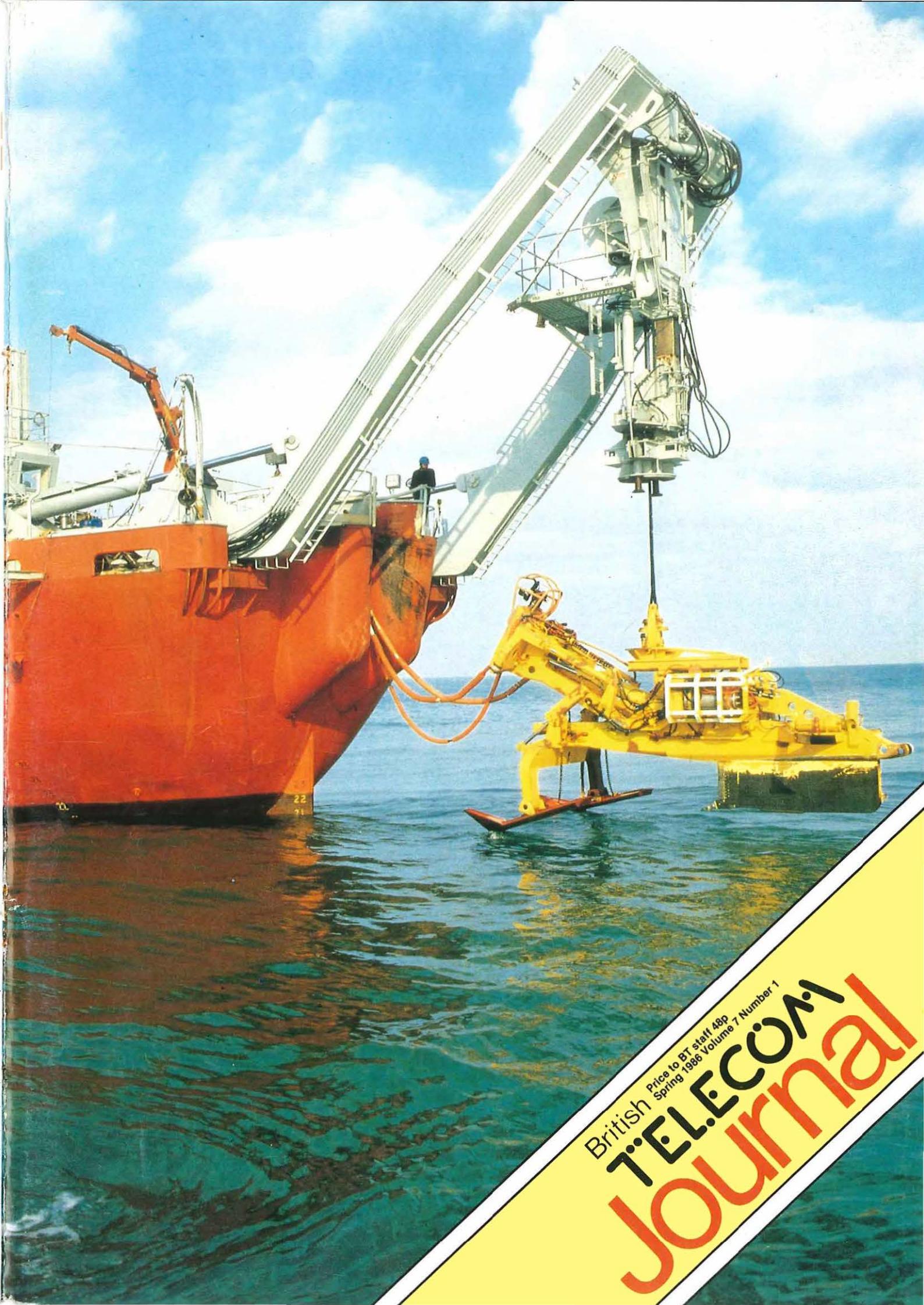


Price to BT staff 48p
Spring 1986 Volume 7 Number 1

British TELECOM Journal

PLESSEY INNOVATIONS FOR COMMUNICATIONS

High-speed link enters service in Florida's lightwave network.

The first Plessey export high-speed optical fibre communications system is now in service for the United Telephone Company of Florida.

Installed by Stromberg-Carlson Corporation, the Florida based telecommunications subsidiary of Plessey, the new 565 Mbit/s transmission system links several of United's exchanges.

The system will eventually extend for more than 300 miles with numerous spurs along the route.

This is part of United's programme of modernisation which includes upgrading to 565 Mbit/s the 140 Mbit/s Lightwave systems already supplied by Plessey.

In future, United Telephone's high density Florida traffic will be carried on optical fibre systems, with most of its extensive routes operating at 565 Mbit/s.

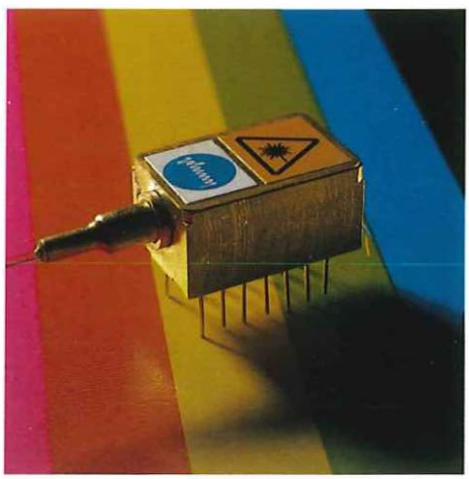
It's another optical fibre first for Plessey.

Providing for future optical fibre needs is how Plessey Transmission achieves and maintains its leading capability in high-capacity optical fibre systems.

For more than a decade Plessey has developed and combined the technologies of opto-electronic devices, digital multiplexing, digital line systems and optical fibre connectors to create optical fibre transmission systems second to none.

Today, worldwide, there are over 11,000km of Plessey optical fibre systems carrying operational traffic, under installation or on order.

In gaining this success, Plessey has notched up a string of firsts. They include the first optical fibre system put into 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, the longest operational unrepeatered optical fibre link in the world, and the world's first commercial contract for a 565 Mbit/s optical fibre system, now installed between Nottingham and Sheffield.



Among the major projects now in progress is the 565 Mbit/s communication highway between Sydney and Melbourne for Telecom Australia.

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

PLESSEY

PLESSEY and the Plessey symbol are trade marks of The Plessey Company plc.

Minding our own business . . .

The power of communication is supposed to 'separate man from the animals.' Naturalists, no doubt, would disagree because every living thing communicates with its surroundings to some extent. But the fact remains that mankind is becoming increasingly dependent on a constant interchange of ideas and information.

British Telecom is at the forefront of telecommunications and the company exists to fulfil this ever-growing demand. Wherever there is a need for individuals, or businesses, to exchange information, there is an opportunity for the company to prosper and expand.

But no company at the 'leading edge' of technology can afford to sit back and wait for market trends to dictate its next move. It has to listen to undercurrents of need and has to create its own opportunities for advancement.

As a private company facing competition from all over the world, British Telecom has a major resource in the experience and skill of its staff and shareholders who, collectively, are at both the supply and demand ends of the spectrum.

The company has truly 'gone public' in the sense that the vast majority of British Telecom staff hold shares in the company and, even after the third and final instalment of the share price was paid last month, there were still more than one million shareholders – the bulk of whom are holding shares for the first time. It is true of any company that its future lies in the hands of its staff, customers and shareholders but in British Telecom's case even more so as these categories significantly overlap.

What is clear, however, is that the company should pay close attention to any idea which will help to exploit its future prospects and developments and this philosophy is illustrated by a series of 'forums' about the business which are currently being held and in which staff from all Divisions are invited to take part in informal discussions with Mr Iain Vallance, Chief of Operations. The first, on the topic of 'Competition in the UK and the World marketplace', yielded a number of serious and realistic pointers for the future.

Encouraging

Mr Vallance looks forward to the 1990s when he sees a British Telecom with international links in North America and elsewhere which can 'take Europe by storm.' It is up to everyone with a vested interest in the company to ensure that his prediction becomes a reality. And coupled with the talks, this year's Awards for Suggestions scheme has surpassed itself in terms of the volume and scope of ideas put forward. Judging will be in July, but whoever wins, the interest shown is an encouraging sign.

One thing is certain. There is still an enormous market potential for the company's products and skills. According to a recent survey in the Daily Express, 78 per cent of British homes have a telephone and the percentage growth in telephones over the past 20 years has exceeded television sets, washing machines and cars.

There is no reason why growth in telecommunications products should not continue in both the domestic and business markets. An indication of future trends can be found in a new housing estate in Oxfordshire designed for 'hi tech' out-of-town living in which properties are equipped with such British Telecom products as Merlin Tonto, high-speed fax, Prestel and the latest telephone equipment. Demand, therefore, is present and it is up to everyone involved in British Telecom – regardless of role or rank – to help steer the company towards continued success.

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Cover: The laying of the world's first commercial undersea optical fibre cable between the UK and Belgium was scheduled for completion by the end of May. In the weeks leading up to the event extensive trials were held off Ramsgate with BTI's cableship *Alert* and its remotely controlled submersible Plough. (See page 43).

British Telecom Journal costs 48p per issue for staff. External subscribers pay £15 for two years including post and packaging. Full details on page 71.

British Telecom Journal
Spring 1986 Volume 7 Number 1

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

THIS IS A PLUG FOR OUR TEST EQUIPMENT

Plug into efficiency

To improve performance of exchange switching units you need optimum efficiency in management, and modern management needs modern equipment. Many managers consider a computerised approach to routine surveillance and maintenance of the PSTN as essential as the telephone itself.

The Rotadata Automatic Network Analyser ANA 8432 (BT Tester 376A item code 314626) operates 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.

Tester 355A (BT Tester item code 314534) is a low cost microprocessor-controlled hand held test callsender incorporating sophisticated NOISE detection facilities. Sends and stores test numbers up to 80 digits with battery backup of stored data. Simple to set up and use.

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Supply Details

All items are available for supply within British Telecom from BT Procurement Executive M6323 Swindon. Please use item code numbers listed above. Contact Mr. S. Carroll. Telephone 0793 484226.

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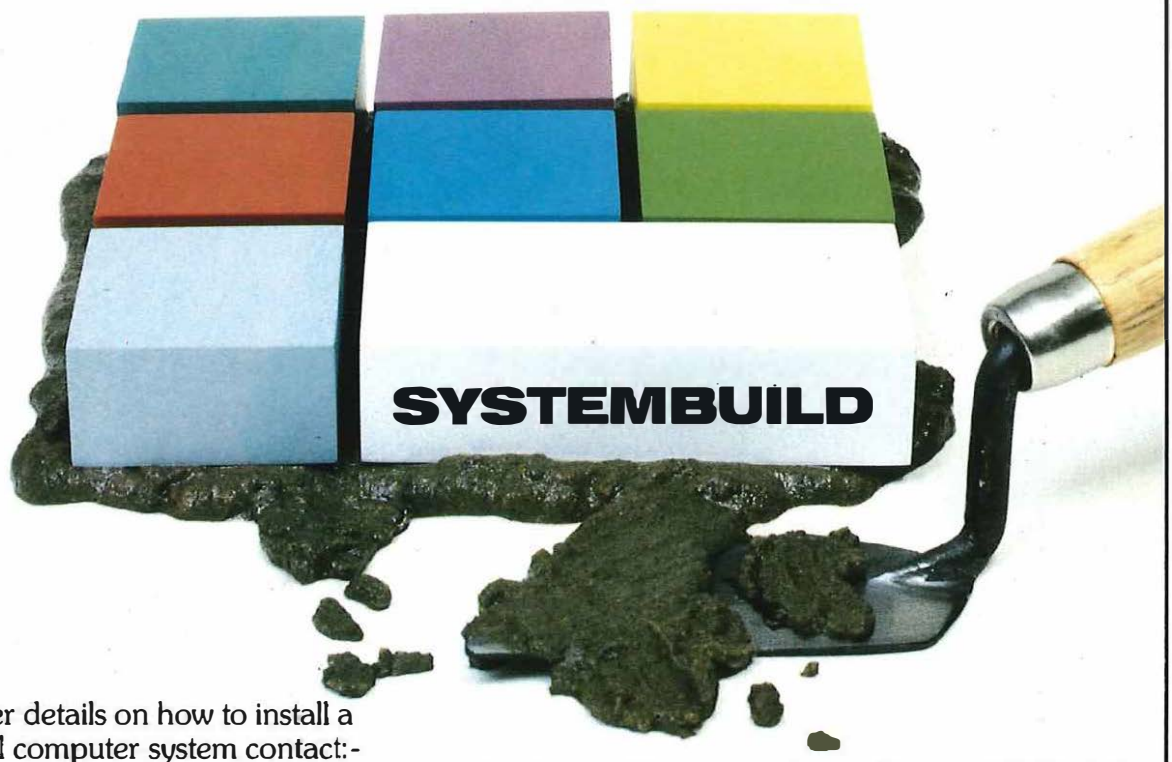

For further details on how to install a successful computer system contact:-
Information Services, Scicon Limited, Wavendon Tower, Wavendon, Milton Keynes MK17 8LX
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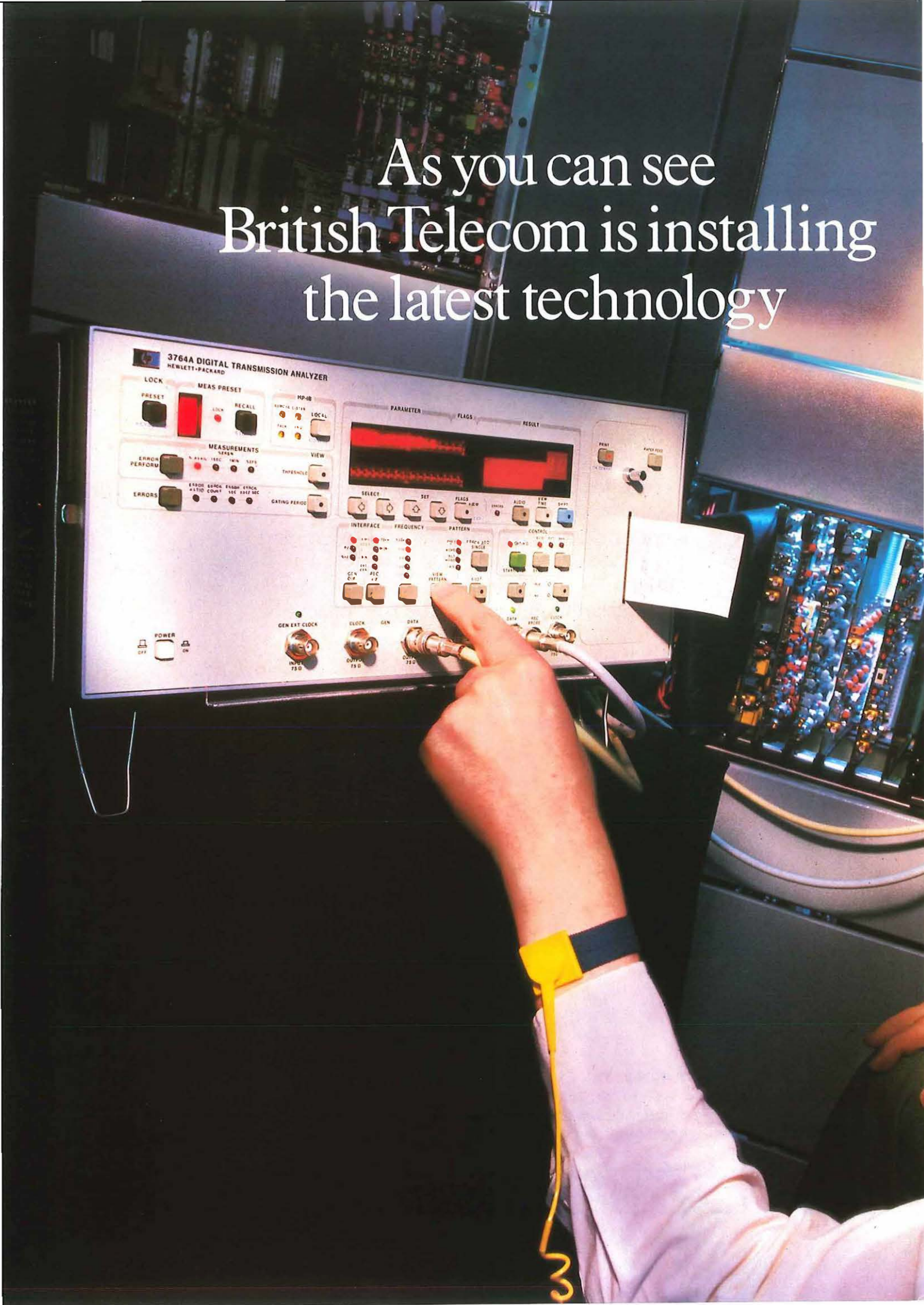
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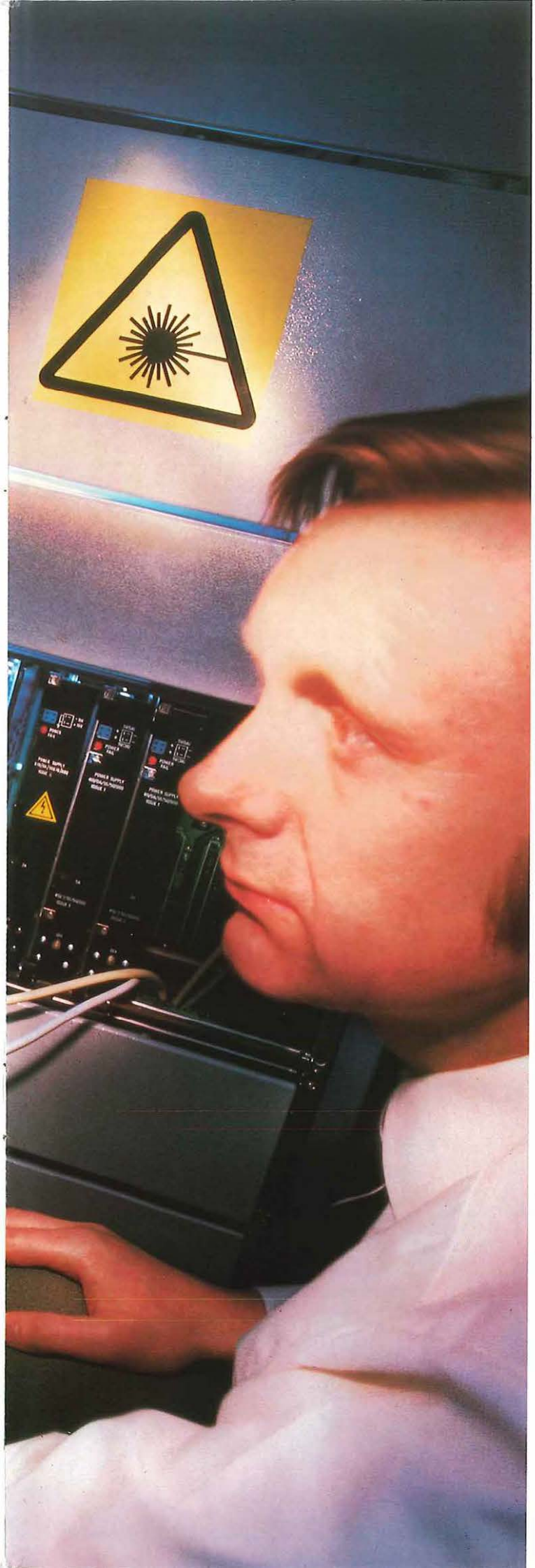

British Telecom is looking to the future with advanced fibre optics. By 1990, it expects to have installed more than 300,000 fibre kilometres of optical links in its junction network. Many links will be at the higher transmission rates of 34 Mbits and above.

And the electrical test equipment behind this Higher Order programme is Hewlett-Packard's.

British Telecom chose the HP 3764 digital transmission analyser for its excellent performance in commissioning and end-to-end testing (to CCITT and CEPT requirements). The 3764 can be used on links from 1Kbit to 170 Mbits. BT was particularly impressed with its ease of use and flexibility – an experienced telecoms engineer can master the instrument in less than an hour.

But above all, British Telecom wanted a reliable communications partner – a company with experienced engineers, and an in-depth knowledge of the market.

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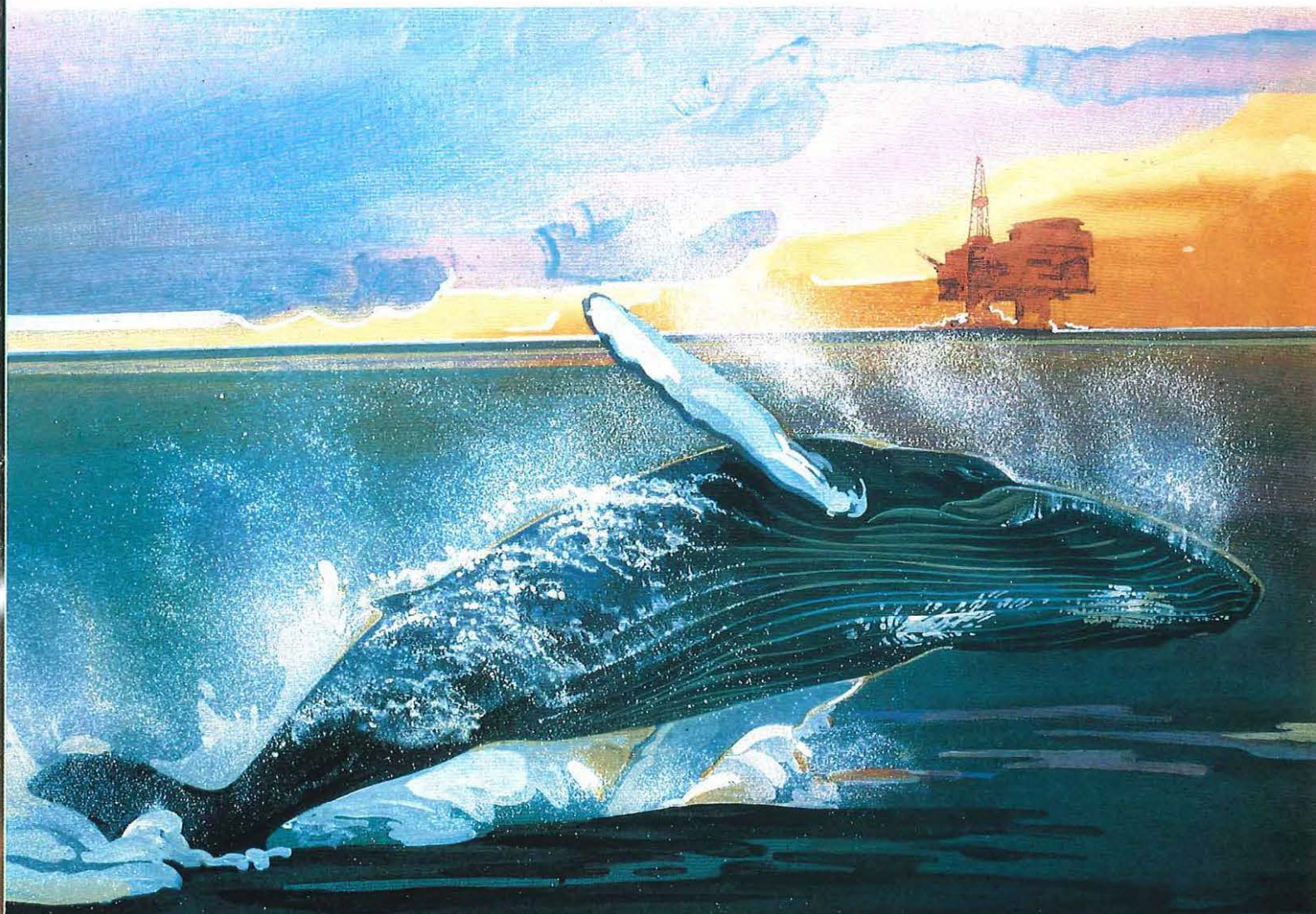

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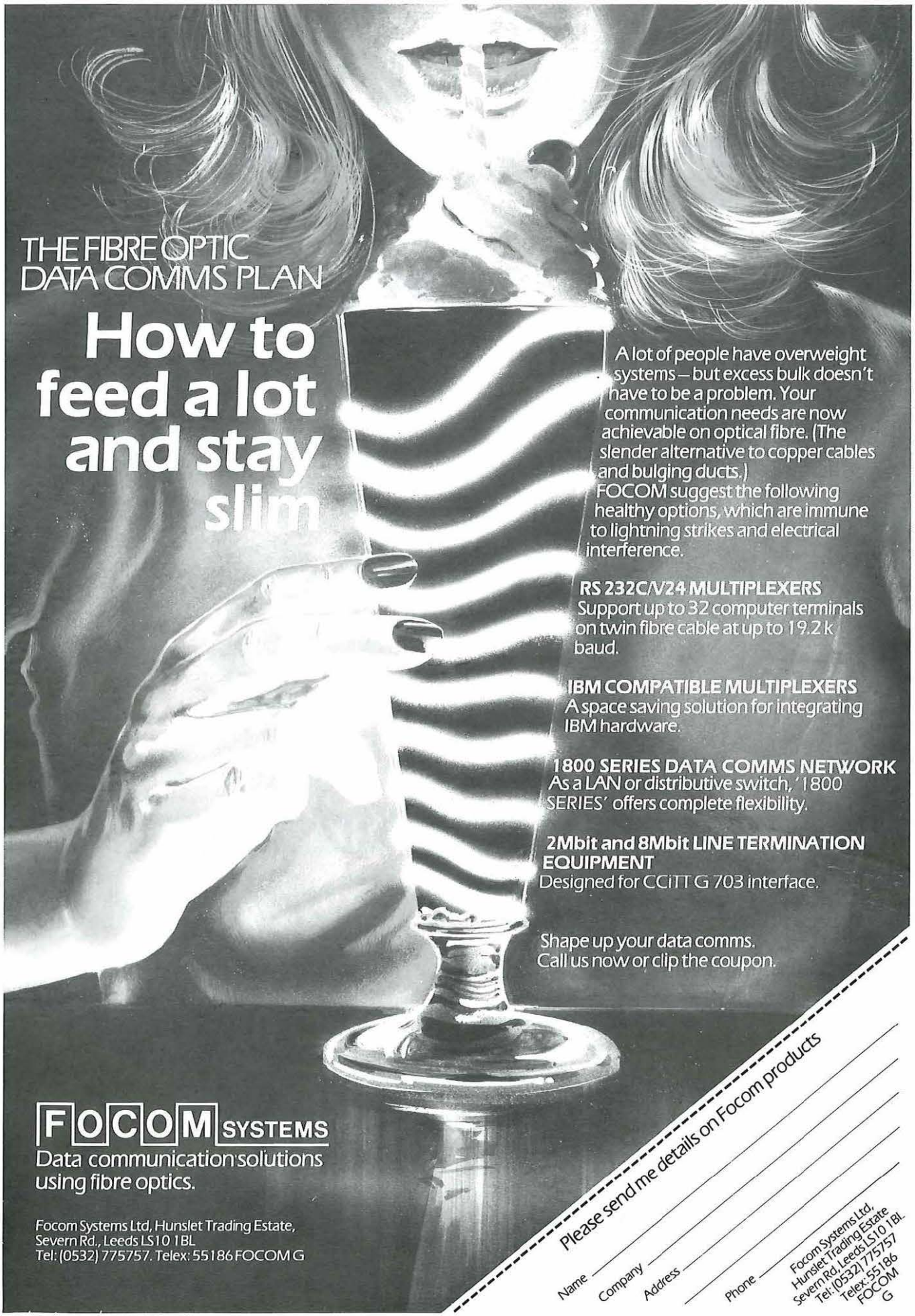
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A lot of people have overweight systems – but excess bulk doesn't have to be a problem. Your communication needs are now achievable on optical fibre. (The slender alternative to copper cables and bulging ducts.)
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THE OFFICE BECOMES A REALITY

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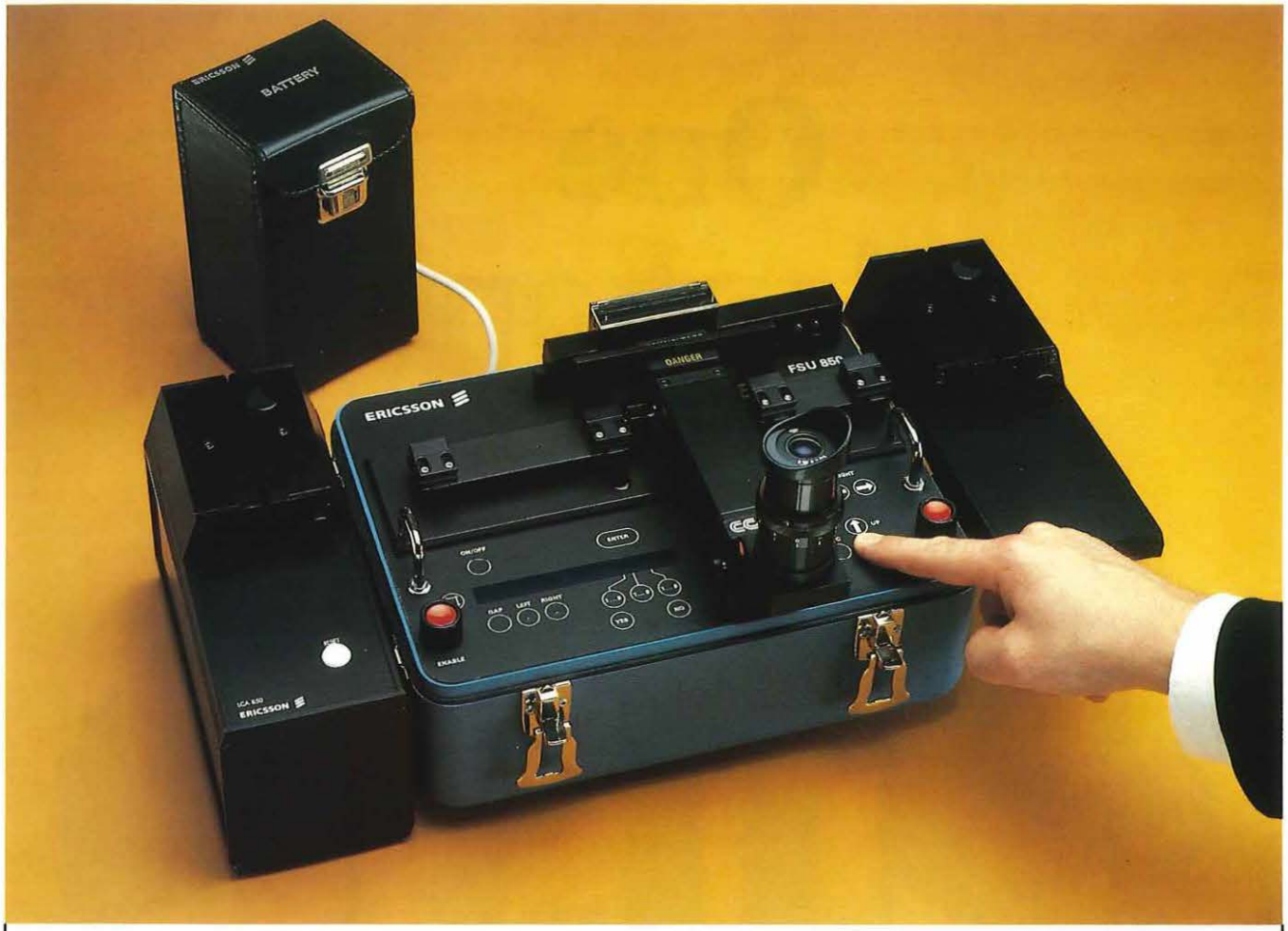

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As you're probably aware, the FSU 850 (known to our friends at British Telecom as the MJ201A) has been an enormous success.

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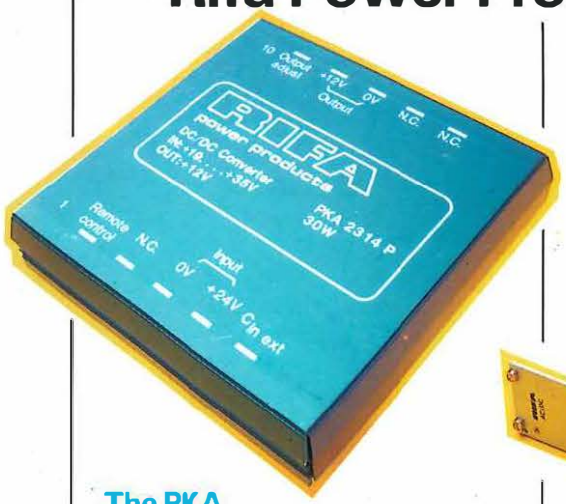
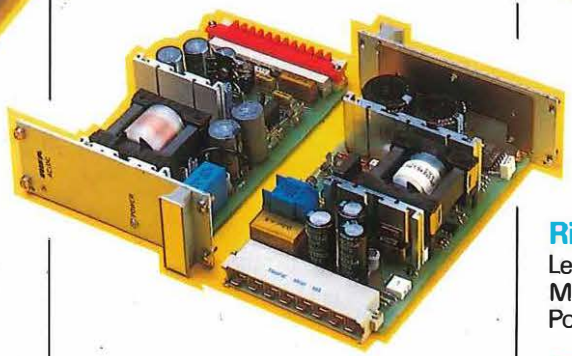


including professional DC/DC converters for telecommunications, and competitively priced AC/DC units in Eurocard format. Power ratings have been extended too, now covering from 10 to 300 Watts.



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Whilst it's true to say that our little blue box, the Rifa PKA DC/DC converter, has been a resounding success, we're the first to admit that it's not everyone's cup of tea. It is still, of course, the smallest, cheapest and most reliable 25-40W DC/DC converter of its type in volume production today. And its MTBF figure of 200 years has yet to be surpassed.

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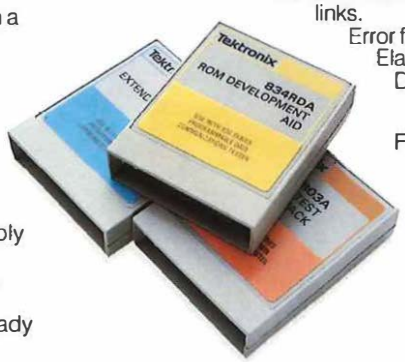

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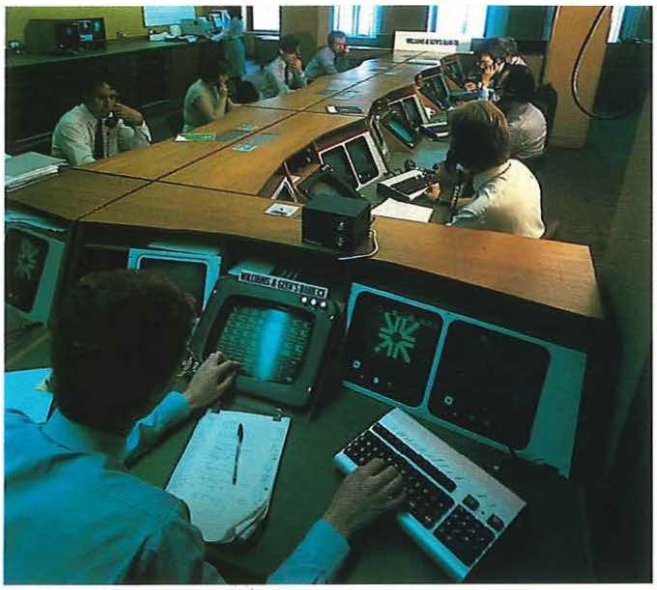
British Telecom
Teletrade

The overseas equipment marketing unit of British Telecom



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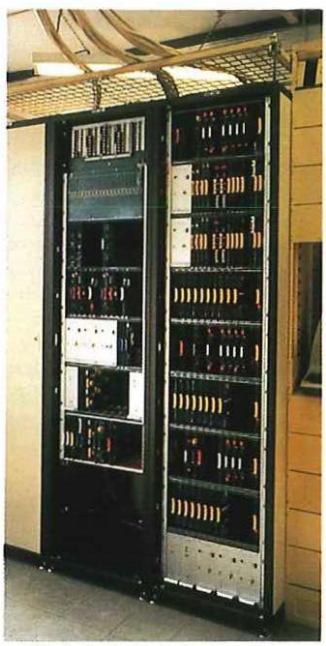

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PUMA A fully electronic teleprinter using microprocessors to provide advanced facilities. It has its own memory.

That's VME Microrack from BICC-Vero. Five stylish but robust enclosures – differently dimensioned and configured – with all the ready-to-run facilities you need. Forget the problems of assembly and connection, and concentrate solely on developing your system.

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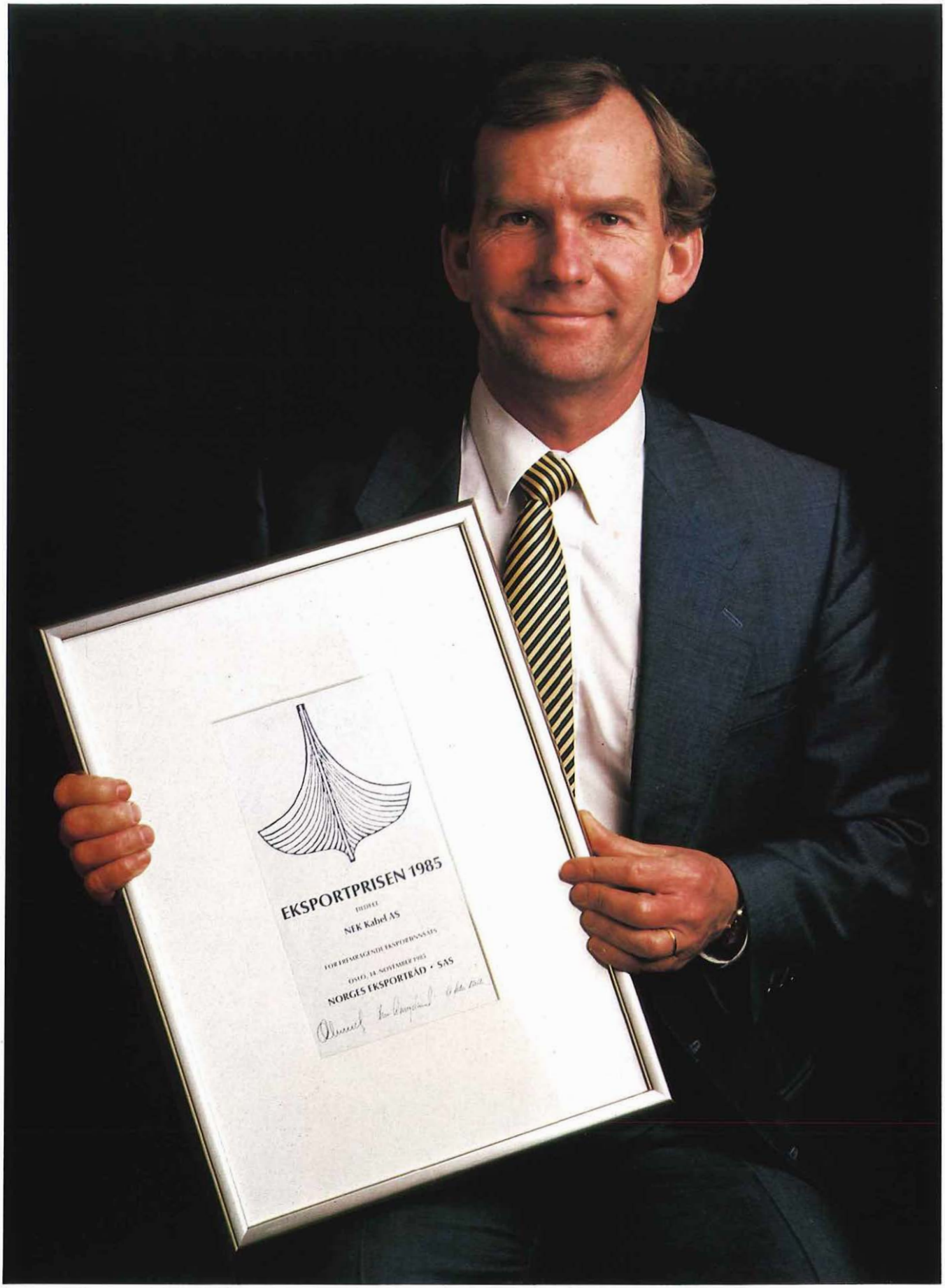
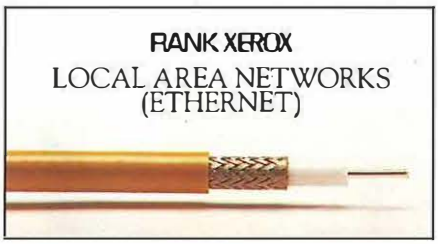
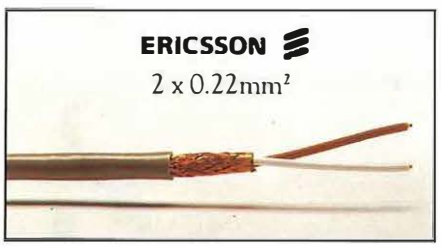
NEK-THE LEADERS IN



Last year NEK was awarded the 1985 Export Trophy for the company's success on the world market. The award was received by Managing Director Mr Bard Snilsberg.

COMPUTER CABLES





Now in 1986 we are set to make an even greater impact on the international computing and electronics markets.

Now recognised as one of the world's leading manufacturers of computer cable, demand for our products has increased substantially in major high-tech markets such as the USA, the UK, Norway and Sweden. Our customer list includes IBM, Xerox, ICL, NCR, Wang, Norsk Data and Ericsson – companies which demand only the highest quality cable for their equipment.

A RELIABLE SOURCE

When you choose NEK cables you can be sure of the manufacturing source, and of the quality – unlike many suppliers of computer cables who buy in from producers all over the world. With NEK any inconsistencies are eliminated, because you know you are getting the best quality with every order.

At NEK all our computer cables are produced by us at our own plants, meeting exactly our own, or the computer manufacturer's specifications. All production is fully controlled by us. For you the customer, it means the peace of mind you only get when you know the product is the best.

CONSISTENT SERVICE

NEK has a reputation for good and consistent service – a reputation we fully intend to retain.

As a result of the expertise we have built up in the field of advanced computer cables, we can make a positive contribution in discussing our customers' special cable requirements with them. We are always ready to advise on the development of custom products, or the use of existing cable types. Our aim is to provide the best solution for your specific cable requirements.

Our standard product range covers every conceivable application using cable, in many different sectors of industry. And if we do not already manufacture the cable you require, we can design and manufacture it to meet your requirements exactly.

EASY AVAILABILITY

So great has been our success, that you can now obtain NEK cable all round the world. With our headquarters in Norway, subsidiary offices have been set up in Sweden, the UK and the USA. Sales offices and agencies also operate in a further 15 countries.

In short, the story of NEK is one of technological development and success, combined with a quality product.

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NORWAY
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NEK

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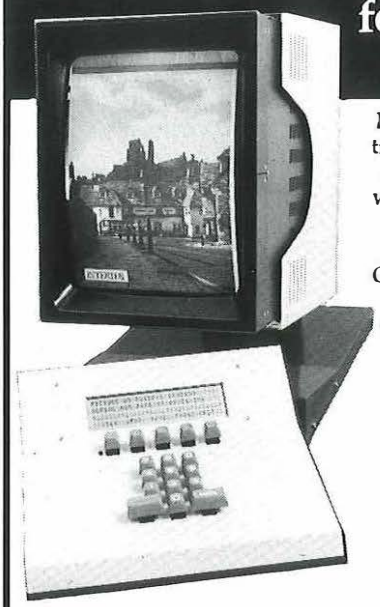
You can picture what's in store for tomorrow's headline



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- *Stores up to 16 pictures (minimum system) plus a test picture – indefinitely.*
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A reliable system ideal for newsrooms, publishing houses, picture libraries, and other similar businesses. At last, the technology for pictures is available to complement existing on-screen text editing and page layout. With Intertec PS156, the choice is at your fingertips.

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Available: 19 inch (48.3cm) rack mounted (1U), or, in Eurocard racking (3U). Also obtainable in module form for incorporation into original equipment.

Programmable Transmit and Receive frequencies and filter bandwidth (Baud Rate). Operation up to 1200 Bauds. An optional Clock Recovery Module available.

A high level Module converts low level output to either Polar or Neutral (80-0-80 or 80v) conditions – the loop supply being current limited, and protected for operation up to 100mA.

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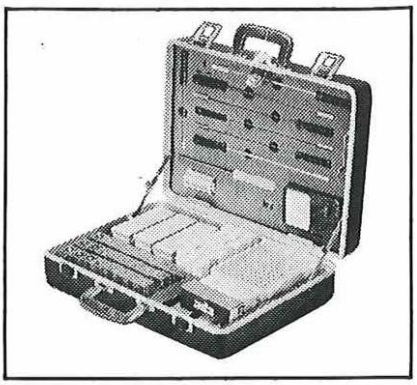

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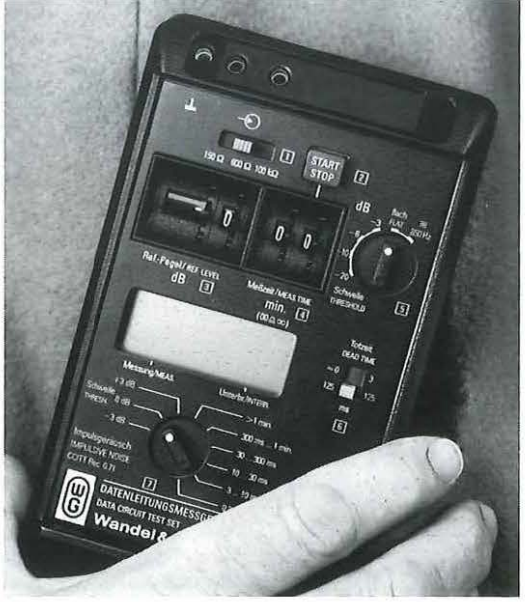

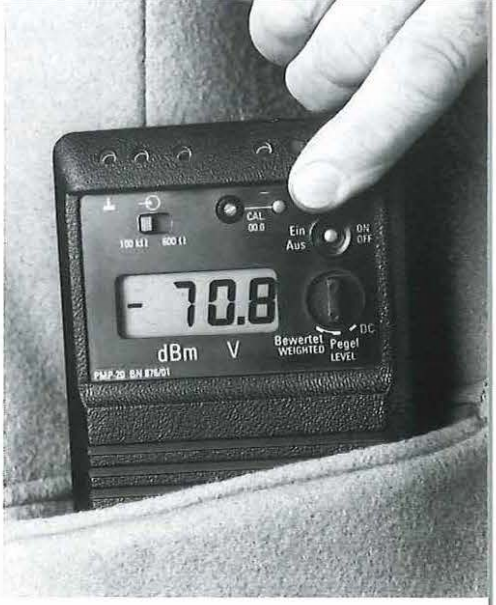

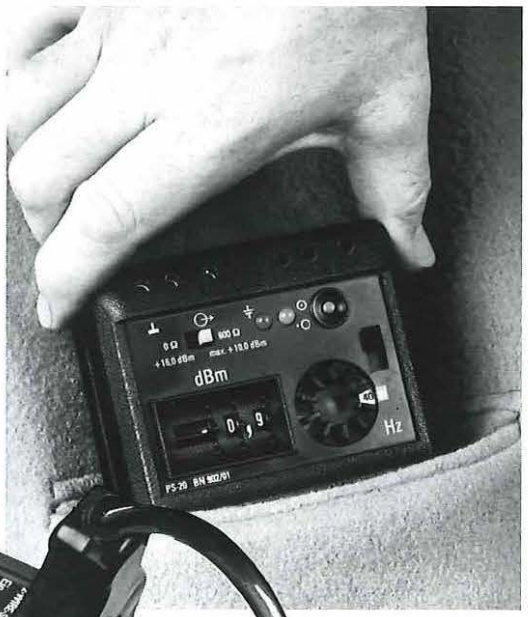

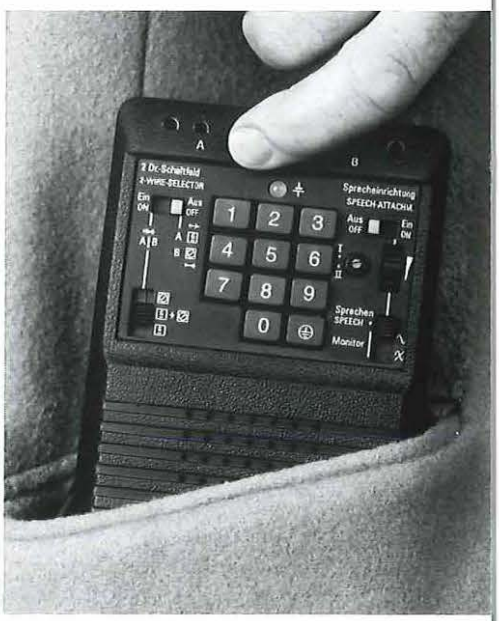

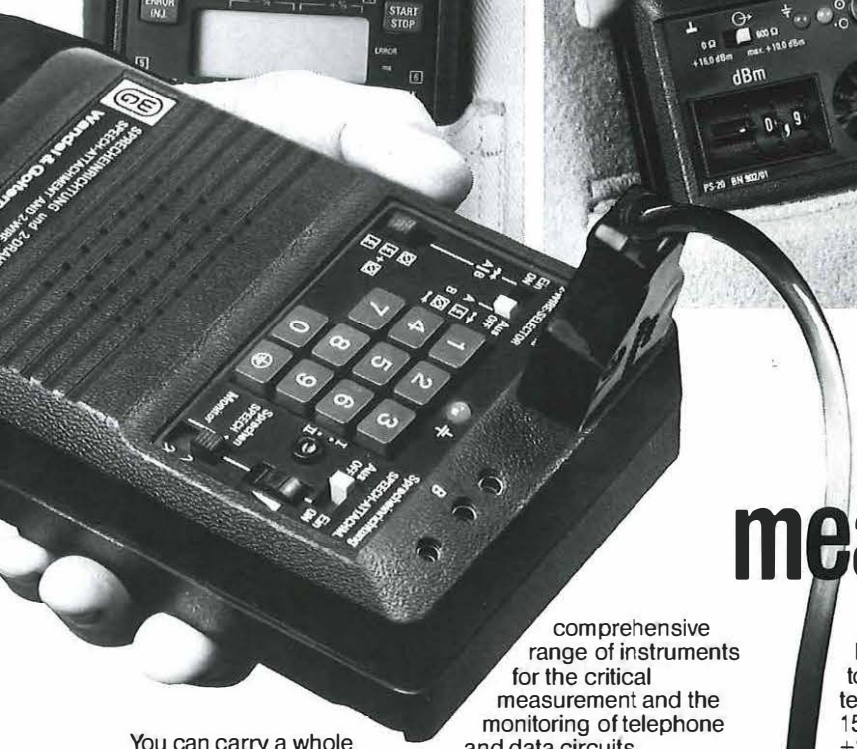

Pocket a whole measuring system.

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.

First in the field and world leaders in the design of pocket level meters including the smallest ever psophometer, Wandel & Goltermann offer a comprehensive range of instruments for the critical measurement and the monitoring of telephone and data circuits.

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: 80Hz to 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: 200Hz to 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.

For a great variety of problem-free measurements in laboratories, broadcast and recording studios, test departments as well as in field service, Wandel & Goltermann pocket-sized level measuring instruments offer many useful advantages.

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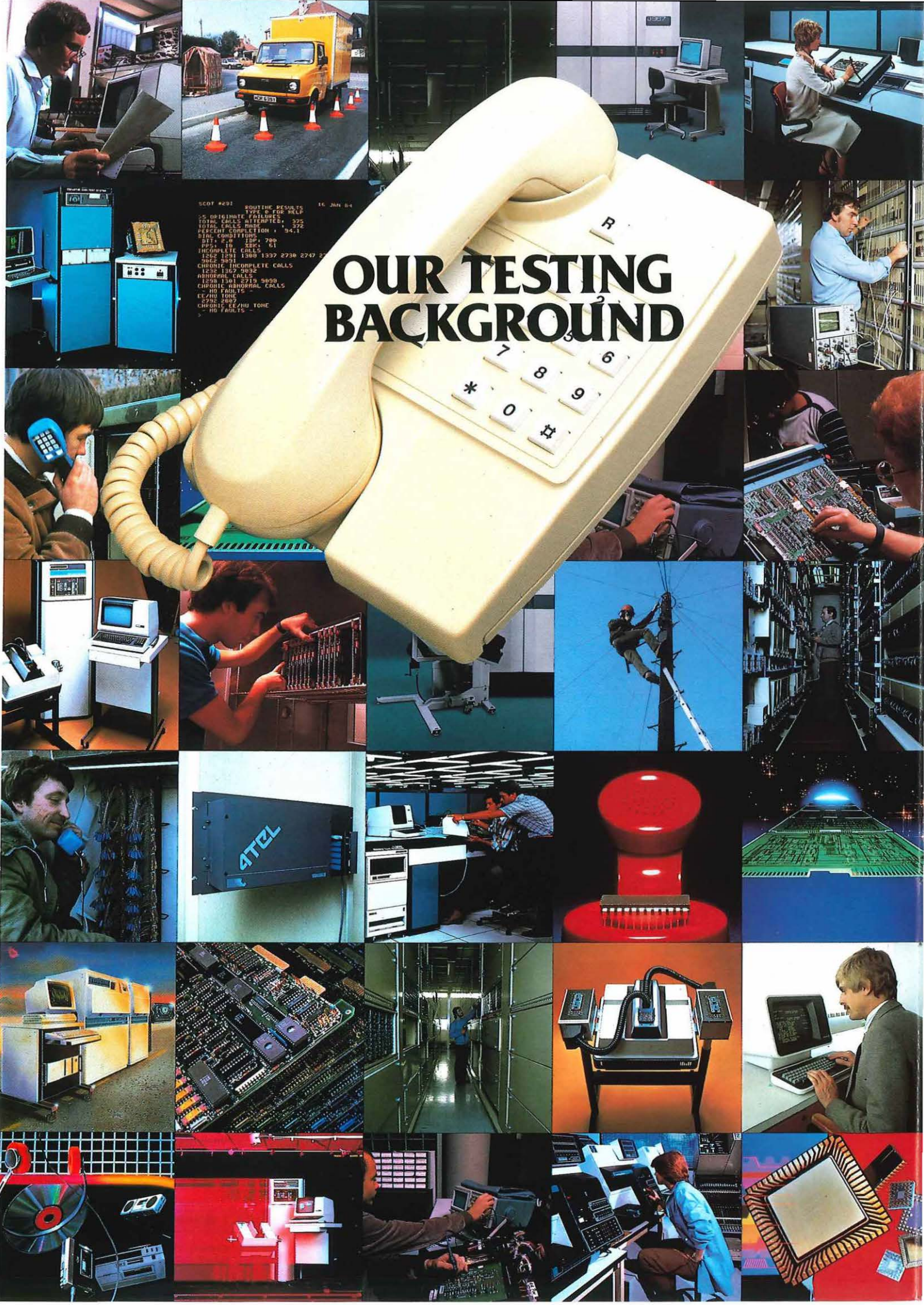
The name for precise measurement.


OUR TESTING
BACKGROUND
SCOT #231 ROUTINE RESULTS 16 JAN 84
TYPE R FOR HELP
>S ORIGINATE FAILURES
TOTAL CALLS ATTEMPTED: 375
TOTAL CALLS MADE : 372
PERCENT COMPLETION : 94.1
DIAL CONDITIONS
DIT: 2.0 IDP: 700
PPS: 10 XBK: 61
INCOMPLETE CALLS
1262 1291 1300 1337 2730 2747 2
9062 9091
CHRONIC INCOMPLETE CALLS
1292 1367 9032
ABNORMAL CALLS
1298 1301 2719 9090
CHRONIC ABNORMAL CALLS
- NO FAULTS -
EE/HU TONE
2792 2867
CHRONIC EE/HU TONE
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PUTS US INTO THE FOREFRONT

As telecommunications networks become more sophisticated and customers demand more from them, it is vital that testing methods keep pace. One company is meeting that challenge.

The company is Teradyne. We pioneered the technology of automated electronic testing, and have unmatched experience in meeting the electronics industry's needs over the past 25 years. In the telecommunications industry our products have set the standard in automatic testing.

For local line maintenance there is 4-TEL®, the leading commercial line test system with more than 18 million lines under test in North America and Europe: CDS Craft Dispatch System, which utilises digital voice technology to enhance the efficiency of field staff: and D-MARC,™ a family of innovative, highly reliable devices that isolate customer premise faults from the network: SCOT,® the outstandingly successful switch tester, brings automatic testing to exchanges in every District of British Telecom. And now, a new network testing system: ATS 1000. It measures end to end transmission quality and isolates the specific network faults causing transmission and noise complaints.

These systems are backed by the corporate-wide resources and experience of Teradyne, plus a commitment to total system support.

Impressive, but hardly surprising when you realise that only one company has a testing background distinguished enough to put it into the forefront.

Telecommunications Division, Teradyne Limited,
The Western Centre, Western Road, Bracknell, Berks RG12 1RW.
Telephone: Bracknell (0344) 426899. Telex: 849713.

TERADYNE

See us on stand C74 at Communications 86

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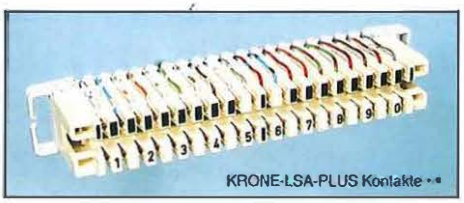
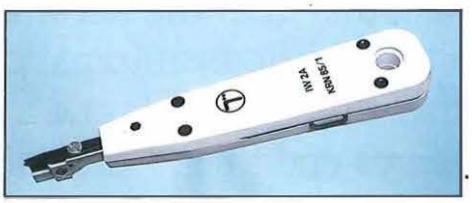


KRONE LSA-PLUS MODULE



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.

Now the answer to all these problems is here with the KRONE LSA-PLUS System.

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:

- Existing cast-iron cabinets
- GRP Cabinet No. 4.
- Sheet steel cabinets, currently on trial
- KRONE heat pressure polyester cabinet, with its unique thermal insulation and pressure-equalisation features to defeat condensation.
- A wide range of weatherproof boxes

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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TO THE RESCUE!

Mike Jacobs and
Ian Robson

Commsure, a new British Telecom emergency service, has been set up to provide business customers with comprehensive telecommunications services within 24 hours of their own equipment being damaged or destroyed.

In today's high speed world almost all organisations ranging from major companies making deals worth millions of pounds every week, to the emergency services dealing with matters of life and death, depend heavily on good communications. The disruption and chaos which would ensue should their equipment be destroyed or severely damaged, leaving them cut off, is not difficult to imagine.

In the last few years, PABXs have considerably shrunk in size, yet dramatically increased their processing power and versatility. The concentration of microprocessors and all other hardware into a small area leaves the modern switch far more vulnerable to critical damage through fire, flood or explosion than was the case with the older, bulkier systems.

The same can, of course, be said of mainframe computer installations and these risks have long been recognised by computer managers, many of whom have drawn up contingency plans to deal with such a disaster. But what if that vital PABX were to be destroyed?

While British Telecom can replace smaller systems relatively quickly, the highly complex tailor-made larger systems, particularly those ▷

Membership of Commsure means that even in a major disaster telecommunications facilities will be restored in a day.

above 250 extension capacity, can take many months to replace. Meanwhile, how does the organisation continue to run?

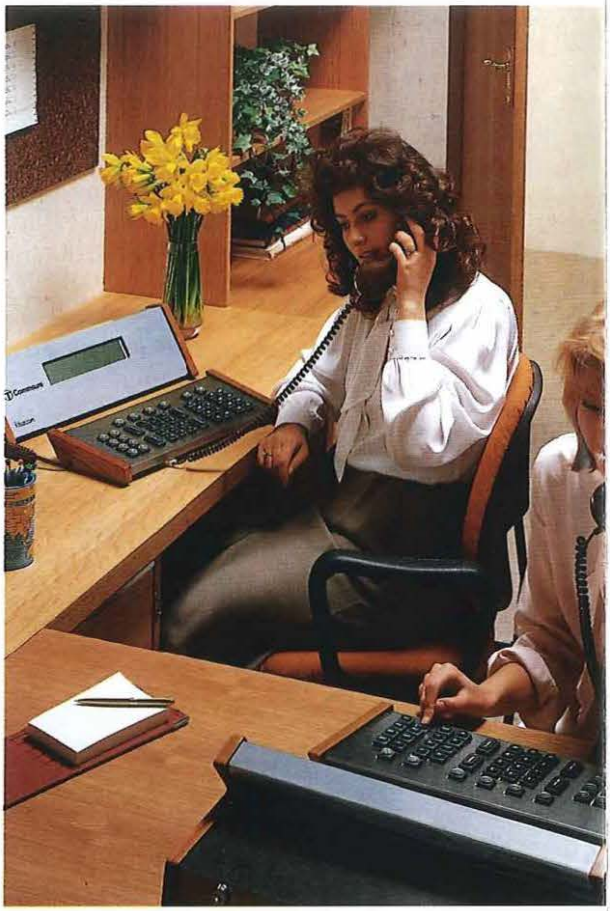
Until recently there was no realistic solution to this problem, other than going to the great expense of installing and maintaining a standby switch. Now, however, British Telecom, in response to demand from many of its larger customers, has come up with Commsure.

Delivered

Membership of Commsure guarantees a customer delivery, within 24 hours, of a purpose-built, air-conditioned mobile unit housing a 500 extension Stored Program Control (SPC) PABX, should their own system be destroyed or damaged. Once delivered to site, the unit's switch is connected to the customer's internal wiring and network services by local British Telecom engineers.

The six months during which the Commsure unit is on loan to the customer allows time for the purchase and installation of a replacement system, although an extension of the loan period can be arranged if necessary.

A major benefit of Commsure is that it gives the customer breathing space to consider the current PABX market. He does not have to rush into making a hasty decision on a replacement system and, of course, his business continues to function.



Above: Inside the unit. The working conditions are both comfortable and attractive.

Below: Commsure on the road. Within hours of an emergency call, the unit is on its way.

How Commsure was set up

Commsure was the brainchild of Phil Taylor, formerly of Middlesbrough Area Customer Works Group but now sales and service manager, at Wearside CSA in North East District. The idea was born in mid 1984 at a time when many customers were beginning to draw up their own, disaster contingency plans.

Market research was carried out among a number of major customers both in the North-East and more generally, and their favourable comments led to the idea being developed further. Approval was given late in 1984 for the scheme to be adopted in British Telecom North East and soon Local Communications Services Board approval was obtained for national introduction of Commsure.

By February last year the first of the current stock of mobile units was ready with most of the work having been undertaken by local staff. A number of presentations were arranged for both British Telecom staff and customers throughout the country and a notable 'first' for Commsure was a presentation to the 100 Club — British Telecom's major customers — at the Heathrow Penta Hotel.

Soon afterwards the Commsure team moved from Middlesbrough to Leeds, where it now forms part of the LCS/Business Systems Support Unit. Many well known organisations from commerce, industry and public services have already joined Commsure and the scheme has already proved its worth in several different incidents.

There is a choice of two Commsure tariffs and discounts are available where a customer has several switches to protect.

Included in the cost of membership are:

★ Guaranteed 24 hour maximum response time
★ Up to six months' loan of the equipment
★ Connection to the customer's internal wiring
★ 24 hour maintenance cover on the Commsure equipment during the duration of the loan
★ Full training.

Enquiries about the service can be made by dialling the operator and asking for FREEFONE Commsure.

Above, right: A Commsure unit in use at National Coal Board offices in the Midlands.

Although British Telecom's Commsure service has primarily been designed for customers with more than 250 extensions, it is open to any whose PABX is essential to the running of its business. There is no restriction on the type or size of switch which may be covered, nor on its supplier, but to qualify for cover it must be maintained by British Telecom.

Commsure mobiles are distributed strategically around the country and although they are guaranteed to be on site within 24 hours of a call to the Commsure office, in many cases delivery could be very much quicker for customers in major centres. Indeed a premium service is available for the City of London, offering a 12-hour guaranteed response time. The Commsure service is staffed 24 hours a day and operates at weekends and public holidays to ensure immediate response to a disaster call.

The mobile units are just 7.3 metres long by 2.3 metres wide yet contain, in addition to the PABX and standby power supply, a separate well-equipped operator suite for use by customers' own staff should this be necessary. The operator suite comprises two operator positions and a workstation for either a supervisor/system manager or a third operator. Ample storage space is provided for personal effects and there is a full set of national alphabetical directories on microfiche, together with a microfiche reader.

Mr M Jacobs is Commsure commercial manager.
Mr I J Robson is engineering manager.

Customers with inadequate parking facilities for a Commsure mobile are not prevented from joining the scheme. As an alternative to the standard method of provision, the equipment can be taken out of the unit and installed in their premises instead. The charges are the same whichever scheme is chosen. All the customer is asked, in either case, is that he provide a mains power supply to the agreed location. When the mobile unit is used a portable generator is made available for the first few days to allow time for the mains supply to be provided.

Package

The hardware within the Commsure unit has been standardised to provide a generally acceptable package at an attractive tariff, but the system software can be adapted to meet the needs of most users. On joining the scheme a record is taken of the customer's unique system configuration requirements and annual updates are offered at no extra cost. In this way if the customer calls upon the services of a Commsure unit a system operating disc can quickly be produced, enabling the Commsure system to simulate exactly, or very closely, that customer's own PABX. Changes in the customer's configuration can be entered via the system teletype.

Although the standard size of the system has been packaged to provide for a maximum of 512 extensions, 48 exchange lines and 48 private circuits, the Commsure switches have been wired and configured for greater capacities to meet the needs of larger customers. Additionally, extra features such as Megastream can be supported to a limited extent. Expansion beyond the standard package would normally be carried out after connection of the unit and would incur extra cost at that time.

Commsure offers all the features expected from a modern voice switch, including conferencing, short-code dialling, group hunting, wait-on-busy and many more. Where necessary, specialist British Telecom training staff drawn from the customer's own British Telecom District will familiarise managers and extension users with the full range of services and facilities available to them and, naturally, the customer's own operators will be given full training and guidance on how to run the system.

British Telecom Journal
Spring 1986

Cluttered desks could be a thing of the past with 'Hotline's' instant information services.

Putting paper in the shade

David Topping

Mr D Topping is sales and customer services manager for 'Hotline'.

A computer database service called 'Hotline' has been developed by British Telecom to help businesses overcome the problem of finding the right information at the right time.

The need for instant information has never been at such a premium – particularly in the business world. But in the growing mountain of information now available, finding exactly what is required can be at best difficult and at worst impossible.

The advent of the computer database helped provide an answer – albeit an expensive one. Early databases were complex and only accessible to information specialists and there were still delays between the request for information and its production. This was partly due to searches carried out by third parties, and partly to the bibliographic nature of the original databases – information was only held in the form of an index to documents held elsewhere.

The ability to access main computers from a distance via telephone lines saw the birth of the first real on-line databases. But as the cost of holding more and more information decreased, a new phenomenon – the 'full-text' database – was born. Here unabridged information was held directly on computer and the final user could see it without delay and in full. As more offices began to use microcomputers the

hotline

INFORMATION

availability of access to databases increased dramatically.

Now, British Telecom has launched 'Hotline' a new on-line database service covering all aspects of the business world from company and market information to the latest marketing gossip. The service is available to anyone, on subscription, who has a microcomputer, modem and communications software.

On-line databases within British Telecom are not new. Indeed, one of the core databases around which the 'Hotline' service is based is the 'Cambridge' telecommunications and information technology database, which for some years has been a prime source of information for staff.

So why launch a new database? First, it is a logical progression for British Telecom to be in the information providing business as it is, after all, only one step from transmitting information to providing it. And, second, with the 'Cambridge' database as a core unit, British Telecom is simply reaping the rewards of years of careful monitoring and indexing of both internal and external information, and fulfilling its commitment to adding value to the already existing network lines.

'Hotline' also has some unique advantages. For some years 'Cambridge' used text retrieval software called 3-RIP, from Paralog, of Sweden, which was accepted as being simple to use yet extremely accurate and powerful. 'Hotline' has taken the simplicity even further by commissioning 3-RIP's designers to write a brand new operating system, exclusive to 'Hotline' called T-RIP.

Database

Features such as highlighting and zoom (printing searched words or phrases brighter than others and showing the surrounding words) make the new retrieval system easy for the end-user. One of the cores of the new service is that of a telecommunications and information technology database, but general business information is also supplied, coupled with other industry and country-specific information sources. In this way, the end-user can have an overview enabling him or her to spot potential areas of new or improve l business, and specific information to see whether the new business is feasible.

Enormous amounts of money can, for instance, be saved if information is available on potential competitors or the market generally so allowing accurate targeting of resources. On-line company reports provide instant credit checks of profitability references for potential acquisitions and technical files allow an engineer to see what is new in electronics and how it affects him.

A further advantage to the end-user is that while it is easy to be specific about an individual item of information searched, it is equally simple to give a less structured command and receive a general overview of the subject which can be useful in generating new ideas and potential business opportunities.

Although some sort of structuring is important, it can be helpful to be less strict about the desired outcome. Information retrieved by an information specialist has two main disadvantages – the cost of hiring the specialist and the time involved in giving a precise briefing. In practice, finding the right information depends on a value judgement made by an outside expert and, without the relevant expertise, the judgement will be at best incorrect and at worst useless.

'Hotline' recognises, however, that some people who are either pressed for time or unwilling to use computers, will still want to have information retrieved for them. For a small premium, they can phone a 'Helpline' and ask information retrieval specialists to undertake a search either through the 'Hotline' suites or from other sources. The specialists can achieve the same results on 'Hotline' as they would on any other system because they do not have to learn another complex language and can also benefit from the system's command simplicity.

Looking ahead, 'Hotline' will swell its already considerable base with a programme of data acquisition including industrial information and new publications. Other developments will include a relational operating system to enable the end-user to manipulate the information held and a number of advances in operating and storage systems are also planned. The latter will be offered as a host to closed-user groups who can benefit from expertise in data storage and retrieval, and expect a high level of security for their information.

As business becomes more complex and markets become increasingly saturated, the information required to maintain a competitive edge will become more valuable. 'Hotline' is dedicated to supplying that need and maintaining a high level of quality and variety.

Database products on Hotline

News
Full text of the Wall Street Journal.
Full text of Marketing Week.
Appointments from Marketing Week.
Full text of The Economist.

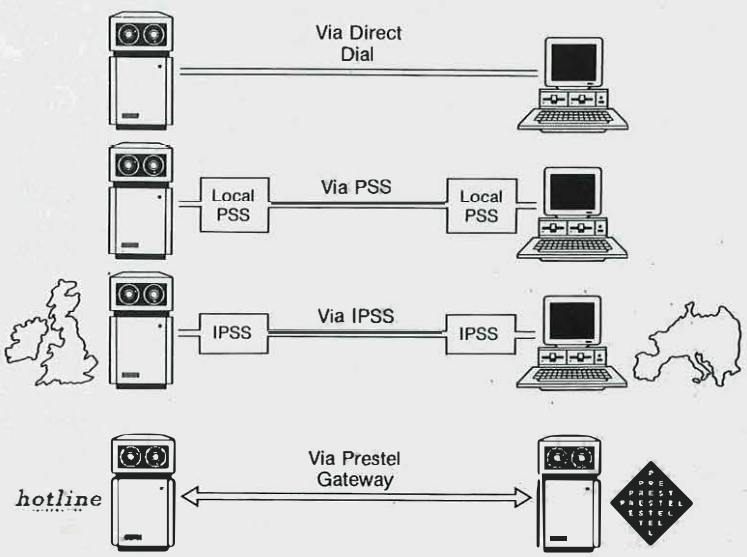
Company information
INFOCHECK company information and credit check
EXTEL statistical services (available shortly).
Inter-company comparisons.

Markets
Euromonitor: market directions.
Euromonitor: electronic directory.
Euromonitor: pages.
China Express Newsletter.
China Express contracts.
Peat-Marwick Grants database.

Telecommunication and Information Technology
Cambridge Database (telecomms and technology news 1985/86).
IEE INSPEC files.
Arthur D Littles telescope database.

Hotline is currently negotiating with a number of other providers of business news and company information.

Methods of using Hotline



British Telecom Journal
Spring 1986

The fight against crime

British Telecom Investigation Department has just completed its first year of operations since taking over from its Post Office counterpart. During the year a staggering 10,000 incidents were reported, more than 500 offenders were caught and a major assault was launched to combat payphone crime which, without counting the cost of vandalism, results in an annual loss of revenue in excess of £20 million.

Telecommunications crime is big business and the targets for thieves as well as the methods used to steal from and defraud British Telecom are constantly changing. In the 1950s, overhead copper cables were a popular target for their scrap value alongside technical crimes, such as the use of switch hook impulsing to avoid payment from the old 'A' and 'B' public call boxes.

Today, crimes include computer fraud, 'bugging', the use of electronic gadgets to obtain free phone calls and endless attacks

Vital suppor

Gathering evidence for a successful prosecution against telecommunication crime is rarely an easy task, but there are exceptions which prove the rule.

A classic example was the coinbox thief who tried to tear out a payphone by connecting it to the rear of his car with a stout length of rope . . . The bumper gave way and the luckless villain drove away leaving his bumper and number plate behind!

Other crooks are much more sophisticated and utilise the latest in electronics to carry out and cover up their activities. British Telecom investigators, therefore, have to be equally well armed in the war against crime and a special unit, reminiscent of 'Q' branch in the James Bond movies, exists to kit them out with an arsenal of surveillance and detection devices.

Called the Technical Support Unit, it consists of a small team of electronics and computer experts who, when approached by an investigator with a particular problem on a case, waste no time in coming up with a technical solution. Headed by Ron Aston, a man with both a technical and an investigative background, the unit has excellent contacts throughout the electronics industry and is aware of, and willing to test, the very latest in equipment to help with its work. Some equipment is 'off the peg' but a great deal has been specially designed and made by the unit for specific purposes.

Use can be made of slow-scan TV and a system of video cameras and monitors can be quickly set

on payphone coinboxes using a variety of modern tools.

BTID, a highly-specialised detective and crime prevention force which is recognised by the Home Office, Chief Constables and the Judiciary, has been created to combat the current crimewave. More than 30 trained investigators, including many seasoned ex-policemen, operate nationally and throughout every facet of the business to investigate criminal offences committed either by members of the public or by employees. They have no special police powers and rely on the usual citizens' powers, backed up by police assistance when required.

BTID investigates matters brought to its attention by British Telecom managers and auditors. Decisions to prosecute are taken at Divisional manager level and brought to court by company solicitors. The Department has an excellent working relationship with the police and in many cases where the police have been in charge of initial inquiries, the case has been referred to British Telecom for prosecution.

Chief Investigation Officer Ron Ward stresses that the Department is not a 'Big Brother' organisation and concerns itself with reported crime rather than minor disciplinary matters. However, for obvious operational reasons, many investigations are carried out covertly and the identities of the staff employed and their detective methods are not generally advertised.

As a result of liberalisation, British Telecom products have now become High Street merchandise and their value has made them attractive targets for theft. Mr Ward is particularly pleased with the recovery rate for stolen property during the year — one operation netted over £150,000 worth of equipment.

The Department has recently recruited a number of computer specialists to be trained in law enforcement techniques and can now boast that it has the only in-house computer fraud squad in the country.

Personal security is another new departure for the Department — and a sign of the times. Following the Brighton bombing, BTID were involved in throwing a security net of the highest possible standard around the first annual shareholders' meeting held at the National Exhibition Centre in Birmingham.

Opposite page: The endless battle against payphone theft and vandalism costs vast amounts of money and manpower.

ting role

up on location using ordinary telephone lines as a common link. If the alarm is triggered, a picture of the offender actually committing the crime is 'frozen' on the screen and anyone else who may have passed through the same location – the approaches to a stores complex at night perhaps – will not confuse the issue.

Modern day cameras operate down to extremely low light levels to enable, for example, surveillance work to be carried out on a moonlit yard where cable thefts have been suspected. Picture quality can also be computer-enhanced to produce results which are good enough for identification purposes.

Another development, produced by BT Fulcrum's factories in Birmingham, enables cameras and monitors to be linked by radio signals to give even greater flexibility to the men in the field.

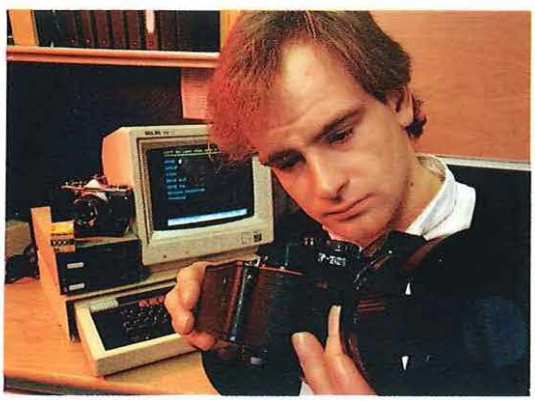
The unit's staff design and build alarms for installation in payphones and other equipment which is likely to be stolen or vandalised. A hand-held remote control box can be linked to a number of alarms and will pinpoint the one under attack.

Almost anything can be alarmed, from a briefcase to a bottle of Scotch, with devices ranging from pressure pads to a hair-like trigger held in a glass slide. Commercial espionage is widespread these days and the unit also has some of the best skills around in 'de-bugging' premises.

Cheating British Telecom out of its revenue can take many forms. Crude attacks on payphones are an obvious way of stealing money which has, in a sense, been 'left on the streets'. The latest in a series of initiatives to curb the problem was launched in London in April. On dialling "100" and asking for FreePhone VandalPhone, eye witnesses can report any incident to the BTID and police. But other crimes are more subtle and include the use of 'electric money' handsets designed to permit free phone calls by fooling the exchange into thinking that money has been deposited. The unit has responded by designing an equally clever electronic safeguard.

The experts have taken a close look at System X and AXE 10 digital exchange equipment to ensure security and, with the help of the police, BTID detectives are waging a constant war against Prestel and computer 'hackers' – unauthorised people who specialise in breaking into data banks.

A comprehensive range of computer equipment is available to help them in their work and the unit's latest acquisition is likely to be the envy of police forces throughout the country. The machine, a 'translator', can ▷



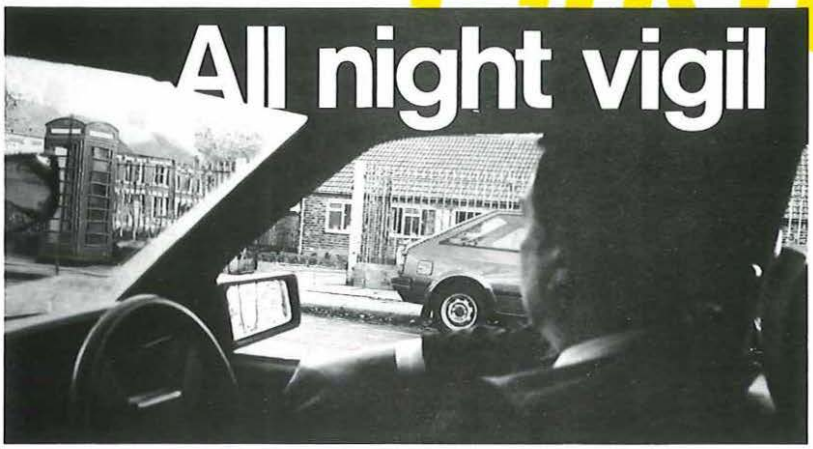
Dave Ward of the Technical Support Unit prepares a surveillance camera fitted with a long-range lens.

Trapped in kiosks crooks pinched van

accept an unmarked computer disc in any of the 800 formats currently available, identify what it is and what it says and translate it into any of the other formats. For a company with British Telecom's diverse computer strength, the ability to identify and cross-reference formats when looking for discrepancies could be a useful tool in the future.

The unit admits that it is having to come to terms with the technologies of both the 20th and 21st centuries but as far as crime and fraud are concerned, it is determined to stay one step ahead.

All night vigil



Shortly after their biggest-ever operation which resulted in the arrest of a gang and the recovery of stolen British Telecom property worth more than £150,000, detectives from British Telecom Investigation Department were at work again with surveillance 'sweeps' against payphone crime in Birmingham and Liverpool. Deputy editor JUSTIN QUILLINAN went with them.

Above: Watching and waiting – investigators find that patience pays off.

'Operation Druid' began in Birmingham on a sprawling council estate where unemployment had just topped the 40 per cent mark.

Tower blocks ringed the area like sentries and the streets within had individual reputations for different forms of human strife. A row of elderly people's bungalows was flanked on one side by a block occupied solely by unmarried mothers and on the other by a street with more than its share of teenagers, many of whom were already known to the police.

In the middle of it all stood a typical target of crime; a telephone kiosk – a beacon of temptation for the thief, a target for the malcontents who view public facilities as a face of authority, and a life-line for those who depend on a telephone near home in good working order.

Four British Telecom engineers, sickened by the regularity with which their repairs had been ruined by thieves and vandals, had been keen to volunteer for the Operation Druid all-night vigil against payphone crime. Two policemen, surprised when told of the extent of thefts and damage involving British Telecom property, had also been keen to share their local knowledge and physical presence.

7.00 pm: All were briefed by BTID personnel and allocated different duties. The BTID men, armed with their silver shields in leather wallets denoting their special authority from the Chairman, Sir George Jefferson, were also equipped with Cellphones, pagers and portable radios.

'Steve', whose job it was to act as 'baseman' at the local telephone exchange had the loneliest job of all. His duties were to maintain the unit-to-unit radio links between us, watch the display of lights which would signal the tripping of the alarm switches which had been specially fitted to the 11 kiosks under surveillance and to record every word spoken in a log.

Unusually, he had a TV set for entertainment – Starsky and Hutch was the programme when the team, including the two police officers, met at the exchange at the start of the exercise.

One PC shook his head at the TV and said that it wasn't a bit like that in real life. Hours later, I was to agree with him.

The small screen, always big enough for the glamour, is restricted in its ability to portray such qualities as persistence and diligence in the face of abstract boredom.

8.00 pm: Temperatures were four degrees below freezing, the radio said, and a thick rind of ice settled on the car containing three of us. A circle of moisture, just above the engine, shrank slowly until the whole bonnet was covered in frost. It was an extraordinarily star-studded night – a good night for astronomers – but no-one glanced upwards, or indeed in any direction away from the kiosk in view.

9.15 pm: Dave, the policeman, regaled us with a story about a drunken nun and was about to describe his dilemma as to whether to arrest her or not when a gang of unruly teenagers ran towards the box. They fooled around inside for a while, without causing damage, before deciding to move on.

11.30 pm: A middle-aged man, painfully thin and hopelessly drunk, staggered menacingly towards the kiosk. Necks craned forward only to see him lurch from view as he relieved himself behind it.

3.00 am: Apart from the surveillance teams, the only living thing on the streets now was an urban fox and as it turned its tail for home we decided to do the same

*Later that day, after only three hours sleep, the same BTID team arrested a 20-year-old youth – without police assistance – in a similar operation 100 miles away in Liverpool. The youth was charged with various offences connected with persistent attacks on coinboxes. That exercise satisfactorily completed, they returned to Operation Druid . . .

Over the next three years, British Telecom's 30 Districts will each install a new mainframe computer as part of a Customer Service System project to simplify dealings with the public and to improve management control and financial procedures.

Caring for customers ...by computer

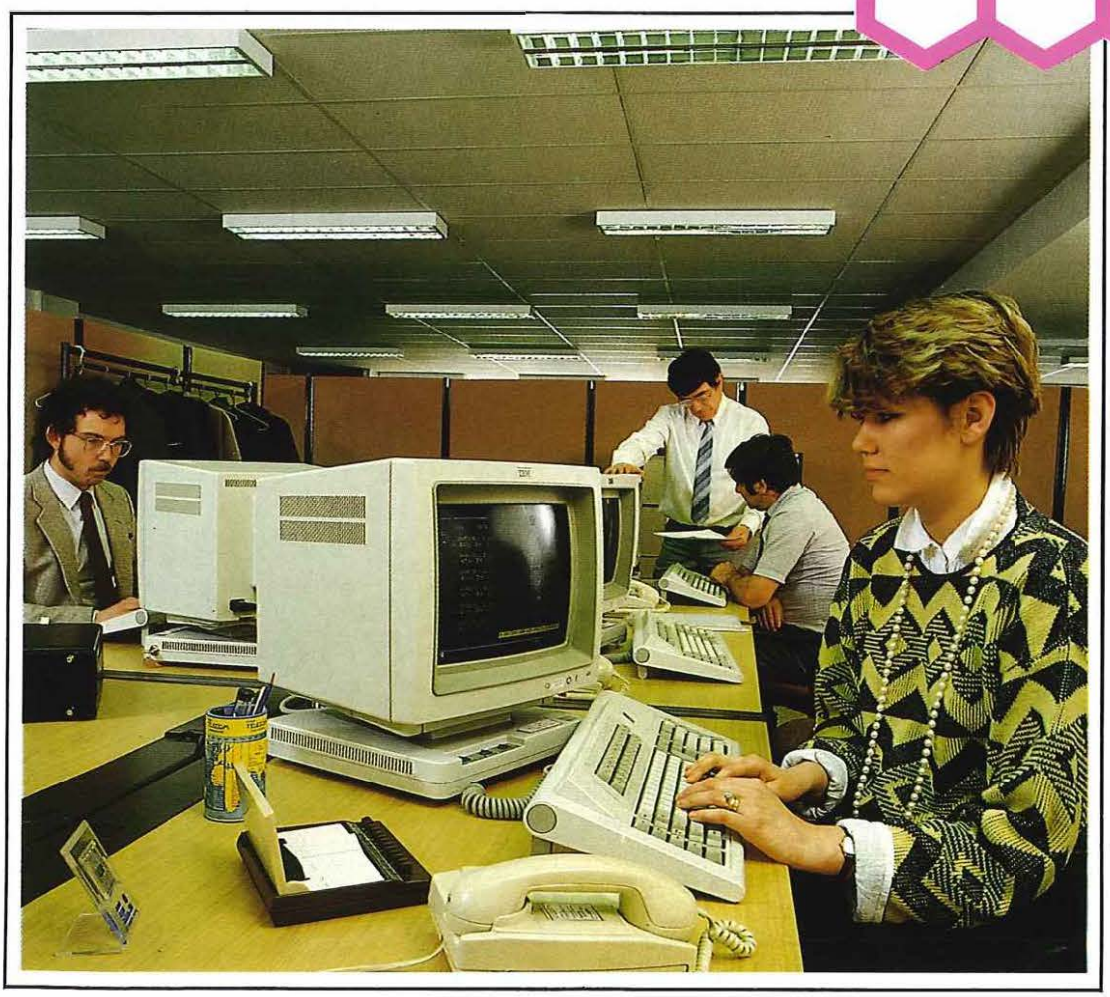
Keith Gorton

A complete re-build of British Telecom's computing methods is an essential part of plans to take the company into the 1990s. It follows the re-shaping of Local Communications Services' management and reporting structures under which the old regions and telephone areas were replaced by 30 Districts in five Territories. District management is now able to exercise a greater degree of autonomy and capitalise on the conditions of the local markets in a manner that was not possible within the old telephone area structure.

In the past, all computing was the responsibility of a headquarters department which, because of its remoteness from end-users, could only be relatively responsive to local needs. Computing was not a normal part of the business process within telephone areas, and tended to be a discrete and special activity. Few areas operated their own mainframe environment and initiatives were restricted to the mini and micro level.

Furthermore, a piecemeal approach to the design of systems and the purchase of hardware resulted in a large number of disparate systems which either duplicate or fail to talk to one another. This lack of an integrated approach to systems design led to systems which were both comparatively inefficient and unresponsive to customer needs.

Customer Service Systems, which will replace most current systems, will give staff and managers on-line access to an integrated, District database. Staff who deal directly with customers will, for the first time, have access to all the ▷



A typical office with CSS has all the information to hand to help the customer in addition to comfortable surroundings, featuring diffused lighting and specially designed seating, to help the staff.

information they need to process an inquiry. There should be no need to rely on other sections for essential information or to sort out conflicting information, because all records will be held in one place.

Twin IBM 3081 mainframe computers are at the heart of the pilot CSS project at Thameswey District's Reading offices.

The application areas covered by CSS include customer services such as order processing, billing and repair services; resource management such as manpower, line plant, stores and transport, and a financial system covering cost accounting and general ledger systems. CSS is also a tool for controlling directories, market analysis, sales statistics, debt management, remote line testing, network allocation, payroll and expenses.

CSS computing, together with most of the Districts' other computing requirements, will be conducted at each dedicated District Information Systems Unit (DISU). The hardware was 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 new Series 39 Level 80 mainframes (using a VME operating system).

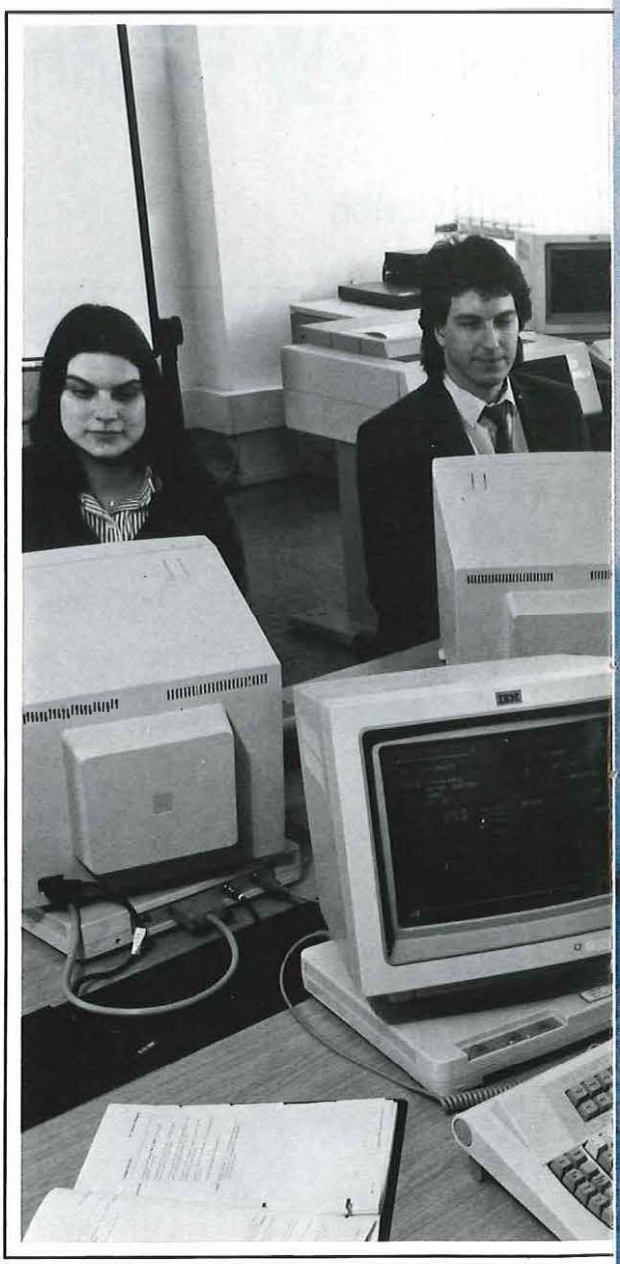
Extensive

Given the large numbers of CSS terminals that will be used in the average District, traditional networking based on the extensive use of modems and private wires would be prohibitively expensive and extremely inflexible. The solution is to establish a MegaStream link beteen the DISU and each of the Customer Service areas using the new Netmux Manager developed by National Networks.

Software will be introduced into Districts in stages. Implementation within any District will take about two years and the plan is to go live in all Districts within the next three years. The key elements of the initial software delivery will be order entry, order handling, customer account management (billing) and directory compilation. CSS is being piloted in the Thameswey District and the lessons learned there will be further tested in the two CSS trial Districts – Liverpool and South Wales.

Because the working lives of large numbers of District staff will be affected by CSS, training will be given in such general aspects as keyboard skills and system navigation as well as specific transaction areas such as directories and billing. The new organisational emphasis on the customer is backed up by customer care training packages. Much of the training has been designed in-house by CSS's organisational development specialists in conjunction with staff from the British Telecom Management College in Bletchley and Stone.

CSS may also have a significant environmental impact on staff and preparations for the project have stimulated an interest in the importance of



Below: Trainer Laurie Higgins instructs Thameswey District staff in the use of CSS equipment.

suitable working conditions. The decision to use colour VDUs in close alignment with the facilities that the system offers indicates a commitment to improving the system's acceptability. Other enhancements may include specially designed workstations and attention to lighting systems and windows in order to reduce glare, all of which contribute to comfort and morale.

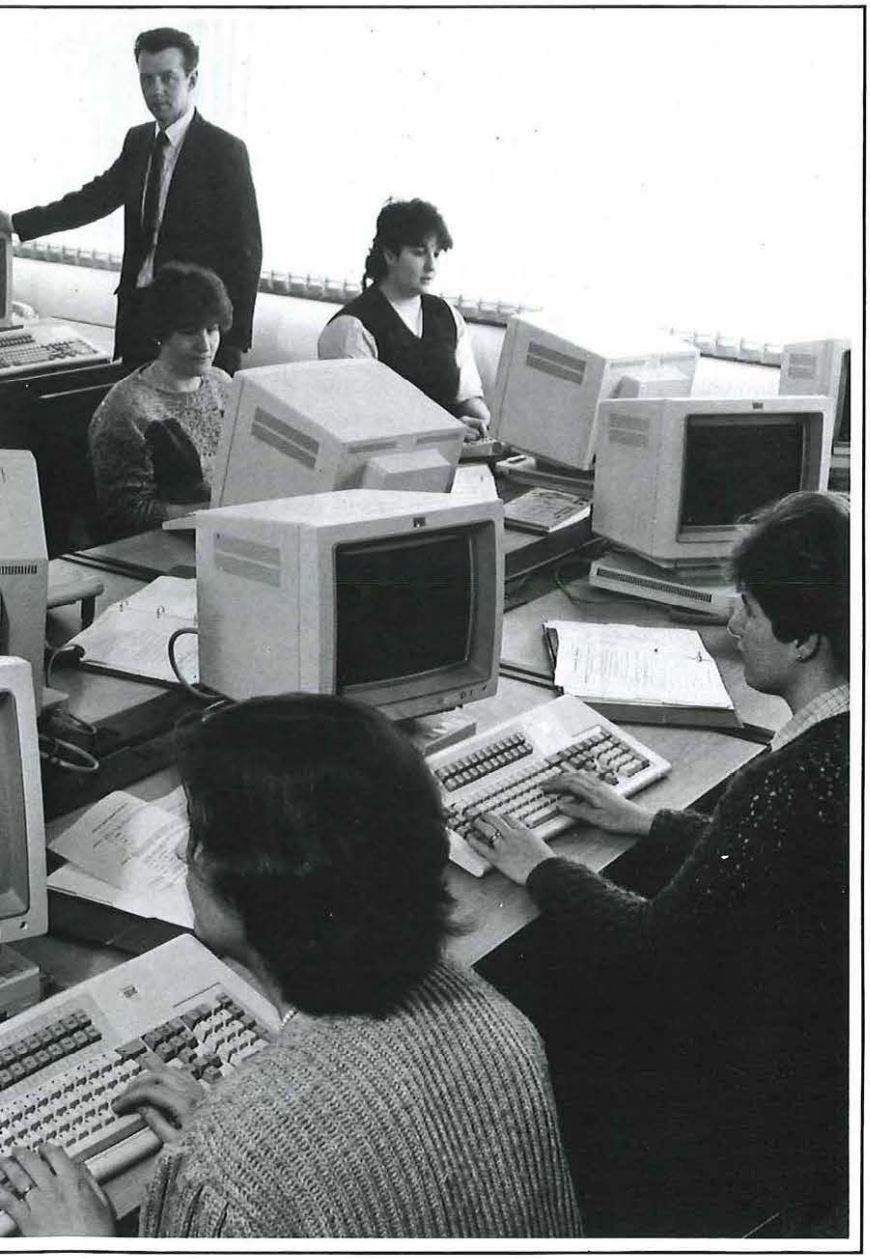
CSS is unique in the history of major British Telecom computer system development because it has been designed and specified by the end user. System specification and testing will be largely conducted by the CSS Directorate's National User Group (NUG) which consists of specialists with years of practical experience unavailable to the conventional, centralised DP department.

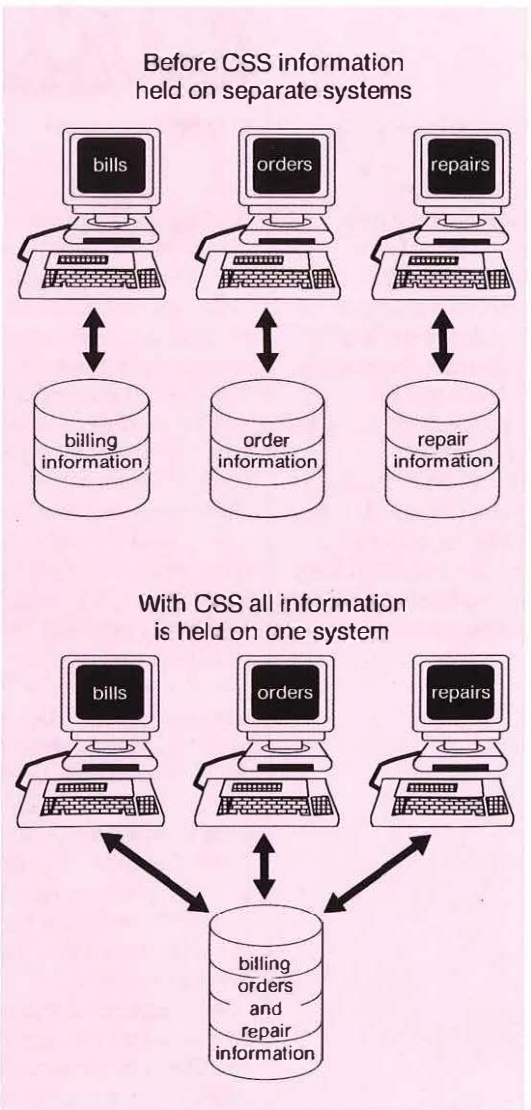
A team of industrial relations specialists have organised both formal and informal meetings with the individual unions concerned including the Communications Managers Association (CMA), Union of Communications Workers (UCW), Society of Telecom Executives (STE), National Communications Union (NCU) and the BTUC. Discussions have covered a range of topics including training, billing and the repair service. The BTUC has agreed to full co-operation on the pilot projects and the two trial Districts.

The system is certain to aid the concept of 'Front Office' working, in which a single enquiry point, dealing either with customers in person or over the telephone, can deal with the majority of customer needs such as billing, orders and complaints. More complex queries and those of the larger business customers will be dealt with by specialists in 'Tier 2' of the Front Office. The scope and possibilities of the Front Office will be evaluated in the pilot and trial sites.

For all its technological sophistication and the massive investment in hardware and software, CSS is not just a computer system: it also embodies new attitudes and new ways of doing things. It will enable British Telecom to deploy its resources properly and transform its relationship with its customers. Ready access to marketing and financial information will boost understanding of the nature and economics of the services on offer and the systems will epitomise the new 'balance of power' between headquarters and the field. ⓣ

Mr K Gorton is Director of CSS and former Chairman of Wales and the Marches Board.





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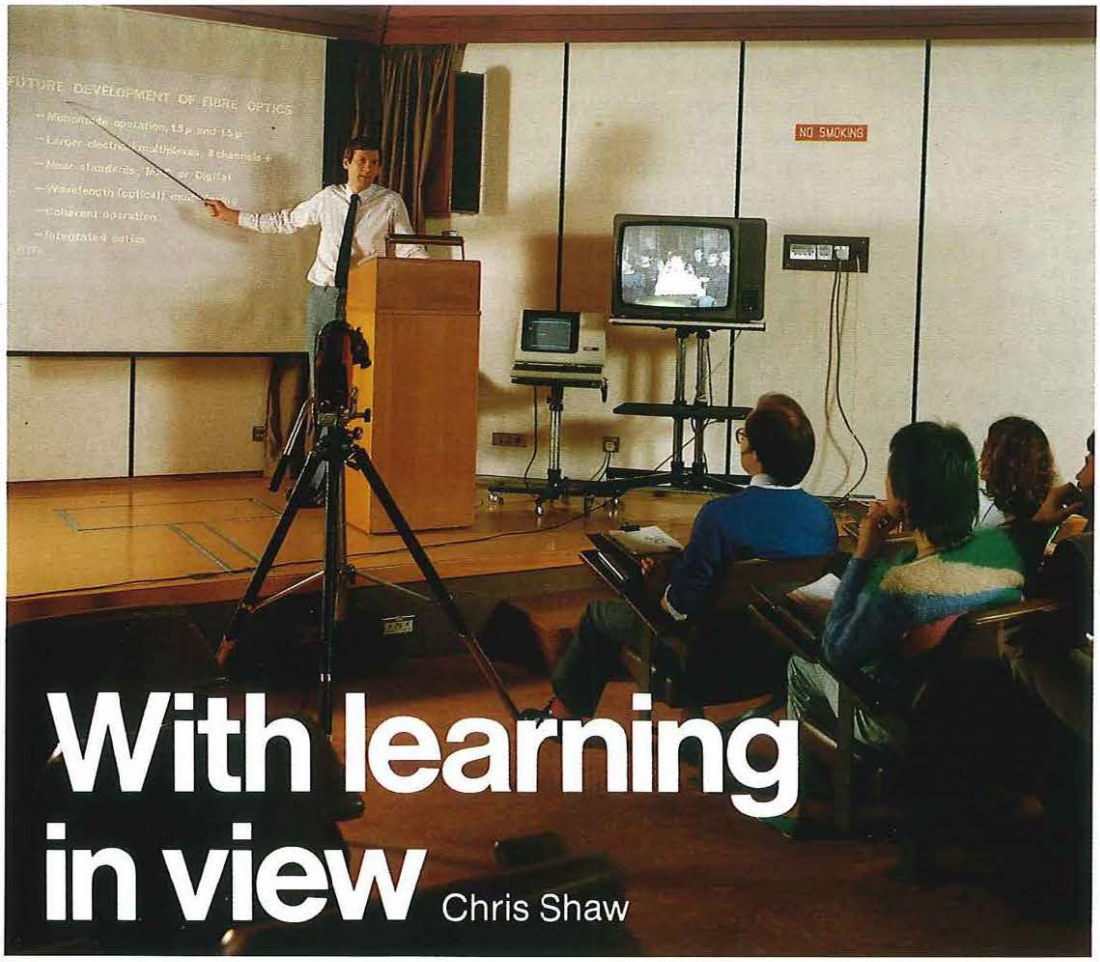


The London University video network enables a lecturer to address scattered student audiences simultaneously while the interactivity of the system allows lecturers and students to see and speak to each other at all times.

With learning in view

Chris Shaw

A switched video network using optical fibre technology has been jointly developed by British Telecom London and British Telecom Research Laboratories, Martlesham for use by London University science students enabling them to cut-down on time consuming travel between colleges.

The University of London, the largest in the UK, runs its collection of colleges in a federal manner with many of them independent and managing their own curriculae. Within the science faculties students have always had to travel between various colleges across London to attend lectures, and lecturers themselves have had to be on the move to meet their students.

In short, the situation was highly unsatisfactory and in an effort to improve matters, Senate House, the governing body of the University, turned to technology to overcome the time and effort spent on travelling. It began discussions with British Telecom in early 1983 and initially ideas centred around high capacity TV-type links, although it soon became clear that the University required an interactive system with switching capability.

At this stage British Telecom Research Laboratories (BTRL) became involved and the switched video network was the result. The equipment used is a development of the switched star cable TV equipment which has been running successfully in the Westminster Cable Company franchise area since June last year and presents four bi-directional full bandwidth video and sound channels to each of the University sites. Trial operations are to begin in October.

Each channel of video is independent of the others and all four are modulated together onto one fibre for transmission. The signals are carried back to the central site where they are demodulated to four video channels again and connected to the video switch.

The switch can connect any one of the incoming channels to any one or a number of pre-determined outgoing channels. At this outgoing stage, channels are again modulated together for transmission via fibre to the distant site where, through demodulation, they are represented as four independent video and sound signals. By use of a star configuration each University site has four channels which can be connected to any or all of the other sites.

Use of a video network derived from the switched star TV environment, however, did not satisfy all the requirements of the University for its teaching network to be interactive. To achieve maximum benefit, the University needed both-way transmission and a means of passing control signals from end to end.

Bi-directional transmission is achieved by duplicating the whole system so that two fibres are used per site, one for each direction of transmission, giving the end user four two-way switched video channels. This enables the lecture to be given to the students who can themselves be seen by the lecturer.

But even this system still did not provide the true interactivity the University required. Their need was for lectures carried by the network to be as natural as possible so that both students and lecturers would feel comfortable.

To achieve this a separate set of conditions had to be considered. For example, if a lecturer talking to his own students at one site showed

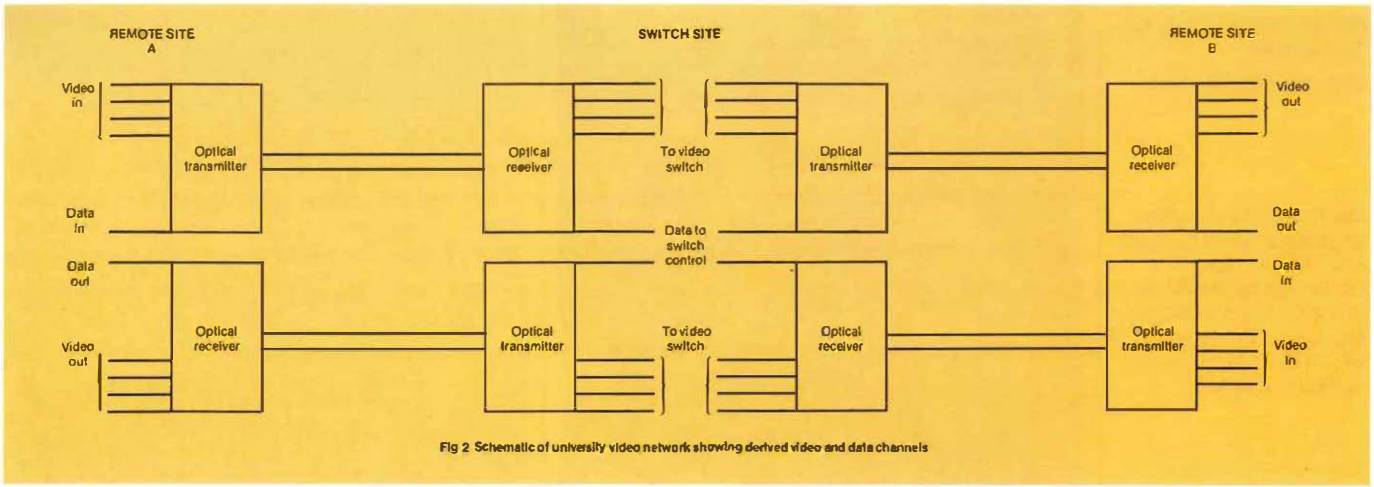


Fig 2 Schematic of university video network showing derived video and data channels

them an overhead slide, it would also need to be shown to the other students at all the remote sites connected to the session. This would require a picture 'cut' from lecturer to slide then back again to the lecturer.

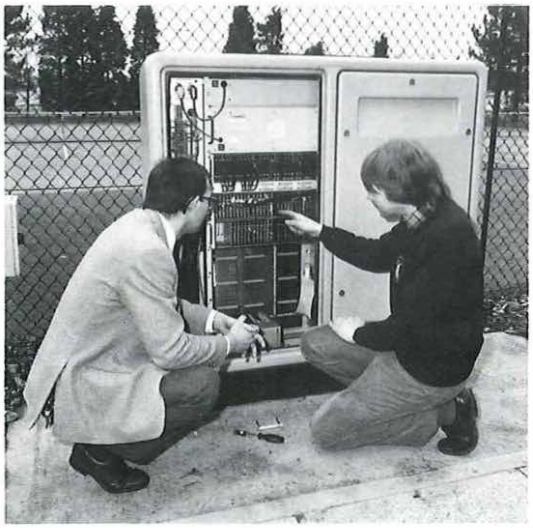
Another consideration was that of controlling camera and screen pictures at the remote site. If a student at a remote site wished to ask a question, for instance, then his or her picture should be sent to all sites connected at that session, with a picture cut back to the lecturer when he gave the answer.

These signals, passing from end to end of the network for camera and ancillary equipment control and from end to central switch for picture control, were a totally new concept for the switched star technology used. The video switch is capable of some interactivity in its normal cable TV environment but most of the information now comes from the head end to the end user as shown in figure 3 on page 42. The two way multicontrol messaging required for the University of London network therefore posed a complex problem.

The most effective way of dealing with the messaging was to carry it on the fibre provided for the video. This was achieved by modulating/demodulating a fifth channel onto the fibre, which provided the University with a transparent 2Mb/second data stream, from which 64Kb/s messaging channels could be extracted and used by the University.

At the same time the University needed control of the whole session to be in the hands of the lecturer, and for the lecturer to have this physical control, a user-friendly console was required with such features as push button access to pictures of remote sites, a pan-and-tilt joystick to operate remote cameras, zoom controls and local camera controls for cutting between lecturer and slide. Finally, the University needed sessions between remote colleges booked in advance so that colleges became connected at the due time and date. ▷

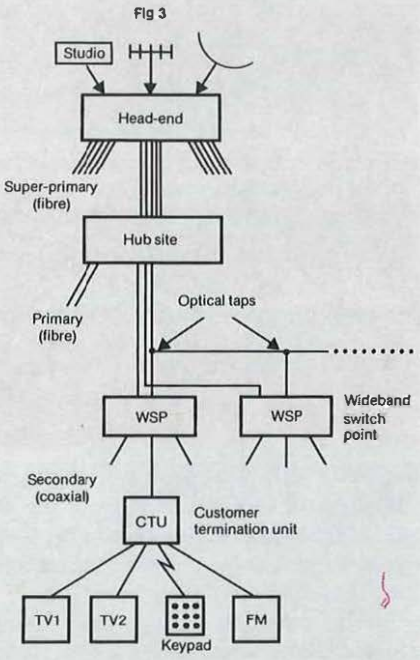
Senate House – the hub of London University – and the outstations served by the new network.



Martlesham executive engineers Keith Everard and Nick Achurch examine equipment in the wide band switched star cable TV network on which the London video network is based.

Mr C V L Shaw was systems engineer for the video network project and is now head of major customer support, BT London.

Fig 3



Switched-star network topology

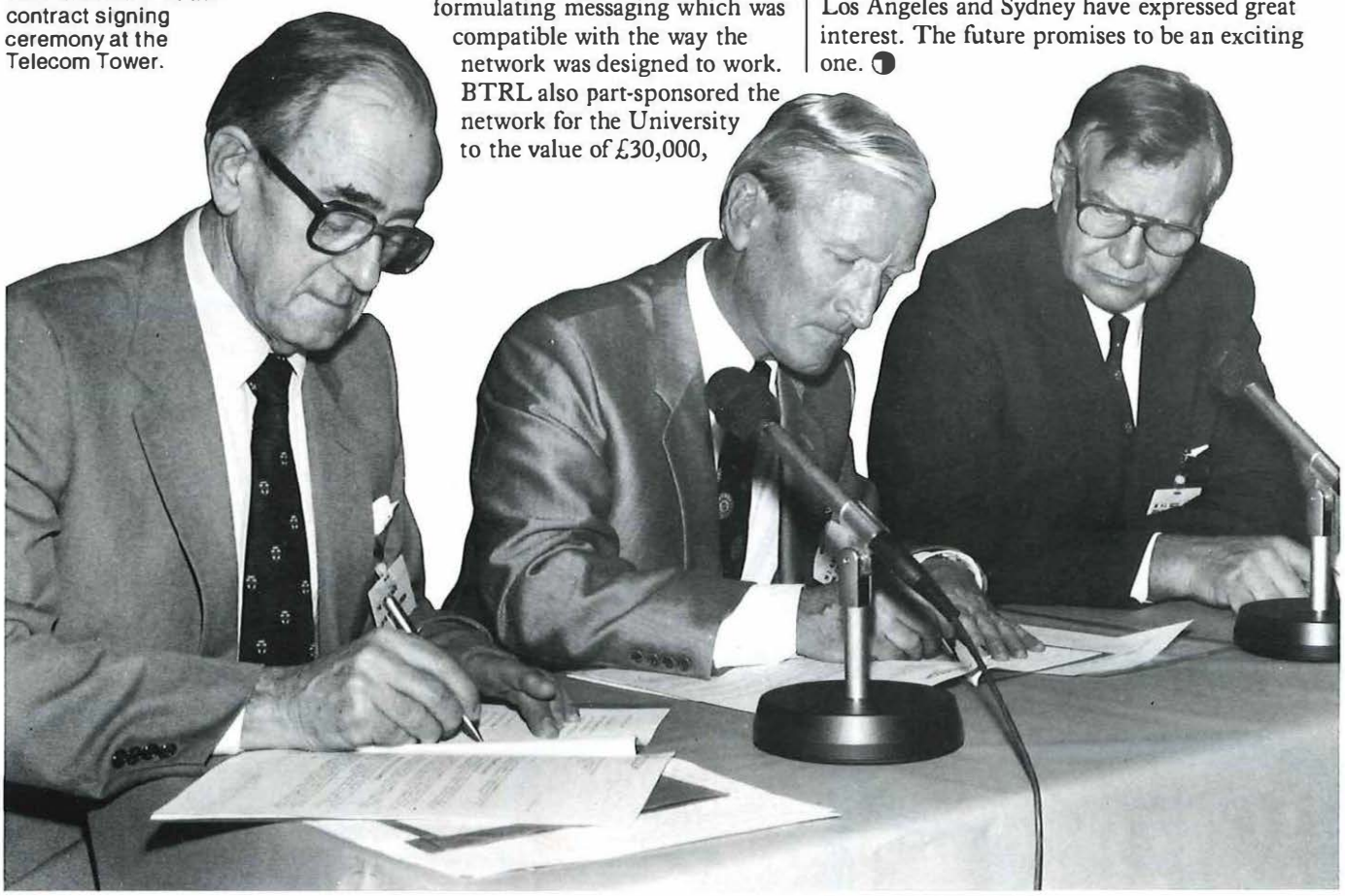
As it was the University's intention to have this scheduling controlled automatically, this meant there were three distinct areas where developments were required before the whole network performed in the required way. These were:

★ end-to-end messaging for control of remote equipment;
★ hardware to enable and implement this;
★ software control of the switch through the automatic scheduler.

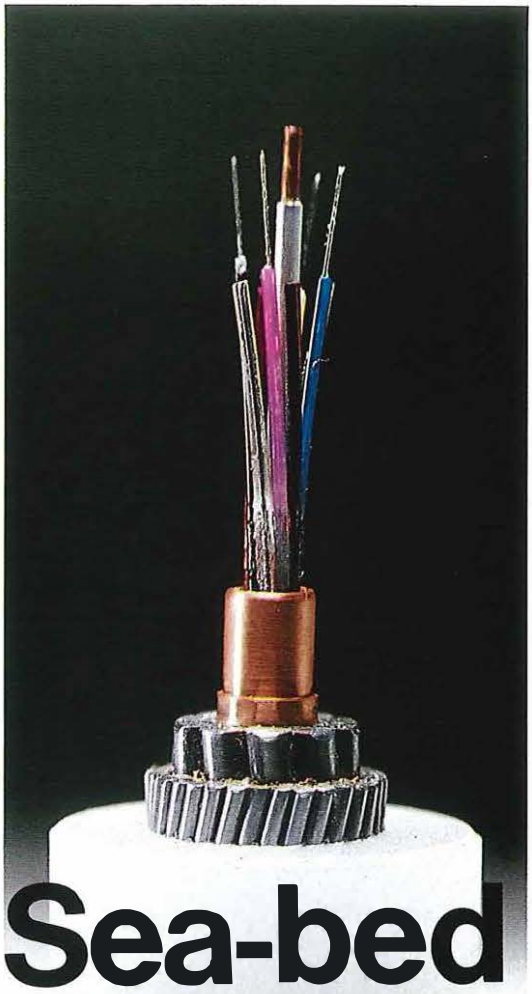
Recognising the importance of the project and the real need to develop the usefulness of the network as outlined, BTRL offered to help the University with development and manpower resource, and by giving University staff access to the messaging formats. Aid was also given in formulating messaging which was compatible with the way the network was designed to work. BTRL also part-sponsored the network for the University to the value of £30,000, demonstrating their commitment to such an innovative project. An ongoing development project was agreed and this will run after the University network has been completed.

British Telecom and London University are now keen to find other sites for such technology and already, through contacts made through the University of London, universities in Munich, Los Angeles and Sydney have expressed great interest. The future promises to be an exciting one. ◑

Lord Flowers, vice chancellor of the University of London (left), British Telecom corporate director and engineer-in-chief John Alvey (centre) and Dr Alan Betts, deputy vice-chancellor at the contract signing ceremony at the Telecom Tower.



The world's first commercial optical fibre submarine cable system is currently being laid between Broadstairs in Kent and Ostend in Belgium. It is the culmination of a three year development and manufacture programme and will provide for growth in traffic to Europe and opportunities for the implementation of the European Integrated Services Digital Network (ISDN).



Right: Cross section of the submarine fibre optic cable.

Sea-bed fibres set the pace

John Myall

Digitalisation of telecommunications networks in many countries has taken on an added impetus in the 1980s. But for an island such as the UK, full use cannot be made of these new facilities without digital connections to the rest of Europe and the world. While satellites enable digital services to be quickly and flexibly established, on high-capacity routes such as those across the Atlantic and the North Sea, there are economic advantages in using optical fibre submarine cables.

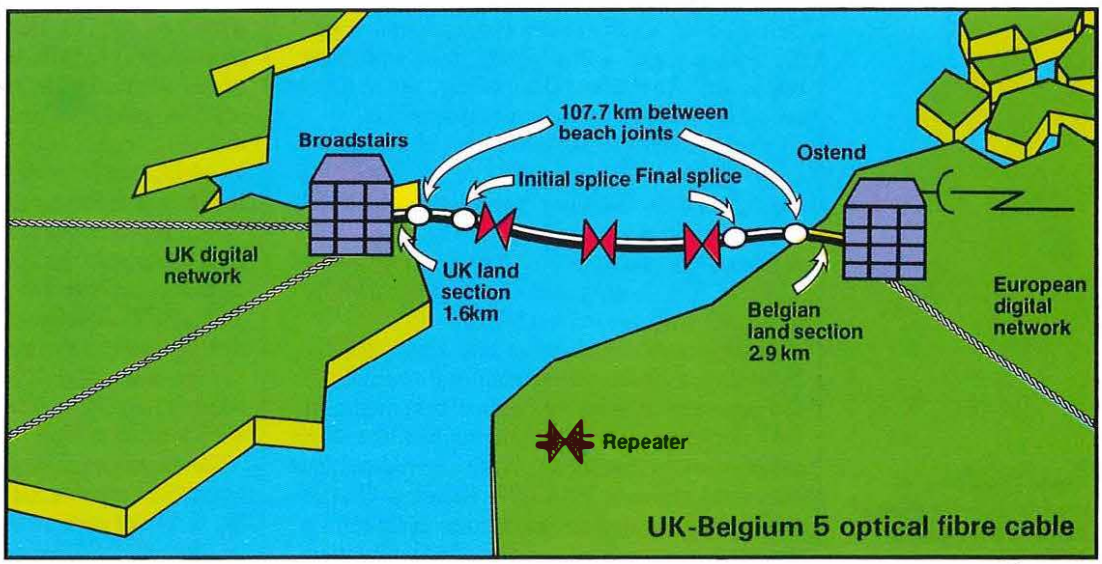
The UK manufacturer of submarine cables, Standard Telephones and Cables (STC), developed an optical fibre system at their Harlow laboratories and their Greenwich and Southampton factories with considerable assistance from British Telecom Research Laboratories (BTRL). Having already laid a trial cable in Loch Fyne (See *British Telecom Journal, Spring 1980*) their attention turned to commercial systems.

British Telecom and its partner administrations in Belgium, West Germany and The Netherlands saw the need for a new system in the southern North Sea for service in 1987/88 and, following detailed discussions, a contract was placed with STC for a digital optical fibre system between UK and Belgium to be laid in 1985/86. An early delivery date was agreed to provide a period of 'preliminary use' for system design evaluation and network and traffic trials of new digital services before being handed over for commercial use.

Knowledge

Although considerable knowledge of the marine conditions in the area was already to hand, several new facts came to light during the early planning period, including a decision by the maritime authorities to move the designated shipping lanes and change the location of the anchorage and pilot cutter pick-up points off Ostend. In addition, it was discovered that the Belgian Government had also issued licences to dredge for sand off the Belgian coast in the area the cable was planned to cross.

After fully considering the additional hazards ▷



Netherlands PTT cableship *DG Bast* was used to lay both shore end sections of the new cable.

Above right: Components for the repeaters used on the route are produced under dust free conditions at STC's Paignton factory.

Right: Final checks are made to the Plough before cable laying begins.

presented by these aspects, it was decided to change the route to avoid these areas despite this presenting new challenges including crossing shallow water over a number of submerged sandbanks.

Although the cable has a high tensile strength to resist direct hits by beam trawls, the co-owners were anxious to minimise the risks of cable damage on such a high capacity system. It was decided, therefore, to bury the cable for added protection and the recently developed BTI Plough pulled by *CS Alert* is being used for this purpose.

The Plough has many unique features including the ability to steer independently of the towing vessel, a low towing force and, most importantly for optical fibre cables, the ability to lay cables with very low residual tensions.

The cable comprises three fibre pairs each carrying two 140Mbit/s traffic paths. These are multiplexed together in the terminals and with line encoding to optimise the signal for regeneration, the final digital line rate becomes 324bit/s. The total system capacity is equivalent to 11,500 bothway voice channels.

To keep costs down and to maintain a high reliability, a submarine system must contain as few repeaters as possible. This is best achieved with current technology by using low loss single mode fibre and regenerators with semiconductor lasers and sensitive PINFET receivers. On the UK-Belgium 5 system this results in three repeaters at a nominal spacing of 43km being required on the 112km route.

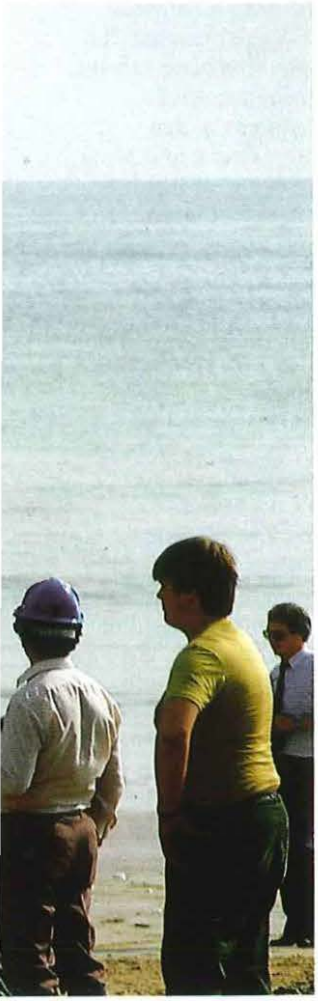
The six optical fibres are laid in a copper tube filled with a high viscosity water blocking compound. Two layers of high tensile steel wires surround the tube to provide torsional balance and the high tensile strength required. These are encased in a thick layer of polyethylene to give good electrical insulation and protection to the cable. The overall diameter of this cable is 44mm.

Protection

Cable in this form can be used in deep water where little damage is likely but for the shallow waters on the UK-Belgium 5 route, additional protection is required. A layer of armouring is added where the cable is to be buried and where sea bed stability is uncertain. Where there is a risk of the cable becoming unburied, it will have an additional layer of 'Rock Armour', bringing the overall diameter up to 91mm.

Each repeater contains six regenerators, one for each uni-directional fibre. The attenuated light signal is converted to an electrical equivalent by a PINFET detector and then amplified. A timing signal is extracted from the data and used to regenerate digitally each pulse which is reconverted into a light signal by the semiconductor laser.

The repeater also includes additional circuitry to enable its performance to be monitored from the terminal stations and to help in the location of cable faults. Because the repeater circuitry is



more complex than that of its analogue predecessor, comprehensive reliability programmes are necessary to ensure the system will meet its reliability targets over its 25 year life.

Repeater manufacture started about a year ago at STC's Greenwich factory and three line repeaters together with a spare were completed by the end of 1985 and delivered to STC's Southampton factory for testing. The main sea cable was manufactured in a parallel operation at the same Southampton factory.

The transmission equipment for the two terminal stations was also completed last December. The power feeding equipment comprises two racks containing a duplicated constant current power plant together with cable terminating boxes and a dummy load for testing the power units. The terminal transmission equipment comprises four racks, one for each fibre pair (transmit and receive) and one spare which is primarily for maintenance tests but can be used to carry traffic.

These racks provide the interconnection between the digital inland systems at 140Mbit/s and the encoded optical signal transmitted over the submarine cable. A single rack houses the submerged repeater monitoring equipment which, in conjunction with the supervisory system built into each regenerator, can help locate cable breaks or repeater faults. The prime objective of the supervisory system, however, is to monitor regularly the system performance.

The land cable was completed in February last

year and was delivered in drums to Broadstairs and Ostend. Local teams from British Telecom's North Downs and Weald District and the Belgian RTT installed the cable from the respective repeater stations to the beaches.

Teams from BTRL and BTI were used to joint and test the cable respectively in both countries. The critical problem was to keep the ▷

Ploughing on ...

The BTI Plough had already carried out successful burial operations for the offshore oil and gas industry but still required a final trial run along the UK-Belgium 5 route before being used on the main lay.

During the trial in early March the Plough became detached from the *Alert* when strong tides caused the towing hawser to snag and part, leaving the Plough on the sea bed.

After being delayed by rough weather, it was eventually recovered by the salvage vessel *British Providence* and returned to BTI's Southampton depot. Fortunately, damage was only superficial and following repairs by marine staff it was back on the UK-Belgium route two weeks later to complete the trials.

transmission losses due to the splicing operation to a minimum as these form a signficant part of the overall loss in fibre. The losses achieved were well within the target of 0.25dB per splice.

With the land cable installed, the summer saw the laying of the shore end cable from the beaches into water deep enough for *CS Alert* to pick up the ends for the main lay. Because of the shallow water involved, particularly off Ostend, the Netherlands PTT cableship *DG Bast* was used to lay both shore end sections as she has a particularly shallow draught and could come in close to the beach to ease the hauling of the cable ashore.

Meanwhile the two repeater stations were prepared to accept the terminal equipment. The individual plug-in units were shipped from the factory together with the backplanes and wiring looms for modular assembly on site into the previously installed rack frameworks. The terminal equipment installation was completed just before the main lay so that it would be ready immediately for overall system commissioning.

The six-day main lay is being carried out by *CS Alert* and the new BTI Plough and its timing is critical because the ship's navigation is more difficult when pulling the Plough at the slow laying speed of one knot. Weather and tides can cause problems and it is essential that *CS Alert* crosses the shallow water over the sandbanks in the right tidal conditions to prevent grounding.

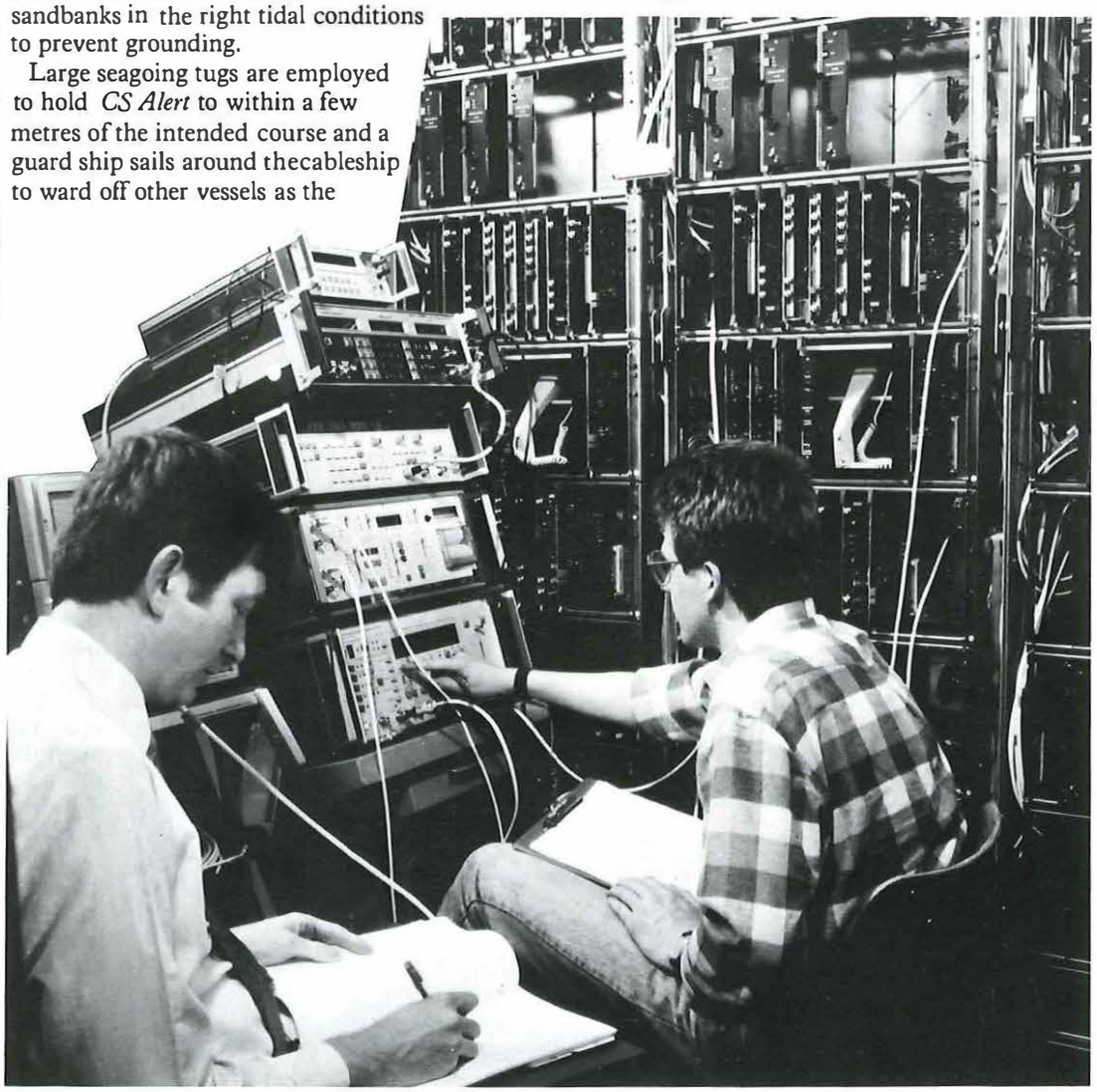
Large seagoing tugs are employed to hold *CS Alert* to within a few metres of the intended course and a guard ship sails around thecableship to ward off other vessels as the entourage crosses one of the busiest shipping lanes in the world. When *CS Alert* reaches the shallow waters off Ostend the shore end is lifted and the final splice made using the joint developed by BTRL. The system is then complete but is commissioned over a four week period followed by a futher two week stability test to ensure there are no incipient faults.

Evaluation

The system will be handed over by the contractor after commissioning and will begin a two year period of design and traffic evaluation trials. At present, completion is expected in 1988 but the likely demand for digital capacity to Europe may require the cable being brought into revenue earning service earlier.

The design and development of this system has given BTI first hand experience in optical fibre submarine cable technology. This has already been put to good use with the procurement of the first transatlantic optical fibre cable, TAT8 where STC is sharing the manufacture with French and American suppliers.

Completion of UK-Belgium 5 will reinforce British Telecom's role as a world leader in the forefront of this new technology and extend its ability to offer its customers modern digital services.



Engineers test fibre optic racking equipment at Broadstairs exchange.

Mr J V W Myall is a head of group on submarine system projects and terminal installation and is responsible for the implementation of the UK-Belgium 5 system for BTI.

British Telecom Journal
Spring 1986

Voicepower means business

A voice version of electronic mail has been launched by British Telecom Business Systems. Called Voice Mail, the system opens up a whole new field of verbal communications to boost business efficiency.

Colin Newson

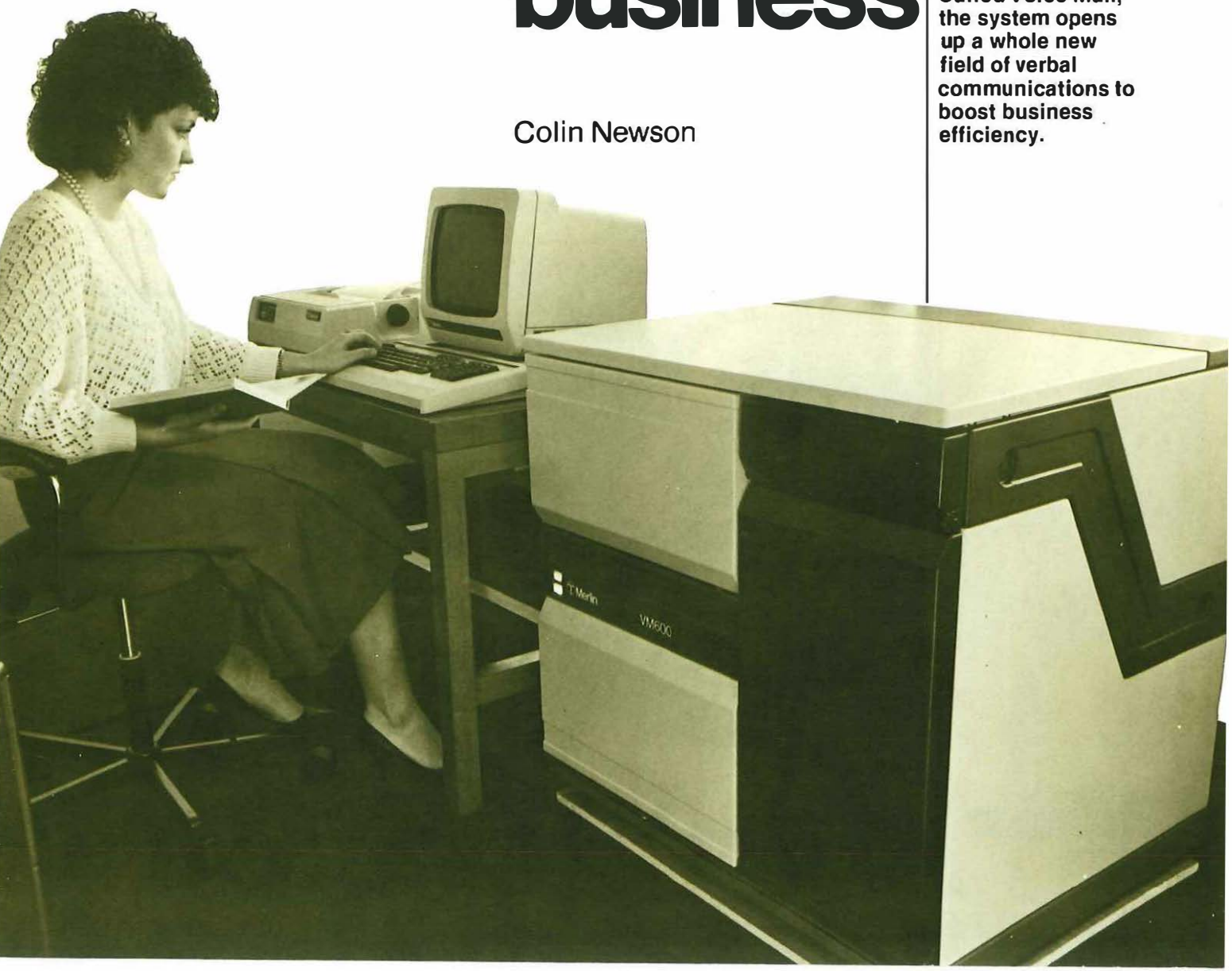
A great deal of time can often be wasted trying to make a telephone call to a specific person who, for a variety of reasons, is unavailable to answer. Frequently the object of the call is not to hold a prolonged conversation but merely to relay a message or perhaps ask or answer a question. It is equally frustrating when busy to be interrupted by a non-urgent call.

Merlin Voice Mail VM600 is a sophisticated computer-based voice-storage system designed to reduce the time wasted by such calls. It can be connected to the private branch exchange (PBX) of a company, and up to 1,200 members of staff can be allocated voice storage facilities or 'mailboxes' on the system.

By making a telephone call directly to the system, or by being diverted from a mailbox owner's telephone, the caller will be given guidance by voice prompts on how to record and retrieve messages for any mailbox. The call can be made from the office, home, or almost anywhere in the world. No special equipment is needed when using the dual-tone multi-frequency push-button telephones supplied with most modern PBXs but a small hand-held tone sender is required when calling from a loop-disconnect dial telephone.

When recording a message the caller may review, and if necessary, re-record it before depositing it in the recipient's mailbox. The system offers many facilities including the ability to distribute a message to up to 40 mailboxes, to force deliver a message by ringing the recipient's telephone in the office or at home, and confirmed delivery, when the system will inform the sender that the message has been read. The system will also dial out to British Telecom Radiopaging equipment when urgent messages are received. As an option, 'message waiting' indicators, such as lamps on telephones, can be provided for mailbox owners which saves the need to interrogate a mailbox regularly and generally improves response times for urgent messages.

Corporate voice messaging between sites ▷



Merlin's Voice Mail equipment comprises a compact processor and memory unit together with a keyboard and visual display. The processor is connected to the host phone system and provides voice message mail boxes for up to 600 recipients.

Voice Mail can operate for small, medium and large organisations.

which are a distance apart may also be provided by connecting up to 99 systems in a network using either private wires or the Packet SwitchStream service. This allows users served by one system to leave messages for a user on another system. If, for example, a London and a Singapore system were networked, a user with a mailbox on the London system could be left a message by a caller to the Singapore system.

The equipment is designed for siting in an office environment and consists of a controller cabinet, a visual display unit (VDU), a keyboard and a printer. The hardware is made up of a main processor with two Mbytes of memory and three subsystems – speech handling, disc and supervisor.

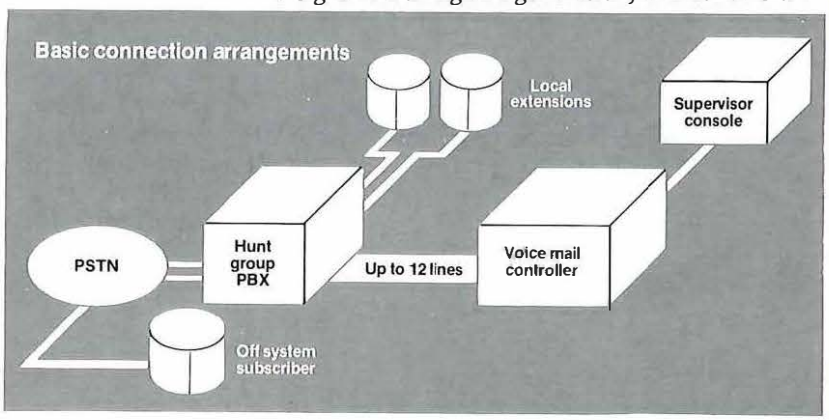
Interface

The speech handling subsystem provides the interface between the PBX and the main processor and consists of microprocessor-controlled line cards, audio cards, and telephone line interface cards. The audio cards and telephone line interface cards provide line isolation, PBX ringing current and tone detection, dual-tone multi-frequency (DTMF), signal decoding and generation, and conversion from analogue speech signals to digital signals and vice versa.

Line cards handle the user interface program and each line card/audio card/telephone line interface card combination is able to handle three PBX extension line ports and up to four such combinations may be incorporated in any one controller cabinet, giving a total 12 PBX line ports.

The disc subsystem provides the mass storage facilities and is used primarily for the storage and retrieval of digitised voice messages. It consists of Winchester disc drives, disc controller units, and a streamer tape unit. The maximum configuration is two 32 Mbyte discs plus two 153 Mbyte discs providing 36 hours of voice message storage. The streamer tape unit provides a means of loading and dumping data or software to or from the system by means of 19 Mbyte cartridges.

The supervisor subsystem provides the means for inputting user information and for



Any modern telephone can be used and most PABXs take the system.

Facilities for recipients

A paging device can be activated on a standard radiopaging service to provide notification of waiting messages.

Separate messages queues for each recipient, identified by the recipient's name.

Security code protection of message queues to prevent unauthorised reading of messages. A secretary may have limited access where a recipient has two security codes. Security codes provided can be changed at will by the user.

Guaranteed access to all messages once access to Voice Mail is obtained.

Notified of any long messages. Notified of the number of new and priority messages. Notification times can be set. (Up to three times per day when Voice Mail is to call the recipient to deliver new messages.)

Optional 'message waiting' indicators.

Pause, continue, skip forwards, skip back, skip to next message, skip to previous message, controlled by keypad.

After retrieval, messages may be deleted, retained or retransmitted to other destinations, with or without preamble, eg when transferring an action to a colleague or subordinate.

Users with Voice Mail networking can send distributed messages to recipients at several different sites.

Personal announcements may be dictated so that any caller will hear the announcement before being invited to leave a message.

When reading through a sequence of messages, replies to any particular message can be sent after that message without losing position in the message queue.

Special class of user may have immunity from purging of messages.

Shared extensions include automatic verbal listing of participants.

Recipients may access their own messages via the public telephone system when away from base.

Users with 'feature phones' can obtain fast entry into their mailbox with a minimum number of key depressions.

A new delivery number (external) can be entered at the user's telephone, for calls to be outdialled over the public network to other locations. A user may choose to receive forced delivery messages either in the office or at some remote location, including international calls.

outputting the usage statistics and message log. It is also used for running the fault diagnostics software package. It consists of an 80 character × 26 line VDU, a keyboard, and an 80-column dot matrix printer.

System software consists of an operating system which not only controls the disc and VDU, but handles voice message transactions between the speech subsystem hardware and the disc subsystem. It also handles data collection for statistics, special message delivery requirements and supervisor facilities including the setting up and amending user information and on-line fault diagnostics. There is also an additional software package which tests all the hardware modules and identifies any item of equipment which may have become faulty. This can be loaded by maintenance staff when the system is off line.

To record a message a call is made to the system. The speech handling subsystem recognises the incoming ringing signal and loops the line. DTMF control signals are then sent by the caller or PBX to open a mailbox and the incoming analogue speech waveform is digitised into a 22.5 Kbit/s data stream by means of a continuously variable slope-delta (CVSD) modulator or speech encoder.

This data is packaged and sent to the disc subsystem for storage under the control of the user interface program on the line card. Message retrieval is a similar process, except that messages are read from disc and converted to analogue speech for transmission to the caller. Callers are guided through the menu of facilities by voice prompts, most of which can be pre-empted by familiar users.

Voice prompts are constructed from 'utterances' which are stored in digital form as part of the vocabulary file. To cater for system enhancements a special piece of software can be used to build new prompts by joining up a number of 'utterances'. Unwanted silences and noise can easily be edited out. Much human factors research has been undertaken in developing the user interface programme which generates these prompts.

Future developments may permit the integration of systems with PBXs to provide true telephone answering machine operation and improved message waiting notification. This will enable callers to be diverted to the owner's mailbox on the voice mail system and invited to leave a message without the need to send control signals from a keypad.

In the longer term, text-to-speech converters should lead to a greater level of integration between the non-voice and voice messaging systems, and advances in speech recognition techniques could permit the voice instead of DTMF signals to be used for remote control of the system.

Messages phoned through to an office can be cleared from anywhere in the world.

Facilities for callers

Anyone can leave a message, from anywhere, via internal or public network, with no knowledge of codes or passwords necessary.

Callers can be automatically transferred to Voice Mail without operator or secretarial intervention.

Messages:-
- can be of any length;
- will have time and date automatically stored;
- can be reviewed, re-recorded or deleted;
- can be distributed to either a standard or an ad hoc list of recipients.

Users sending a message can specify the way it is delivered:-
- as a priority message it will be the first to be heard by the recipient;
- delivery may be deferred until a specified time and date;
- forced delivery enables an important message to be delivered by causing the recipient's phone to ring at intervals until the message is received;
- recorded delivery informs the sender when the message is first accessed by the recipient;
- confidential delivery ensure that only the recipient can access the message, when normally this is also available to a secretary.

Any combination of these attributes is available.

Rotary dial telephones may be used via portable tone generation units.

Separate messages for any number of recipients can be left in one call.

Dictation facilities with secretary as recipient.

Several callers (depending on the number of free system ports) can record a message for the same recipient at the same time.

VM600-Typical Utilisation

PABX Lines	Mailboxes (Recipients)	Total hours of messages
3	100	3
6	200	6
9	600	18
12	1200	36

Supervision and monitoring

- Set up, change and delete details of users and facilities allocated.
- Set up, change and delete standard distribution lists.

List all system users.

- Summarise line traffic and system facility usage over 28 day period.
- Handle system alarms and warnings, eg failure to deliver forced messages.
- Provide continuous log of system events.
- Control message purging activities, eg specify attributes to restrict the types of messages purged, such as non-priority messages and protecting individual mailboxes from purging.
- Control the facilities available to privileged users, allowing only those appropriate to individual needs.
- A Billing Package allows an organisation to assign costs to users according to class of service, message length and message retention time.
- Allocate security codes. (Changeable by users.)
- Provide statistical data on use of system facilities for analysis.
- Comprehensive on-line diagnostics.

Mr C R Newson is an executive engineer in BTE/Business Systems responsible for the technical development and marketing of Voice Mail.

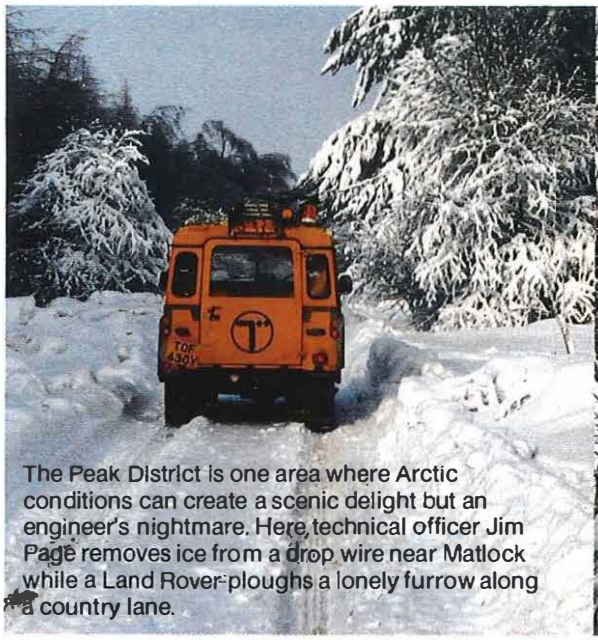
British Telecom Journal
Spring 1986

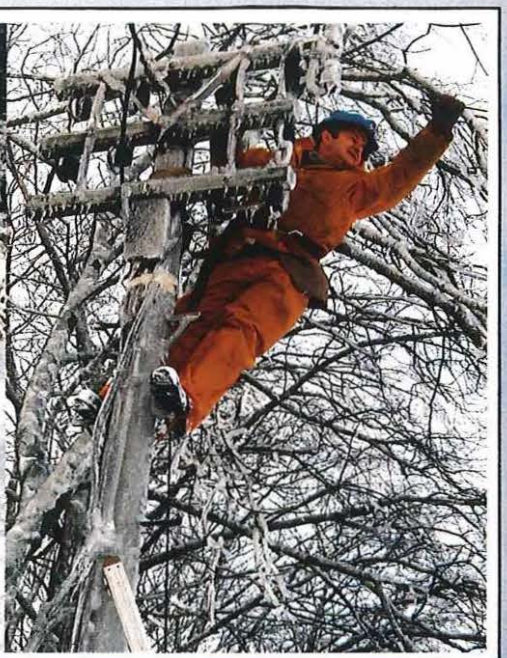
FREEZING FEBRUARY

It may seem a chilly memory now but Britain's freezing February — the coldest for 40 years — proved a particularly testing time for British Telecom engineers.

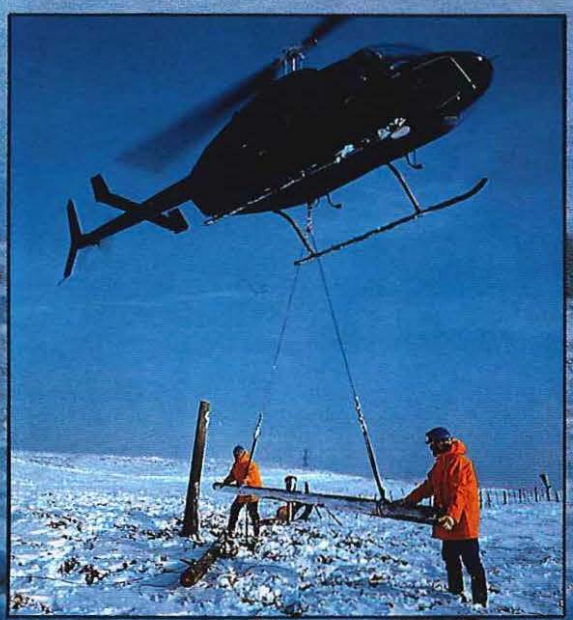
As well as having to contend with prolonged sub-zero temperatures, they had to fight their way through drifts — some 15 feet deep — to reach outlying areas and maintain service.

Ice and snow bringing down overhead wires was the main cause of trouble but despite the difficulties most faults were quickly repaired.





The Peak District is one area where Arctic conditions can create a scenic delight but an engineer's nightmare. Here technical officer Jim Page removes ice from a drop wire near Matlock while a Land Rover ploughs a lonely furrow along a country lane.

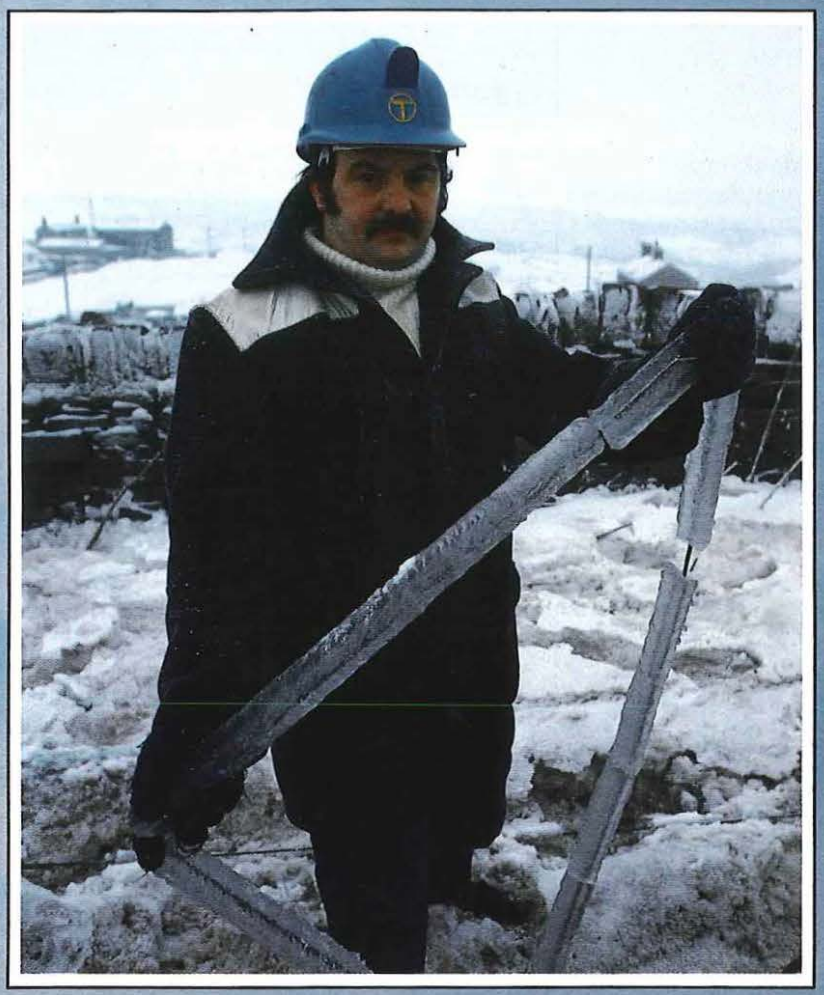


As usual, conditions in the Highlands of Scotland were particularly chaotic and this year British Telecom made use of a helicopter to fly in engineers, telephone poles and cable drains. These pictures capture some of the activity amid the desolation.

In the toughest terrain only the most robust vehicles can make headway. Here close to Hadrian's Wall in Northumbria, this specially designed British Telecom vehicle battles through the snow to reach a remote radio station.

British Telecom Journal
Spring 1986

Freezing February



The bitter weather maintained its stranglehold in Yorkshire and this section of fallen overhead wire sheathed in thick ice at Bradford was typical of the conditions facing engineer Eddie Kershaw.

British Telecom Journal
Spring 1986

Automatic boost for service quality

Geoff Wesson

A desk-top, computer-controlled automatic network analyser, developed by British Telecom staff in Nottingham, has made a major impact on service quality by speeding the identification of faults in the public switched telephone network.

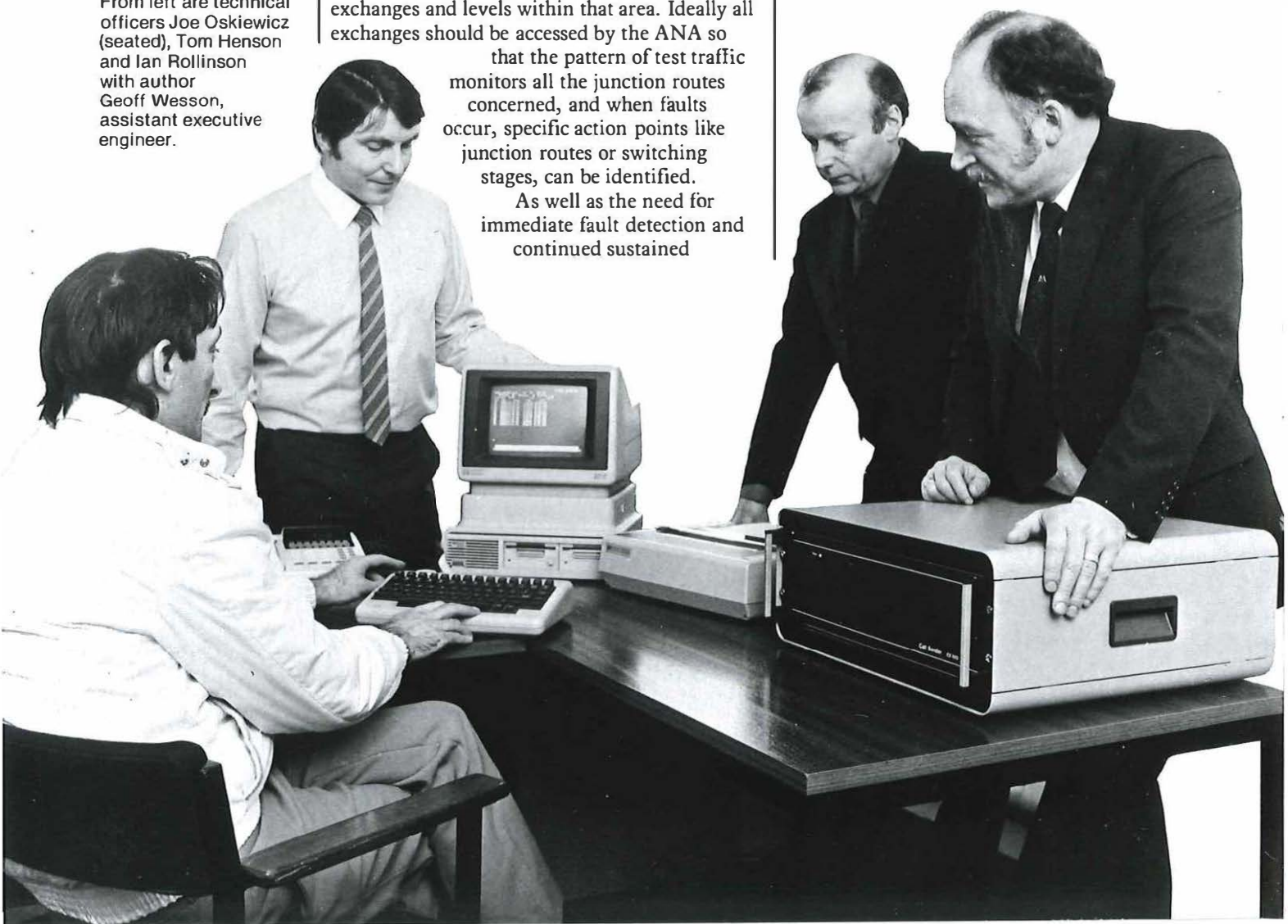
A change in British Telecom's existing maintenance philosophy could be the direct result of the development of Nottingham Area's Automatic Network Analyser. It can give immediate indication of service difficulties in the switching network and so enable fault reference centre (FRC) staff to identify problems more quickly. It has been developed from experience gained over many years using methods of measuring such as call sending, customer reports, call failure detection equipment, centralised service observations and, more recently, measurement analysis centres (MACs).

Since the introduction of the ANA in the Nottingham MAC Area, there has been a significant improvement in service as shown in figure 3 opposite.

The ANA is able to send a continuous pattern of up to 600 test calls per exchange, per day, from designated units within the area to all exchanges and levels within that area. Ideally all exchanges should be accessed by the ANA so that the pattern of test traffic monitors all the junction routes concerned, and when faults occur, specific action points like junction routes or switching stages, can be identified.

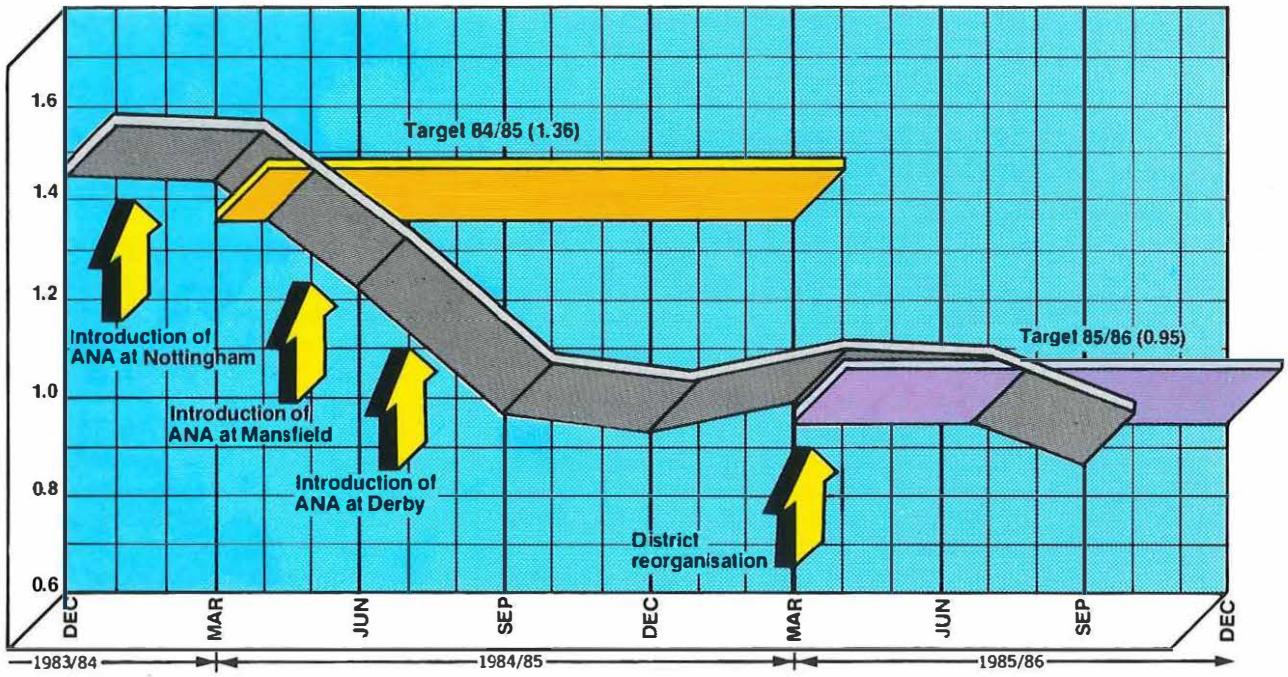
As well as the need for immediate fault detection and continued sustained improvement, comprehensive statistics should also be available to aid engineering staff where in-depth investigations may be required to clear particular faults which normal maintenance procedures do not readily identify.

The ANA equipment is totally microcomputer-controlled and comprises twin disc drives, printer, keyboard and visual display unit (VDU). The centralised callsender unit has 16 intelligent callsenders which dial, recognise tones and communicate with the computer. Each callsender has two channels and each of the 32 channels can have its own discrete callsending program. The callsenders recognise all standard British Telecom supervisory tones with the exception of dial tone and they can detect meter pulses. The ANA works to standard multi-metering and MAC test numbers although the use of the latter is not recommended by the MAC guidelines.



The Automatic Network Analyser equipment and the Nottingham team who were responsible for its development. From left are technical officers Joe Oskiewicz (seated), Tom Henson and Ian Rollinson with author Geoff Wesson, assistant executive engineer.

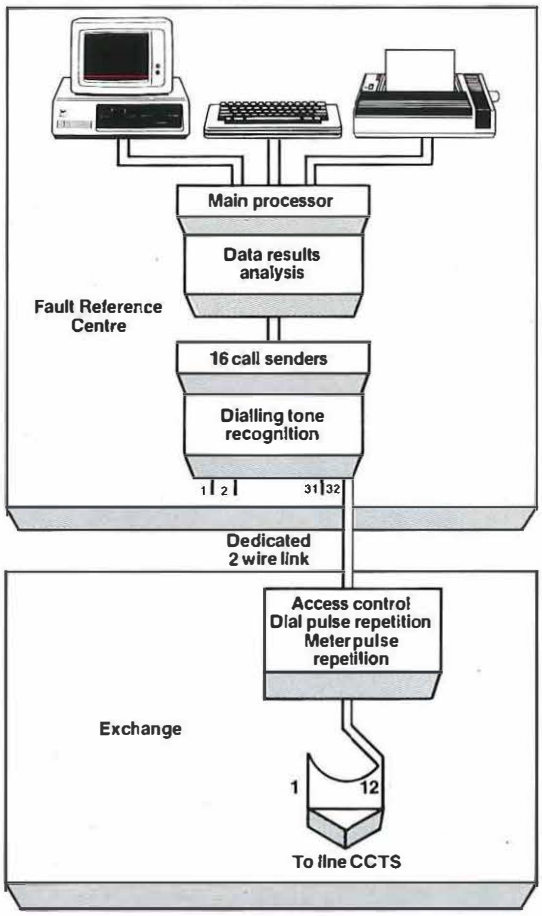
Fig. 3 Nottingham Area plant defects: Quarterly cumulative results



The callsenders gain access to the originating exchanges via a dedicated trunk and an access circuit which distributes the calls over the exchange (see fig 1 below). The access also presents a standard loop to the exchange and repeats dial pulses. Meter pulses are detected by the access and converted into tone pulses which are transmitted back to the callsender.

The ANA is menu driven and all data, printout and controlling instructions are input via the keyboard. The current model has a common test number library of 255 test numbers, from which each of the 32 exchanges draws its individual sending program of up to a maximum of 100 entries. In practice, however, only 97 addresses are used to ensure even distribution of calls.

Fig 1 System schematic



Balanced

The program in Nottingham is balanced to match the exchange traffic patterns, with test calls being allocated pro-rata with the number of junctions per route. The callsending list for an exchange can be associated with one of ten code lists, each having a maximum of 60 entries to cater for any prefix code digits.

The test number library will accept from three to seven digits and the code list up to six digits. Callsending programs can be structured for a maximum of 150 terminal destinations and 999 measurement points are available, each holding ▷

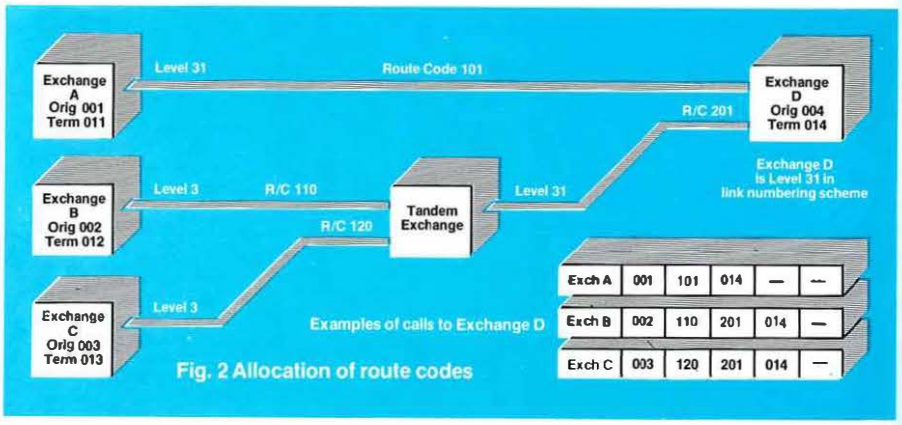


Fig. 2 Allocation of route codes

a log of the last ten failures and total call and failure counters. The measurement point is called a route code and has a four digit identifier.

Route codes are allocated to convenient points in the public switched telephone network (PSTN) (see figure 2, on previous page), typically to exchange originating and terminating traffic, and to all outgoing junction routes including those from tandem exchanges. Each call processed by the ANA can be assigned up to five route codes, two of which will be for the originating exchange and the terminating level, leaving three available for the measurement of outgoing junctions and tandem levels.

Performance

Each route code file contains up-to-date information on plant defects (PD), plant engaged (PE), and wrongly charged (WC) categories and when details are demanded on the VDU, current performance statistics are displayed. An entry in the failure file, which records the last ten failures, shows the originating exchange, the test number dialled, the type of failure, the date and the time. As each call processed adds to the files in the relevant route codes assigned to the call, a faulty link will be highlighted because it will carry proportionally more failed calls than the other route codes.

Analysis of the failures is based on six action periods. Each route code has a threshold number of failures which it will tolerate within the action periods, set according to the number of calls carried by the route. When a call failure occurs and the entry is made in the relevant failure files, the computer checks the number of failures within the six action periods and if any of the thresholds are exceeded FRC staff are alerted by an entry on the Alarm Routes Screen.

The main advantage of the ANA is its ability to identify trouble spots in the PSTN quickly but with faults categorised into PD, PE and WC, congested routes and charging errors can also be identified. If the congestion does not correlate with reports from traffic recordings and overflow readings, for instance, a weakness in the normal measurement systems may be indicated.

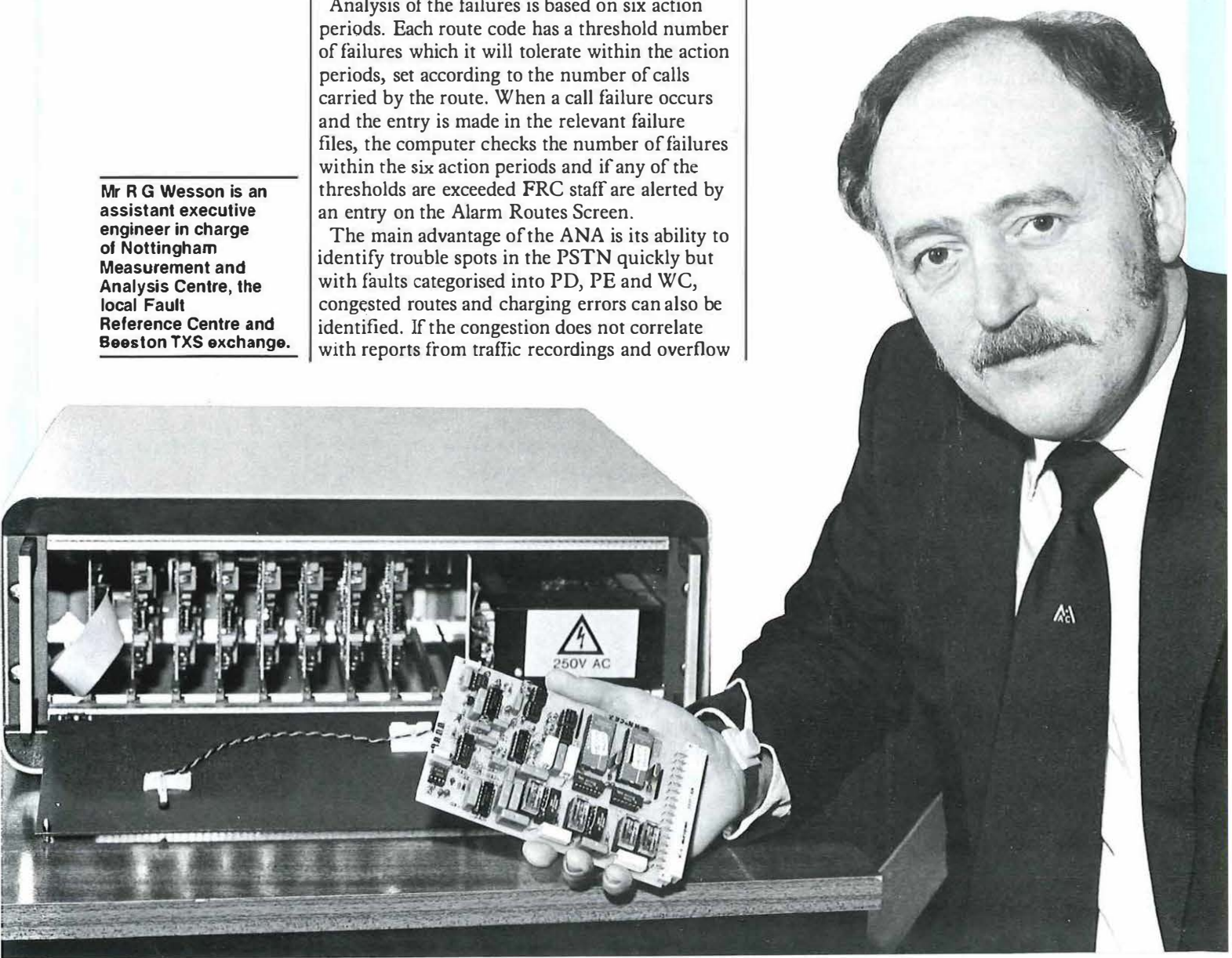
From the information in the route code files it becomes possible to identify the routes which are performing badly and the ANA compiles a list of the worst 15 performances, for each category (PD, PE and WC). This information is available on VDU or hard copy and 'Bad Routes' are frequently up-dated to ensure accuracy.

Co-operation

The ANA is essentially a maintenance aid for local use and as such does not have targets. The more faults the ANA detects, however, the fewer are likely to be found by other means. Co-operation between FRC and exchange staff is, of course, vital.

Although developed mainly for local network surveillance, the flexibility and analytical qualities of the ANA are proving valuable in the trunk network and the callsending programs are continually being up-dated to cover further points in the local network such as routes from adjacent Group Switching Centres (GSCs). ⓣ

Mr R G Wesson is an assistant executive engineer in charge of Nottingham Measurement and Analysis Centre, the local Fault Reference Centre and Beeston TXS exchange.



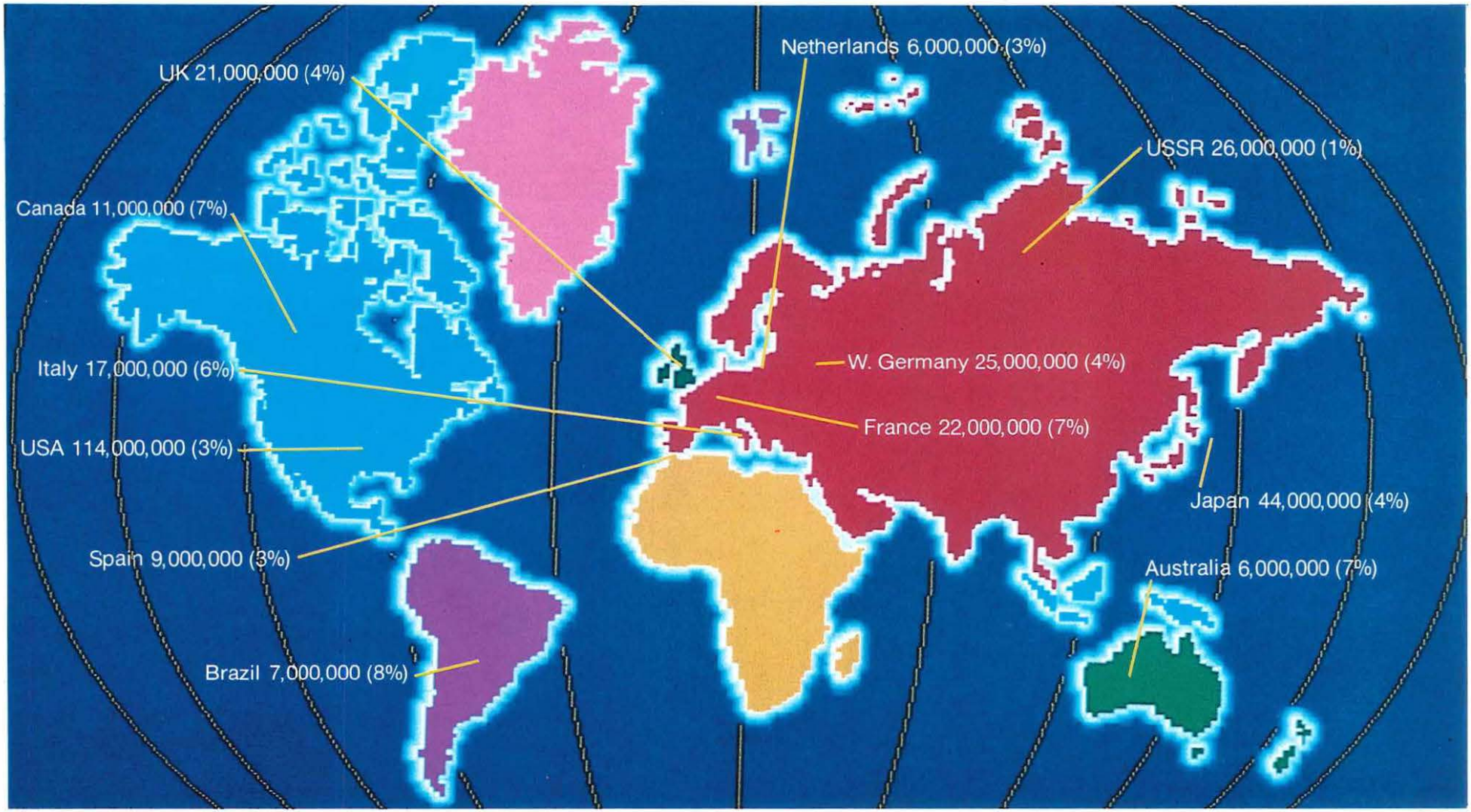
Below: Geoff Wesson displays a call sender card from the equipment's call sender unit.

Telephone lines around the world

The international comparison of telecommunications statistics shows the 12 countries with the largest number of telephone lines at 31 March 1985 or nearest available date. These countries account for about 80 per cent of the world's telephone connections while containing only about 23 per cent of the world's population. The percentage growth over the preceding year is shown in brackets.

The statistics have been obtained from various sources. Connection figures are approximate and percentage growth figures have been calculated from original statistics.

The figures have been produced by the International Comparisons and Statistics Group 01-356 6868.



British Telecom Journal
Spring 1986

Below, left: Journalist and personality Ann Leslie finds Telecom Gold indispensable on assignments.

Below, right: Mike Cornish, finance director of BICC Technologies Limited, uses his aircraft seat as a high-flying office. He transmits material via Telecom Gold after touch-down.

The number of subscribers to Telecom Gold, British Telecom's electronic mail service launched in 1982, doubles each year and in January stood at 36,000 in the UK. Latest developments, including 'Gateways' to electronic data bases, look set to make the service even more popular.

Telecom Goldrush!

Robin Oliphant

Telecom Gold is based on a software package, marketed by ITT Dialcom*, an international company which British Telecom intends to buy. The system offers multi-national and international working, telex interworking, integration with information services, and maximum terminal and network access facilities. The package's potential for the development of application areas is another key feature likely to be of growing importance in the future.

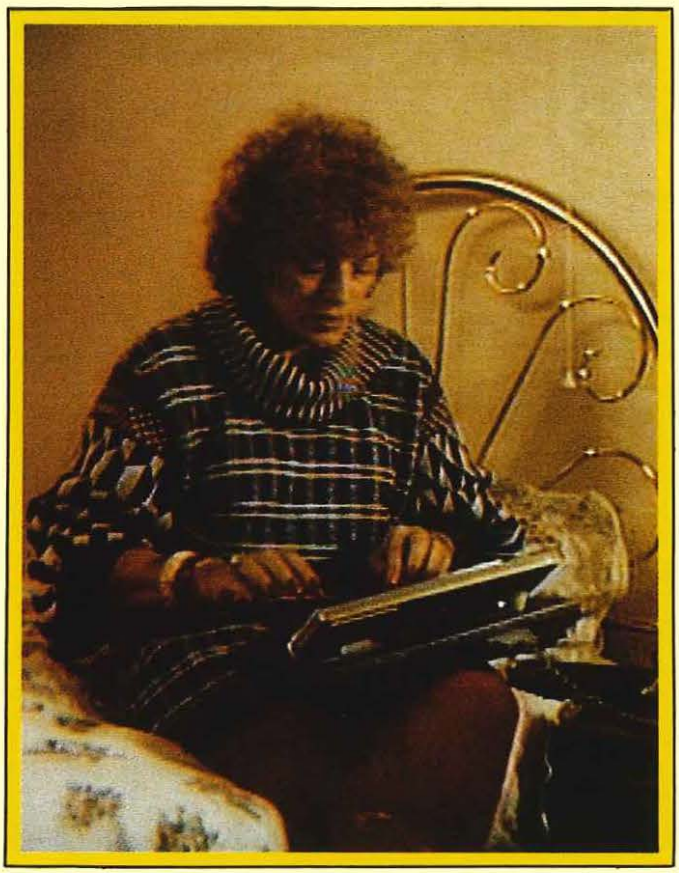
The international network continues to expand every year and now has nodes in 16 countries throughout the world. It is a 'closely coupled' system running identical software in each country and each of the nodes is as powerful as the other to create a unique, distributed network.

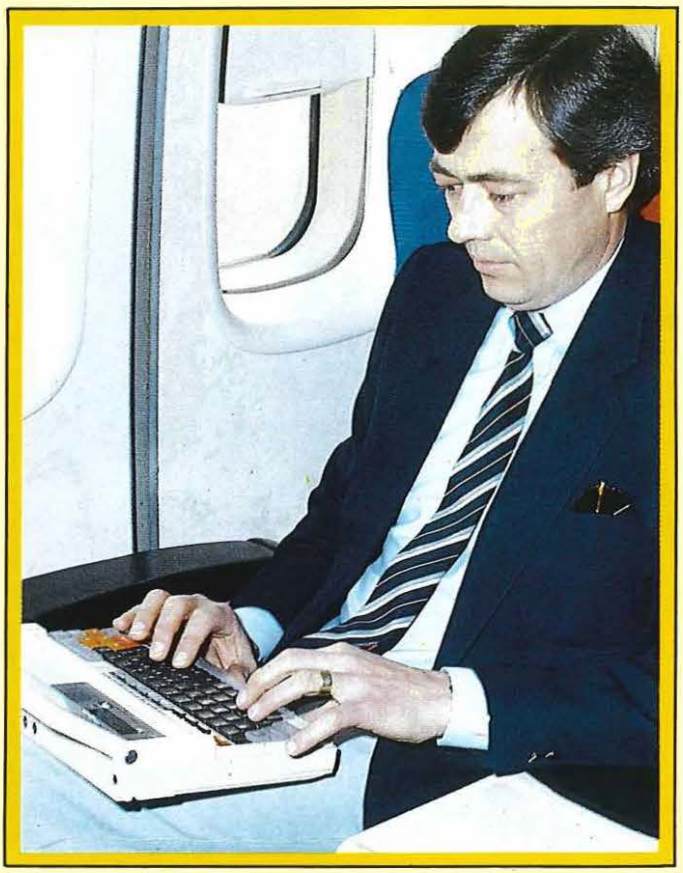
DIALCOM LICENSEES

Australia
Canada
Denmark
Eire
Germany
Hong Kong
Israel
Korea
Netherlands
Puerto Rico
Singapore
New Zealand
UK
USA

Peat Marwick Mitchell, the international firm of accountants and management consultants, were quick to see the potential of the system and their international staff now has more than 3,800 mail boxes linking most of the world. The system has proved so effective that PMM is now installing a direct link to the Telecom Gold computers and the company finds that Telecom Gold is quicker and cheaper for international messages than telex.

Stockbrokers W I Carr & Sons & Company (Overseas) Limited, use the service to receive up to the minute information from Tokyo. Information is transmitted to London as soon as the Nikkei Dow Jones Stock Exchange closes at around 5.00 am London time and it is then printed out and couriered to City clients before the London Stock Exchange opens.





Right: The London Stock Exchange where clients of a leading firm of City stockbrokers depend on information relayed from Tokyo by Telecom Gold.

Below: Mark Orson, communications analyst with an international firm of accountants and management consultants uses electronic mail to link offices both in the UK and abroad.

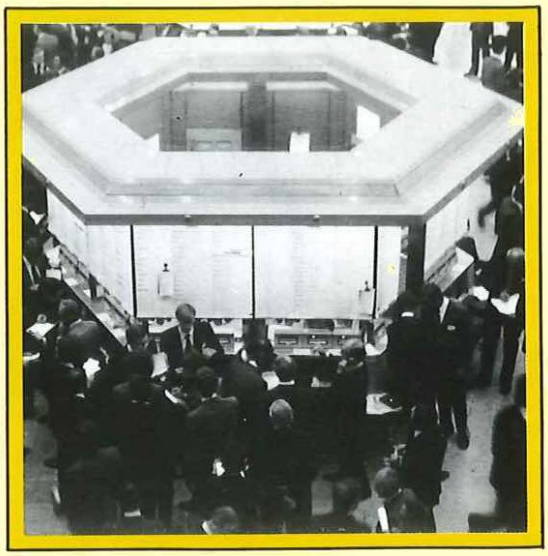
Mr R Oliphant is head of marketing for Telecom Gold.

Despite Telecom Gold's success, there continues to be a need for telex interworking because many of the world's one and a half million telex subscribers live in countries that will not see the development of an electronic network for some years.

There are also a number of secondary advantages of being able to access telex via electronic mail. Any equipment can be used and there is no need to dedicate either a machine or a line to do it. The system can automatically send telexes to a long distribution list and if a line is engaged it can continue to try the number until it gets through. It also notifies the user if the telex has been successfully transmitted or not.

The development of electronic mail has taken some unexpected twists. The original expectation of Telecom Gold was that large corporations would be the main subscribers and multi-national corporations, such as the Westinghouse Corporation, use Telecom Gold to research, collate and analyse international sales activity. But the majority of subscribers nowadays are small to medium sized businesses and private individuals. Journalists such as Jack Schofield of the Guardian and Ann Leslie of the Daily Mail have both discovered the benefits of the system.

The wide penetration into offices of micros and intelligent workstations, many of which have a communications capability, has meant that Telecom Gold now has a mass business market for its services. These businesses are attracted by the growing number of value added services that Telecom Gold has to offer which can vary from the setting up of specific systems where there is a special community of interest within or between firms, to the provision of gateways to electronic data bases.



A newly-developed information processing service for example, has proved particularly effective for the travelling sales force of a large company. The sales force, who are equipped with portable micros, plug into telephones each evening and put their orders into the system which then processes them and automatically generates reports. The warehouse gets an immediate statement of dispatches required; the payroll staff receive details of commission to be paid and the national sales manager receives a total picture of orders taken the previous day. The service can be run on a daily, weekly, or monthly cycle.

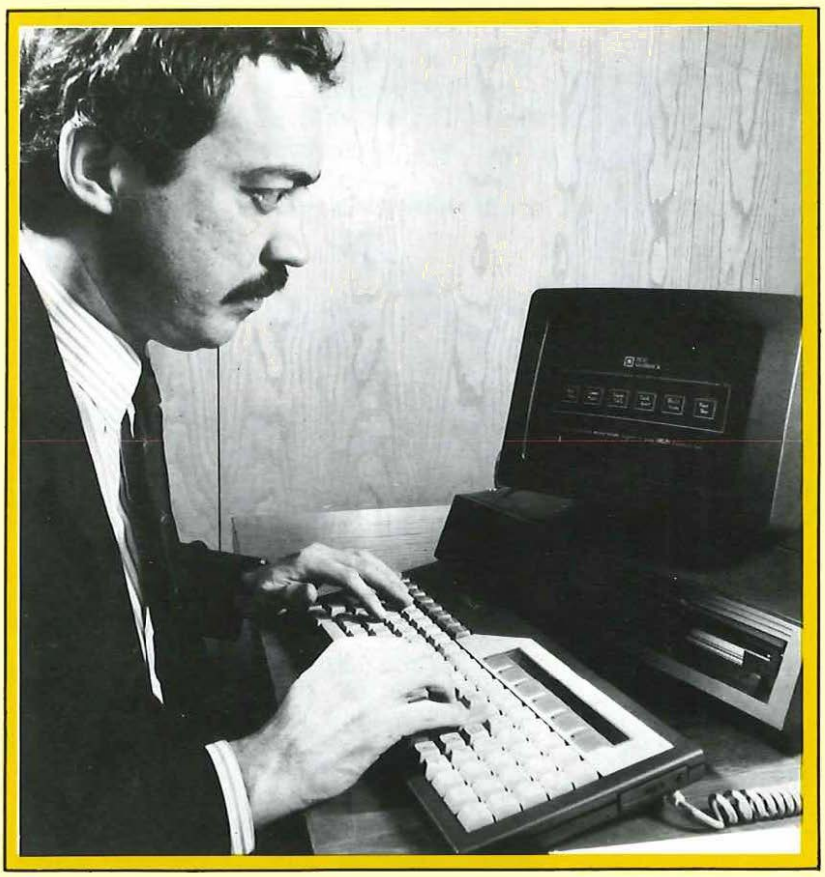
'Network for Law', recommended recently by the Law Society, is another specialised service which provides the standard specially for solicitors.

The extension of the mail service to include access to the increasing number of databases is another major area of development. Last year saw the opening of the gateway to the Official Airline Guide Electronic Edition to all Telecom Gold subscribers. This giant electronic database, which contains the schedules and fares of 700 airlines worldwide is continually updated with the latest information.

This year promises to see the opening up of another public electronic database, 'World Reporter', which will carry the text of all the major newspapers in the world – more than 250 million words. A recent survey showed that many subscribers are anxious to obtain up-to-date financial information, in similar fashion.

The coming year promises to be one of continued growth in electronic mail services. The first practical implementation of the X400 international standards for message exchange between different messaging systems is set to happen and the probable move to deregulation of data services is also set to have a major impact on the electronic mail market. ◑

*British Telecom, the largest of ITT Dialcom's licensees, plans to acquire all its electronic mail and messaging business including software, licences and copyrights.



British Telecom Journal
Spring 1986

A good deal for all

Below: Mitel's extensive range of business communications products.

Five important decisions have been taken to boost British Telecom's standing as a manufacturer and operator. It has bought control of the Mitel Corporation and ITT Dialcom; won the licence to provide services on the Isle of Man; linked with Du Pont in a hi-tech venture and is helping to set up a new Malaysian company.

British Telecom has acquired a 51 per cent shareholding in Canada's Mitel Corporation, one of the world's leading suppliers of business communications systems, at a cost of about £160 million. The decision follows the acceptance by the Trade and Industry Secretary of undertakings given by British Telecom designed to safeguard competition within the UK.

According to Sir George Jefferson, Chairman of British Telecom, Mitel's new relationship will give it the financial strength to exploit its product range to the full. The undertakings given to the UK Government will not inhibit Mitel's ability to sell its equipment in the UK through non-BT outlets and the acquisition will add an international dimension to British Telecom's business, he said.

Mitel has secured greatest recognition for its family of microprocessor-controlled office switching systems (PABXs) for voice and data, but also make specialised telephone sets, voice/data terminals and call-cost accounting equipment. Its products are sold in more than 80 countries, and are designed to interface with integrated services digital networks (ISDN) to provide users with the integration of speech and data which is crucial for the future development of information technology.

Mitel has about 25 per cent of the world market for PABXs up to 100 lines, and this market constitutes about 40 per cent of the entire world market for PABXs. A significant proportion of Mitel's market share has been occupied by the SX-100/200 family, of which some 40,000 systems have been installed worldwide. This family will now be augmented by a digital enhancement to the SX-200, increasing its capacity from 150 to 350 lines and making it capable of handling both speech and data.

The company also uses digital switching for its large PABX, the SX-200 and it is shortly to introduce a new digital switch in the UK and Europe – the SX-500 which will provide for up to 24 exchange connections and 80 extensions.

Facilities

Mitel has manufacturing and research and development facilities in Canada and the United Kingdom. Manufacturing plants are located in the US, Puerto Rico, Hong Kong, West Germany, Mexico and New Zealand.

Mr Deryk Vander Weyer, Deputy Chairman of British Telecom, is the new Mitel Chairman. He will carry out this role in addition to his duties on the British Telecom board. Mr Anthony Griffiths continues as Mitel's President and Chief Executive Officer. Appointed to the board are Mr Christopher Bull, British Telecom's Corporate Treasurer, and Mr David Leakey, Deputy Engineer-in-Chief of British Telecom. Those continuing in membership include the company's co-founders, Mr Terence Matthews and Dr Michael Cowpland.

British Telecom has won the licence to continue as the telecommunications operator on the Isle of Man for the next 20 years. There was a unanimous recommendation by the Isle of Man executive council to offer the licence to the company and this was approved without dissent by Tynwald. A separate subsidiary company, Manx Telecom Limited, which has already been registered on the island, has now been established to run Manx services as part of British Telecom's Overseas Division.

- In a joint venture deal with Du Pont of the USA, British Telecom is to be involved in the development, manufacture and marketing of optoelectronic components and devices used with optical fibre telecommunications and other segments of the electronics industry.

A new company called BT&D Technologies will begin production next year. It will employ about 150 people in a plant located near British Telecom's Research Laboratories at Martlesham Heath, near Ipswich.

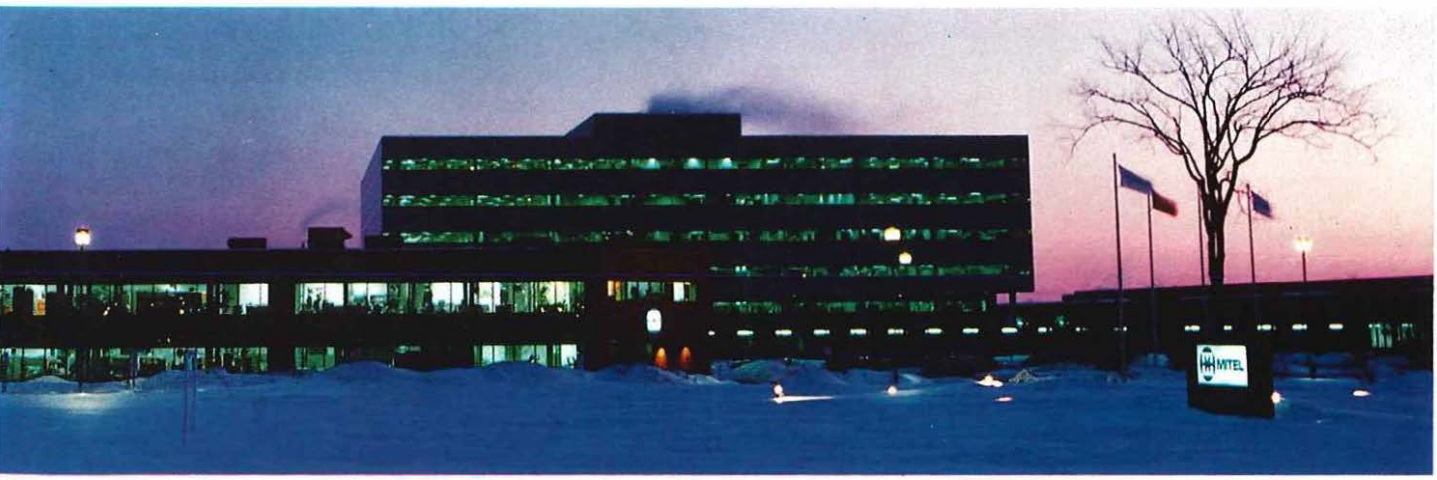
- In Malaysia, British Telecom has joined forces with three local companies in a bid to set up a new subsidiary company, Britarafon, which will seek to develop opportunities in all spheres of telecommunications. Each partner will have a 25 per cent share.

A memorandum of understanding has been signed by Mr John King, Managing Director of British Telecom's Overseas Division, who believes that the Far East is becoming one of the world's most competitive regions in the field of telecommunications.

- British Telecom has also taken over ITT Dialcom Inc, a world leader in electronic mail and messaging systems. See 'Telecom Goldrush' on page 56 for full story.

Below: British Telecom's headquarters in the City of London.

Bottom: Mitel Corporation's headquarters at Kanata, Ontario.



British Telecom Journal
Spring 1986

Plotting the way ahead

Tom Fulton

British Telecom's immense store of technical artwork, engineering drawings and maps can now be used more effectively thanks to a new high-resolution computer graphics system pioneered in Glasgow.

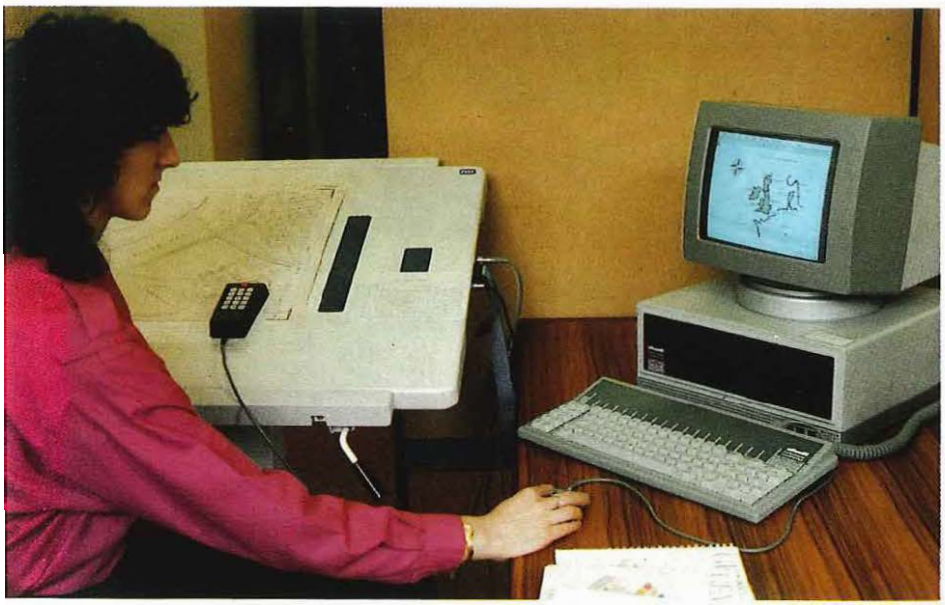
Top right: Senior drawing office assistant May Monaghan modifies map data using one of the Glasgow Graphic Bureau's twin screen 'Interact' workstations.

Below: Day-to-day operations are not disrupted as drawing office assistant Fiona Cunningham uses an off-line data builder to capture digital map data.

Computer graphics offer high-speed access to the information held in the vast numbers of drawings used throughout British Telecom. They cover a range of facilities from the presentation of statistical information such as graphs, bar-charts, and pie-charts on a micro or personal computer to the high resolution, or good quality, graphics based on a mini computer. High resolution graphics are widely used for such purposes as the production of artwork for printed wiring boards and for detailed work on Ordnance Survey maps and buildings engineering drawings.

There are passive systems, such as British Telecom's Video Map System, which are very fast at retrieving and displaying maps, and such systems fulfil an important role where viewing of map data only is required with a limited graphics capability. But they do not have the interactivity or flexibility required for local line plant or building engineering service records and also present problems in providing the print output required.

Many micro based CAD systems are also available, and are used successfully in some parts of British Telecom but they have limited capabilities and do not have the capacity to hold network information geographically.



New systems support package

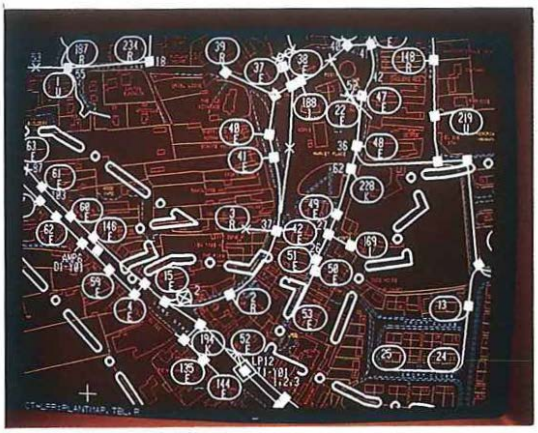
Local Communications Services Computer Graphics Unit offers a support role for all aspects of graphics systems covering areas such as:

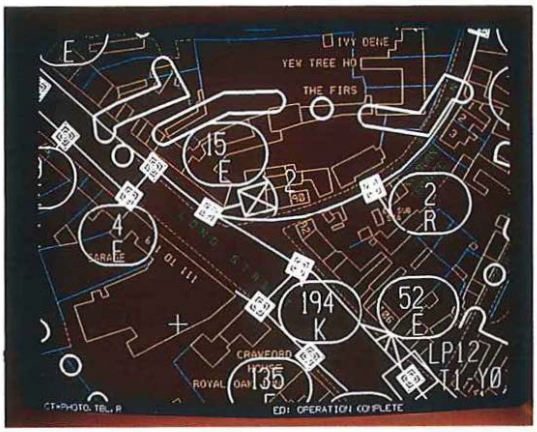
- ★ Software development for local line records, cable TV records and for building engineering services
- ★ Training for operators with on-site support if required
- ★ Consultancy services to aid planning and installation
- ★ Consultancy services for system management
- ★ Bureau services to help with initial data capture of building and possibly for maps, where the maps are not yet available from Ordnance Survey in digital form.

It is now possible for a British Telecom District to gain the benefits of Interactive Computer Graphics at a starting price of £5000 by utilising the lower tier of its two-tier concept. The District can then control growth into the more sophisticated High Resolution Tier, costing between two and three hundred thousand pounds, at a pace relevant to its own situation and requirements.

In 1979, British Telecom started to develop a fully interactive graphical data base which would allow all parts of a drawn record to be identified and classified, so that the intelligence associated with the separate elements would not be lost. To know, for example, how many cables are in a duct, is not a great deal of value unless it is also known where the duct is, and experience has shown that an alpha-numeric data base alone cannot properly describe connectivity. The main thrust of the development work has come from Local Communications Services Graphics Unit, and from the British Telecom London software development team. The results of their work have enabled British Telecom to gain early benefits from the introduction of High Resolution Computer Graphics in other parts of the business.

Since its installation in Pegasus House, Glasgow, in 1980, the system has been expanded and enhanced to keep pace with technological changes in the field, and the present system now has 15 graphics workstations operating from a VAX780 processor. Ten workstations are in Pegasus House, and the remainder operate over KiloStream links in Aberdeen, Edinburgh, Newcastle, Cardiff and London. Similar systems have also been installed in BTL, Central Midlands District, and in British Telecom International drawing offices.





The system's total flexibility has allowed the software development to progress with few restrictions, and users are now able to prepare and maintain a wide range of records using the digitising methods and computer software programmes available. Records currently being maintained include line plant records, plant on map, cable and duct diagrams, and cable television records.

Because of its built-in intelligence, diagrams can be interrogated to obtain reports giving information such as the number and type of furniture or equipment in a given room, or building. Reports are always generated from the most up-to-date diagrams and therefore reflect all approved modifications. If historical information is required it is a simple task to run the software on previous issues of the design files.

Bottlenecks

A common problem for all computer systems occurs when the required data is already held on a paper system, and the subsequent transfer on to computer costs time and can lead to bottlenecks. British Telecom faces an immense problem in this respect because it holds more than 150,000 Ordnance maps, together with a vast number of duct and cable diagrams, and other plant and engineering records for around 7,000 buildings.

Optical scanning techniques will help eventually but such techniques do not yet offer the degree of intelligence in the finished product to be of real use for High Resolution Computer Graphics. The Computer Graphics Unit has tackled the problem by introducing a second tier into the graphics system which allows existing data to be digitised on micro-based systems off-line from the main processor. This data-builder, costing under £5,000, utilises Glasgow developed software running on commercially available microcomputers connected to a digitising tablet.

When the required data has been digitised, it is then batch-loaded on to the main processor – possibly via the public switched telephone network (PSTN) – ready for a final check and edit on the graphics workstation before being utilised operationally. In this way, day-to-day operations are not disrupted by data capture.

The system is based on a design plane which, when considered as a piece of electronic graph paper, has more than four billion points on its 'X' and 'Y' axes – capable of plotting a graph of the British Isles actual size.

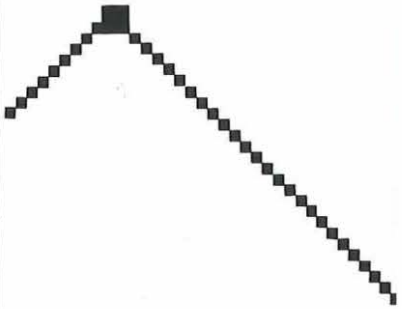
Data is stored at real scale (1:1), and by using zoom and pan commands, any desired part or area of a record can be located. It is only when a hard copy output is required, that scale needs to be considered, and since it is stored at real scale, the one file can be plotted out at a variety of scales to suit any particular purpose.

Digital systems were considered expensive, in the past, but costs have been consistently coming down and now price comparisons show them to be both cost competitive and cost effective. ⓣ

British Telecom Journal
Spring 1986

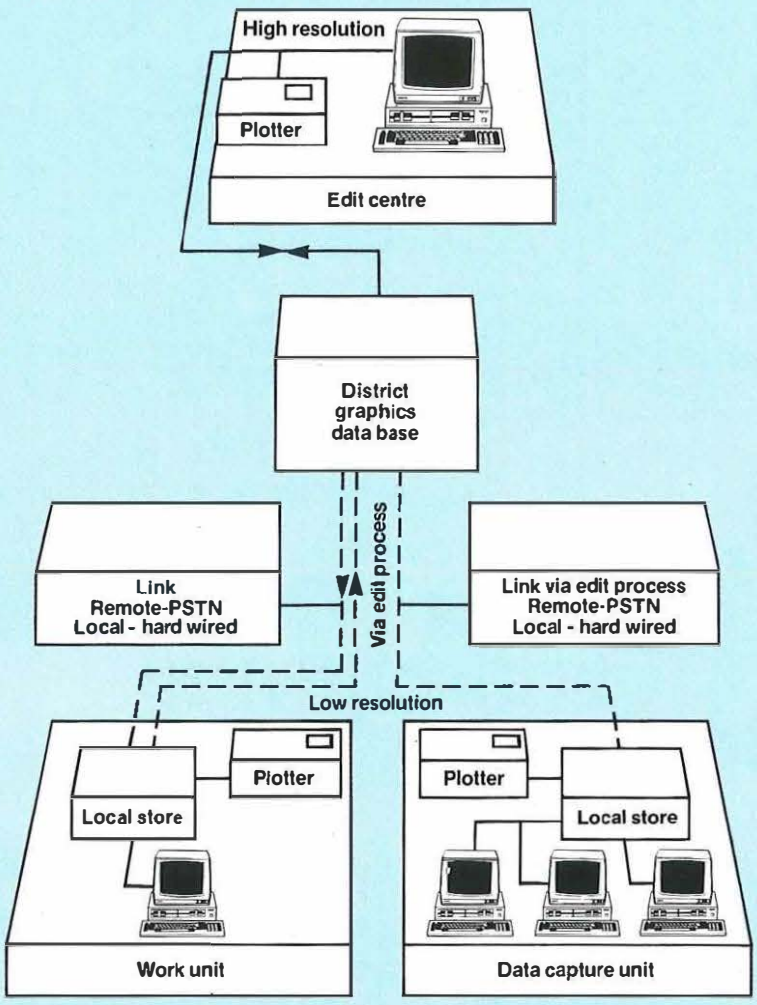
Plotting the way ahead

Left: Computer graphics can be displayed on any scale required.



Mr T S Fulton is system manager of the Computer Graphics Unit in Glasgow.

Two tier graphics system



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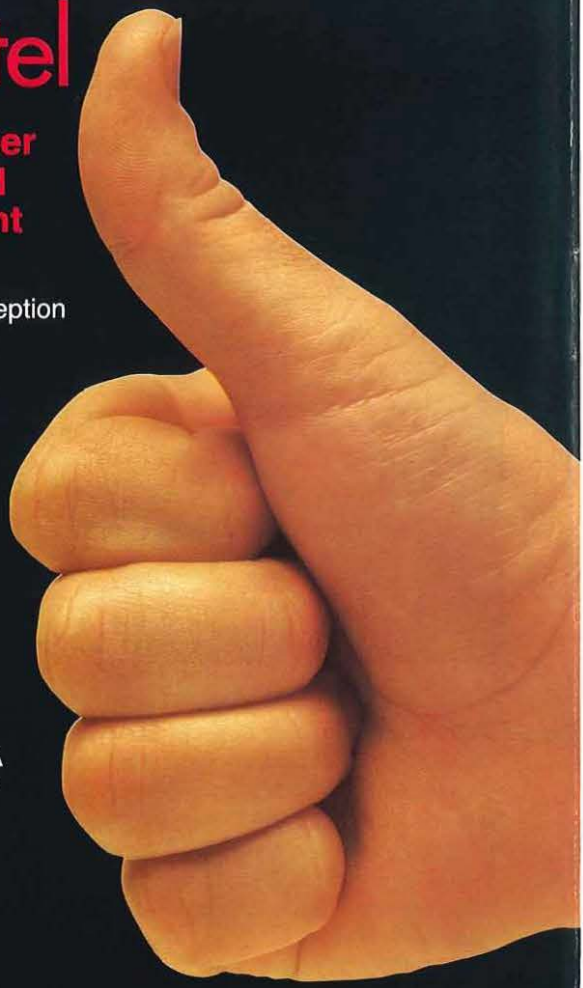
Telspec-Ceptel

automatic changed number interception and general announcement equipment



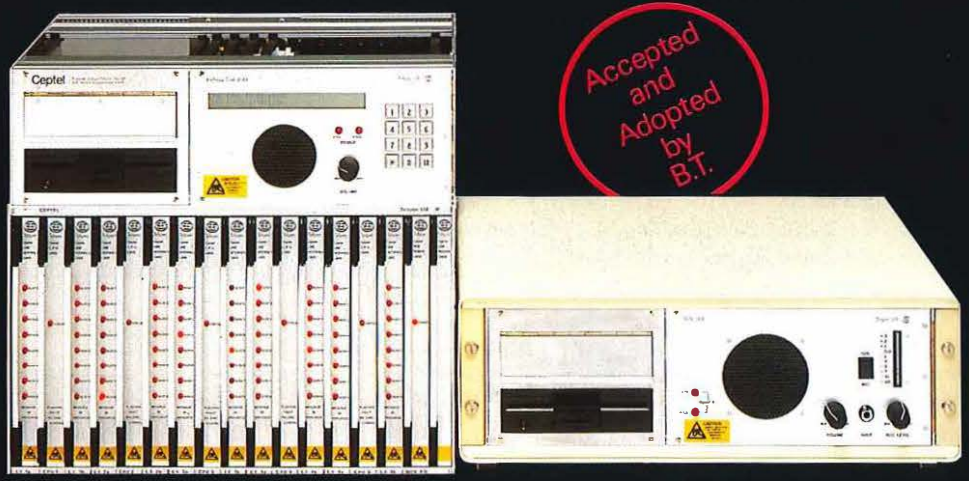
Telspec's CEPTEL system provides automatic interception and announcement for changed telephone numbers configured in the equipment. The service is provided without the interception of an operator as CEPTEL works on a digital speech storage technology using a microprocessor. It can be used with all types of British Telecom Exchanges employing 2 wire (A & B wire) or 3 wire (A, B & P wire).

The CEPTEL exchange based equipment consists of two units, the exchange control shelf and the line interface shelf, being modular in sub units of 8 lines – a total of 80 terminations can be provided on a single line interface shelf. Further expansion is provided for a maximum of 960 terminations using a single exchange control shelf and 12 line interface shelves fully equipped. The CEPTEL has a 3v 100mA hour re-chargeable battery to support the memory for 4 days if the power supply is disconnected.

CEPTEL FACILITIES
— message loading.
— message modification.
— traffic analysis.
— audio monitoring.
CEPTEL continuously carries out self-diagnostics.

CEPTEL STUDIO UNIT
The Ceptel studio unit is desk mounted and mains driven and is used to prepare the floppy disc for the CEPTEL exchange unit. The system is flexible, allowing options for changes of steering data etc.

Now also available,with remote working facility...



Accepted and Adopted by B.T.

To check out CEPTEL in detail send for your full colour brochure to Telspec Limited , Lancaster Parker Road, Rochester Airport, Rochester, Kent. ME1 3QU. Tel: (0634) 687133. Telex 965617 TLSPCG.

Dawn of digital man

A world in which mankind will be able to communicate with machines to obtain information incredibly quickly, regardless of location, has been described to audiences all over the country in the Faraday Lecture tour, presented this year by British Telecom.

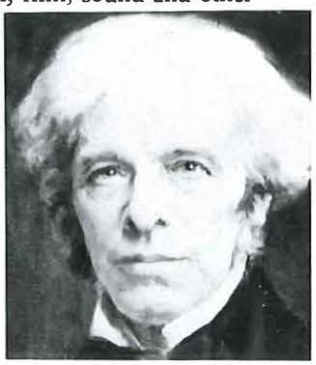
The tour, named after Michael Faraday – the 19th Century 'father' of electromagnetism and an early electronics pioneer – ended in March after a circuit of 16 UK locations ranging from Edinburgh to Exeter and Belfast to Birmingham.

The 57th series of Faraday Lectures was entitled 'Beyond the telephone – the intelligent network' and was presented by British Telecom on behalf of the Institution of Electrical Engineers.

Exciting

A total audience of 70,000 people comprising schoolchildren, members of the IEE and the public at large, heard that telecommunications had the fastest changing technology of any industry. With the dawn of the 'digital era', when all types of information from the written word through television pictures to computer data can be sent over the same network, engineers and scientists were facing many exciting challenges.

Supported by live demonstrations, high quality audio-visual material, film, sound and other special effects, the lecturers, led by Mr William Jones, British Telecom's senior director for Development and Technology, described the mechanics of turning speech into a digital signal and explained the enormous capacity of multiplexed optical fibres.



The whole range of British Telecom digital services now becoming available, including data transmission, videoconferencing, fax, videotext, electronic mail and message handling, were covered in the lecture which concluded with a prediction that high-speed digital communications and the 'intelligent network' will have a dramatic effect on the future.

The Ascot voice-recognising telephone was demonstrated and the lecture also explored the further possibilities of voice-recognition. Audiences were fascinated by the prospect of man speaking to man through holographic images and were told that a greater compatibility of man/machine interfaces and the ability of an intelligent network to process information into its most suitable form could mean that barriers to true communications were crumbling.

The Faraday Lectures were instituted in 1924 and, although an IEE event, have in recent years been presented by such major organisations as British Petroleum, Standard Telephones and Cables and the Central Electricity Generating Board.

Digital Man, the dots-and-dashes figure, became the star of British Telecom's Faraday Lecture tour which cost about £750,000 to stage nationwide.

Left: Michael Faraday, the 19th Century pioneer.

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3M

New North Sea cable

British Telecom, Denmark, Finland, Norway and Sweden have signed an agreement for the provision of an optical fibre submarine cable system between the UK and Denmark in 1988.

The total project will cost £32 million which includes £24.5 million for the supply of the system, a contract for which has been awarded to the British company STC plc following international competition between potential suppliers.

The new cable, from Scarborough in the UK to Blaabjerg in Denmark, will be a major step in the extension of the international digital communications network in Europe. It will be capable of carrying around 8,000 simultaneous telephone calls or a mixture of services including data and television.

The 345 nautical miles-long cable will comprise two optical fibre pairs and the main cable will be laid by the British Telecom International cableship, *CS Alert*, and the coastal ends by the Danish cableship, *Peter Faber*.

The cable system will be laid and buried using the cable-laying and burying plough, jointly owned by BTI and and the Danish P&T and currently being used on the UK-Belgium 5 link (See page 43).

Tape for the blind

British Telecom's half year report to September 1985 has been produced on audio tape for its blind and partially-sighted shareholders.

The 40-minute recorded report includes a message from the Chairman, Sir George Jefferson, a review of operational activities by the Chief of Operations, Iain Vallance and the financial review by the Corporate Director for Finance, Douglas Perryman.

Fast Tokyo link

The first all-digital public telephone link to span the world's oceans has been set up by British Telecom International (BTI) and its Japanese counterpart KDD.

A new satellite link interconnects modern digital exchanges in London and Tokyo to give faster call connection and clearer speech transmission.

A total digital path between the two was made possible by the commissioning of a new satellite transmission technique known as TDMA (time division multiple access) via an INTELSAT satellite over the Indian Ocean and British Telecom's earth station at Madley in Herefordshire. TDMA has also been in use on the UK-USA route for several months but it has not yet been practical to make that route digital all the way.

To date 60 digital circuits are in operation between British Telecom's international exchange at Keybridge House in London and its Japanese counterpart. More than a thousand similar circuits are to be introduced shortly by British Telecom for services to the USA, Hong Kong and Australia.

British Rail 'getting there'

The first stage of Britain's largest private telephone exchange has been installed by British Telecom for British Rail.

Customers calling Southern Region stations and offices in London can now save time and money by dialling direct to the required extension.

The system is part of a multi-million pound scheme giving British Rail a single telephone network for the whole of London, with direct dialling both to and from the public network and over British Rail's own national trunk network.

Forestry deal

A £1 million order to provide the Forestry Commission with a headquarters computer system and a nationwide terminal network has been announced by British Telecom and will be supplied by its systems house, British Telecom Applied Technology (BTAT).

BTAT will provide a VAX 8600 central processor and a network of KiloStream circuits, private wires, multiplexers and dial-up modems to conservancy and district offices for operation of new accounting and adminstration systems.

British Telecom has already supplied 115 Merlin M4000 multi-tasking microcomputers for the Commission's conservancy and district offices and an IT440 voice/data switch for its Edinburgh headquarters. The latter is the first of its kind in the UK.

Contracts

Plessey has been awarded a £17 million contract by British Telecom for a system which will help to solve major cable faults on the national long-distance telephone network. Called ASDSPN, or 'Aspirin', the system is a computer-controlled Automatically Switched Digital Services Protection Network which constantly monitors the trunk network and switches traffic to an alternative route if problems arise.

Pressac, the Nottingham based manufacturers of electromechanical components for the telecommunications industry has been awarded a further contract worth £1.2 million by British Telecom Consumer Products Division.

Hear all about it!

The first ever phone-in Budget service organised by Voicebank, British Telecom's voice messaging system, proved a success with more than 2,500 calls in the first 36 hours.

Businessmen were able to listen to details of the Chancellor Nigel Lawson's Budget speech provided by Price Waterhouse, one of Britain's leading firms of chartered accountants. They could also leave their names and addresses to receive a written copy.

Details were recorded on to Voicebank within 90 minutes of the Chancellor sitting down and up to 32 callers were able to listen to the five minute message simultaneously. Names and addresses were stored on the Voicebank 'mailboxes' in readiness for mailing on the following day and the whole exercise was completed with the minimum of delay.

Credit card boost

Shopkeepers in parts of London are the first to use a new data service launched by British Telecom to provide shoppers with fast and automatic credit-card transactions. The service will initially use Barclaycard's new DARTS terminal, which allows staff to authorise credit cards and process the sale swiftly, simply and securely, just by wiping the card through the terminal and keying in the amount of the transaction.

Sale and card details are automaticaly transmitted over British Telecom's data network, Packet SwitchStream (PSS), direct to the relevant card company's computer. The British Telecom network behind this service –▷

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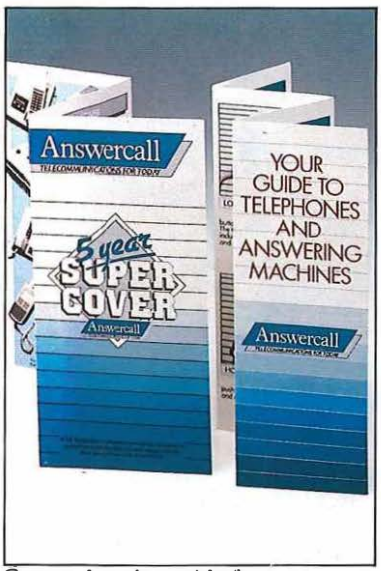

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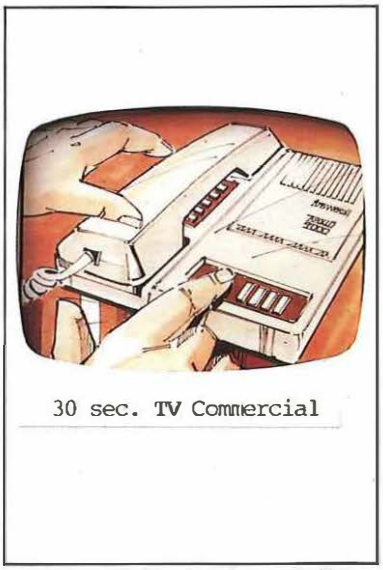

30 sec. TV Commercial

National TV campaign early '86.

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known as Quick Connect-TPAD – is a new speedy access link to PSS.

Under the Quick Connect service, British Telecom provides a direct link from the retailer's premises to a local telephone exchange, where it is connected to a high-speed digital switch. This ensures that the transaction data fed into the terminal will be passed over the high speed link into PSS – and then to the card company computer. This is significantly faster than dialling up the same connection over the ordinary telephone network.

Indian agreement

A memorandum of understanding has been signed by British Telecom and Multitech International Ltd. Under the agreement British Telecom and Multitech International, a company within the Dalmia Group of India, will explore the possibilities of manufacture and sale in India of British Telecom products.

The agreement was signed in London by Mr Geoff Price, chief executive of British Telecom's Teletrade division, and by Mr Sanjay Dalmia, president of the Dalmia Group. The signing marks the culmination of discussions between the two companies which began in March of last year.

Scottish Office order

British Telecom has been awarded a contract worth about £2.8 million to modernise the Scottish Office telecommunication system.

Outdated elctro-mechanical PABXs at 14 offices in Edinburgh will be replaced by a fully digital communications nework. The first of the exchanges will be in service in September this year and the contract is to be completed in 1987/88.

The order is the biggest won by British Telecom in Scotland and is for 14 Merlin DX digital call-connect systems, all interlinked by MegaStream, the British Telecom National Networks high-capacity digital private-circuit service which can be used for both voice and data. Nearly 400 direct exchange lines and more than 4,000 extensions will be provided.

Cash for cable

British Telecom, the builder of the cable TV network used by Coventry Cable Limited, is to acquire the majority of Thorn-EMI's shareholding in the company together with its total shareholding and sole ownership of Swindon Cable Limited.

The two companies will run as separate subsidiaries of British Telecom. Mr Colin Browne, Chief Executive of Broadband Services, said that the developments were in line with British Telecom's continuing commitment to the long-term future of cable TV in the UK.

Thorn-EMI has decided to reduce its involvement in a number of entertainment-related areas.

New city network

More than 40 banks and dealing houses have signed up for Dealerinterlink, a low-cost, on-demand private network system which has been launched by British Telecom in time for Stock Exchange deregulation later in the year.

The service enables private circuits – heavily used in the City to provide fast trading links between two points – to be established within 24 hours. It will also give organisations a flexible system around which to arrange their, as yet, unpredictable trading routes.

Dealerinterlink, based at British Telecom's Moorgate telephone exchange, provides users with a block of 30 links for voice or low-speed data.

Going on the air

British Telecom has entered the private mobile radio market with a new service, Baselink, which provides a local two-way radio service for businesses which need to keep their mobile workforce in contact with their office or base.

Customers can be served by one of a large number of shared radio stations already installed throughout the UK, or can opt for a complete Baselink radio system for their own exclusive use.

Baselink is growing rapidly and local coverage areas will expand to provide complete regional services, with national coverage available next year.

Baselink is geared towards fast and efficient data communications and can be used, for example, to send instructions to a company's mobile radio personnel and for the receipt of up-to-date, accurate reports.

● British Telecom Mobile Communications sponsored a royal performance of Handel's Messiah at the Royal Festival Hall as part of the Huddersfield Choral Society's 150th anniversay season.

Instant translations

A new service offering the simultaneous translation of telephone conversations with non-English speakers has been launched by British Telecom. It can be used for straightforward one-to-one calls, or for multinational conference-calls involving up to 40 people, including the translators.

British Telecom's Confertel Bureau, which regularly links business people in international phone meetings, have joined with Interlingua TTI, one of the world's leading translation agencies, to offer the new service.

The Confertel Bureau uses specially developed equipment to ensure good quality lines and the calls are constantly monitored by trained operators who are available to offer advice and assistance at any time.

Interlingua TTI have interpreters in nearly every language, and experts in common business disciplines such as law, finance and engineering. Strict confidentiality is guaranteed to all users of the service.

Appointed

Mr Richard Worsley has been appointed Director of British Telecom's Corporate Personnel and Corporate Services. His duties will include the administration of the company's central headquarters in London.

Mr Worsley, 43, was formerly head of personnel for British Aerospace, which he joined three years ago from the CBI where he was director of social affairs.

Most of his working life before that was spent with the Engineering Employers' Federation (EEF), working some time at the EEF London headquarters and some time with three of the constituent associations of the Federation in Manchester, Bristol (deputy director) and Ipswich (director).

Cellnet revs up!

A Cellnet racing team takes to the tracks this season as part of a £1 million sponsorship package for Formula 3 motor racing.

Cellnet are teaming up with Glen Waters' Intersport Racing to back two young British drivers – David Hunt, 24, younger brother of former World Champion James, and Keith Fine, 23. Hunt drove a Cellnet car in two races last season.

In addition to the Cellnet team competing in all the Formula 3 Championship races this season, Cellnet is also sponsoring the Formula 3 race at the British Grand Prix plus the world's richest Formula 3 event. The Cellnet ▷

Staying streets ahead

Out with the old and in with the new . . . that's been the name of the game in the North-East where Project Hothouse has been in full swing during the last few months.

Purpose of the project has been to modernise about 3,000 payphones in the area by replacing the traditional red kiosks with new-style stainless steel housings.

British Telecom staff assemble the housings at a leased factory near Newcastle and test them so that they can be taken to the selected sites and bolted into place following removal of the old kiosks.

Formula 3 Superprix at Brands Hatch on August 2-3 boasts a £5,000 winner's prize and more than £20,000 for the heat winners.

Marketing support will include a Cellnet test drive competition and the use of a fully-equipped, self-contained, hospitality unit which will cater for up to 200 guests in luxury-style comfort. The unit will be used by Cellnet retailers and dealers at the Formula 3 races and other sporting events in the UK. Supporting literature and promotional material such as clothing, gifts and posters will also be available.

On site Paging

The Page, a British-made radiopaging system for exclusive use within customers' premises, has been launched by British Telecom Site Services, a new division set up to provide specialised technical help for buildings and events.

As well as a standard 'bleeper' function, the pocket pagers can also display messages of up to 40 letters and figures. They operate within the customer's premises or construction site.

Messages can be transmitted to individuals, to special groups, or to all users, either by a switchboard operator or by extension telephone users. Predetermined messages can be activated automatically by security alarms or by dialling a special number on an internal telephone system. Automatic logging of paging calls is also possible.

Phones in the sky

British Telecom International (BTI), British Airways and Racal-Decca Advanced Development are teaming up to conduct trials of what is believed will be the world's first satellite telephone service for air travellers.

The trials, which will begin next year, will be conducted initially from Racal's Jetstream aircraft. Later, they will be extended to scheduled British Airways flights.

Passengers will make calls by inserting a credit card into a specially adapted payphone. This will unlock the handset and connect the caller with a ground-based operator in the UK who will connect the call.

On the ground, BTI will dedicate one of the antennas at its Goonhilly satellite earth station to aeronautical services.

Live debate on TV

A two-way television link set up by British Telecom between Oxford and Cambridge made possible the first simultaneous debate involving the two universities' union societies.

Using outside broadcast equipment that normally covers national events such as Wimbledon, Hickstead and other major sporting activities, British Telecom provided six sound and vision circuits between the two debating halls to allow the best choice of pictures.

At each location, two giant television screens and several smaller monitors showed proceedings at the distant end. The facilities were given free, as part of British Telecom's contribution to Industry Year.

Tan creates jobs

Bristol-based Telecom Tan, British Telecom's telephone marketing operation, has taken on an additional 50 new employees to staff a new operations centre for the Marketing Services division to help cope with 8 million calls this year.

More TV choice

Satellite television programmes are being offered by British Telecom to residents of the Barbican, central London.

The company is also taking over the relay systems previously operated by Visionhire Cable in Bracknell, Berkshire, and plans to offer residents there a package of new television programmes in addition to the existing relay services.

The Bracknell systems currently

Well done!

A man of distinction 12 times over . . . that was the unique achievement of 21-year-old former Martlesham apprentice Richard Aldridge in his B/Tech Higher National Certificate examinations.

Richard, was presented with a special award by Lord Mottistone (left), President of the Council of the Society of Electronic and Radio Technicians. Mr John Alvey, British Telecom's managing director of Development and Procurement and the company's Engineer-in-Chief was also present at the ceremony.

distribute television and radio service to about 11,000 homes and most have spare capacity which British Telecom plans to use to offer the enhanced range of TV services.

Barbican residents are being offered satellite programmes over the existing cable TV system acquired by British Telecom last year. The selection includes films, the Arts Channel; Screen Sport; the Children's Channel and Lifestyle programmes together with a text channel for international news and financial information.

AccountCall on line

Telephone customers in Bristol and Bath can now dial calls from many public payphones without either cash or Phonecards. The new service – AccountCall – has started as a trial using more than 700 modern electronic payphones in phone boxes and is expected to be extended to cover the whole of the country. The phones offering the service will continue to provide normal coin-operated calls.

Using the telephone keypad, callers enter a code which avoids inserting cash and the cost of the call will then be added to the customer's phone bill. The calls are logged on separate accounts and sent with the quarterly phone bill.

For businesses, any member of staff can be given the AccountCall facility and separate statements will show the number of calls being made, by whom, and the cost, eliminating the need for individual expense claims for phone calls.

There are three levels of service. Full service allows calls to all directly dialled national and international numbers. National service allows calls to any number in the UK. Specified number service allows calls to one number only.

A matter of time

British Telecom and Accurist Watches Ltd have joined forces through the speaking clock – Timeline. Since the end of March, British Telecom's most popular phone-in service, heard by more than 230 million callers a year, has carried the name of one of Britain's longest established and most popular watches in an experimental trial.

Crown contract

British Telecom has won a contract to provide mobile phones to the Crown Suppliers, the Government's central purchasing agency.

Telecom Jade has been chosen principally for the Government car service to provide a continuous mobile phone facility.

The Crown Suppliers say that the contract will enable them to standardise in-car phones to eliminate any incompatibility of hardware and systems.

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- STEEL WALL MOUNTING FRAME
- SIZE: 310 x 260 x 190mm

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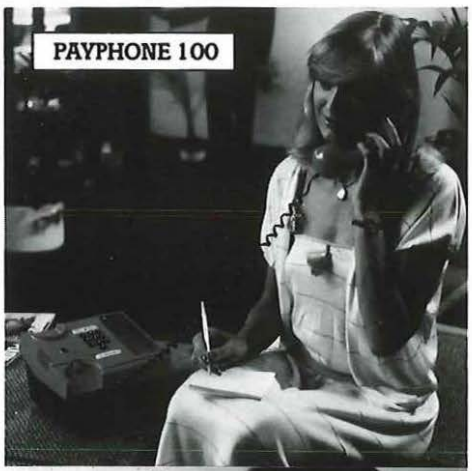

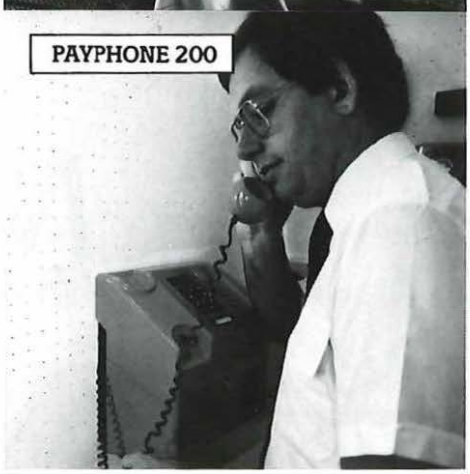

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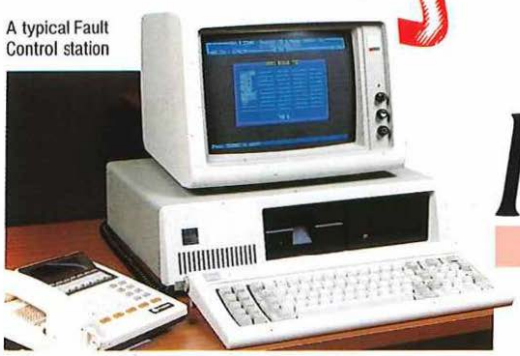

A typical Fault Control station

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It could end the public's search through its pockets and purses for the right coins to make calls.

Cashless calling is made possible – and highly practical – by the PP2000 Payphone range which Plessey has developed. This range provides the most comprehensive and up-to-date facilities yet designed.

The PP2000 range can be used with credit cards, bank cards, electronically coded coins with pre-paid value, and normal coins.

With its PP2000 range, Plessey recognises that credit cards are increasingly replacing cash in everyday life – internationally. The Payphones therefore accept cards such as American Express, Visa and Mastercard.

The Plessey cashless call system makes the whole business of call charging easy for both the telephone administration and the user alike.

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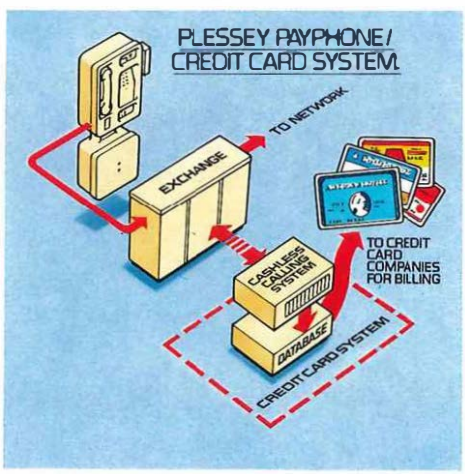
The control for the cashless call system is located at a convenient point in the network.

The Payphone automatically accesses the system via the network. The caller is prompted on the necessary steps to make his call by a series of synthesised voice messages.

Simultaneously, the system communicates with the data base identified by the credit card to confirm its validity. As a security feature, invalid data – such as for expired, stolen or blacklisted cards – will cause the system to terminate the call.

The system also automatically compiles a call record for subsequent transfer to the administration and the credit card company for charging.



All the Payphones in the Plessey PP2000 range are easy to install, maintain and operate.

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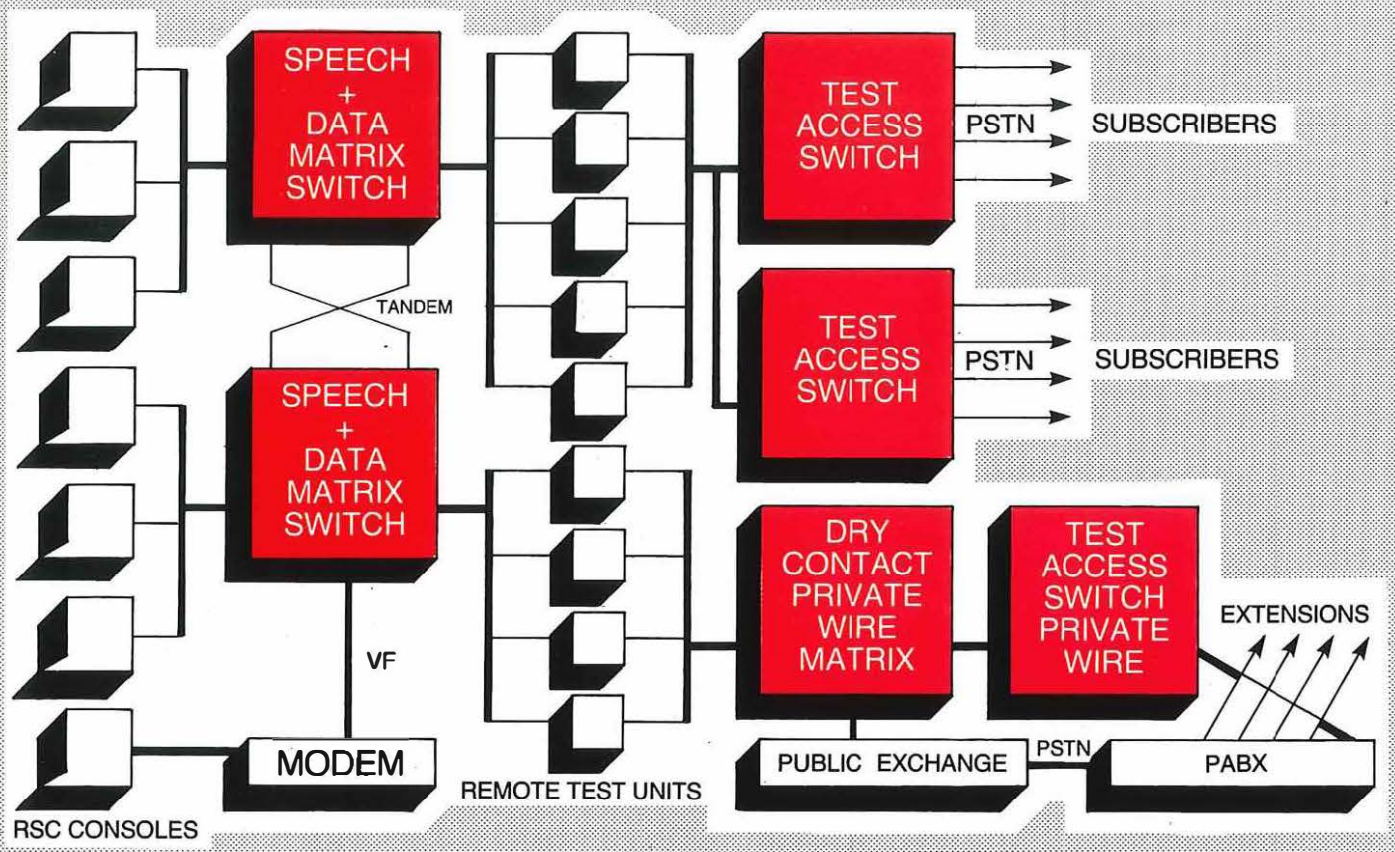

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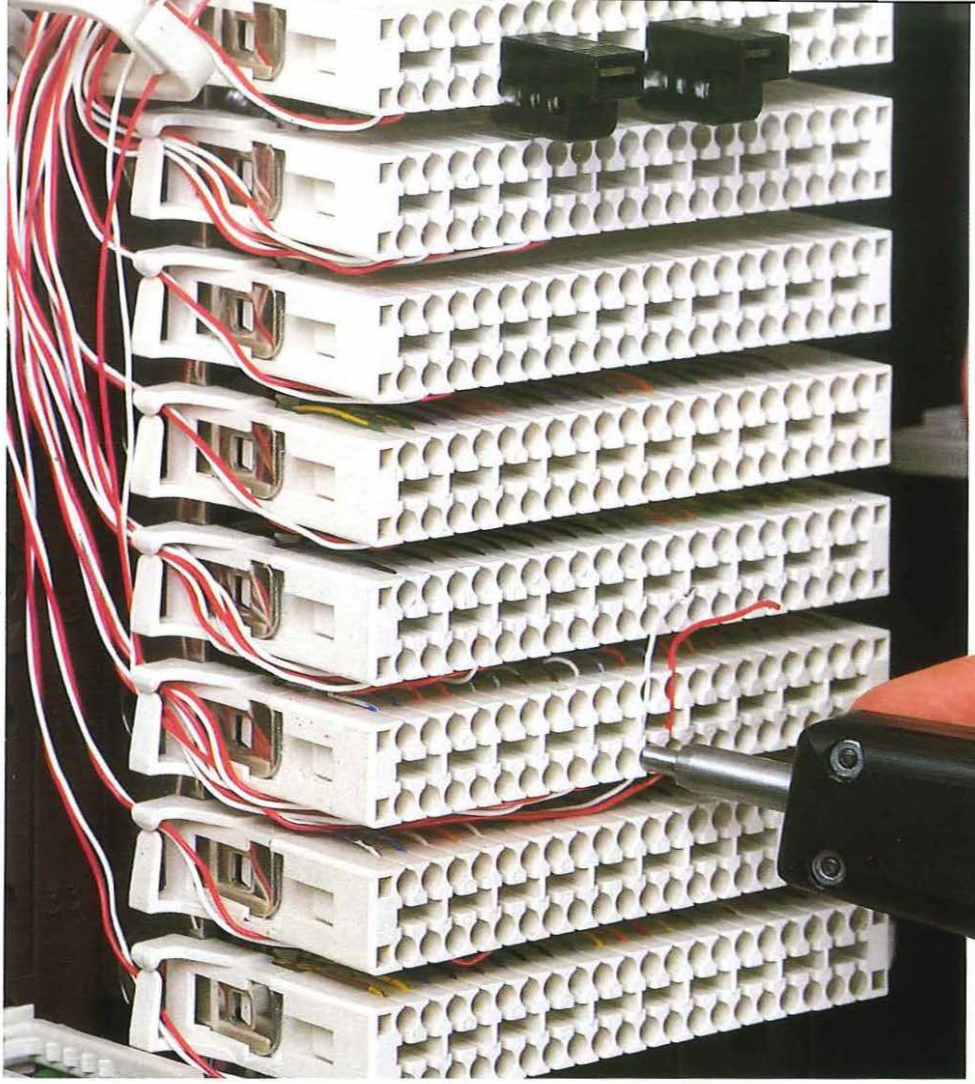

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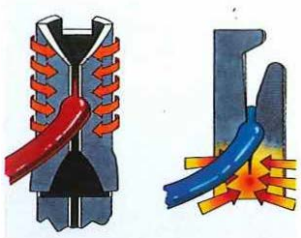

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*Patent Pending

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Communicasia 86	**Singapore**	**9-12 April**
Fiber Optics 86	**Earls Court, London**	**29 April-1 May**
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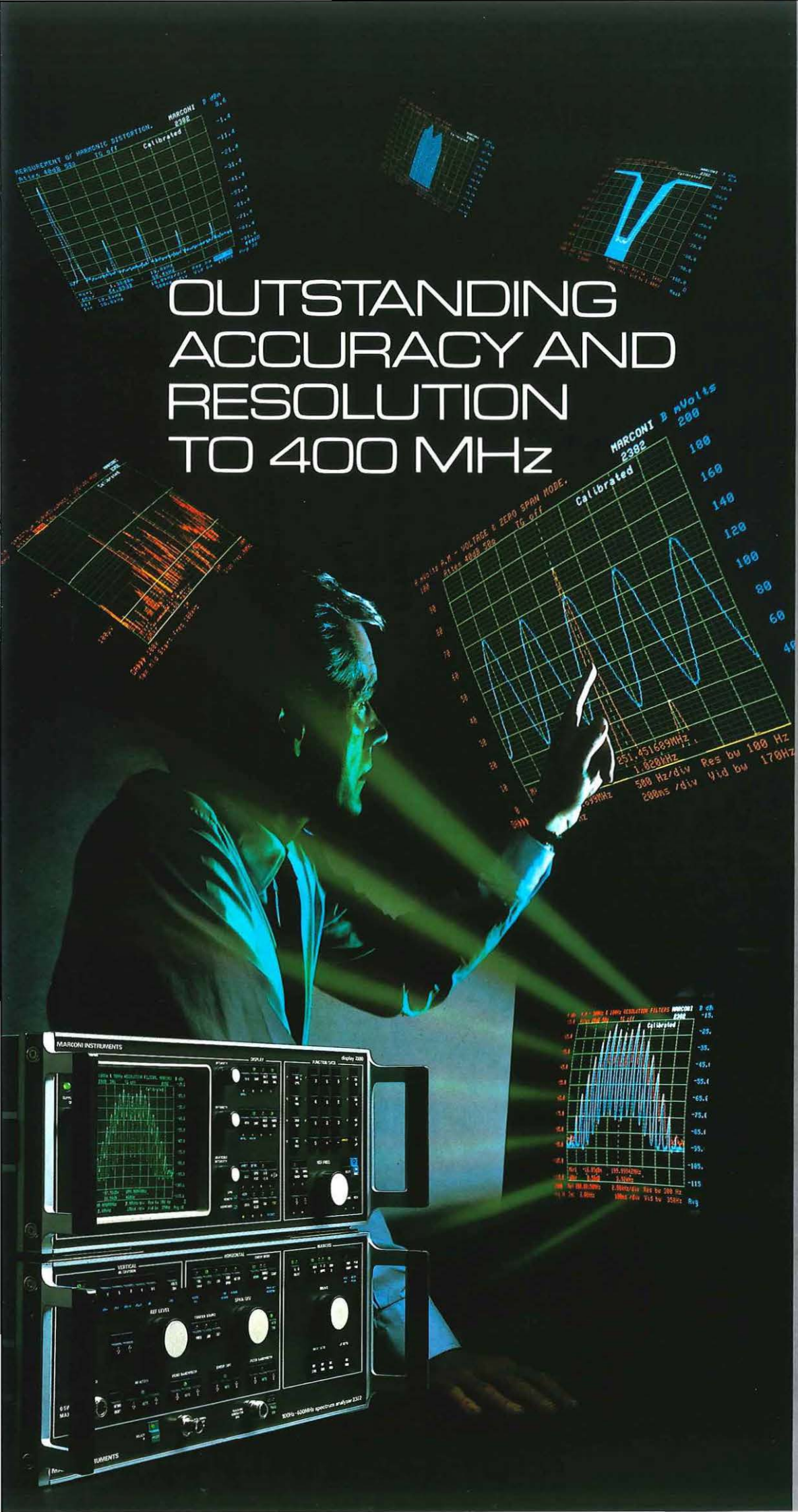

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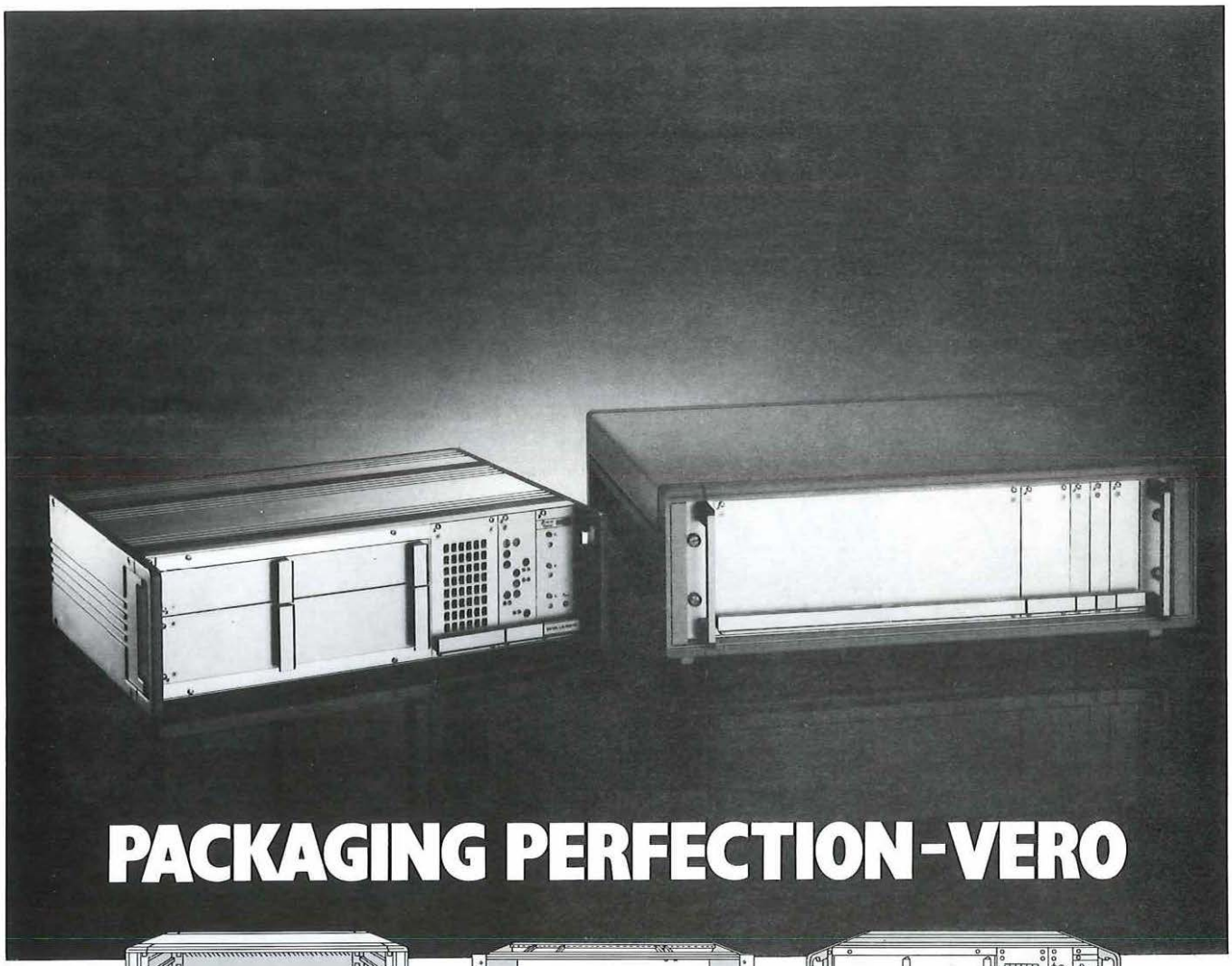

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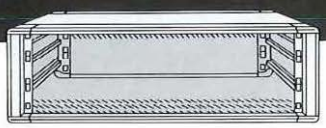

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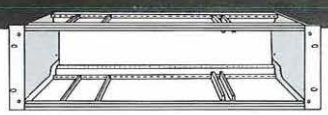

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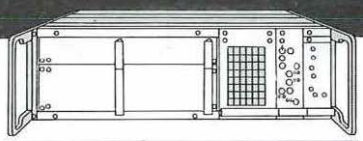

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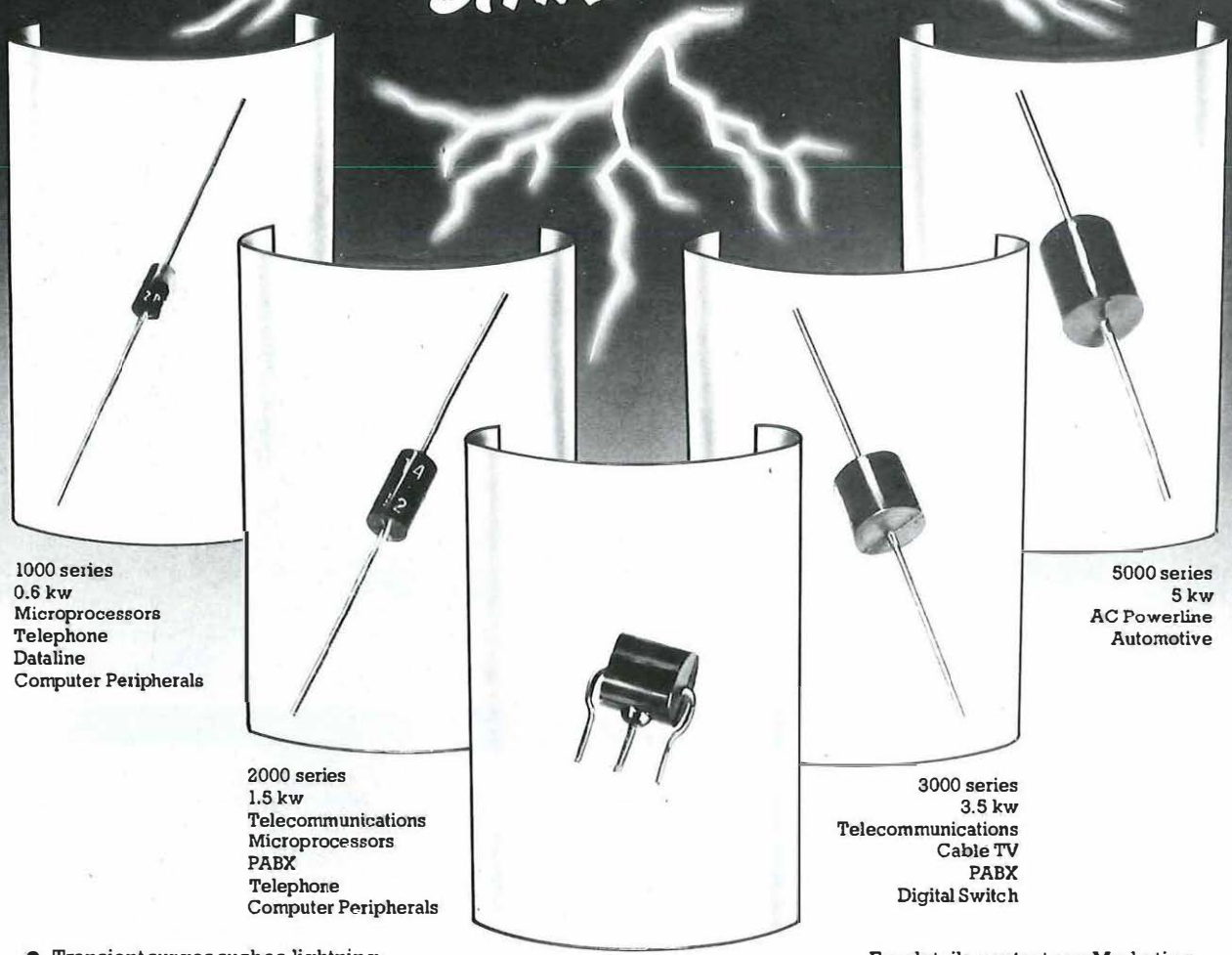

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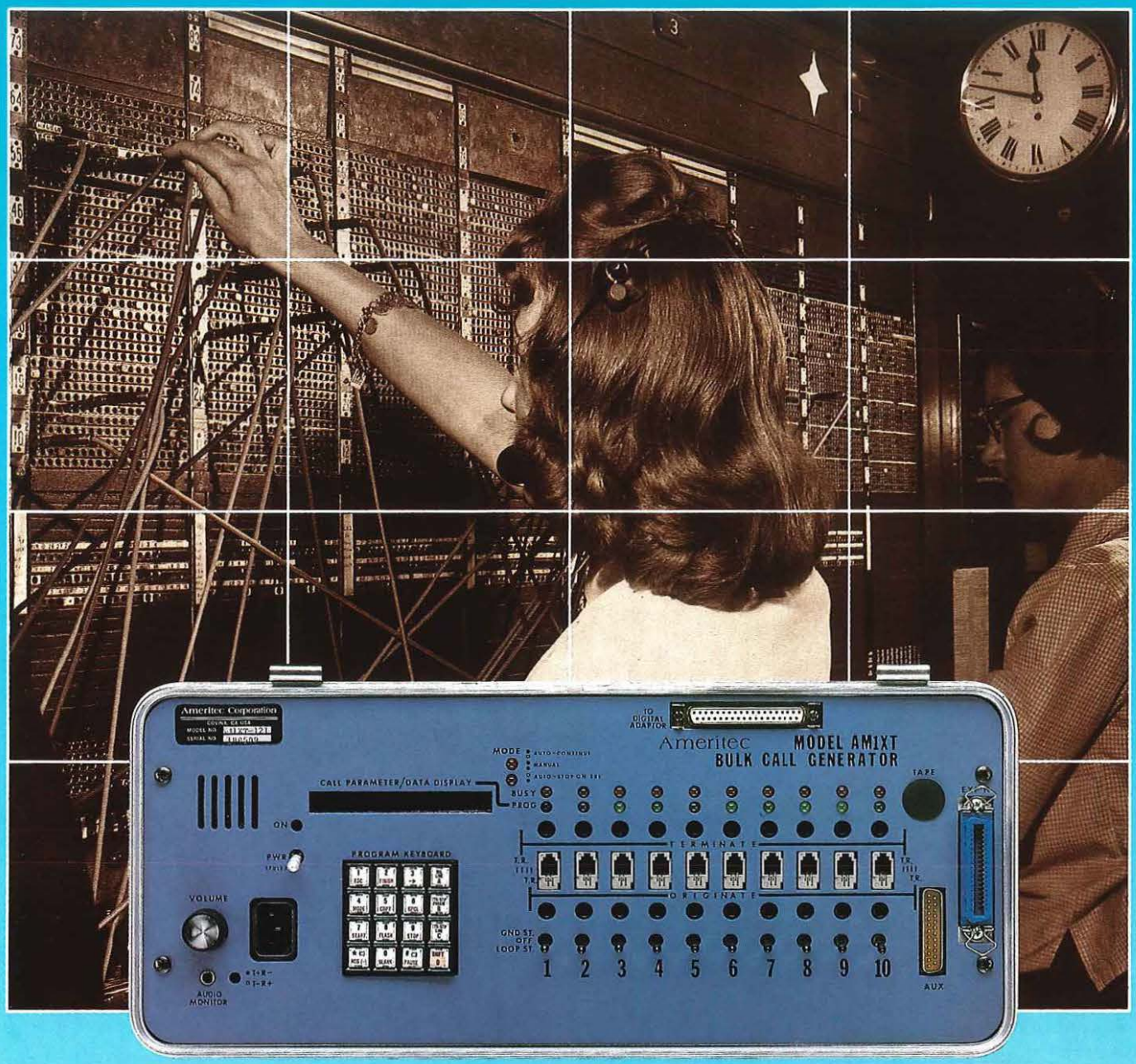

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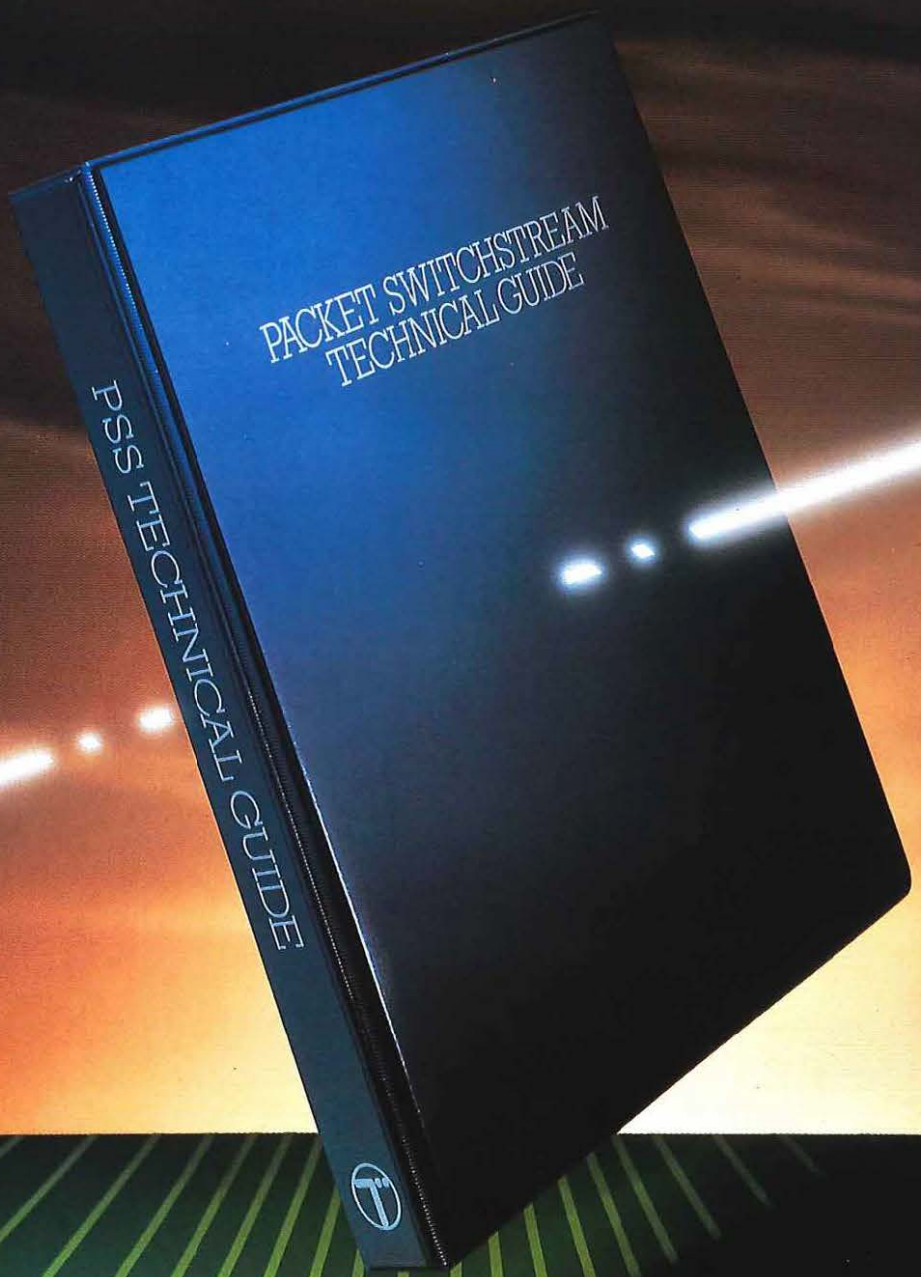

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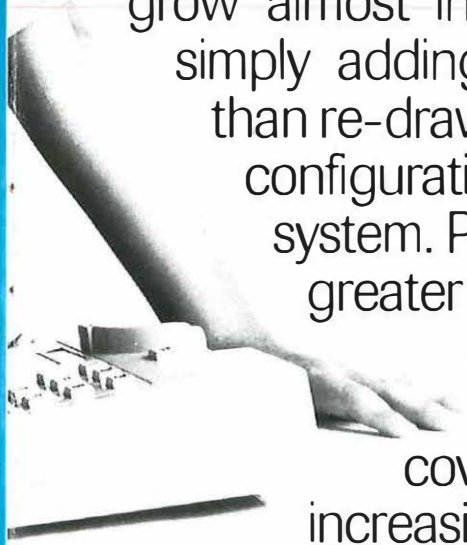

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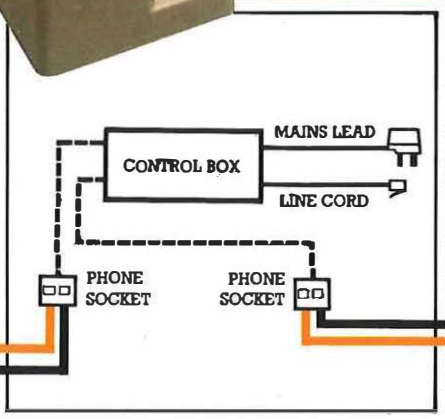

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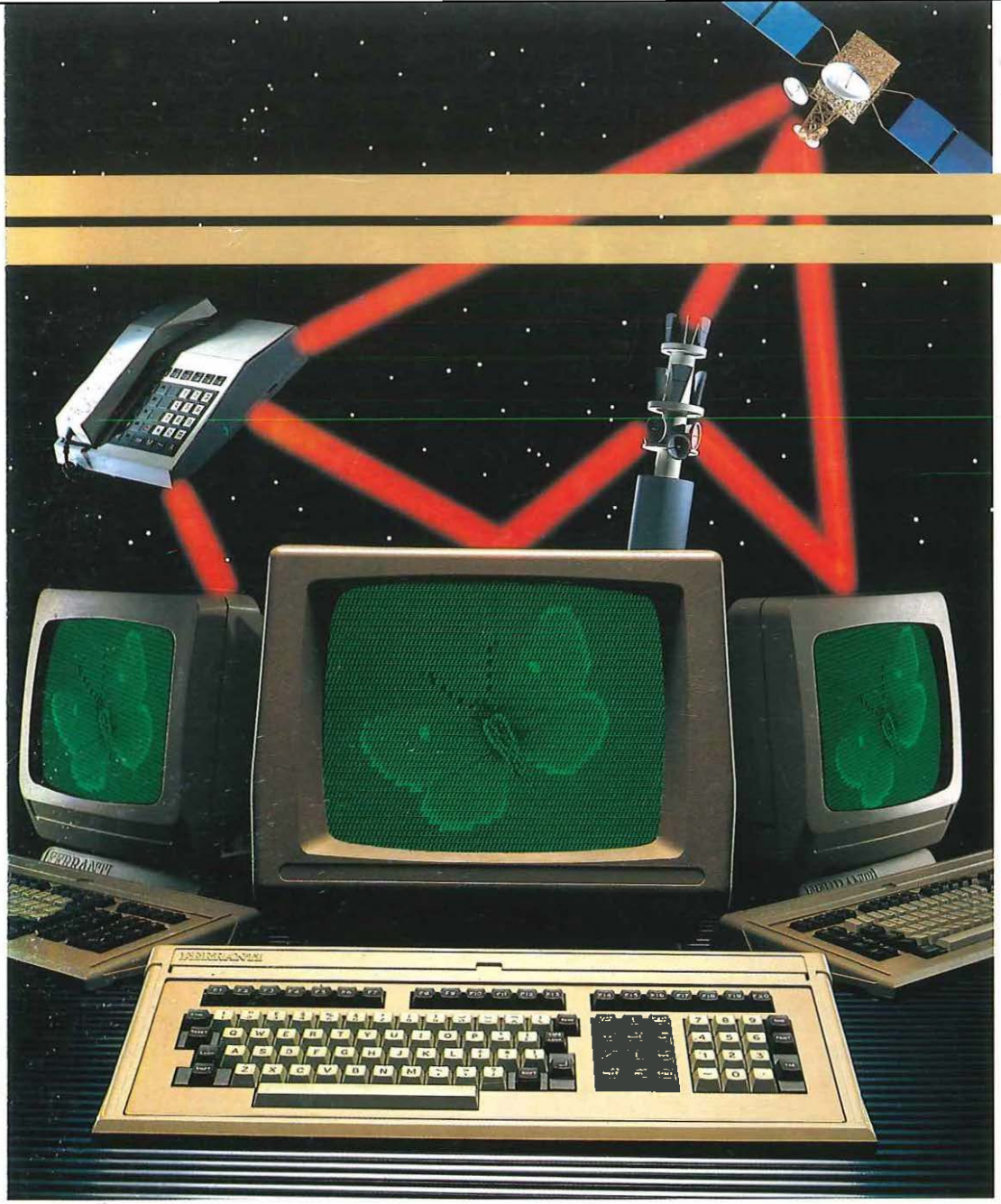

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