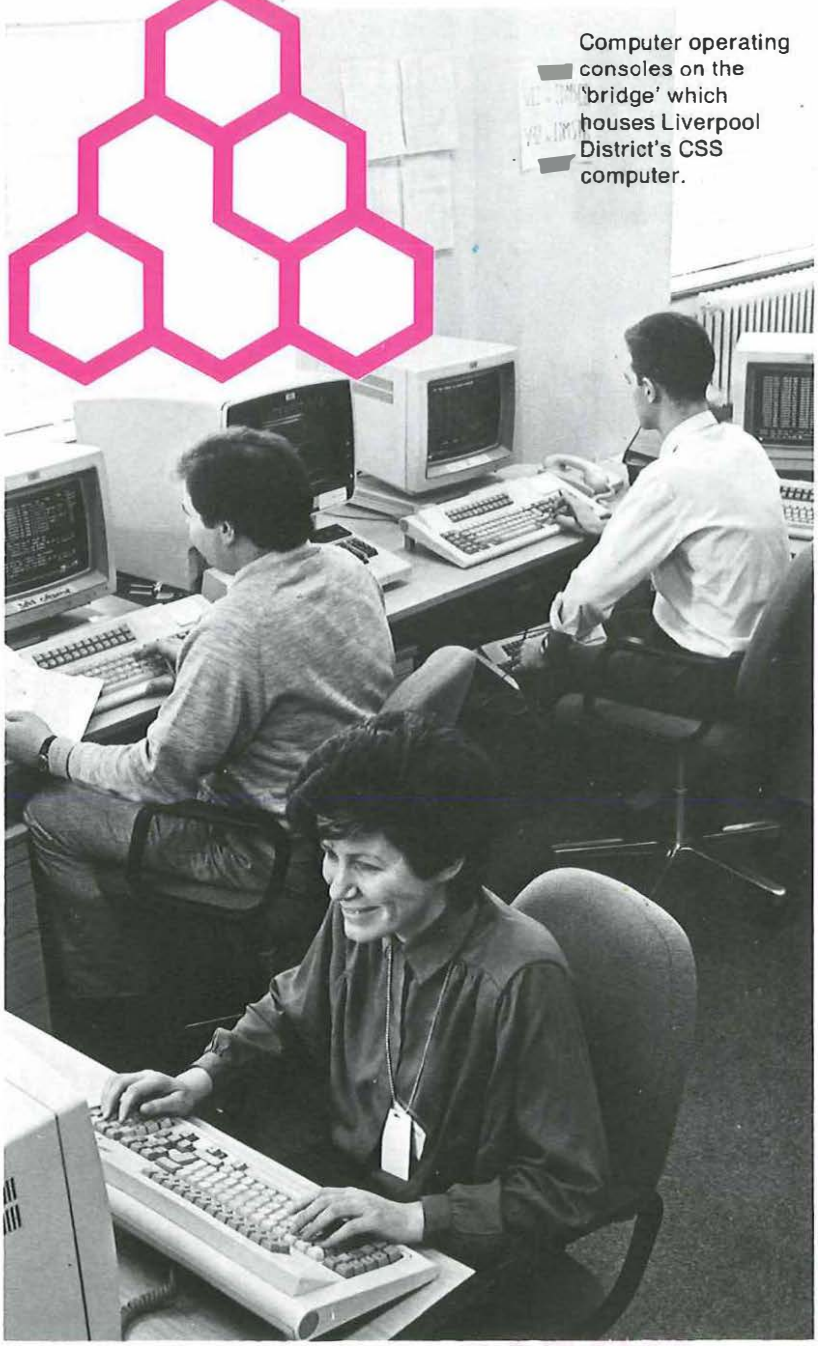
Positive steps towards customer care



Computer operating consoles on the 'bridge' which houses Liverpool District's CSS computer.

One of the most important improvements to British Telecom's overall level of service will, without doubt, be the introduction of Customer Services Systems (CSS). As outlined in the *British Telecom Journal* (Spring, 1986) CSS involved the installation of a new mainframe computer in each of BT's 30 districts to simplify dealings with the public and to improve management control and financial procedures.

Delays in implementation have been the subject of press criticism and decisions have yet to be made about the specifications and origin of equipment to be used nationwide. But a trial CSS exercise in part of Thameswey District has been followed by the introduction of complete CSS in Liverpool and South Wales and there is already positive evidence of the benefits of the system.

The creation of a new workable system in pioneering Thameswey took several months and a backlog of material accumulated which had to be put into the system. This in turn led to staff, trained in new techniques, becoming 'rusty' before their expertise could be utilised.

The lessons learned have been put to good effect in the first trial areas, and, as knowledge and experience snowball, a national version of CSS looks set to dramatically enhance the company's public image. It will boost the 'Front Office' concept in which customers will deal with a single enquiry point for such things as complaints, billing and orders instead of being passed 'from pillar to post' in a bureaucratic system operating within rigid confines. ▷

Top: Liverpool's mailing and enveloping machine for CSS bills.

Above: data processing officer Tracy Forrester checks Liverpool's laser printer used for producing bills.

Liverpool

Customer Service Systems (CSS) went live in Liverpool District on Monday 3 November last year and was immediately available to all the District's customers – Liverpool has about 625,000 exchange connections and is about twice the size of the part of Thameswey District which went live some nine months earlier.

The system was switched on at 7.30 am and the first order was taken five minutes later. Some 1,250 orders were taken on the first day. Details of the orders taken are now passed automatically by the system to installation offices, exchanges and directory offices. Engineers' works instructions are also printed off by the system at the appropriate locations.

Staff are now using the system to deal with customers' billing enquiries and the ready availability of information on customer accounts and payment histories on terminal screens is making their work much easier and quicker than before.

There are about 900 terminals in the District and on average about 400 users are logged on to the system at any one time. Response times so far have been excellent and the aim is for the system to be available for the inputting of information from 7.30 am to 5.30 pm daily, Monday to Saturday.

All users of the system have taken to it with enthusiasm. They have been particularly impressed by the ease with which information can be entered and displayed, the clear screen layouts and the reduction in the amount of paperwork.

No significant problems were encountered in the first bills to be produced by the system and 15,000 bills can be produced every day, five days a week with a maximum run of about 19,000.

Backlog

At Thameswey, where data conversion from the interim systems to CSS was being attempted for the first time, it was a considerable time after the interims were switched off before a usable CSS database was produced. This meant that a large backlog of work had built up by the time CSS went live.

Liverpool has not had to suffer this disadvantage, the gap between the interims being switched off and CSS going live was the scheduled four weeks.

Trial database conversions began in Liverpool in February 1986 and the first work was done on Schema 30 but this switched to Schema 40, the latest MVS version of the CSS application software, as soon as it became available. The District's policy was to carry out its trials on versions of the software which resembled the 'day one' version as closely as possible. The equivalent of one and a half complete conversions were carried out before the go-ahead was given to switch off the interim systems.

Liverpool's interims were held at four Multi-Access Data Centres (MADCs): Derby, Rochdale, Cardiff and Leeds. The final outputs of meter readings, amendments and closed orders were completed two days before the last bills and reminders were output and the conversion process began when extracts of data held on Customer Rental Records (CRR) and the New Billing System (NBS) were taken the next day.

During the conversion period, Liverpool received much help and cooperation from the MADCs and from other Districts.

The pressure was on right up to the last moment and just 48 hours or so before CSS was due to go live, an attempt to load information extracted from the Merchandised Order Handling (MOH) system, one of the interims, failed.

The problem was identified and rectified at the DISU during Saturday and Sunday but this

led to a great deal of last-minute rescheduling of work. Finally, late on Sunday evening, the information was checked again and, after a minor discrepancy was sorted out, it was given a clean bill of health.

Over the next few months Liverpool will be introducing new applications and facilities, such as repair handling and line testing, and will be moving towards the start of Front Office operation.

South Wales

On Monday 17 November 1986 CSS was introduced in South Wales to some 1,200 registered users in the East and South Customer Service Areas (based on Cardiff and Newport, respectively), serving some 454,000 customers.

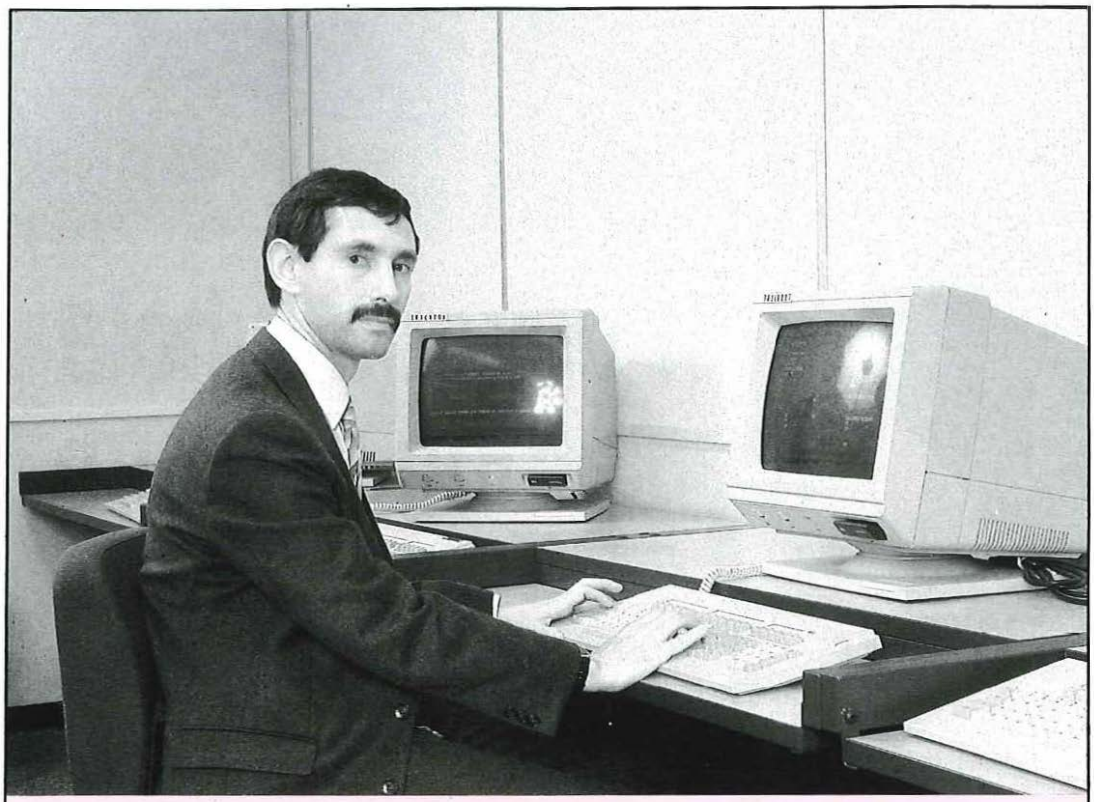
Despite all the build-up to CSS, the introduction of the system took place quietly and without drama.

It is true to say there was some apprehension amongst staff about going live on the new system even though they had been thoroughly trained and had practised its operations. But they were generally excited and enthusiastic at the prospect of using CSS, and once they actually used it their confidence grew rapidly.

Staff from the District training team, the District User Group and the National User Group were drafted in to help overcome any initial problems. The technical expertise of the DISU staff was also called upon to provide support for end users and this meant that early problems were quickly and effectively resolved.

For many staff the change-over was accompanied by a number of other major changes. Many people moved into new office accommodation that had been used for training only a week previously. New telephony systems were introduced and staff needed to familiarise themselves with all these changes and deal with customers using CSS.

In the event, the changes worked very well. Sales staff were taking live orders on the system from the outset and, by the end of the first day 840 orders had been taken and approximately 113,000 transactions used. During the first week, these figures steadily increased to nearly 1,000 orders a day and over 190,000 transactions used at an average mainframe response time of one second. By the end of the week the system was handling an average of 250–300 users concurrently and the growth indicated increasing levels of staff skill and confidence in the system. ■



There are currently 31 British Telecom development staff seconded to ICL to work on the MVS to VME Conversion of CSS software. BT staff have been seconded to ICL on the project since June 1985.

ICL took delivery of the latest MVS version of the CSS application software, Schema 40, on 31 October 1986, and the combined ICL/British Telecom team are in the process of converting it to run the ICL version of CSS.

Hardware has been bought in accordance with a philosophy of dual-sourcing: CSS will eventually run both on the IBM 3081 series of mainframes (using the OS-MVS operating system) and ICL's mainframes (using a VME operating system).

The picture shows John Mills, a BT senior analyst, working at ICL, Feltham.

Pocket a whole measuring system.

You can carry a whole measuring system in your pockets when you use Wandel & Goltermann instruments. Private circuit line-up is made even easier by using a complete generator-receiver setup housed in super lightweight cases.

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Also included in the range is a pocket-sized optical power meter.

Each instrument weighs around 500 grams and is of robust construction for field use. Features include automatic digital level readings with 0.1dB resolution and Nicad or dry batteries with alternative a.c. adaptor/charger.

Wideband Level Meters:
PM-10: 80Hzto 20kHz, −50 to +10dBm, internal 820Hz test level generator. PM-20: 15Hz to 20kHz, −50 to +30dBm, 0 to 100V d.c. PMP-20: CCITT weighting filter, −85 to +10dBm.

Level Generators:
PS-10: 200Hzto 4kHz, 10 fixed frequencies, sweepable. PS-20: 20Hz to 20kHz, 30 fixed frequencies, level settings in 0.1dB steps.

Optical Power Meter:
OLP-1: 850, 1300, 1550nm, −60 to +3dBm.

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The name for precise measurement.

Mitel are more than just a major designer and manufacturer of business telephone systems for British Telecom. So much more that in 1986 BT bought a 51% stake in the company for over £180 million.

What did you get for the money?

A partner. One that does business all over the world – and who's already a number one supplier of PBX's in the highly competitive US market.

An innovative ally acting as a complement to yourselves. A corporate colleague.

Here's to the future . . . . .

Q. Just who are Mitel anyway?

A. Well, since you asked . . . . .

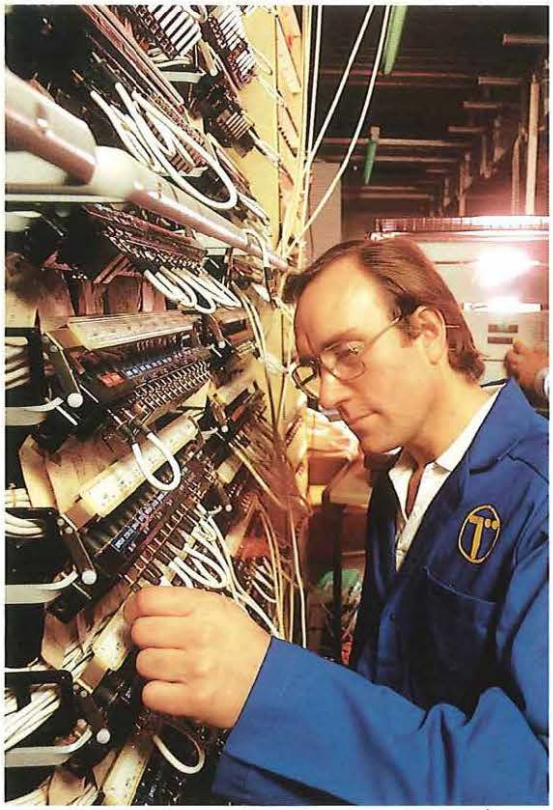
MITEL

COMMUNICATIONS ANSWERS THAT WORK . . . FOR YOU.

Smoothing out the digital path

Dave Cushion

With a new digital exchange coming into service every day, British Telecom has had to overcome problems in connecting new and untried exchange systems into the network. A low-cost monitoring device has been developed to help with the job and, after successful trials, is ready for widespread use throughout the country.



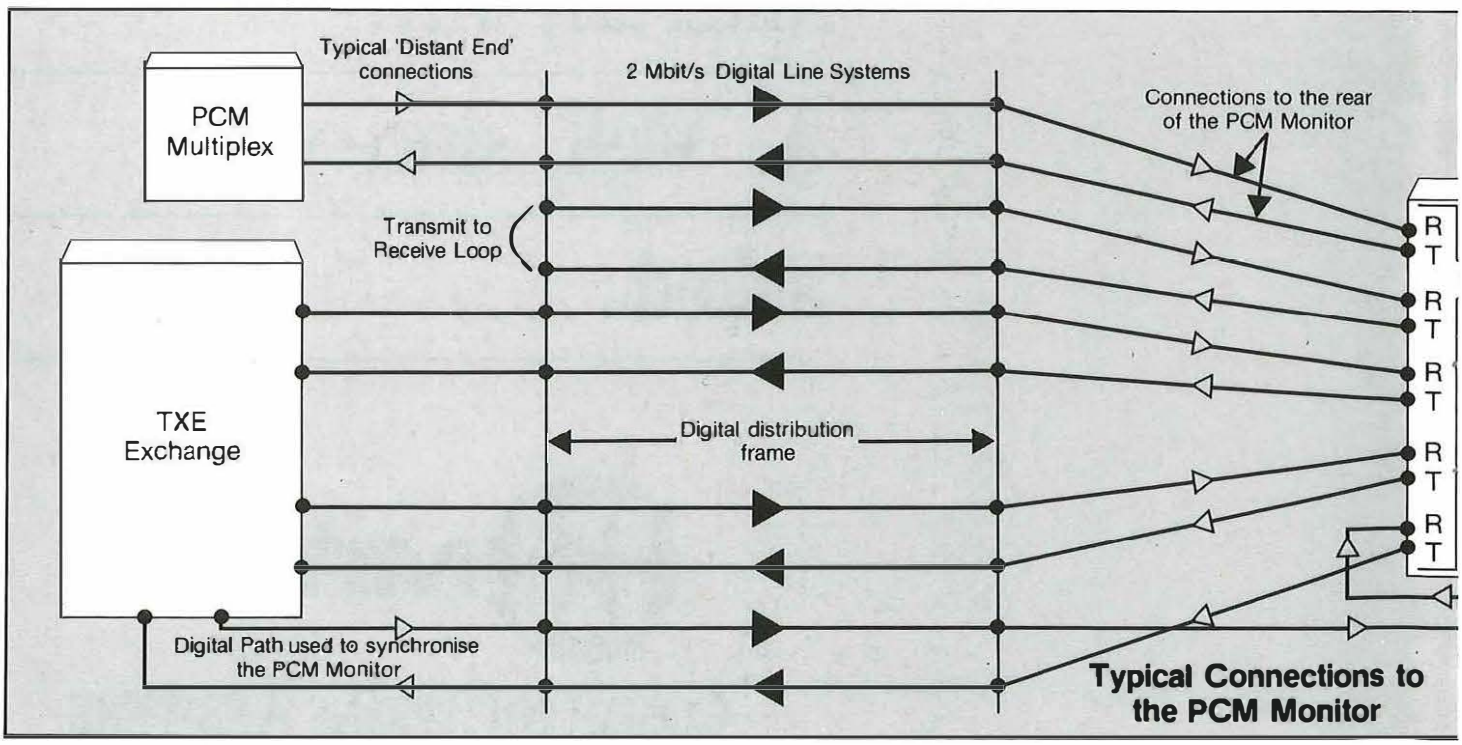
The exchange modernisation programme under way throughout the country, in which System X and AXE10 units are being installed under contract, has highlighted a number of problems.

As a result British Telecom's London Regional Exchange Planning Group approached the predecessors of the London Service Organisation (LSO) Network Services Division to find a solution.

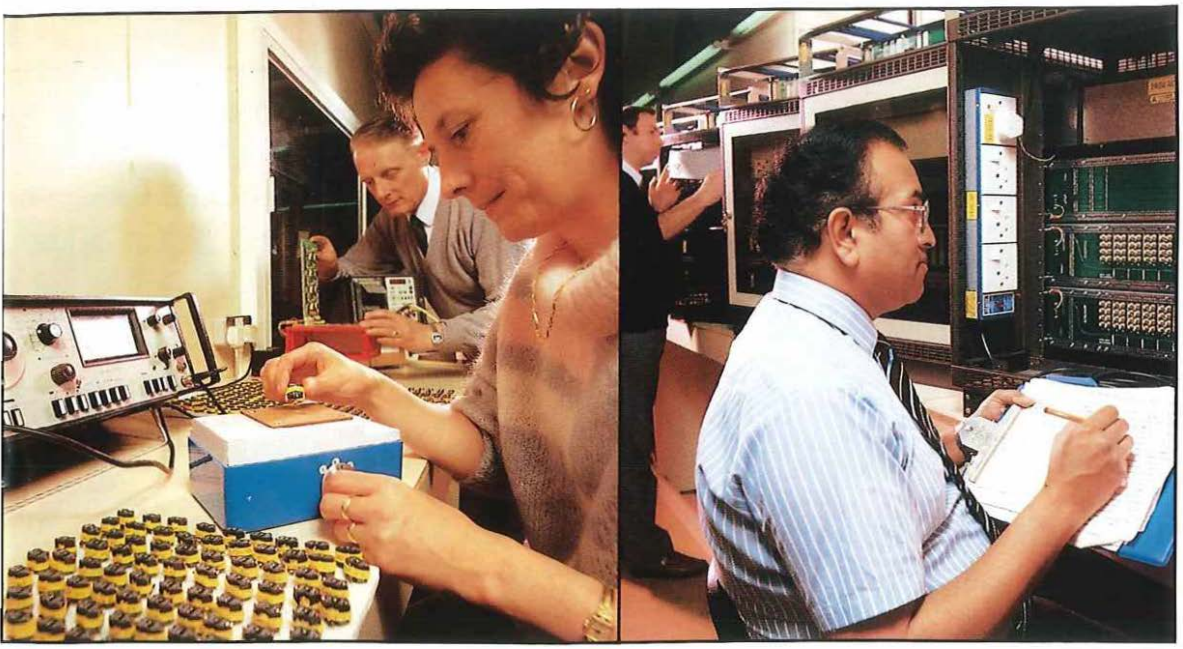
Prototype equipment was produced by BT/LSO and Burdett Engineering Limited, of Crayford, Kent.

The advantages of this equipment were that a digital system could be lined up in its working state prior to availability of the exchange equipment and failures could be monitored and dealt with as they occurred.

The new monitor gave confidence that the



Typical Connections to the PCM Monitor



Some of the stages in the manufacture of PCM monitors at Burdett Engineering Limited, of Crayford, Kent. The pictures show (far left) the assembly of a line distribution mother board, (centre) line card matching transformer testing and (right) socket-to-socket inspection and measurement.

network was working and did not require re-testing before the exchange was commissioned. The Mk 1 equipment, although effective, proved far too expensive at £20,000, and was re-designed by BT/LSO. A Mk 2 was produced by Burdett Engineering at £5,000 – a sum that can be recouped in man-hours alone in a couple of months.

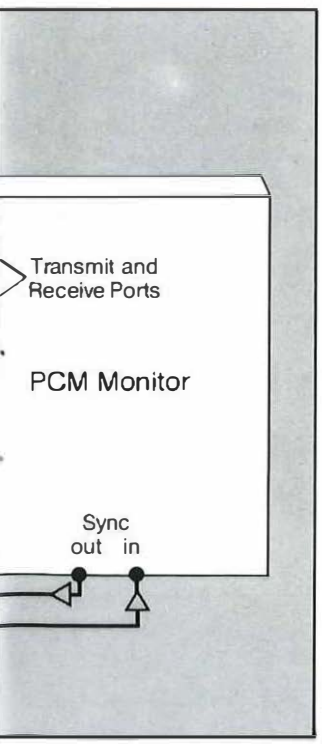
Ten of these purchased by BT/LSO for London districts received an enthusiastic evaluation as a result of which 40 have been ordered to date for London, and 70 for other districts.

This equipment – a pulse code modulation (PCM) system monitor – has enabled districts to advance their TXD programme and achieve early ready-for-service dates. The monitors so far distributed throughout the country are functioning well and some are also working to higher order and fibre-optic line systems. ■

Opposite page: the PCM monitor in use at Baynard House, London's main switching centre. The picture shows commissioning engineer Bob Carter connecting a circuit from the exchange's distribution frame to the monitor.

PCM Monitor – a technical description

Mr D L Cushion is an assistant executive engineer with British Telecom's London Service Organisation.



The problems of connecting untested equipment to the network include the display of permanent alarms at the distant end and a lack of any effective means of monitoring the system.

A temporary solution was to loop the 2 M/bit path at the digital exchange after its multiplexer had been commissioned.

But this did not completely overcome the distant end alarm or monitoring problems because:

- the distant end multiplex cannot be left in a 'ready for service' condition in either slave or master mode without causing alarms to occur or the need for costly re-strapping
- signalling cards cannot be left in a 'looped back' state as this causes damage to relays
- the TXD staff would not be aware of any faults to either the 2 M/bit path or a multiplex in the event of a failure.

Under the new system, monitoring is achieved by providing alarm states including loss of input; alarm inhibit signal; frame alignment fail, and distant alarm.

An additional warning light is provided to give a ready indication of a loop condition on the 2 M/bit path.

Each port is accessed by the equipment on a time-shared basis for about two seconds. If an alarm occurs the port display will stop on the faulty port and give an alarm. Ports can be enabled or disabled and their working status programmed into the monitor's memory.

Port selection can also be achieved manually and an output is provided to allow a PCM tester 246, or equivalent, to monitor the selected incoming 2 M/bit signal.

The transmitted data on all ports is constant and contains the information needed to extinguish all alarms on any PCM-type multiplex equipment.

As all PCM multiplexes must have their timing derived from an incoming signal when working to a TXD, the receive path of the monitor looks for synchronised incoming data and an alarm occurs if this is not so.

The PCM monitor Mk 2 is housed in a metal cabinet with a lockable perspex door and can be a permanent fixture or easily transported to other sites. ■

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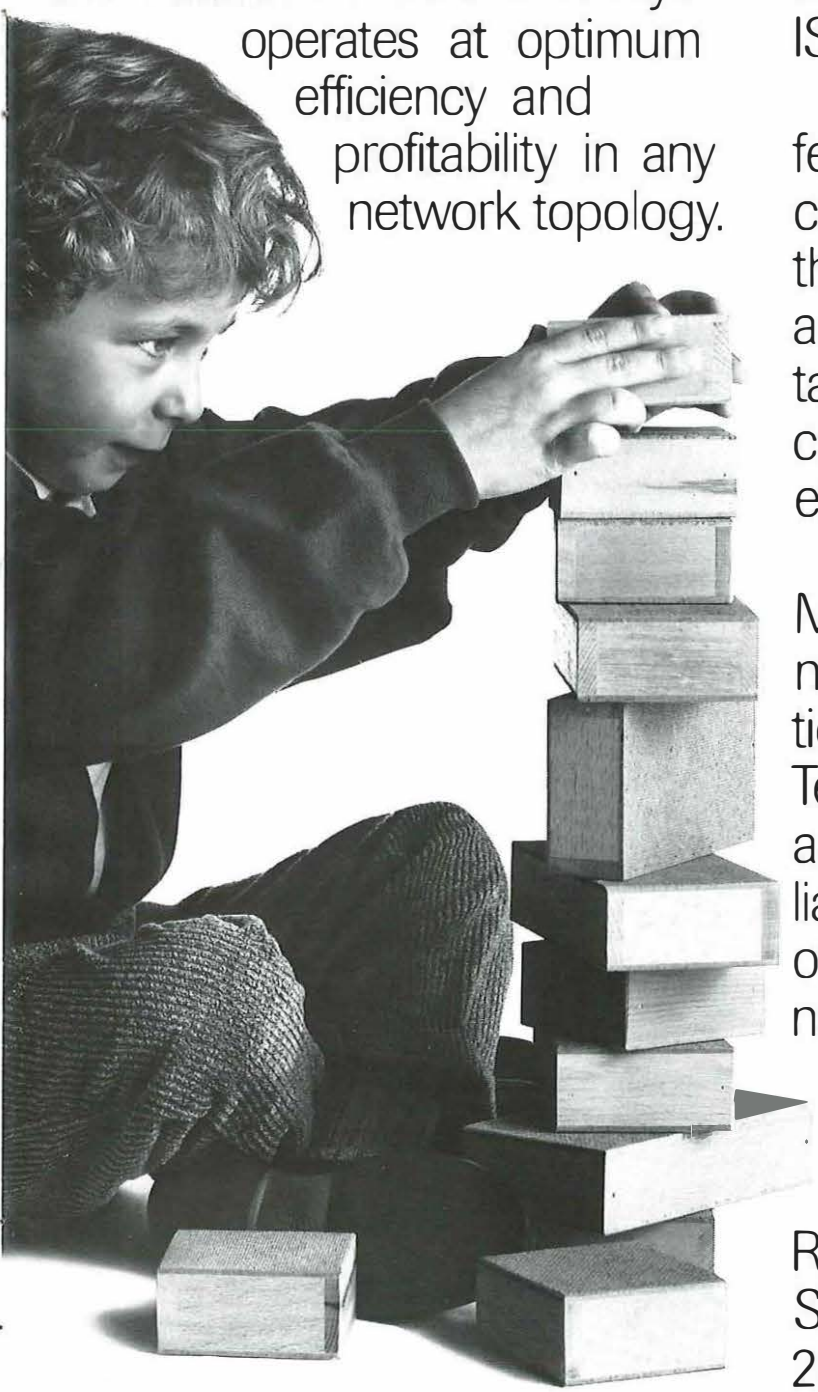

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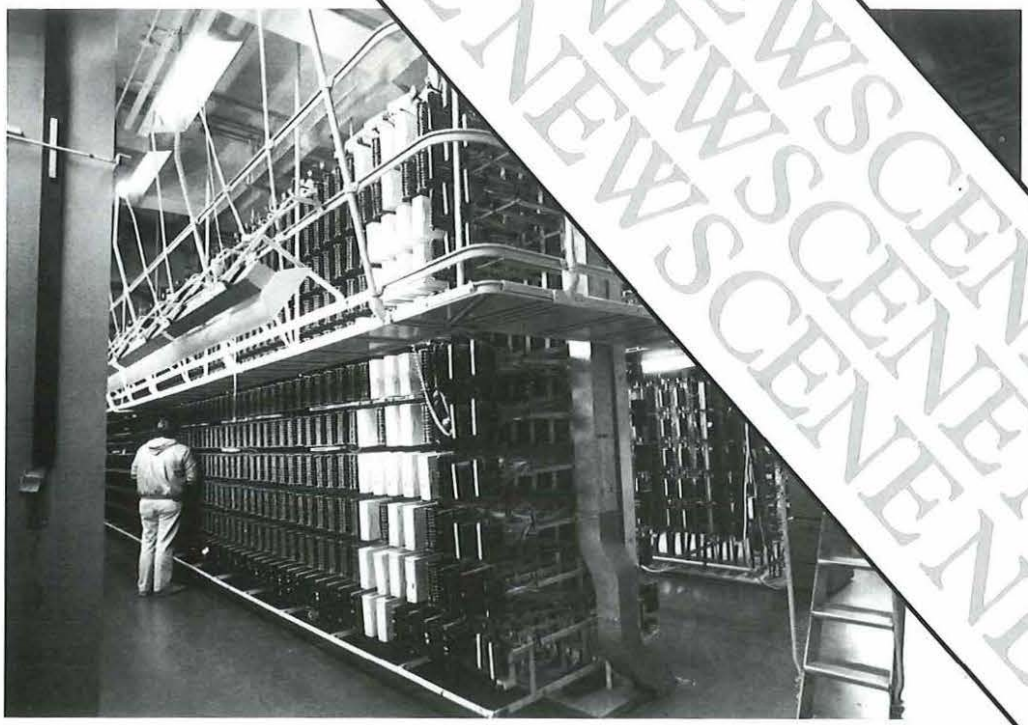

The present overworked and overloaded main distribution frame at Hove exchange in South Downs District.

Congestion–the cosmic solution

Out-of-this-world telecommunication problems demand 'Cosmic' solutions and one answer to serious physical line congestion in some exchanges could be the COSMIC main distribution frame now being installed at Hove in South Downs District.

Customers' lines are connected into their local exchanges by jumpering – engineers connecting the lines into a main distribution frame (MDF) – and then on to the exchange switching equipment.

But as time goes on with more and more customers coming on to the exchange or numbers being changed, the mass of MDF wiring and cabling grows heavier and bulkier.

Eventually, jumpering wires cannot even be pulled out without insulation breaking down and then the problem rapidly worsens as the old wiring has to be left in place.

At Hove, with 70,000 cable pairs to handle and about 1,000 number transactions (additions or changes) a month, faults have climbed to a third of the area's MDF failures.

The Americans hit the problem before the UK and manufacturers AT & T – Western Electric came up with an entirely new MDF – the COSMIC – which is now widely used and has impressed British Telecom engineers who have been to the United States to see it in operation.

National Director of Engineering (Inland Communications) John Tippler has visited Hove with district manager Tony Wyard to see installation progress by BT Fulcrum and the transfer to Cosmic – the first installation of its kind in the country.

Compared with the standard BT frame, Cosmic is just single-sided and is easily accessible by jumpering staff who will be specially trained and assigned for the work.

Initial installation work is less and jumper wiring lengths shorter. The frame has its dedicated computer-aided management and allocation system to ensure the shortest jumpering lengths and set up an infallible record file.

All this keeps the MDF neat, tidy, efficient and easy to work on, even with many transactions. Connections are made quickly and accurately by insulation displacement with a specially-designed tool for single-handed operation.

Cosmic construction is scheduled for completion by the end of February.

Director of Engineering John Tippler (right) watches Cosmic coordinator Chris Bonus making a connection on the new COSMIC main distribution frame at Hove – the country's first installation of its kind.

The look of the future at Hove as the Cosmic main distribution frame take shape under temporary inspection lighting for installation teams.

Fibres on show

The Fifth International Fibre Optics Exhibition and Conference, which is being held as part of the British Electronics Week at London's Olympia Exhibition Centre from the 28th to 30th April, 1987, presents an opportunity for telecommunications engineers to update themselves on the latest technology.

With Europe predicted to account for one-third of the world market in fibre-optics by 1991 and the UK currently representing one of the most innovative centres in world fibre-optic developments – interest in the event is high.

A strong technical programme has been assembled for the conference, and the 100 stands at the associated exhibition include the vast majority of UK companies involved in fibre-optics as well as exhibitors from ▷

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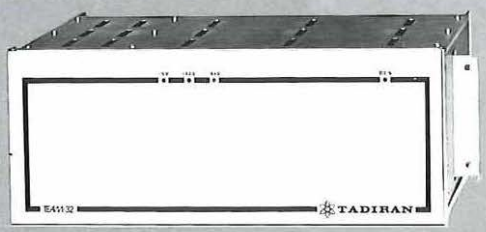

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France, Germany, Japan and the USA.

The conference will cover areas such as local area networks, advanced telecommunications, components, optical sensors, and business opportunities. There will also be a one-day practical workshop which will give participants an opportunity to gain 'hands-on' experience of handling optical fibres, measuring their characteristics, and using them in systems.

Many of the exhibits will concentrate on products and systems aimed at the telecommunications market, ranging from the basic fibre-optic cable – through systems for splicing and testing – to the hardware associated with launching, detecting, modulating and multiplexing signals for fibre-optic communications.

Fibre for the future

A £50 million optical fibre network linking British Telecom's customers in the City of London is now being installed as the first stage in a major programme to introduce the most advanced, singlemode type of optical fibre into major business premises. More than 60,000 km of fibre will be installed over the next year – almost enough to go around the world twice.

The optical fibre network currently being installed in London extends from King's Cross in the north to Elephant and Castle in the south and from Covent Garden in the west to Wapping in the east. During the next few years local optical fibre connections will be extended to major business customers located in other parts of London, including Docklands, and throughout the rest of Britain.

About 100 Dealerinterlink customers will be the first to use the network and other services will then be progressively provided through optical fibre connections, including telex, packet switched data lines, private circuits, KiloStream and MegaStream. Customers will also be able to use their optical fibre pipeline to connect with the public switched telephone network.

Singlemode fibre is being used, which provides virtually limitless bandwidth for future services. This means that there is no need to provide additional cables when new services are added.

Serving the sick

Chronically sick and severely disabled customers and the emergency services will continue to receive a free priority service from British Telecom when a new fault repair and maintenance system is introduced in April.

There will be no change to the standard fault repair service which customers receive as part of their quarterly rental. This aims to respond to fault reports by the end of the next working day and, in practice, nearly 90 per cent of faults are cleared within this period.

The new system will replace the present non-standard arrangements. It will allow customers to choose from a range of options and will enable British Telecom to meet its licence obligation to provide a priority repair service to certain categories of customers nominated by Oftel.

Memory bank cards

A credit card sized 'memory bank' which can hold up to 800 pages of text as well as photographs is to be supplied by British Telecom.

A licence to sell the tamperproof cards – known as 'LaserCards' – has been purchased from the Drexler Technology Corporation of California, which holds the patents for the invention.

The LaserCards hold up to 2Mbytes of data – the equivalent of 800 text pages or eight photographs – in a low-cost format.

British Telecom is negotiating with a major London hospital which is considering the use of LaserCards for holding maternity records. Photographs of X-rays, sonic scans, and medical notes can all be held on the same card.

Other fields where the cards have found application in the USA, Europe and Japan include financial payments and records, data collection, distribution and security.

Islands venture

The Solomon Islands Government is to set up a joint venture company with British Telecom to run the country's national and international telecommunications services.

The new company will be granted a 15-year licence to operate the services.

A major feature of the agreement is the construction of a domestic satellite system consisting of five earth stations located in the provinces to link the main centres within the Solomon Islands. Such a system is necessary because the mountainous nature of the islands and the distances between them do not easily permit the use of multi-channel terrestrial systems.

National telephone services are at present operated by the Posts and Telecommunications Division of the Ministry of Posts and Communications. The service will be transferred to the new joint venture company early in 1987.

Paging America . . .

British Telecom Mobile Communications has reached agreement with Metrocast, an American telecommunications concern, to provide the UK's first international paging service.

Under the terms of the agreement, British Telecom's UK radiopaging customers will be offered a single pager that will provide coverage both in the UK and in major towns and cities of the USA and Canada.

Customers of the Metrocast service in North America will, in turn, be able to receive paging coverage in the UK – again without the need to change pagers.

The breakthrough has been achieved through the development by Metrocast – a joint venture with Metromedia Telecommunications – of a radiopager able to operate over a range of different radio frequencies. British Telecom has combined with Metrocast to develop the service for the UK paging network.

First AXE 10

A further milestone in British Telecom's £1 billion-a-year modernisation programme has been passed with the bringing into service of the first AXE 10 digital electronic local telephone exchange.

The exchange, installed to meet growth in demand for telephone service in Sevenoaks and district, Kent, was supplied by Thorn Ericsson Telecommunications Ltd.

The Sevenoaks unit is designed to provide telephone service initially to about 1,500 customers. It is expected that these will be connected progressively during the next 12 months or so. ▷

Bobbies beat vandalism

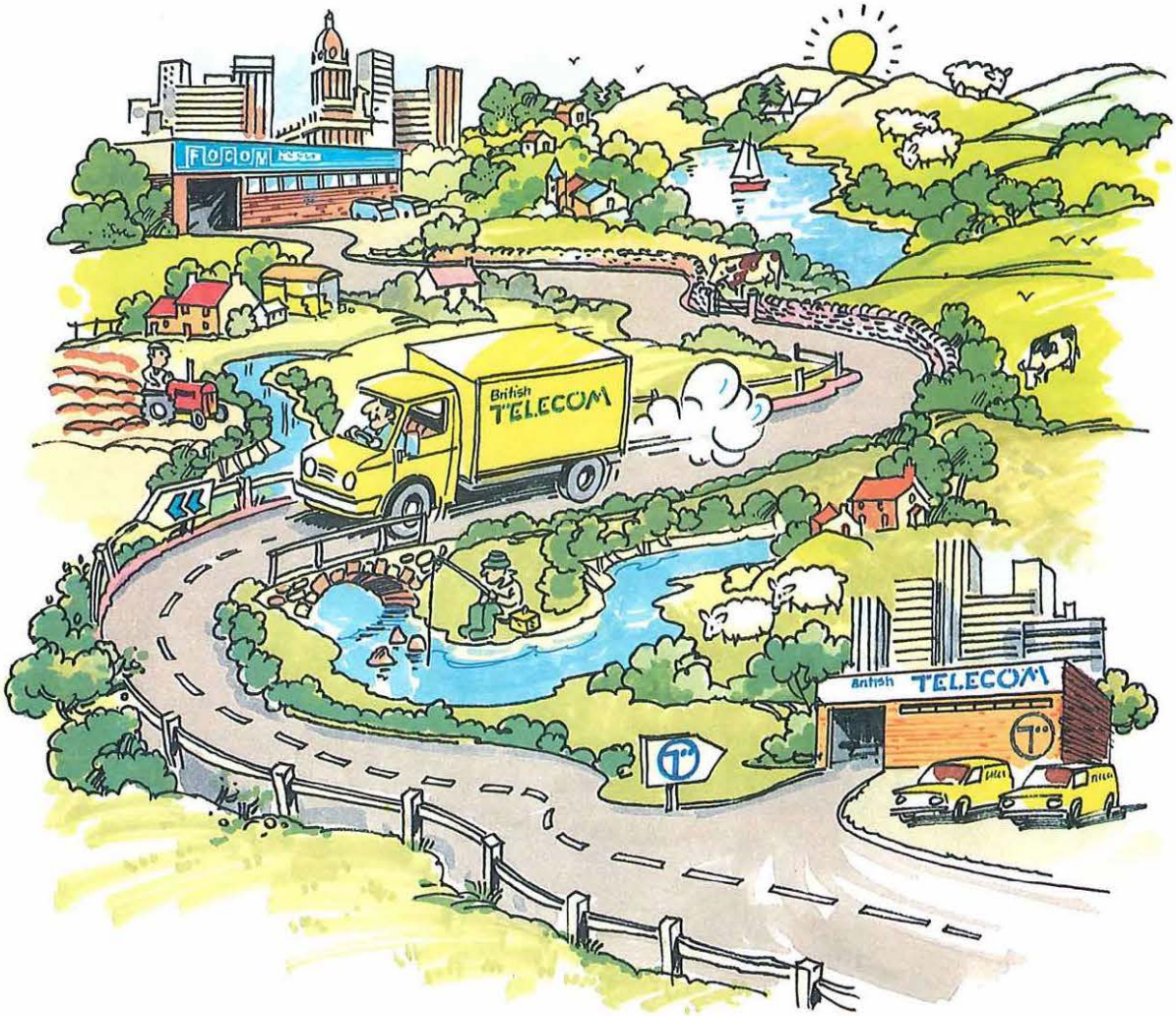
A collect-a-card scheme called 'Copacard' designed to help youngsters appreciate their public payphone service and, at the same time to know their local bobby on the beat, has proved a big success in South Wales.

British Telecom and the South Wales police joined forces to launch the scheme with a million cards. To get a card, youngsters stop their local community policeman, and, after answering two simple questions about emergency and police station telephone numbers, are given a card from a set of 36.

The scheme is the latest initiative in the battle against payphone vandalism which costs British Telecom £18 million a year.

Pictured is PC Mike Bartlett with a group of eager collectors.

WHAT'S IN THE BT VAN?



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Extensions are planned for the exchange and two remote centres at Tonbridge and West Malling. The combined system will grow to provide a total of nearly 40,000 lines before the end of the century.

The Sevenoaks exchange is the first of 26 local AXE units ordered by British Telecom and due to come into service during the next 18 months. The next will be Birmingham South, which is due to be ready in spring.

Operation 'Fastnet'

The Army has started to use Fastnet, the £13 million digital private communication system supplied by British Telecom.

The first phase of Fastnet covers the Army's 50 largest sites, and with 30,000 planned extensions, is the largest private digital network in the country. The exchanges and their digital inter-connections will form a single integrated system, handling telephone calls, data, facsimile and teleprinter messages.

Micros for the Navy

British Telecom has been awarded a £2 million contract to supply the Royal Navy with more than 300 specially adapted micro-computers. The M4000 systems will be used mainly for catering administration and accounting, both on ships and inshore establishments.

The M4000 is a standard British Telecom product, but the system accepted by the Navy has many additional features. Capacity has been increased, a special printer selected, and other modifications made to allow for conditions at sea.

The contract is British Telecom's first for major office automation with the Ministry of Defence, and it was won in competition with several other companies.

Contracts

Beckman Industrial has been awarded a £300,000 contract for the supply of handheld digital multimeters to British Telecom.

Evode Roofing Limited has won two British Telecom contracts worth a total of £45,000, for roof refurbishments at major exchanges in Dudley and Bromsgrove.

Pansophic Systems (UK) has won a £360,000 order from British Telecom for its report generator, Easytrieve Plus, the world-leading language for IBM systems. The order covers all of British Telecom's IBM Customer Service Systems (CSS) sites throughout the UK.

Pressac Limited has been awarded contracts worth a total of £3.75 million by the Consumer Division of British Telecom. The orders cover various components and assemblies including ongoing supply contracts for line jacks, remote plug-in tone callers and extension cords.

Rediffusion Radio Systems of Crawley has been given a £1.1 million order by British Telecom for paging transmitters and racks.

STC has been awarded a £20 million contract to double the capacity of British Telecom's directory enquiry service. STC have again sub-contracted the installation and maintenance work to **Computer Field Maintenance Limited.** British Telecom's Directory Assistance System (DAS) will soon have the processing power for 250,000 calls an hour instead of the current 180,000.

STC and **ICL** have won an £8 million contract from British Telecom International to develop, supply and install systems to replace existing manual methods of connecting and testing international telecommunication circuits. BTI has ordered four automatic circuit systems – known as automated digital distribution frames – to manage the connection of international digital voice and data circuits. The first system will be ready for service early in 1988.

T-Bar has received an order worth £225,000 for a DSM2001 digital matrix switch from British Telecom's Customer Service Systems at Exeter. Switching 600 V.24 ports, the equipment is located at a new purpose-built site.

Latest test phones

Chesilvale Electronics Limited is now supplying large quantities of two new dual-standard engineers test telephones to British Telecom.

The DSTS 2 is a development of the standard test telephone, known as the Tele 284A and differs in that it meets USA standards. It also has last number redial.

The DSTS 4, supplied to British Telecom as the Tele 286A is a replacement for the old Telephone 704. It is the new field engineers test telephone and again operates in loop disconnect and DTMF signalling modes. Its internal batteries also provide battery feeding to the line whilst it incorporates many more new features such as last number re-dial in tone and pulse and off-line memory retention.

Both instruments meet environment requirements and the standard British Telecom drop tests.

Ideas in action

The winners of the 1986 British Telecom New Ideas Competition (see autumn issue of *British Telecom Journal*), Geoff Wesson, an assistant executive engineer, and his Nottingham team certainly are seeing their ideas proven.

Their suggestion, which featured in the BBC TV programme 'Ideas Unlimited', was for an Automatic Network Analyser (ANA), which uses the latest technology to detect deterioration in the Public Switched Telephone Network.

ANA has proved to be very efficient in improving customer service by speeding fault identification. Rotadata who developed and manufacture ANA have supplied almost 70 systems to BT districts so far.

INDEX TO VOLUME 7 – Spring 1986 to Winter 1986/87

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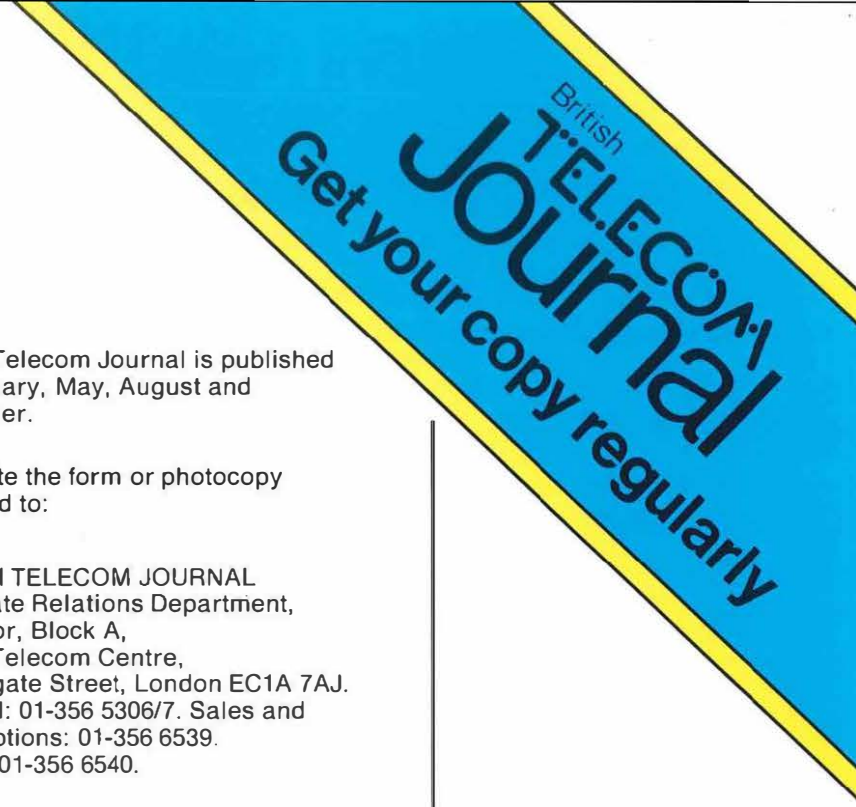

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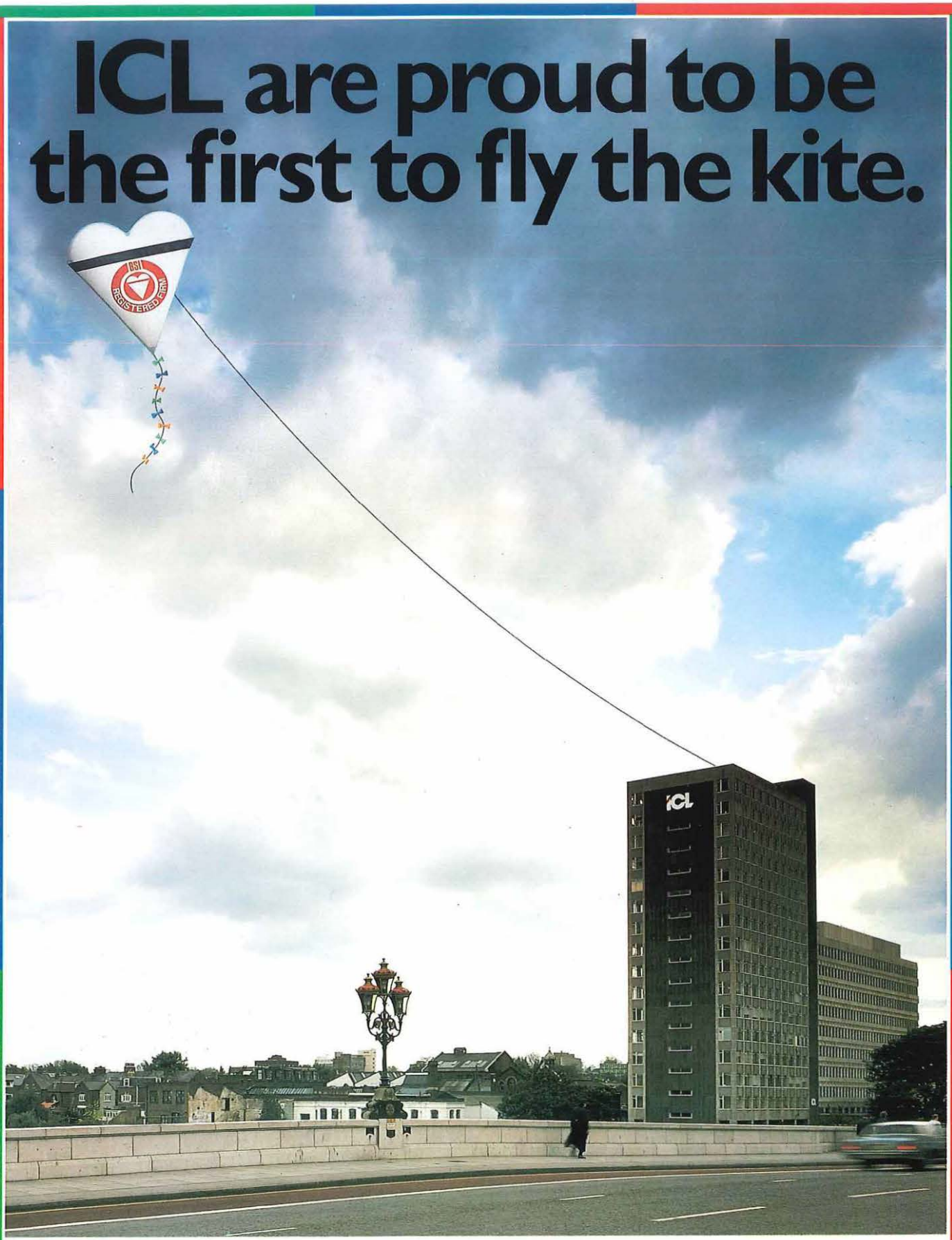

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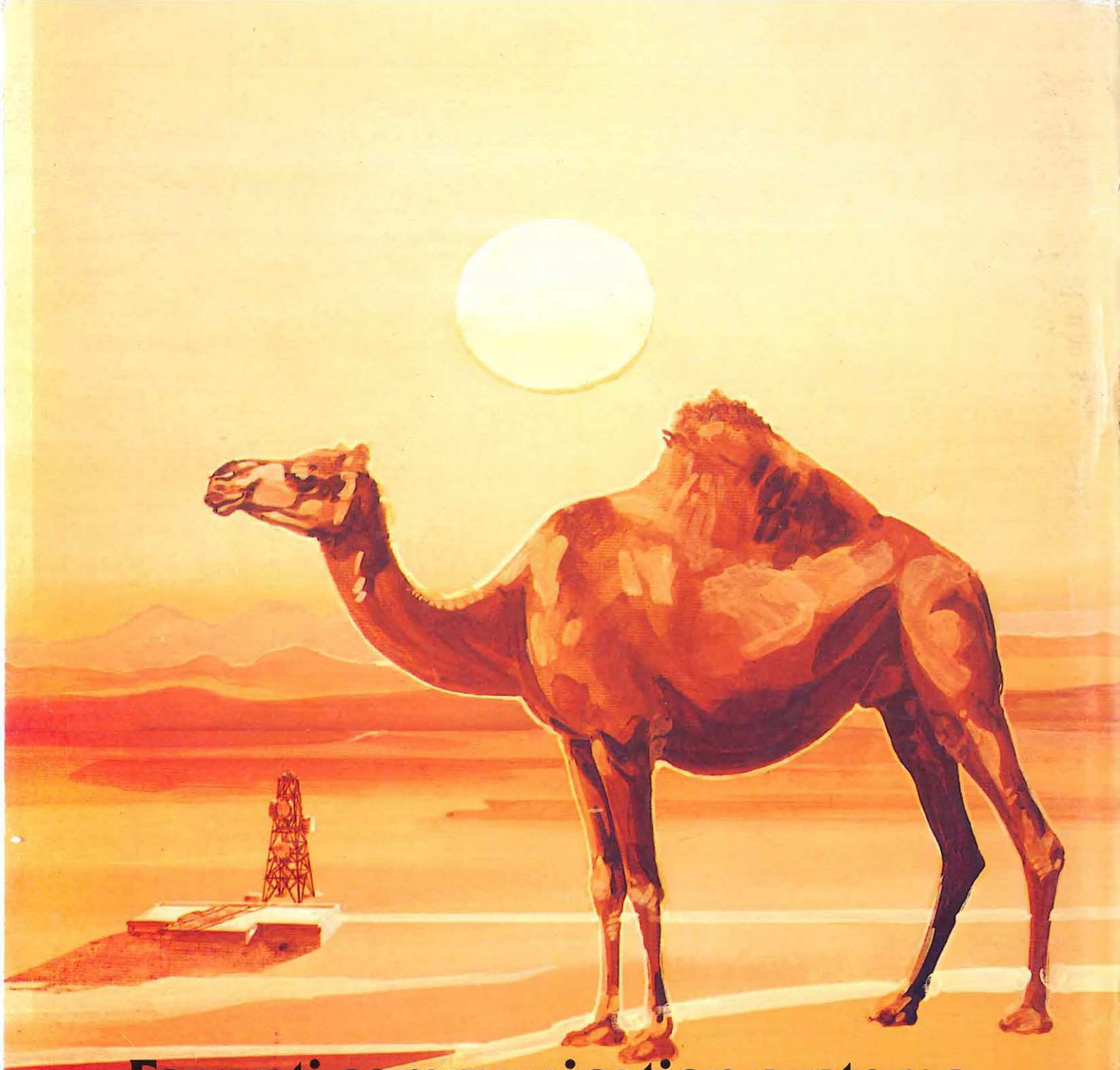

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