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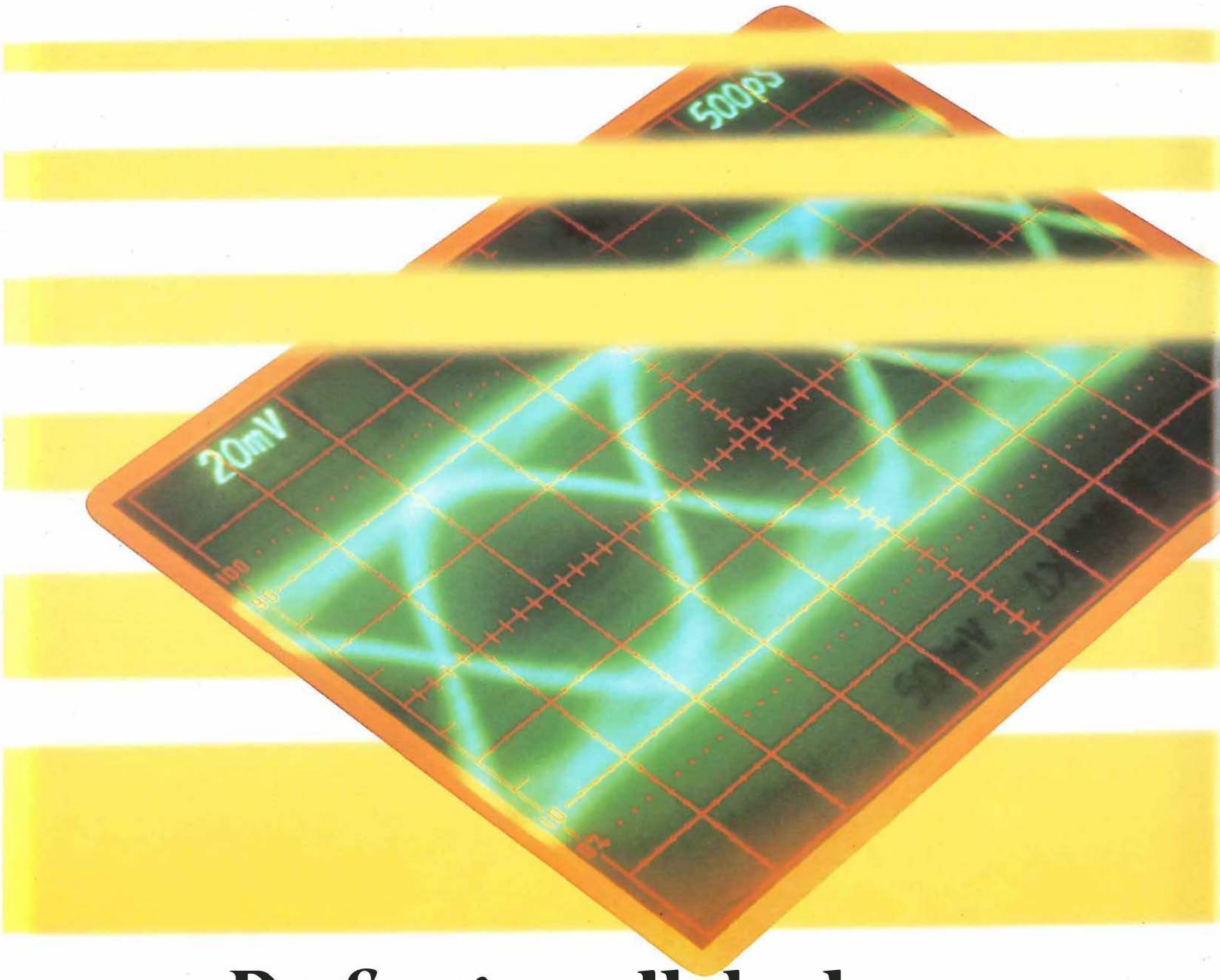

Perfecting all the latest digital transmission systems.

Looking forward to future needs is how Plessey Transmission achieved its leading-edge technology in optical fibre digital line systems.

For more than a decade in fibre optics, Plessey has been combining the technologies of digital multiplexing, line systems, opto-electronic devices and optical fibre connectors to create optical fibre transmission systems.

Today, continuous investment in new product development maintains this well established position at the forefront of optical transmission technology.

Plessey developments in opto-electronic devices and electronics provide the basis of a total capability in optical transmission systems from 2 to 565 Mbit/s providing 30 to 8000 telephone channels, or the equivalent in video or data, per installed fibre. These long wavelength based systems using LED and laser optical devices are suitable for single-mode and multi-mode cable operations.

In the UK, more than 450 Plessey optical fibre transmission systems with a total route length exceeding 3200 km are now carrying traffic, under installation or on order. In achieving this, Plessey has notched up a string of firsts such as the first optical fibre system put into normal traffic service in the UK, the first long wavelength optical fibre system in normal traffic service in the world, Britain's longest optical fibre link and the world's first commercial contract for a 565 Mbit/s highway.

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Plessey Public Networks Limited, Transmission Division, Beeston, Nottingham, United Kingdom NG9 1LA.
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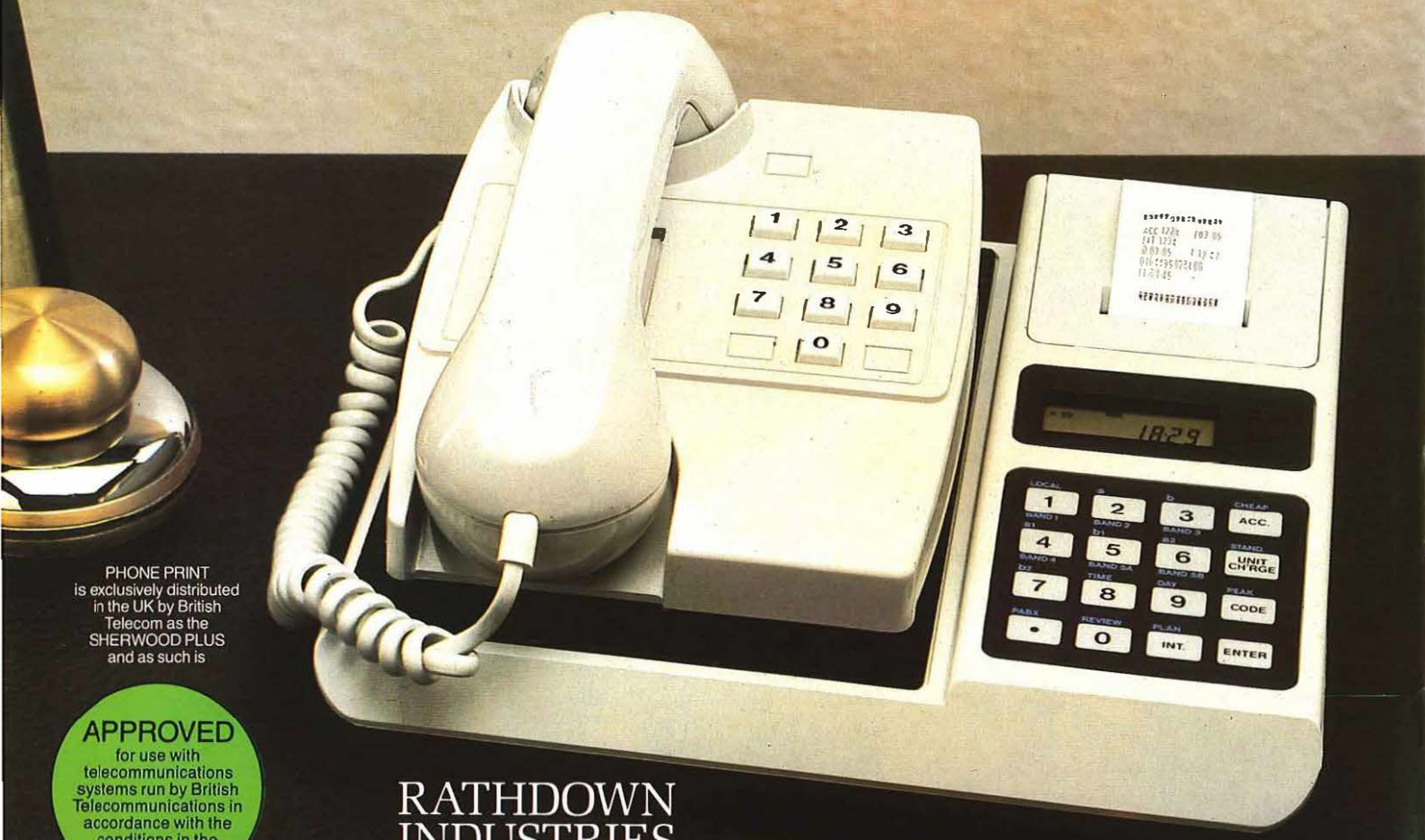

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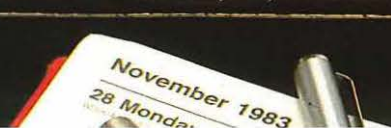

INNOVATIVE TELECOM PRODUCTS.

When you've been finding faults as long as we have, it's easy to knock the competition.

STC first set out to design a new system of remote line testing equipment back in 1977.

The results attracted worldwide interest and praise.

Not least from British Telecom who worked closely with us to develop the STC RLT II.

Its ability to pin point faults at any distance from the Repair Service Centre led to its introduction on a trial basis both here and abroad.

Today, the RLT II is tried, tested and already operating in several centres throughout the U.K.

We're sorry to say our competitors are a little behind.

But who's fault is that?

RLT II Remote Line Tester

FOR FURTHER INFORMATION PLEASE CONTACT A E REDHEAD, STC TELECOMMUNICATIONS LTD., INFORMATION TERMINALS DIVISION, OAKLEIGH ROAD SOUTH, NEW SOUTHGATE, LONDON N11 1HB. TEL: 01-368 1234

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Successful and secure packet switching networks need fast and reliable host computers.

That's why GEC Computers created the unique GEC 4100 Series, with their 32-bit processors, proven OS4000 operating system and award-winning real-time hardware executive 'Nucleus'.

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When you invest in the GEC 4100 Series, you can easily handle videotex, teletex, electronic mail, command control and communications (C^3I), satellite networks and much, much more.

So if you would like to meet the perfect host, we invite you to send for our brochure now.

Call London (01-953 2030, ext 3187), Birmingham (021-327 1829), Manchester (061-872 3433), Gouda, The Netherlands (01820 35222) or Frankfurt (0611 632001).

GEC Computers Limited, Elstree Way, Borehamwood, Hertfordshire WD6 1RX. Telephone: 01-953 2030. Telex: 22777.

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THE FIBRE OPTIC
DATA COMMS PLAN
How to feed a lot and stay slim
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.)
FOCOM suggest the following healthy options, which are immune to lightning strikes and electrical interference.
RS 232C/V24 MULTIPLEXERS
Support up to 32 computer terminals on twin fibre cable at up to 19.2 k baud.
IBM COMPATIBLE MULTIPLEXERS
A space saving solution for integrating IBM hardware.
DART DATA COMMS NETWORK
As a LAN or distributive switch, 'DART' offers complete flexibility.
2Mbit and 8Mbit LINE TERMINATION EQUIPMENT
Designed for CCiTT G 703 interface.
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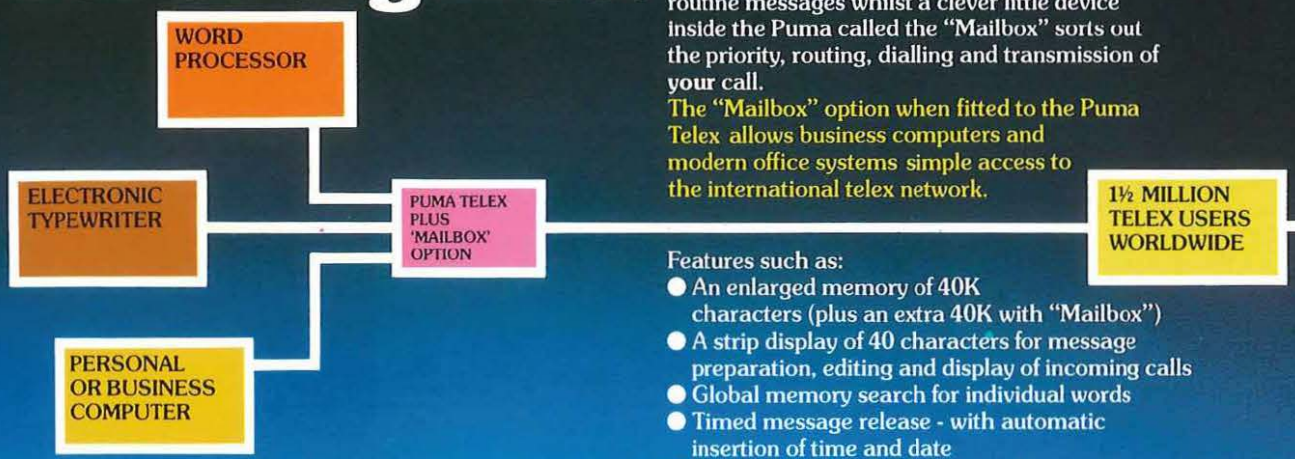
eMargin what A harrised teLex opeRater could do to yoUr set of 5igures.

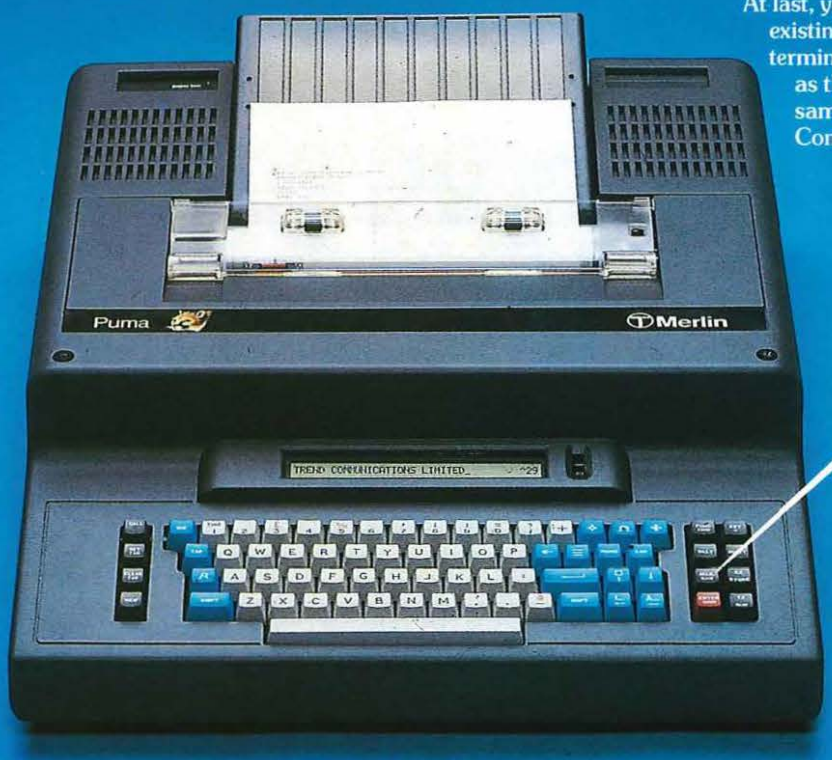
No matter how good your telex operator is, there will always be times when the demand for outgoing and incoming calls will exceed the 'cool' of the operator.
And mistakes occur.
Trouble is, it's likely that mistakes will happen when you have a load of complicated figures to send down the line to head office — bad news!
But if you are equipped with a PC or WP or even an electronic typewriter you can now prepare your data/message in the normal way and when you are confident all is correct, press a button and send it through to Trend's new Puma Telex Terminal.
The telex operator is calmly getting on with more routine messages whilst a clever little device inside the Puma called the "Mailbox" sorts out the priority, routing, dialling and transmission of your call.
The "Mailbox" option when fitted to the Puma Telex allows business computers and modern office systems simple access to the international telex network.



Features such as:

- An enlarged memory of 40K characters (plus an extra 40K with "Mailbox")
- A strip display of 40 characters for message preparation, editing and display of incoming calls
- Global memory search for individual words
- Timed message release - with automatic insertion of time and date
- Automatic dialling and repeat of last number called
- Battery back-up in case of power failure.

At last, you can combine all the features of your existing office systems with the most flexible telex terminal available — with the same compact size as the original Puma Telex — all for virtually the same price, so switch to Puma and be sure.
Contact Trend or your local BT Sales unit for full details.



Switch to Puma and be sure!

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TREND®

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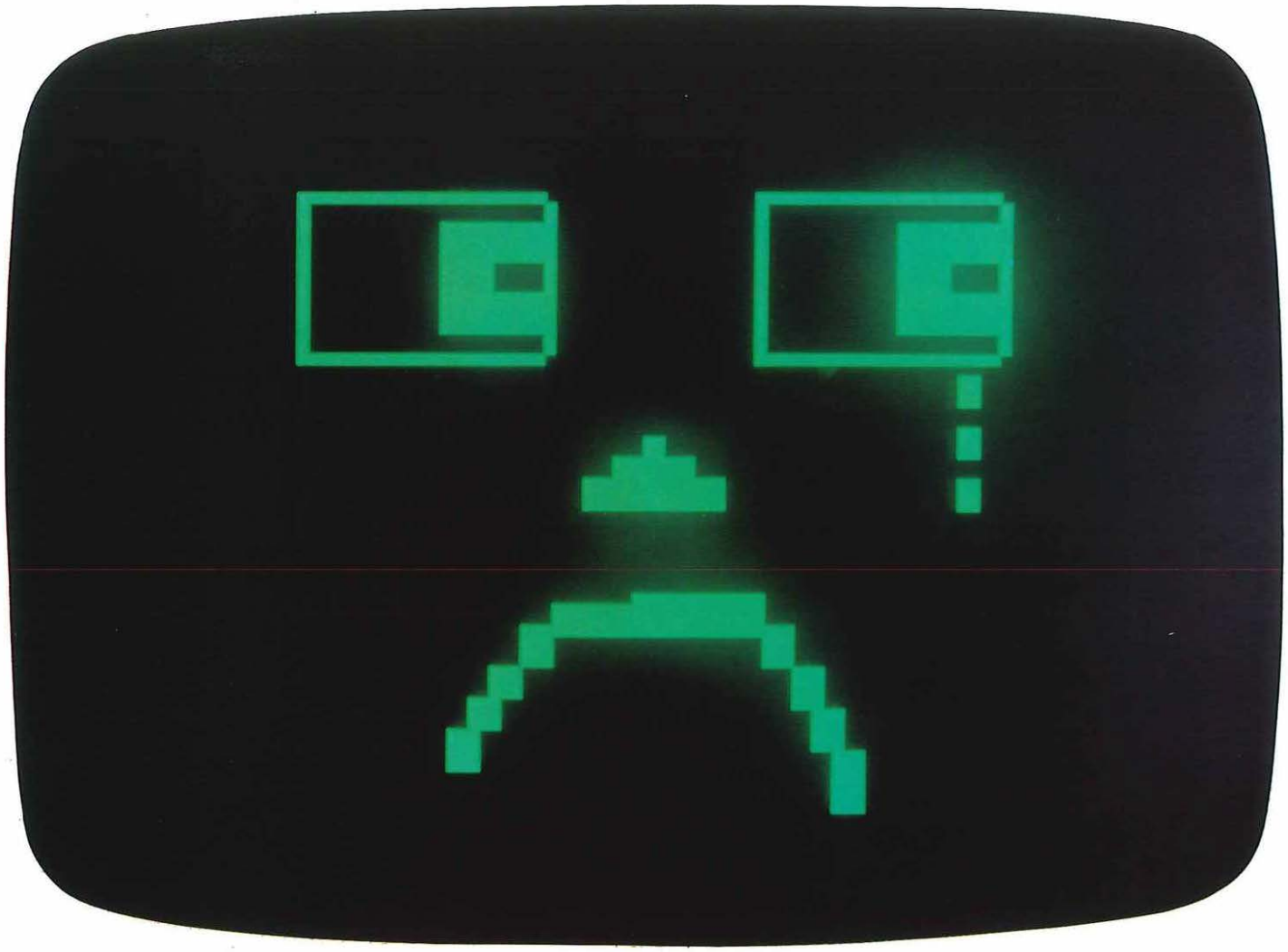

OTHER LINE-TESTERS ONLY GIVE YOU THE PROBLEMS.

The problem with some automatic line-test systems is that they're designed to do nothing but test lines.

Some will give you a rough idea of fault conditions, but some only display test results. Not the LRS-100. It goes quite a few steps further.

As a complete test system it is, of course, able to perform all of the standard functions you'd expect it to.

Such as demand-testing, when faults are reported. Routine-testing groups of lines overnight, to locate potential problems.

And it'll even carry out follow-up tests ('Robot Testing') on problem lines at regular intervals, to find intermittent faults.

But the difference is in what the LRS does with all the information after it's been collected.

For example, it cross-references reports, to build up patterns and recognise common faults.

Also, the LRS compares the condition of the line it's testing with other available information, and produces a System Recommended Action.

And in its full configuration LRS-100 will even keep an exact record of the total workforce available and its current workload, and assign each repair (according to priority) to the appropriate faultsman.

It can carry out the whole operation, from line-testing to assigning the repair, so quickly that you're able to make firm appointments with customers as and when they report faults.

This enables you to speed up clearing times and reduce fault report rates.

So your Repair Service Centre runs at

THE LRS-100 GOES ON TO GIVE YOU THE ANSWERS.

optimum efficiency, something we definitely think your customers will appreciate as much as you do.

And because it's such a powerful system working on a centralised computer base, one LRS-100 not only covers a larger number of lines, but also integrates administration control and line-testing completely, as at BT London South (where it serves a total of six RSCs and 400,000 exchange connections).

Different configurations of the LRS system give it flexibility enough to combine with all current versions of ARSCC (such as the ARSCC-E at Glasgow, where LRS will cover seven RSC's), and BT's longer term plans with Customer Service Systems (CSS).

This adaptability together with our vast experience in telecommunications makes sure the LRS-100 won't become obsolete.

Before you decide which system you need for your RSC, telephone 0628 72921.

Or write to Northern Telecom (U.K.) Limited, Langton House, Market Street, Maidenhead, Berkshire SL6 8BE to find out more information about the LRS-100.

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WHATEVER YOUR PLANS ARE FOR DIGITIZING THE PUBLIC NETWORK, 5 ESS-PRX OFFERS THE BEST OPTION

Why? Quite simply, because the 5ESS-PRX is more than a digital switch – it's a Network Machine.

Capable of being concentrated in network nodes or distributed within a wide operating area – a networking capability that really is unique.

Other manufacturers may claim that their systems have fully distributed control. But, none offers true distributed processing. Where 'telephony power' is vested in the exchange periphery. Where peripheral units function pseudo-autonomously. Capable of handling requirements locally, without having to rely on shared or distributed resources in the body of the exchange.

Of course, competing systems also offer remote switching capabilities – but this simply extends the control lines. The host still remains the dominant element, channelling telephony processes to the remote units as necessary.

Hardly the solution for today's network requirements.

With 5ESS-PRX, telephony power is concentrated in the exchange periphery. Enabling local telephony requirements to be satisfied locally. As a result, when switching modules are remoted they become, to all intents and purposes, stand-alone exchanges with a minimal dependence on the host.

And the result? A true network capability. Where remote units can support independent trunks and, maintain virtually full service when the umbilical to the host is severed. Where remote switching modules can even support remote units, extending the power of the 5ESS-PRX right down to small clusters of subscribers.

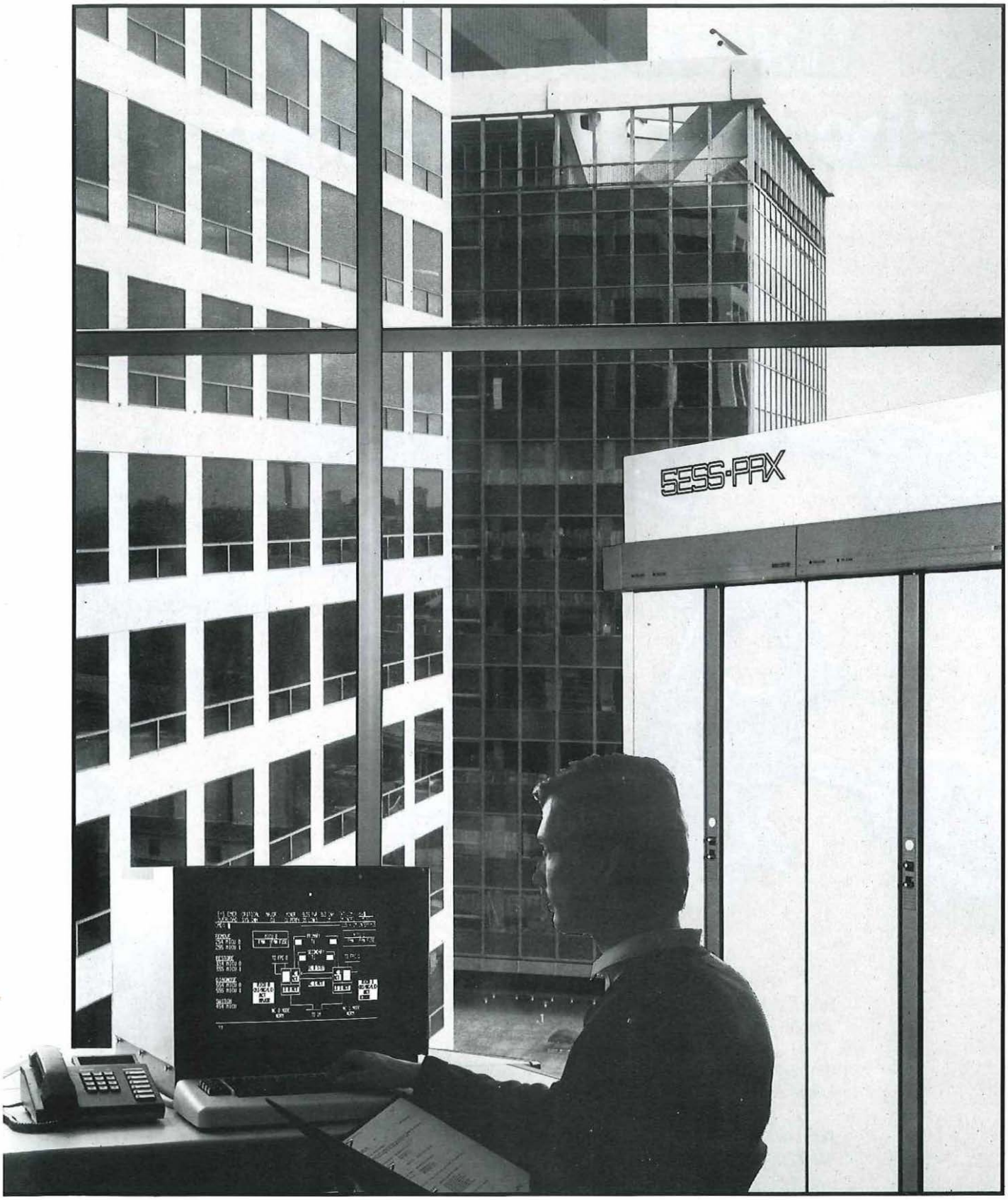
The economy of such a system is obvious. Digital services can be provided by locating exchange elements where they're needed. Metropolitan areas can then be served by one exchange; its powerful switching modules being geographically distributed throughout the area.

With the 5ESS-PRX, all this can be achieved without implementing independent exchanges. And without incurring the corresponding costs.

To find out more about the networking capabilities of the 5ESS-PRX, contact AT&T and Philips Telecommunications.

AT&T

PHILIPS



TMC Major Systems Ltd., Swindon Road, Malmesbury, Wiltshire SN16 9NA. Telephone 06 662 2861. Telex 44208.

You can't argue with glass that talks

Some time ago two bright STC scientists came up with a rather novel idea.

They were experimenting with threads of pure glass the thickness of human hair as a possible practical optical wave-guide with important potential in a new form of communication.

Optical fibre transmission had been born. Even in those early days, nobody could argue with its potential for having an almost unlimited capacity for high quality signals.

Over the years, we've remained in the forefront of the production and technical perfection of optical fibre in the UK.

After having developed the first practical transmission system between Hitchin and Stevenage we opened Europe's first factory for optical fibre cable.

We have produced the world's first high-capacity commercial singlemode optical system that operates between Luton and Milton Keynes.

And currently we're producing the world's first international underwater optical fibre cable system.

Key components in both these systems are high-powered STC lasers for signal transmission.

All these things demonstrate the international scale of STC's transmission activity.

Thanks to inventions like talking glass, British communications has a future well worth speaking of.

If you would like to take a closer look at how STC is shaping the future, we'll be delighted to send you our colour brochure. Write to:

Peter Earl at Standard Telephones and Cables plc, STC House, 190 Strand, London WC2R 1DU.

Making sure the future has a future.

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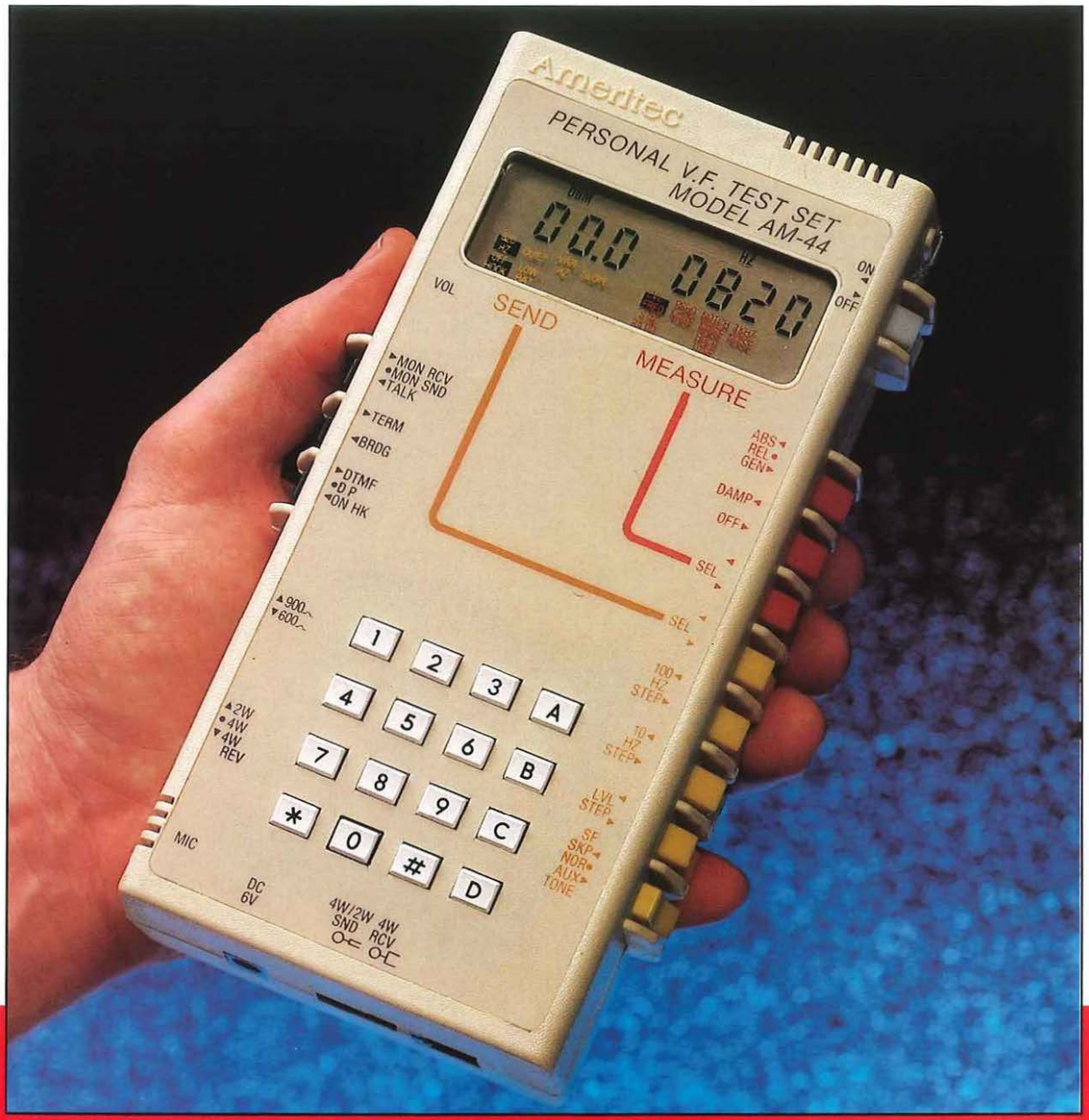

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The new AM-44E personal VF transmission test set offers a unique range of features in a compact hand-held unit.

Easy to operate, the test set provides full signal measurement and signal generation capabilities: signal level, frequency, idle channel noise and signal-to-noise ratio. Level and frequency are displayed simultaneously.

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UNIX* is about mobility. The strength of Perkin-Elmer 32 bit Unix is mobility harnessed to 32 bit hardware capable of taking this system to its full potential.

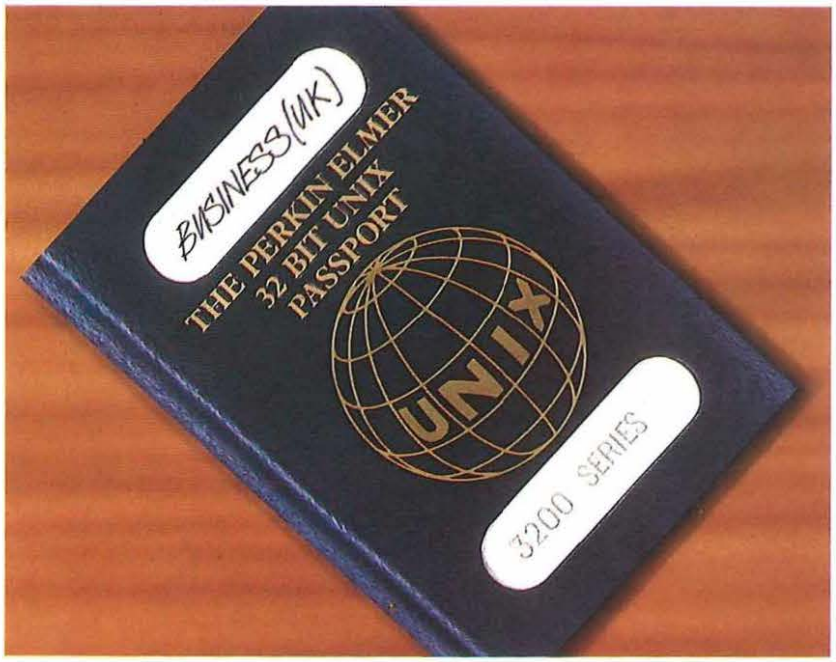
It brings you freedom across all the principal language barriers . . . freedom to move across hardware divides . . . freedom to upgrade without massive software rewriting . . . easy access to the exciting new software developed for 16 bit micros -- yet the scope for accommodating up to as many as 128 users.

UNIX -- plus a whole lot more.

Perkin-Elmer UNIX is very much standard UNIX (After all the world's first 32-bit UNIX was developed on Perkin-Elmer hardware in 1975 at Bell). When Perkin-Elmer introduced Edition VII in 1981, we became the first supermini company to offer full support for a UNIX system.

It is advantages like these that have won over users like Oxford University's Department of Astrophysics, and BIS Software who develop financial applications for Britain's major banks.

UNIX is about standards. The stated AT&T supported UNIX standard in the commercial world is System V. As part of its Everyware™ committment to standards Perkin-Elmer provide XELOS, a true derivative of System V Release 2. The rich hardware features of the Perkin-Elmer range such as 64Mb/s bandwidth, 128 registers and 4 hardware interrupt levels

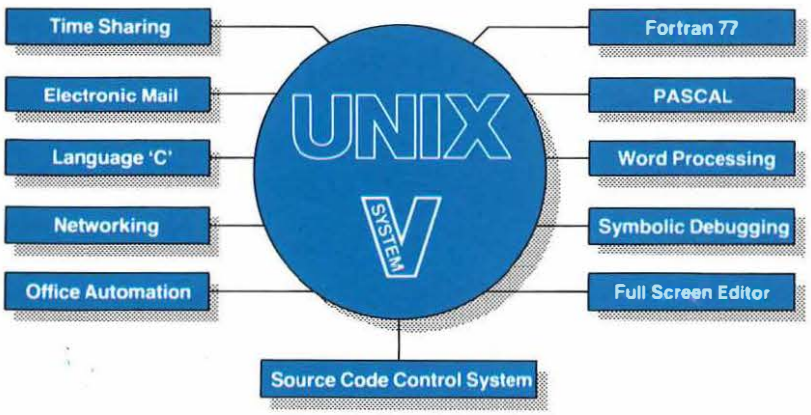


are eminently suited to UNIX, making the Perkin-Elmer offering the most powerful on the market.

Total Support. It comes as standard.

Perkin-Elmer here in the UK are able to provide full software support for UNIX System V with training packages to suit customer needs. Whether you are in the commercial, educational or scientific area you will find our knowledge, expertise and support of UNIX unbeatable. And our hardware ranges from the low cost 3205 at around £20,000 right up to the massive 3250 mainframe.

So talk now to the 32 bit specialists about your passport to profitable systems management.



To Geraldine Duffy, Perkin-Elmer BTJ1
Please send me more information

Name_____

Position_____

Address_____

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Phone_____

Perkin-Elmer Data Systems Limited
227 Bath Road SLOUGH Berks
SL1 4AX Telephone (0753) 77777
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PERKIN-ELMER


Associates
CHANNEL=60
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The new Granger CCITT TransMux.™

Granger transmultiplexers are converting analogue FDM directly to digital TDM in over 300,000 channels. New fourth generation units—TM7800-M1—save more power, space, time, and money.

- Meets or exceeds all CCITT recommendations.
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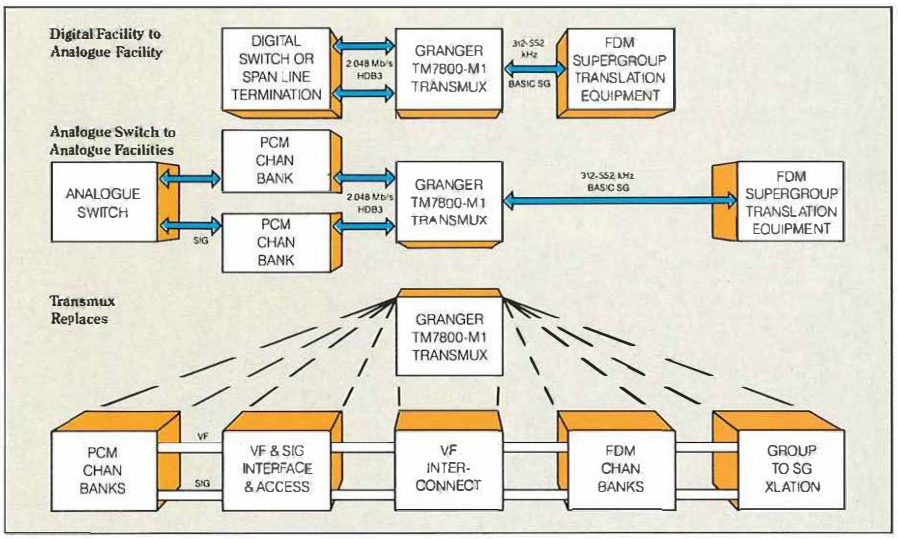
- Saves money by eliminating the need for conventional equipment.

Since 1979 Granger's TransMux™ has been the simplest, most economical way to connect new digital TDM switches to existing analogue FDM trunks. Granger transmultiplexers are working in 42 major telecommunications systems. Now our fourth generation TransMux offers even lower power drain, higher packing density, more programming power, and lower cost per channel.

Typical applications of the new Granger TransMux TM7800-M1.



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Digital circuits maximize reliability and reduce service costs to nearly zero. The VLSI digital circuits are extremely reliable, and the TransMux never requires tuning or alignment. A-to-D and D-to-A conversions are performed by digital circuits operating under a sophisticated proprietary algorithm.

Remote alarm. Remote control.

A microprocessor monitors the entire TransMux operation. Any failure will illuminate an LED alarm on the front panel and transmit an office alarm and diagnostic message in plain English to a display on the handheld keyboard. The keyboard with display may be located remotely, connected via an RS-422 port to the TransMux. You can also remotely program any of 14 modes of signaling. Or the level of each individual channel. Or test tone insertion or removal. All programs are stored in a non-volatile EAROM device.

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So fast, it's hard to believe. But Granger has been doing it for years.

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Information, like money, is easily wasted.

Information trapped inside your data bank is as much a wasted asset as cash lying buried under the floorboards.

Like money, information needs to be put to work to realise its full value.

And that's what Ferranti data communications is all about. Putting information into the hands of those in an organisation who need and can use it.

Ferranti communications systems include store and forward, message switching, packet switching, protocol conversion and networking.

There are already hundreds of PT7 programmable terminals controlling thousands of Ferranti displays within British Telecom.

Now there's the Ferranti Argus Pro-personal Computer, which can be linked together with our PT7 terminal system to the new Teletex network with a Ferranti Teletex Adaptor.

Don't forget either, the Ferranti Voice Manager, an intelligent storage and distribution system designed to eliminate waste and delays in telephone calls.

From a company that's used to working alongside British Telecom – a cost-effective total Data Communications package.

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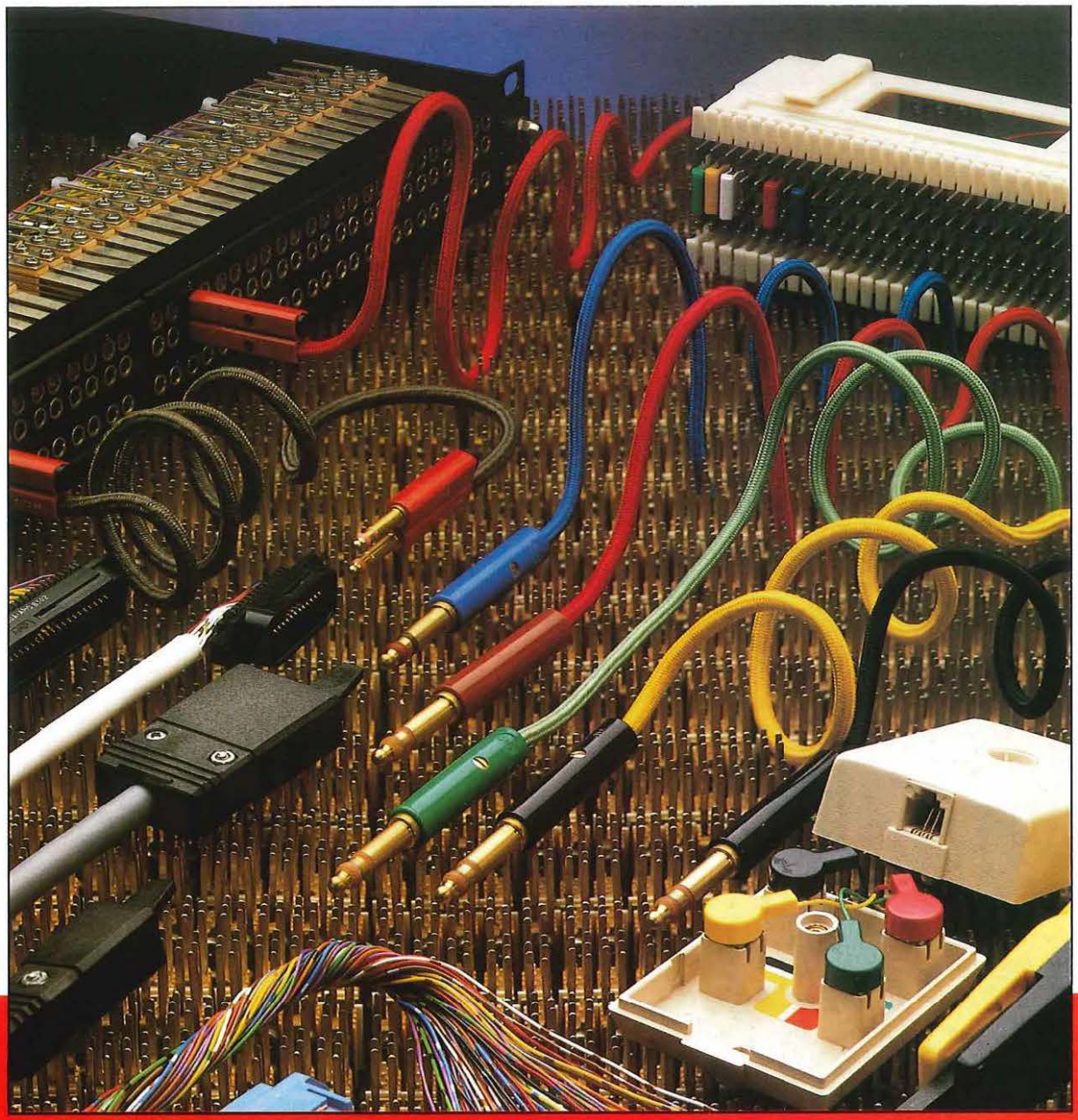

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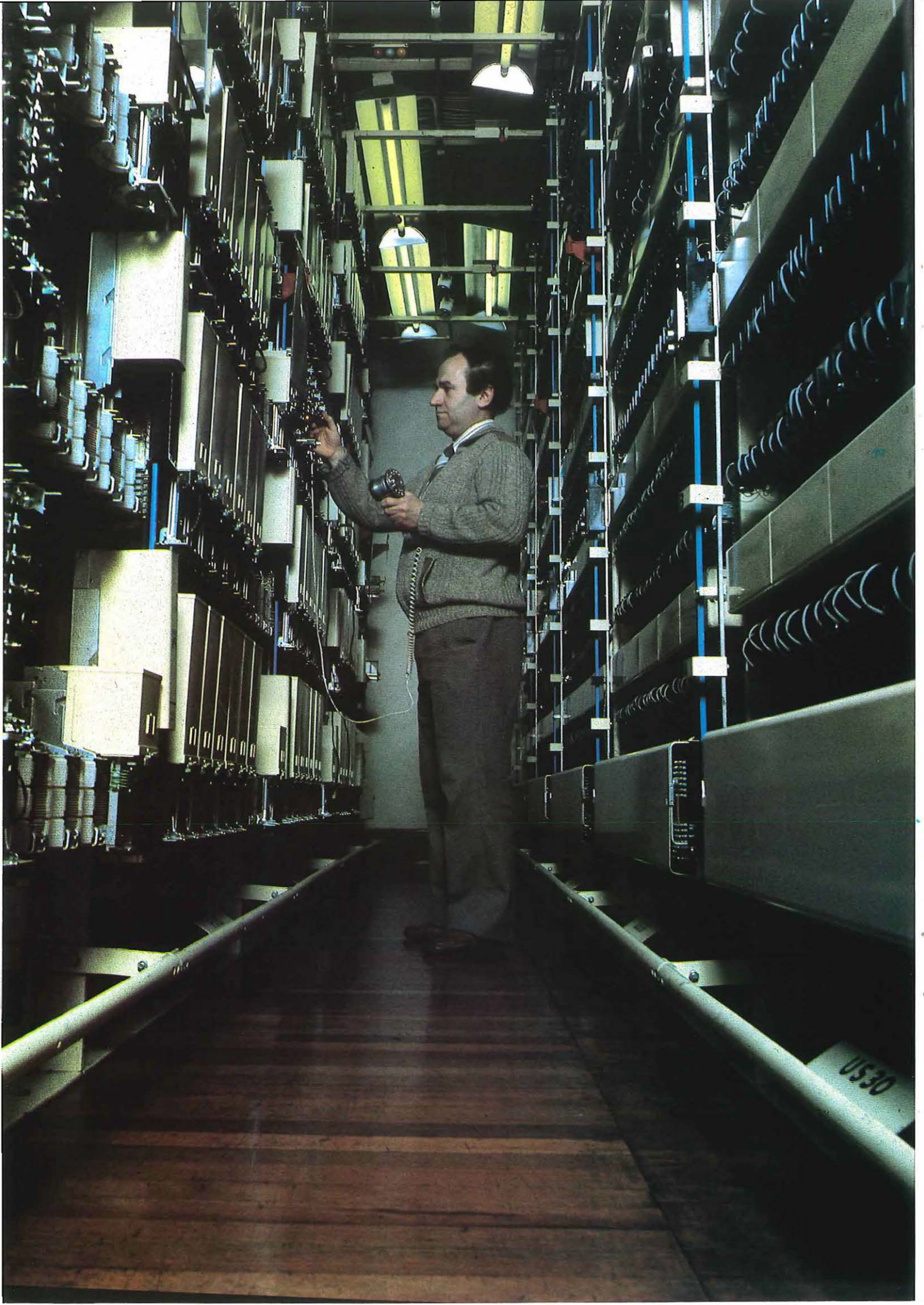
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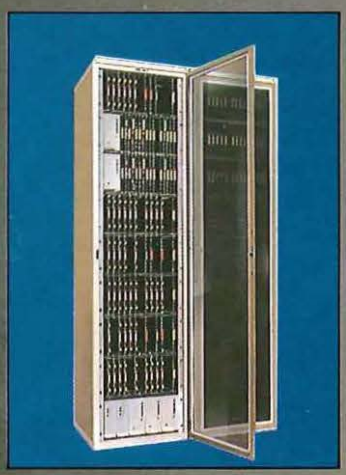

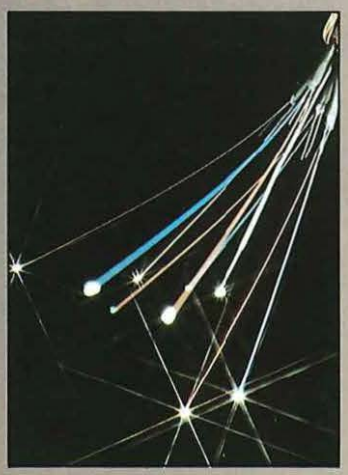

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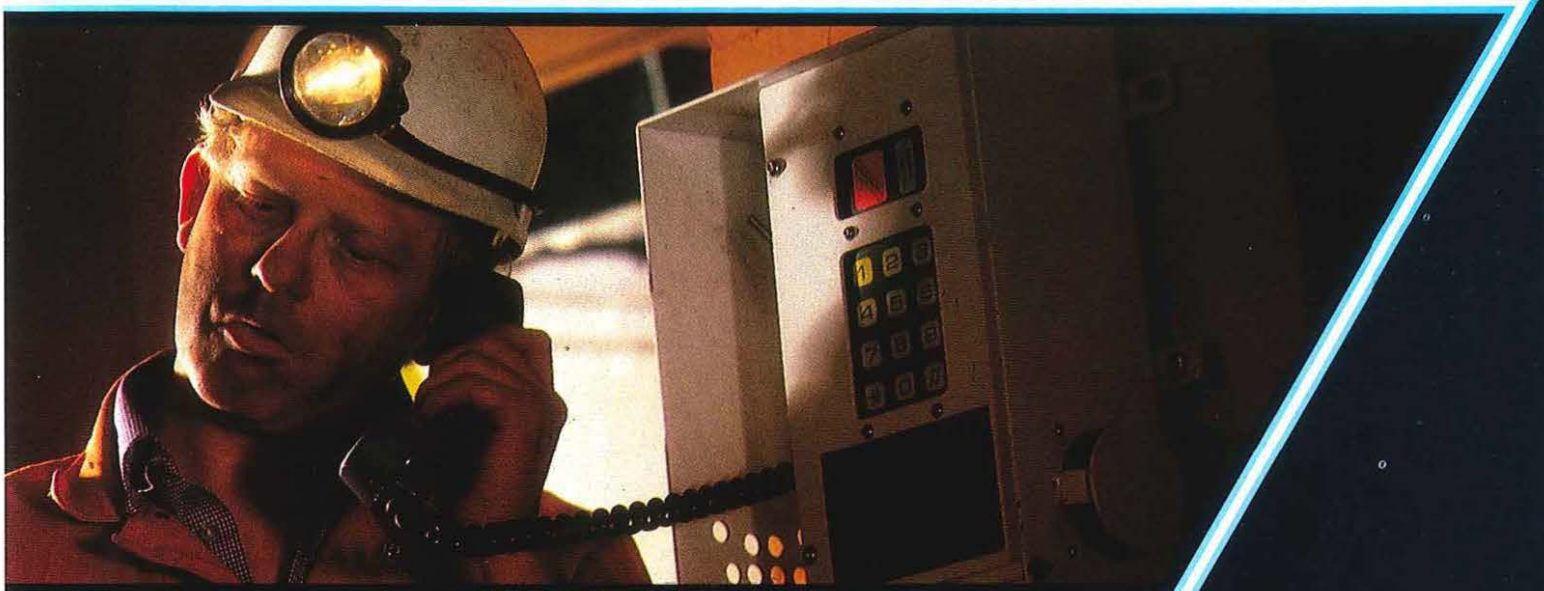

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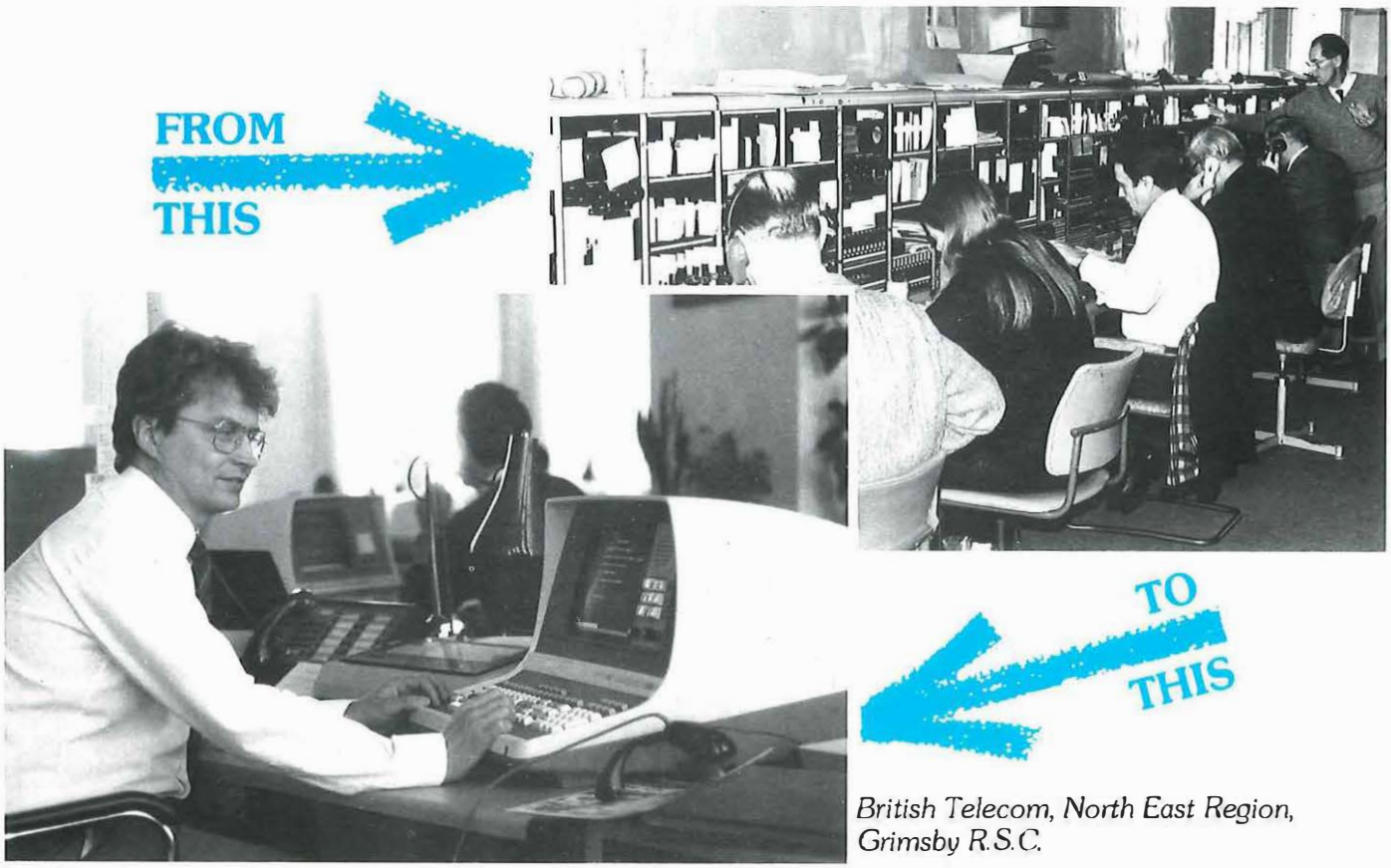

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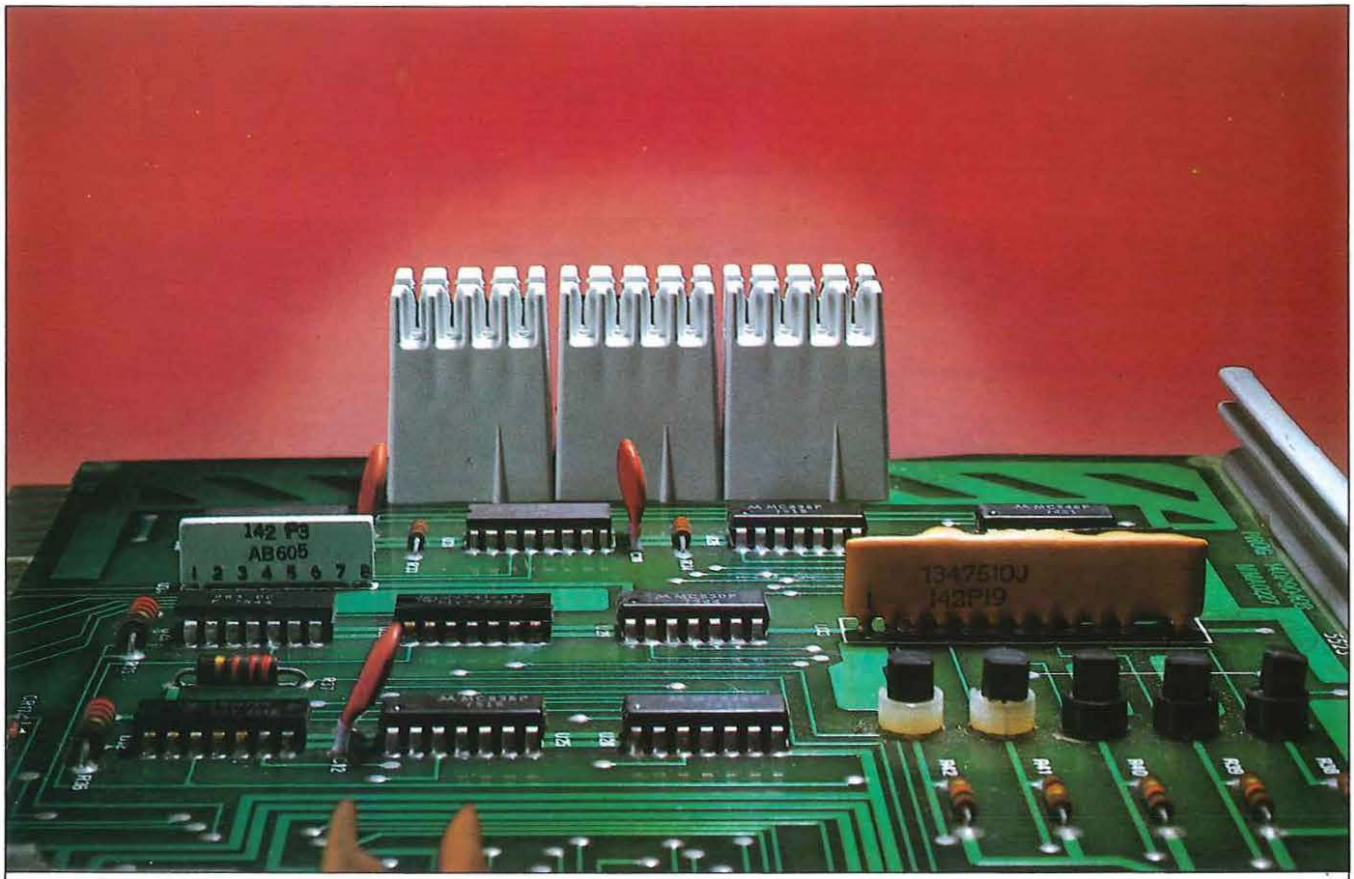

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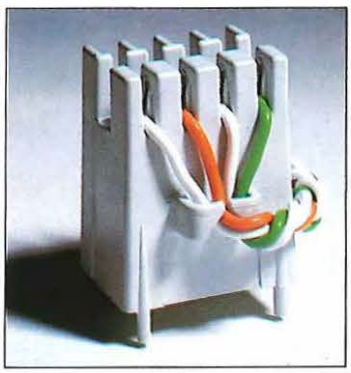

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British Telecom Journal
Autumn 1984 Volume 5 Number 3

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All set to float

The stage is set, the cast rehearsed and the publicity blazing for what in stock market terms, can truly be heralded 'The Sale of the Century' – the offer to the public to buy shares in British Telecommunications plc. It marks the culmination of a year's detailed planning and preparation since the Government decided to privatise British Telecom and sell 51 per cent of it by having its shares 'floated' on the London Stock Exchange.

In transferring a majority holding from the State to the private sector, the Government is determined to achieve widespread ownership and to give small investors a real opportunity to be shareholders. To this end, a massive £7 million publicity campaign has been mounted on TV, radio and in the press and about one million people have shown a direct interest by seeking detailed information on what will be the largest share offer in history. Market research has also shown that interest comes from all socio-economic classes and from every part of the country.

With fixed assets of £8.6 billion, a turnover in the last financial year of £6.8 billion and an average daily investment of around £4 million to expand and improve its service, British Telecom is likely to attract serious consideration by potential investors. And there are extra incentives for British Telecom's founder shareholders as well as the usual – but never guaranteed – dividend income and growth in share value.

At the time of the share offer, investors will have a choice between vouchers worth £18 each which are free of income tax and can be set against their telephone bills, or a bonus share scheme. The number of vouchers or bonus shares will depend on the number of shares bought and the length of time for which they are retained. British Telecom's 240,000 employees are also being given favourable opportunities to share in the company's future, both by the offer of free shares and the chance to acquire further shares on favourable terms.

In the Government's special communication programme to encourage widespread investment, leaflets have been enclosed in telephone bills sent out to every one of British Telecom's 22 million customers, a British Telecom Share Information Office has been set up to handle enquiries and a network of stockbrokers established throughout the country.

The share prospectus – which gives details of the company and must be lodged with the Registrar of Companies before any shares can be issued – will be made available to the public through a wide range of outlets, including branches of banks and Post Offices, as well as through the offices of stockbrokers and other financial advisers. In addition, an abridged prospectus providing the key financial information about the sale and containing an application form, is being made even more generally available.

So all is now ready for the première of British Telecom as a private sector company. It will be the curtain-raiser to an information technology-based future which promises exciting developments in both products and services.

In this issue

Cover: A draughtswoman's life sounds like a safe office occupation but for Scottish drawing office assistant Jennifer Graham the job can involve high adventure. Jennifer is seen here working 150ft above the Firth of Forth inspecting brackets which carry the aerial telephone cable between Edinburgh and Fife.

British Telecom Journal costs 42p per issue for staff. External subscribers pay £12 for two years including post and packaging. Full details on page xxxi.

British Telecom Journal
Autumn 1984

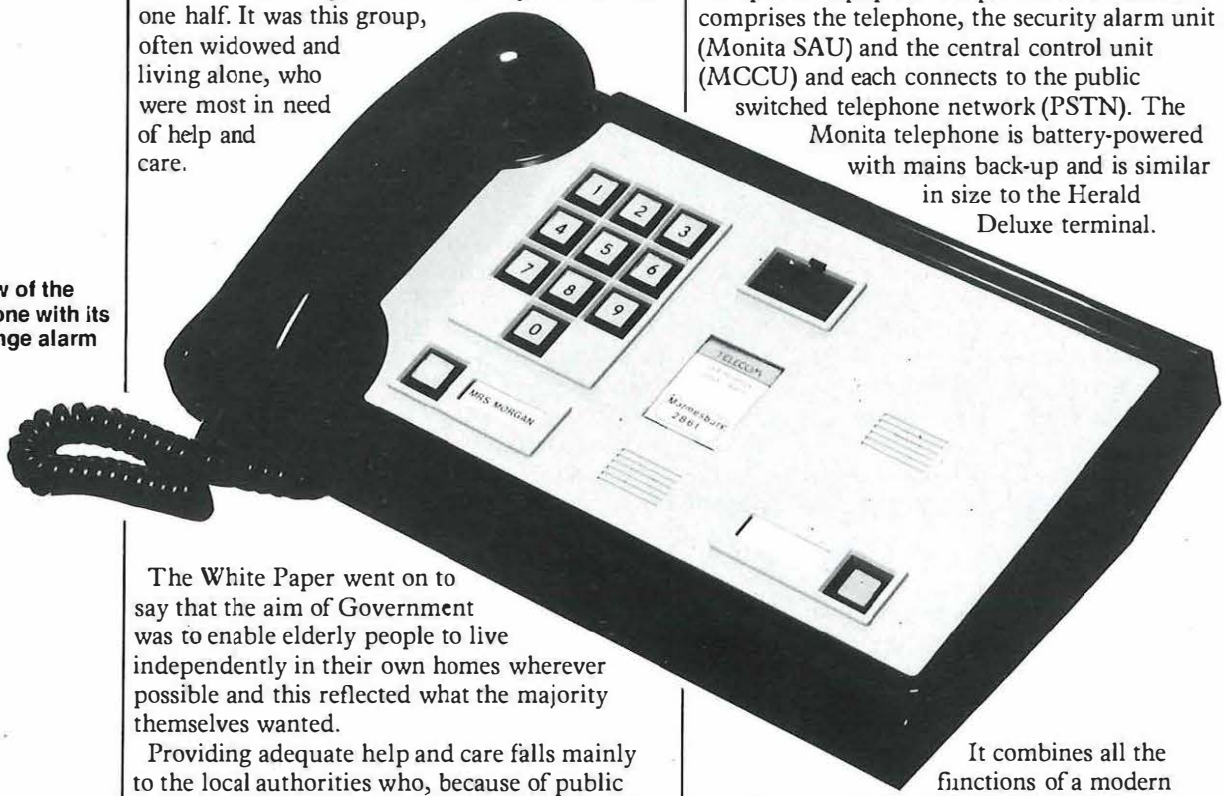
Special phone system for elderly

Triggering the alarm alarm alarm

Jim Stead

A new easily operated, computer controlled telephone alarm system, designed mainly for elderly people living alone, has been developed by British Telecom

Three years ago the Department of Health and Social Security published a White Paper entitled 'Growing Older'. It stated that in the last 20 years the number of people aged 65 and over had risen by a third, representing about 15 per cent of the population. Not only were more people living longer, but the average age of the older generation was also rising. By the end of the century the number aged 75 and over was expected to have increased by about one fifth and the number aged 85 and over by no less than one half. It was this group, often widowed and living alone, who were most in need of help and care.



A close up view of the Monita telephone with its prominent orange alarm button.

The White Paper went on to say that the aim of Government was to enable elderly people to live independently in their own homes wherever possible and this reflected what the majority themselves wanted.

Providing adequate help and care falls mainly to the local authorities who, because of public sector spending cuts, are sometimes unable to cope with the increased requirements of the elderly. To give some relief to the already stretched resources it was obvious that there was a need for an alarm device which, when triggered, could summon help in cases of emergency or crisis speedily and easily.

As a result, a number of manufacturers began developing autodiallers – usually add-on units to the telephone – which when triggered, dialled a relative, friend, social worker, or in some cases, all three, for help.

British Telecom felt that the majority of devices had certain operational disadvantages and that there was a market for the specially-designed telephone which incorporated an alarm capability which when triggered, would simply dial a central station, staffed seven days a week, 365 days a year. The staff there – whether local authority, housing association, housing trust or British Telecom – could first speak to the person who had initiated the alarm call and then co-ordinate the required response dependent upon the crisis.

From this idea Monita (formerly known as OPATT) was born and contracts have been placed with TMC Ltd to develop and produce the specific equipment required. The hardware comprises the telephone, the security alarm unit (Monita SAU) and the central control unit (MCCU) and each connects to the public switched telephone network (PSTN). The Monita telephone is battery-powered with mains back-up and is similar in size to the Herald Deluxe terminal. It combines all the functions of a modern press button telephone with those of an automatic alarm terminal.

Features

Special features for normal telephone use include an extra large keypad with recessed buttons, a 'pimple' on button 5 for the partially sighted, a single number repertory dialler with on-hook capability and optional handsets for the hard of hearing.

There are no fewer than a dozen special alarm features:

- auto-dialling circuitry which dials two alternately pre-programmed control centre numbers;
- a large orange button with associated LED; ▷

Right: With the special Monita transmitter strapped to her wrist, this elderly woman knows she can enjoy the freedom of her garden without fear of being cut off from help should she need it.

An operator takes an alarm call at the central control unit.

- pre-programmed 12-digit identity (the telephone number);
- half duplex loudspeaking telephone facility;
- three position volume control;
- auto answer capability;
- radio trigger receive module with 'cancel' button (optional extra);
- auto test sequence to the control centre;
- six separately identifiable alarm inputs, three of which are silent;
- two input circuits to activate external equipment such as a flashing beacon or klaxon;
- mains failure detector;
- integral modem.

The radio trigger is optional and consists of the receiver module housed within the Monita telephone and the transmitter which is worn by the customer on the wrist or around the neck.

The operating range of the trigger is about 100 to 150 meters giving the user full flexibility around the home. To summon help all that is needed is a press of the transmitter which sends a signal to the receiver module. This in turn operates a buzzer indicating that the signal has been received. After ten seconds the radio receiver triggers the Monita telephone which automatically calls for assistance.

Included in the radio trigger is a low battery facility which automatically tells the control centre that the transmitter battery is running low and needs replacement. In some instances, especially where the accommodation is small, it may be economical to install pull-cord switches in place of the radio trigger and British Telecom has developed a special pull-cord switch which can be wall or ceiling-mounted and incorporates visual indication that the alarm has been triggered.

The Monita security alarm unit is also battery powered with mains back-up and is designed specifically for industrial locations.

Special features include:

- compact weather proof metal case with anti-tamper lid;
- auto dialling circuitry which dials two alternatively pre-programmed control centre numbers;
- pre-programmed 12-digit identity (the telephone number);
- five separately identifiable alarm circuits (all silent);
- bistable relay which can drive one external device such as a klaxon or flashing beacon;
- auto test sequence to the control centre.

The Monita central control unit is a 50 volt device powered from a standard British Telecom power unit. The compact, free-standing microprocessor controlled unit features a VDU, printer, standard telephone keypad, handset with press-to-speak switch, and line terminating unit with two data modems for two PSTN lines. There is also a synthesised voice re-assurance announcement and a range of comprehensive operator controls.

To operate the alarm all that is required is pressure on the orange button or a pull on the pull-cord switch of the personally worn radio transmitter. The alarm can also be triggered by passive sensors such as intruder or fire detectors. In each case the Monita telephone will automatically seize the PSTN line and dial one of the two pre-programmed control centre numbers. The circuitry detects dial tone, then makes up to ten call attempts alternating between the two numbers.

On receipt of an incoming alarm call the MCCU acknowledges and decodes it and verifies the alarm and identity data received, injecting the date and time of the call before displaying and printing the information on the VDU and printer. The control centre operator can then answer the call manually.

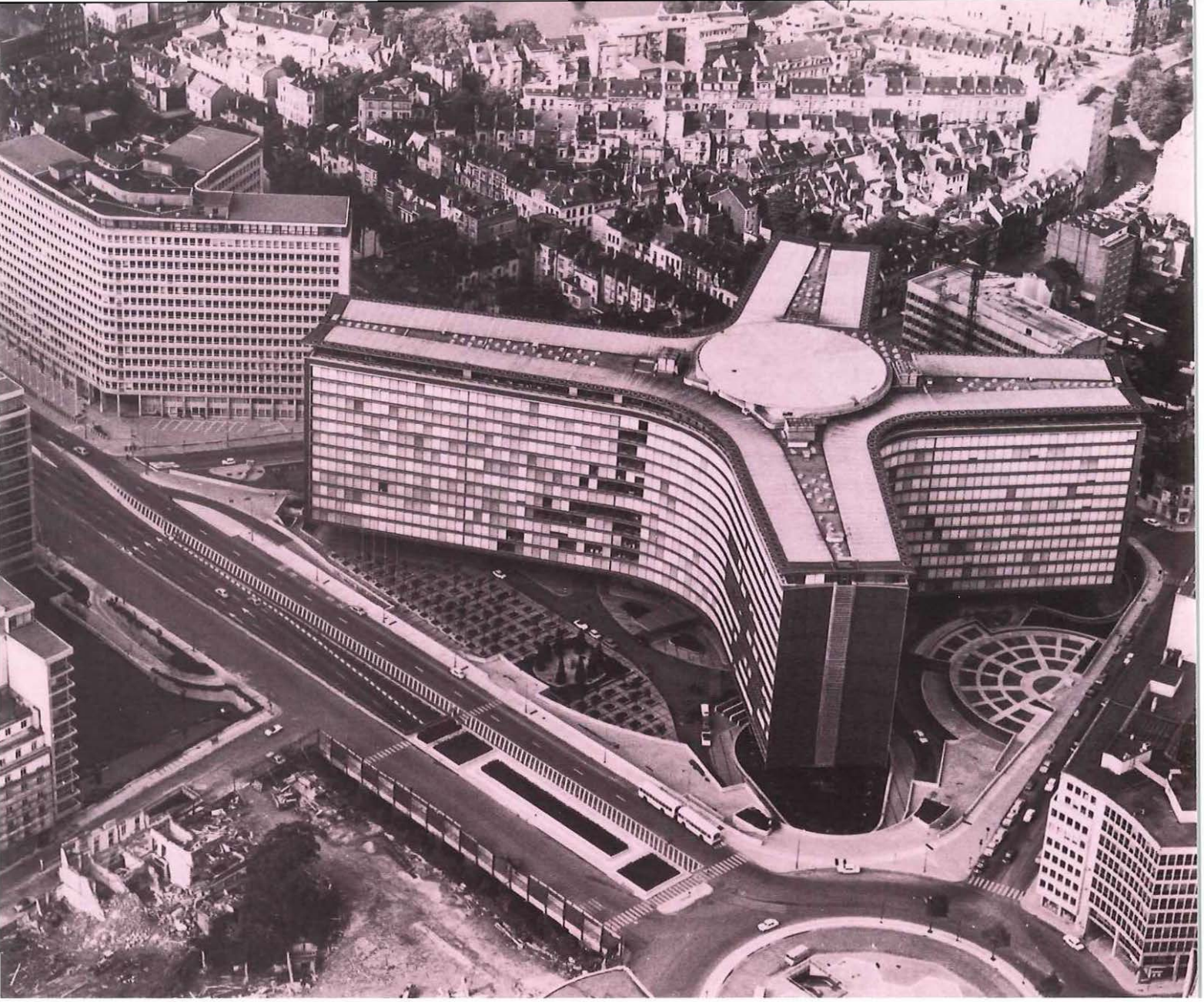
Synthesised

If a second alarm call is received by the MCCU while the operator is dealing with the first, the synthesised voice re-assurance message is automatically transmitted by the MCCU. The re-assurance message is transmitted three times before the MCCU leaves the distant Monita telephone in the auto-answer mode and clears down the connection. The alarm and identity data together with the date and time are printed and displayed, this time accompanied by the word 'unserviced'.

The central control unit operator has now to return the call to the waiting Monita telephone which remains in the auto-answer mode. This is done by reviewing the memory of the MCCU – which can store up to 50 unserviced alarm calls – and displaying the particular unserviced call on the VDU. Once displayed, the operator seizes a PSTN line by pressing the appropriate key and the MCCU automatically calls the waiting Monita. Similar procedures are followed by the operator when dealing with an alarm call from a Security Alarm Unit but without speech.

As the equipment becomes available at the end of the year, it is anticipated that it will be fully exploited and applied to many more applications than it was originally designed for. Ⓣ

Mr J O Stead is a head of group in Local Communications Services/Product Strategy and Planning with special responsibility for the Monita project.



The European Commission headquarters in Brussels.

Community approach

Frank Lawson

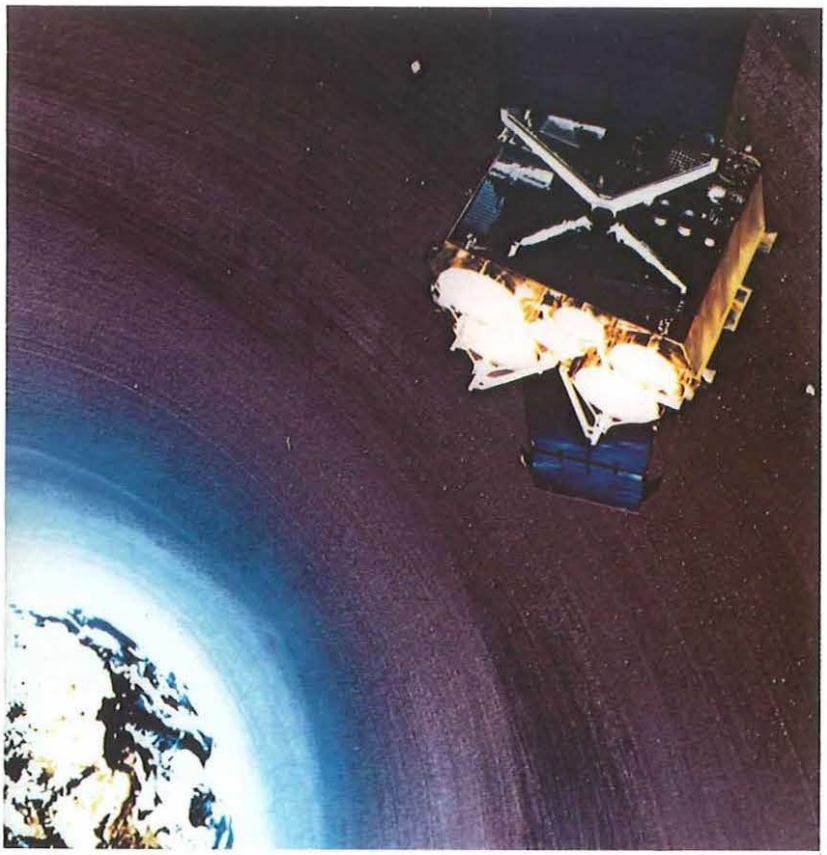
In this second article on the European telecommunications scene, British Telecom Journal looks at recent initiatives within the EEC.

Although media coverage of the European Community tends to dwell on butter mountains, wine lakes, political crises and the Common Agriculture Policy, the EEC is dedicated to telecommunications and is making big strides towards improving services. The European Community and the Commission have to make the most of opportunities for both industrialists and citizens and view telecommunications not only as a major aspect of the infrastructure but also as an important growth sector, which includes information technology and telematics. It is also a highly competitive sector worldwide, with challenges from Japan and the USA.

The Japanese have an impressive master plan of the Information Network System (INS) proposed by Nippon Telephone and Telegraph which could completely change the basis of work in the office and at home. Spread over ten years, it integrates a variety of domestic and business services.

Similarly, in the USA liberalisation has given some carriers the scope to operate in other countries, and great interest is being shown by American companies in the development of the liberalised UK scene and particularly the development of wideband networks.

In the past, countries within the Community have tended to fragment their efforts, and are at different stages of development with different national priorities. Because of this and other political issues, Community efforts to achieve cross-frontier trading and co-operation in telecommunications development have not been as successful as hoped. ▷



The European Communications Satellite project is now established.

To make success appear even more elusive, the UK now has a liberalised regime well beyond that experienced in other EEC countries. Profound changes have taken place in the UK since 1980, which have made existing differences even more pronounced.

Some examples are:

- The separation of telecommunications from the Post Office. (In some EEC countries there is still a PTT).
- Competition instead of monopoly carrier status following the licensing of Mercury by the Secretary of State.
- A wide-ranging General Licence which allows a large number of companies to operate numerous Value Added Network Services over British Telecom's network.
- The introduction of competition in the cellular radio services which will offer tremendous scope to customers on the move and could transform personal communication facilities.
- The loss of British Telecom's exclusive right to determine standards for terminal equipment and to test equipment for connection to the network. British Telecom has opened up almost its whole range of equipment for private supply, and progressively the whole area of provision, installation and maintenance of new equipment will be open to competitors.
- The fact that British Telecom now operates as a plc.

Regulatory bodies

It is not surprising, therefore, that some European countries view the UK system as entirely different. But they recognise that the UK Government has chosen to go down a particular path and that the decision was an internal matter. They should also accept that the trend in the UK is likely to continue, subject to the will of future Parliaments and decisions of regulatory bodies.

But perhaps the most important factor is that telecommunications throughout Europe is being revolutionised by the phenomenal scale and speed of technological developments in the converging worlds of computers, telecommunications, broadcasting and consumer electronics. Equally significant is the rapidly

increasing cost of exploitation of some of these technological developments on a non-shared basis, such as the likely total cost of developing competing next-generation switching equipments in a number of countries.

In its new initiative, the Community seeks to create order and opportunity out of this fragmentation of effort. It aims to create a wider market, and to achieve this, it feels it necessary to harmonise standards over a wide field and to minimise the options open to suppliers who seek to supply the expanded markets. The UK, including British Telecom, supports these initiatives to create a Community-wide dimension in Information Technology, develop wider market opportunities and harmonise the standard setting and type approval equipment.

The Institutions of the European Communities

a. The European Economic Community (EEC) came into existence with the signing of the Treaty of Rome in 1957. Originally there were six member countries, (Belgium, France, Federal Republic of Germany, Italy, Luxembourg and Netherlands). On 1 January 1973 the UK, Denmark and Ireland joined. Greece joined on 1 January 1981.

b. The Commission of the Community acts in the interest of the Community as a whole and is the guardian of the Treaties. It can put proposals to Council (see below) and execute Council decisions. It can also take individual countries before the Court of Justice (see below). The Commission has Commissioners who take particular responsibility for certain sectors. For administrative purposes the Commission is divided further into Directorates and most current activity is carried out within the Directorates of Telecommunications and Information Technology. Directorates make use of ad-hoc groups and working parties, but the Commission exercises responsibility.

c. The Council of Ministers consists of the Foreign Ministers of the national Governments. It can take decisions on a majority basis but normally seeks unanimity. It may form specialist Committees or Councils. It is the decision making body of the Community. The Presidency is held on a basis of tenure for six months in rotation.

d. The European Parliament has a right to be consulted on a wide range of legislative proposals and has an element of budgetary authority.

e. The European Court of Justice can deliver findings which are enforceable in the countries of the Community.

f. The European Investment Bank is a key instrument of financial support for those countries requiring financial backing for projects.

g. The Committee of Permanent Representatives (COREP) consists of ambassadors supported by civil servants.

h. 'Summit' meetings of Heads of State and Government are held several times each year.

i. Community Law is a complex matter. Regulations are binding and directives are binding. In applications of intent, decisions are entirely binding, but recommendations and opinions are not binding.

But the goals and the timescale must be realistic, and to translate the theories into practice will involve heavy demands on scarce resources. It is therefore important to avoid any duplication of effort, and the EEC initiatives must be seen in the wider context of developments by the European Conference of Posts and Telecommunications (CEPT), the International Telegraph and Telephone Consultative Committee (CCITT) and other international bodies.

Not unnaturally the Community and the Commission are fascinated by the potential of the new technologies, They are anxious to achieve co-operative efforts in research and development and the exploitation of new types of networks. UK delegates to the meetings organised by the EEC are emphasising that the customer, particularly in a competitive situation, calls the tune. New initiatives and any trans-national developments should concentrate on customers' needs and their willingness to pay. If a balance is achieved, opportunities will exist not only within EEC markets but throughout the world. Innovation cannot be confined to market sectors and should be fully exploited.

European co-operation should not imply that developments are delayed until Community countries can move together – such a move would be short-sighted. The countries within the Community are at different stages of development in the provision of basic telephone facilities, replacement of switching systems, digitalisation of the network, plans for Integrated Services Digital Network (ISDN), and development of second and third generation equipment and services and facilities. Innovation must be encouraged on a country-by-country basis, but existing cooperative programmes like ESPRIT and COST must be further developed to encourage joint efforts in the pre-competitive field of research and development.

Over the next few months, the UK and other Community countries can expect to see considerable activity in this area, some of it at top political level. But much of the activity will be dominated by small groups of dedicated experts meeting together informally to exchange ideas and dicuss efforts. These activities, combined with, and complementing the activities of CEPT, will bring about a new telecommunications scene in Europe.

British Telecom, as ever, will have played its part in achieving this. . .

British Telecom Journal
Autumn 1984
Community approach

Mr F Lawson is director of marketing projects at British Telecom headquarters.

British Telecom Journal
Autumn 1984

Shocks to the system

As a major user of highly sensitive microelectronic equipment, British Telecom is at the forefront of a drive to minimise damage caused by static electricity

Bob Taylor and
John Lee

A view magnified 2,000 times of damage to a polysilicon input resistor caused by only 500 volts.

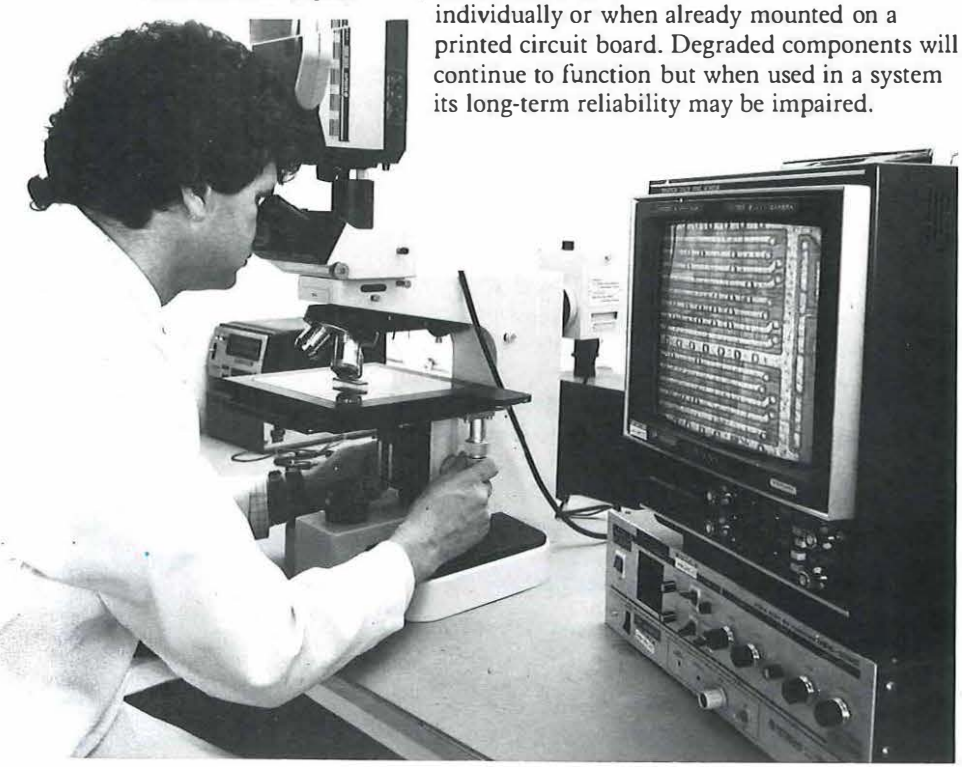
Almost everyone has at some time experienced an electric shock when either touching a door handle or perhaps when getting out of a car, but the sheer scale of the static voltages involved are not so readily appreciated. For an electrostatic discharge (ESD) to be perceptible, the static voltage discharged has to be in excess of 4,000 volts and for sparks to be produced, more than 7,000 volts.

Static electricity is normally generated by friction between dissimilar materials and a number of factors can affect the strength of charge generated including environmental conditions, the surface area of the materials involved and the rate at which the two materials are separated.

The greatest hazard to electronic equipment is normally due to static voltages generated on the human body and then discharged into the system. Electronic, and in particular micro-electronic components, can be seriously damaged by ESD. When equipment has been subjected to a discharge the outcome can result in either a malfunction or a system crash, both of which can cause great frustration.

Microelectronic components can be permanently damaged or degraded by ESD and are particularly at risk when handled individually or when already mounted on a printed circuit board. Degraded components will continue to function but when used in a system its long-term reliability may be impaired.

Co-author Bob Taylor uses a high-power microscope to check the condition of microchips. The result is displayed on the screen (right).



Nearly all microelectronic components can be damaged unknowingly by voltages below the perceptible threshold level of 4,000 volts. As microelectronic components become more complex, the internal geometries separating individual circuit structures on the silicon die become smaller and the vulnerability to ESD damage increases correspondingly. Evidence to date has shown that voltages as low as 100 volts can permanently damage integrated circuits. It has even been suggested that one of the factors which will govern the ultimate limit of miniaturisation of integrated circuits will be their susceptibility to ESD.

It is sometimes wrongly believed that only metal oxide semi-conductor (MOS) integrated circuits, and in particular complementary metal oxide semi-conductors (CMOS) are susceptible. But due to the continual scaling down of geometries, all technologies – including bipolar – are at risk. MOS and CMOS integrated circuits are highly vulnerable, however, because their electronic switching is activated by field effect transistors which are switched when operating voltages are applied to the transistor gates within the integrated circuit.

To overcome the risk of damaging the gates, integrated circuit manufacturers incorporate input protection networks on their chips. These networks are designed to operate, by conduction to ground, at safe voltages to protect the gate oxide while still offering a high impedance path to normal operating voltages.

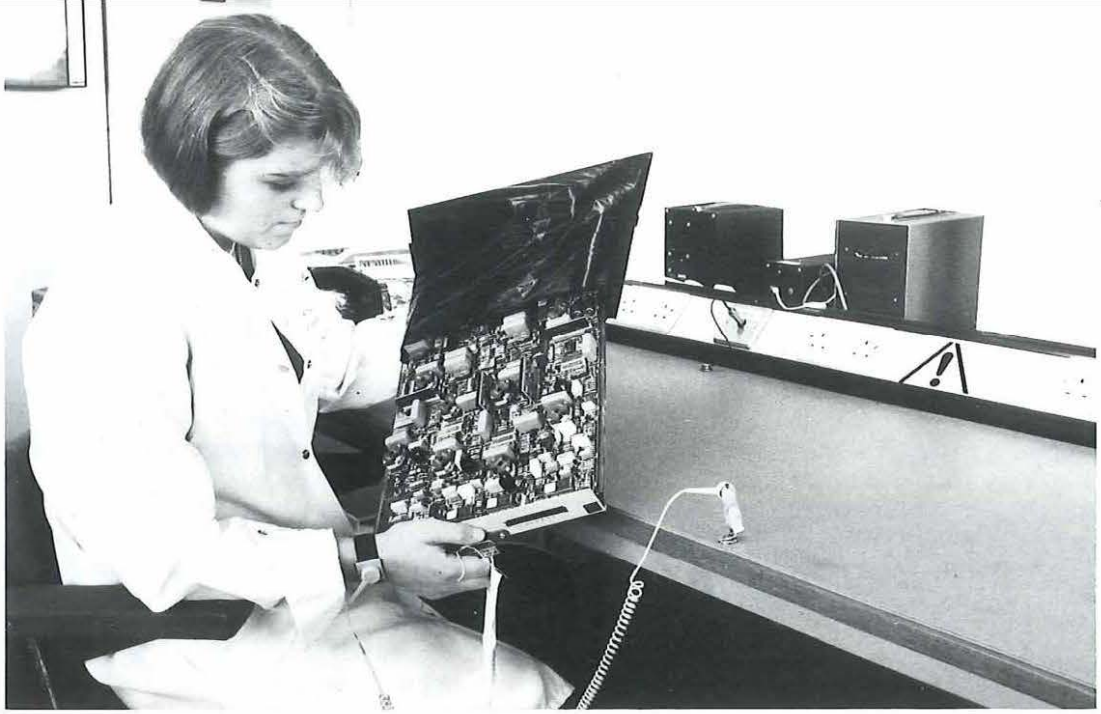
Laboratory

When integrated circuits are being assessed in the laboratory, the effectiveness of their in-built protection networks is evaluated because of the likelihood of physical damage in service. Polysilicon resistors, used in input protection circuits may withstand less than 500 volts and in the majority of cases damage is only revealed when the layers of the chip are intentionally removed.

Over the past two years a great deal of collaborative work on electrostatic discharge has been carried out between British Telecom's Research Laboratories at Martlesham and its Materials and Components Centre in Birmingham. This has resulted in a significant understanding of ESD phenomena and in the design and construction of an automatic tester which subjects components to simulated discharge pulses. This equipment is now commercially available and regularly used.

Because ESD poses a threat to components both before and after installation, it is important that the risks are minimised in two ways. Firstly, at the component level, the onus is on the manufacturer to ensure that the in-built protection circuitry is as effective as possible and secondly, it is important to ensure that both British Telecom and its contractors take precautions so that components and systems are not jeopardised by unnecessary exposure to discharge pulses.

Detailed studies have shown the only way to



Positive +	Air Human hands
	Glass Mica Nylon Wool Lead Aluminium Paper Cotton Steel Hard rubber Nickel, Copper, Brass, Silver, Gold, Platinum, Acetate Rayon Polyester
	Acrylics Polyurethane Polyethylene Polypropylene PVC (Vinyl) KEL F Silicon PTFE
Negative —	

The tribo-electric series can be used to determine the likely electrostatic generating capability of various materials. Note that air and human hands are top of the list.

Using anti-static devices at Birmingham's Materials and Components Centre are technician Paul Thurlow (below) who is placing a microchip into the automatic component ESD tester designed and constructed at British Telecom Research Laboratories, Martlesham and technical officer Ruth Wainwright (above) examining a printed circuit board.

Mr R G Taylor investigates semiconductor physics and **Mr J R Lee** is a consultant on all aspects of electrostatic damage. Both work in the Materials and Components Centre at Birmingham.

control the static discharges from the human body is by equipotential bonding via a wrist strap and cord to the equipment receiving attention. It is not necessary for the cord to be earthed but only for the individual and the equipment to be at the same potential. Not all British Telecom equipment has bonding points for direct connection of the cords but this is gradually being rectified. It is also important that all electronic equipment and components bought by British Telecom are dispatched in static shielded packaging to avoid electrical overstress.

Together with the computing and electronics industries generally, British Telecom has recognised the savings which can be made by minimising discharge damage and Materials and Components Centre, together with Local Communications Services (LCS)/Local Lines Services, has developed a range of electrostatic protection items to provide correctly controlled performance while observing all necessary safety factors.

The ability of systems and equipment to withstand the effects of stray electromagnetic radiation is also vital for reliability. There have been many reports of small computing systems malfunctioning due to interference from domestic electrical equipment such as vacuum cleaners.

'Electromagnetic compatibility' enables signals and interference to co-exist without loss of information in the wanted signal. The term also covers electromagnetic radio frequency interference suppression and surge protection.

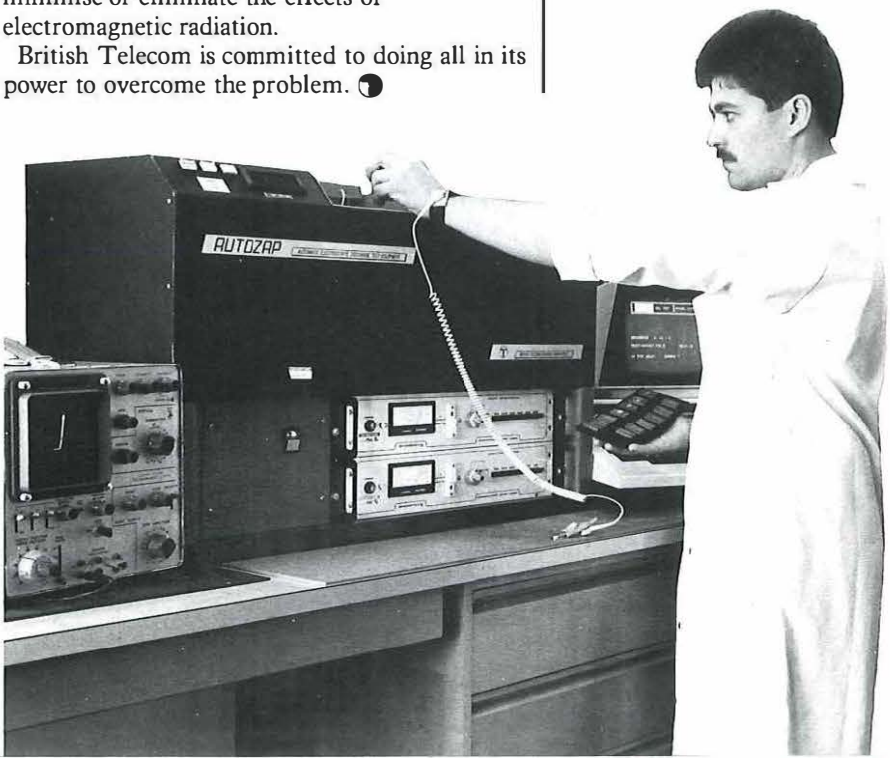
'Compatible' equipment can be designed to operate in a defined electromagnetic environment and should take into account three basic elements: the source generating the interference or 'culprit' equipment; the affected or 'victim' equipment; and the coupling path. Argon welding sets and video games are typical examples of man-made interfering sources but many are natural in origin and include lightning and static charges on people.

The coupling path through which the interference is transferred carries either conducted or radiated interference. Radiated interference can be inductively and/or capacitively induced into cables connected to the 'victim' equipment and arrive as conducted interference. Equipment problems caused by lightning manifest themselves in a similar way where high voltage transients can be induced into cables some distance away.

As the hardware used in telecommunications becomes even more dependent on microelectronic components, the risk of failure due to electromagnetic interference will continue to increase.

Currently an investigation into the seriousness of the problem is being carried out at the Materials and Components Centre and the indications are that it can be tackled in two ways. Firstly, legislation could be used to limit electromagnetic radiation: there are many regulations in the US and in some European countries which control the emission of 'culprit' radiation. Secondly, the 'victim' equipment should be correctly designed with the necessary shielding, filtering and grounding needed to minimise or eliminate the effects of electromagnetic radiation.

British Telecom is committed to doing all in its power to overcome the problem. ◑



British Telecom Journal
Autumn 1984

Promoting the phone

Few businesses make optimum use of the telephone. In a bid to help them do so, British Telecom has created PhonePower, a dynamic new sales force.

Ray Dunstan

PhonePower is a consultancy service promoting the effective use of the telephone in a marketing environment. Consultants, covering the whole of the UK, have been specially trained to show sales and marketing staff how the telephone can be used to save both time and money.

A consultancy can cover one or more of the following topics:

- improving cash flow
- generating new business
- maintaining and improving current business
- reviving old business
- launching new products and services
- making effective appointments
- handling enquiries promptly and efficiently
- dealing with dissatisfied customers positively

When contact is made with a potential client, a consultant will talk to management and sales office staff about the company, its marketing objectives, products, customers and office procedures. A report will then be prepared outlining the likely effects of introducing PhonePower techniques. Depending on the size of the project the report may be verbal, a letter or several pages presented as a formal document.

Research and advice is given free and if a customer wants help to put a PhonePower programme into action, the consultant will assist with staff selection and training, implementing new office procedures, and advise on setting up work stations. If the company wishes, the consultant will advise and assist on running a short pilot trial to measure the effectiveness of the PhonePower proposals before full implementation. The consultant will also

PhonePower consultant Janet Gardener from British Telecom London discusses telephone strategy with staff at Transalpino Holidays in central London. The firm makes extensive use of the telephone to sell holidays in Europe to the under 26s.

monitor performance during the trial, giving advice to management at progress meetings and in all cases there is a follow-up process to ensure the operation is functioning properly.

PhonePower training courses are designed for all degrees of business experience, from the most junior clerk up to senior management level. Training techniques do not involve rigidly scripted exercises. Because PhonePower treats each of the trainees as an individual, with particular needs, each course is tailored to fit specific requirements.

Training covers all aspects of the telephone, highlighting how to get the best use from it in each situation. Each course is fully supported by training films, audio-visual aids, literature and practical role-play exercises. In these, conversation is recorded to be played back later for in-class analysis. The training courses are held either at British Telecom's PhonePower offices or, alternatively, at the client's premises if they prefer.

Although PhonePower has only been fully operational for a few months teams have already been receiving favourable reactions from their customers, both internal and external. They have stepped in successfully to advise British Telecom area sales teams and many companies large and small in every sphere of business.

A recent and typical example was a Midlands advertising agency having poor results in selling advertising space over the telephone. A consultant visited the company and spent much time conducting extensive research into existing systems and practice. On presentation of a report of the findings, proposals and costings, the agency decided to employ PhonePower and on an agreed day the consultant arrived at their office to set up a full day's telesales training course for the staff. As a direct result, the agency noticed a significant increase in sales of advertising space.

PhonePower recently held its first national conference, and the event in Peebles enabled consultants to meet for the first time to exchange ideas and experiences and to voice their opinions on the future of the service. The vital role that PhonePower would be playing in British Telecom's future plans was made clear and the field sales teams were seen as a key force in this operation. ◑

British Telecom Journal
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Promoting the phone

The PhonePower logo.

Mr R Dunstan is administration manager for PhonePower.

Following a visit to a company one of the first tasks of a PhonePower consultant is to write a report for the firm suggesting ways in which improved use of the telephone could benefit business.

British Telecom Journal
Autumn 1984

Working party's PBX study

Making the most of the system

Arthur Hiett

The last few years have seen many exciting new changes in the telecommunications equipment available to British Telecom's customers. A sphere of particular development has been the private branch exchange (PBX).

The introduction of stored program control (SPC) opened up a whole new range of supplementary services to customers using extensions on private branch exchanges (PBXs). For the first time they were able to enjoy the benefits of call diversion, three-party calls, call back when free and several other services. These sophisticated SPC PBXs are now marketed by a large number of manufacturers and competition is keen.

Each type of PBX provides the supplementary services in a slightly different way and until now the services have, in general, only been usable between extensions on the same PBX, although some PBXs can extend their use via private circuits to extensions on another PBX of the same manufacture. Customers wishing to establish a private network by buying PBXs from different manufacturers have been unable to exploit the supplementary service capabilities on a network wide basis.

It was to resolve this problem that British Telecom's National Networks Strategy Unit (NNSU) set up a working party of PBX manufacturers to define what has become known as the Digital Private Network Signalling System No 1 (DPNSS 1). This work is a continuation of the strategy unit's traditional role of establishing standards to give customers a wider choice of compatible products so maximising use of British Telecom's lines.

When it began two years ago the working party comprised NNSU, Plessey, Mitel and British Telecom Enterprises (BTE) Merlin. Since then more manufacturers have joined and the ten members are now: Plessey Office Systems, BTE Merlin, Mitel Telecommunications, GEC Information Systems, STC Telecommunications, Ferranti/GTE, Philips Business Systems (PBS), TMC, IBM UK and Thorn-Ericsson Telecommunications. At least five of these manufacturers are currently developing DPNSS 1 for their own PBXs.

The first use of DPNSS 1 will be in the Government Telecommunications Network where three large transit PBXs, of different manufacture, are due to become operational next year.

Basically, DPNSS 1 provides error-free data links between the central processing units (CPU) of interconnected PBXs in a private network as shown in figure 1. Signals are sent over these links in the form of messages from one CPU to another to set up calls and request supplementary services. Since the signalling channel is separated from the traffic channels, messages can be sent at any time without interference to speech or data.

Transmission

DPNSS 1 can be considered in three layers. The first provides the physical transmission path between the PBXs, the second carries the signalling messages along the transmission path and protects them from transmission errors and the third is the signalling messages themselves. The physical transmission of DPNSS 1 is either on channel 16 of a 30-channel pulse code modulation system (PCM) or by means of a modem via an additional private circuit which is dedicated to signalling.

To ensure reliable error-free transfer of DPNSS 1 messages between PBXs, they are carried along the signalling channel in accordance with the internationally recommended 'High Level Data Link Control' (HDLC) protocol. Figure 2 shows an HDLC frame carrying a DPNSS 1 message.

The first two octets of the frame, known as the address field, give the number of the traffic channel to which the message relates. This enables the receiving PBX to associate the message with the appropriate channel. Some supplementary services use messages which are not related to real traffic channels. These are known as virtual calls and enable information to be passed between PBXs without wastefully using a traffic channel.

The third octet of the frame – the control field – indicates whether the frame contains a DPNSS 1 message or perhaps an acknowledgement. The control field also carries a serial number to enable the loss of a frame to be detected. The receiving PBX acknowledges each frame which contains a message by

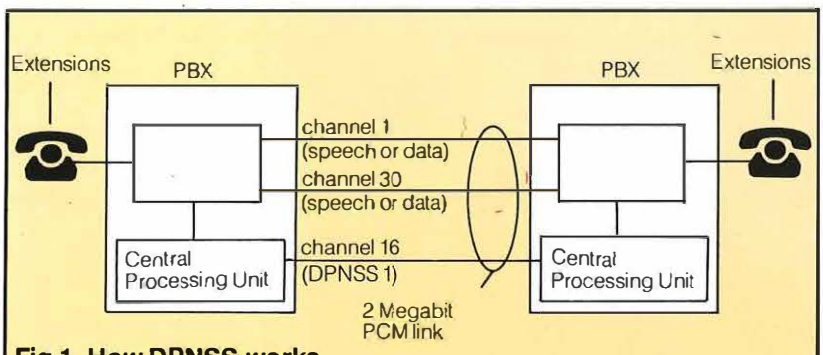


Fig 1 How DPNSS works.

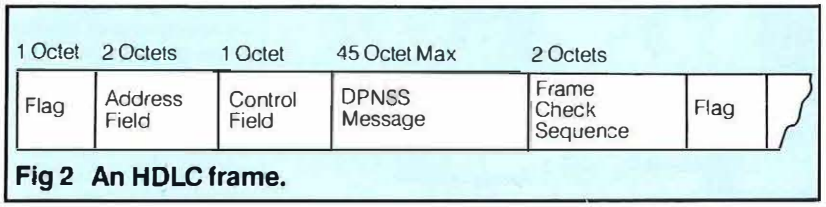


Fig 2 An HDLC frame.

British Telecom's Monarch is one of many types of modern digital PBX in use today.

DPNSS 1 is published in British Telecom's Network Requirement which currently specifies a simple telephone call plus the following 19 supplementary services:

Circuit switched data call	Call offer	Redirection
Swap	Non specified information	Series call
Call back when free	Call waiting	Three party takeover
Executive intrusion	Bearer service selection	Night service
Diversion	Route optimisation	Centralised operator
Hold	Extension status	
Three party	Controlled diversion	

returning its serial number to the sending PBX. Frames are repeated until acknowledged.

The DPNSS 1 message itself follows the control field and the whole frame is terminated by a two-octet frame check sequence. The frame check sequence enables the receiving PBX to detect any corruption to the frame that may have occurred during transmission. Frames containing errors are not acknowledged and will, therefore, be repeated by the sending PBX. Adjacent frames are separated by a unique 8-bit pattern referred to as a flag. When there are no messages continuous flags are transmitted.

A typical DPNSS 1 message will contain all necessary information to establish a call across a private network plus the type of calling party ▷

The 15 different types of message used in DPNSS 1:

Initial Service Request Message - ISRM Subsequent Service Request Message - SSRM	Used to establish a call or supplementary service.
Number Acknowledgement Message - NAM	Indicates that the call has been successfully established.
Call Connected Message - CCM	Indicates that the call has been answered.
Clear Request Message - CRM Clear Indication Message - CIM	Used to release a call.
Network Indication Message - NIM	Used to pass information back to the originating PBX during call establishment.
End to End Message - EEM	Used to signal between end PBXs without affecting intermediate transits.
Link by Link Message - LLM Link by Link Reject Message - LLRM	Used to signal to the adjacent PBX
Recall Message - RM Recall Reject Message - RRM	Used to established a second call on a channel, eg enquiry call.
Single Channel Clear Request Message - SCRM Single Channel Clear Indication Message - SCIM	Used to release a second call on a channel.
Swap Message - SM	Used to change from voice to data and vice versa.

Signalling information within each message is coded using letters, numerals or symbols of the International Alphabet No 5 (IA5), with each character being 8 bits (one octet) in length. The characters are formed into supplementary information strings. Each supplementary information string starts with the IA5 character * and ends with the character #. Some strings comprise an identifier code - * 27# - which means call offer. Other strings comprise an identifier plus a parameter - * 40B * 5432# - which means divert to extension 5432. Depending upon the type of call a message may contain a number of supplementary information strings.

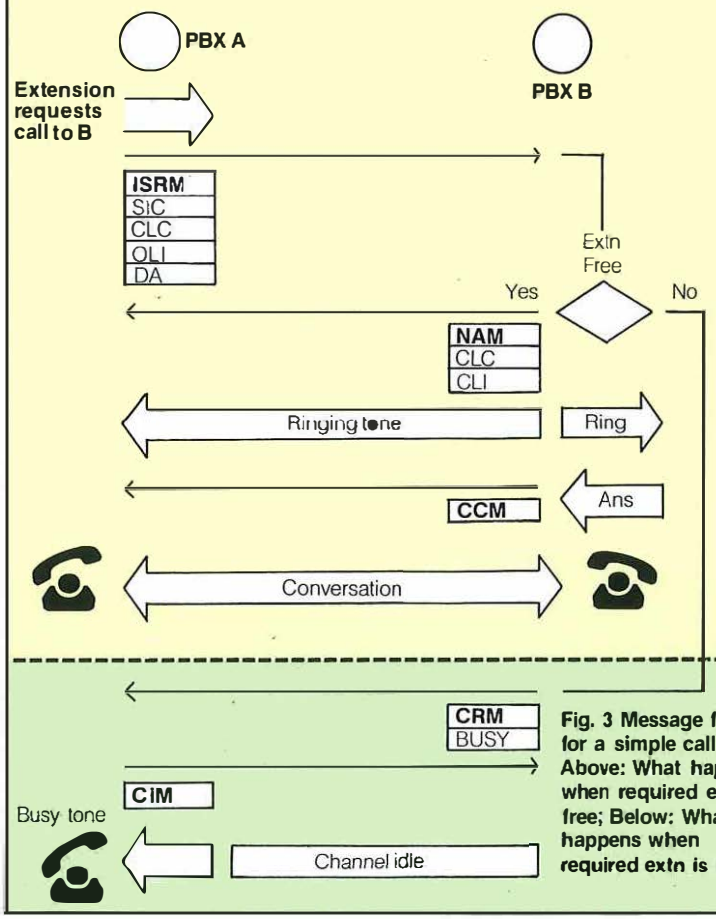


Fig. 3 Message flows for a simple call: Above: What happens when required extn is free; Below: What happens when required extn is busy.

When an extension on PBX 'A' requests a call to an extension on PBX 'B' an initial service request message (ISRM) is sent. It contains:
Destination Address (DA) – Extension number of B
Originating Line Identity (OLI) – Extension number of A
Service Indicator Code (SIC) – Telephony
Calling Line Category (CLC) – Ordinary Extension

Any intermediate transit PBXs will route the call in accordance with the Destination Address in the ISRM.

On receipt of the ISRM PBX 'B' connects the call to the required extension and applies ringing. A number acknowledgement message (NAM) containing called line category (CLC) and called line identity (CLI) is returned. When the called extension answers a call-connected message (CCM) is sent to PBX 'A'.

If the required extension is busy, when an ISRM is received, PBX 'B' immediately releases the call by sending a clear request message (CRM) containing a Clearing Cause – Busy. On receipt of a CRM 'Busy', PBX 'A' applies local busy tone to the caller and restores the outgoing channel to the free state.

such as ordinary extension or operator, and telephone number. Supplementary service requests may also be included in the message in the form of supplementary information strings (see panel on page 13). Some supplementary services involve dialogue between the PBXs.

PBX facilities are constantly evolving and DPNSS 1 has been designed for future growth. As the range of facilities offered by PBXs continues to grow so too will the list of DPNSS 1 supplementary services. And British Telecom will continue to be at the forefront of development. Ⓣ

An extension user may arrange for his calls to be diverted to another extension. If a call is made to an extension which has diversion registered on it, a NAM is returned in the normal way but a supplementary information string "Divert" is included. This string will indicate the type of diversion encountered, together with the extension number to which the call is to be diverted.

PBX 'A' will then establish a new call and release the original one. Where possible the new call may re-use some of the existing route.

The ISRM of the new call will contain an additional supplementary information string (DVG) which will indicate that the new call has been diverted and where from.

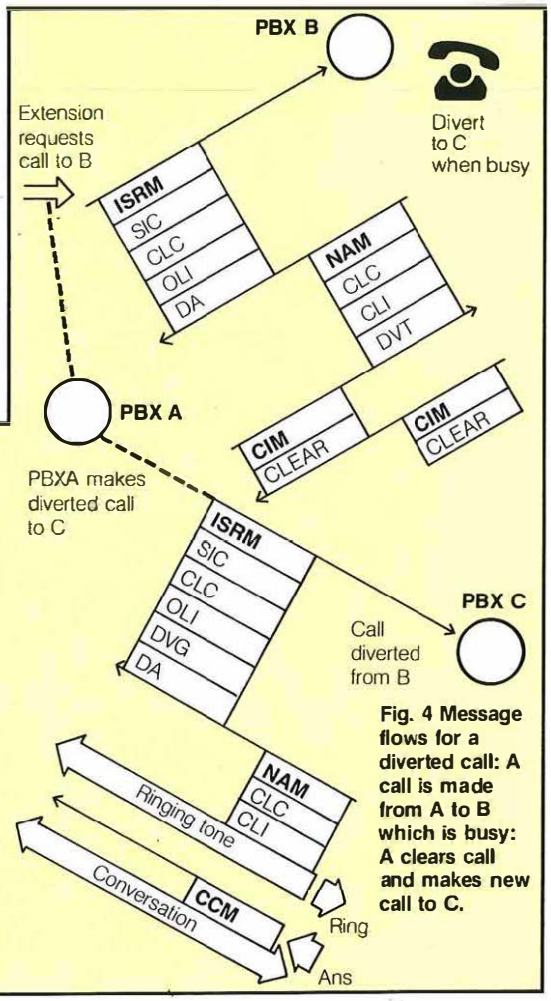


Fig. 4 Message flows for a diverted call: A call is made from A to B which is busy: A clears call and makes new call to C.

Mr A E Hiett is a head of group in the special network techniques section of National Networks Strategy Unit. He is also chairman of the DPNSS working party.

100 Call office centenary

Dave Wenlock

British Telecom Journal
Autumn 1984

One hundred years ago this autumn new government licences opened up the way for Britain's telephone companies to begin expanding the public call office service. Today British Telecom customers, whether in busy city centres or remote rural outposts can use any of 77,000 'call offices' to dial worldwide. This article marks the centenary by tracing the development of one of the landscape's most familiar features.

It is a fact that no other service reflects British Telecom's image more directly than its 'public call offices'. They also provoke strong customer reaction on a variety of issues, ranging from where they are sited to their colour.

But in the early 1880s things were very different. Although there had existed, particularly in London, a small number of call-rooms (as they were then termed), the telephone companies operating them had little incentive to extend because they were required by Government to pay a royalty of 50 per cent on the gross receipts. In November 1884, however, the Government – in response to pressure from the trading community – granted new licences and reduced the royalty to ten per cent.

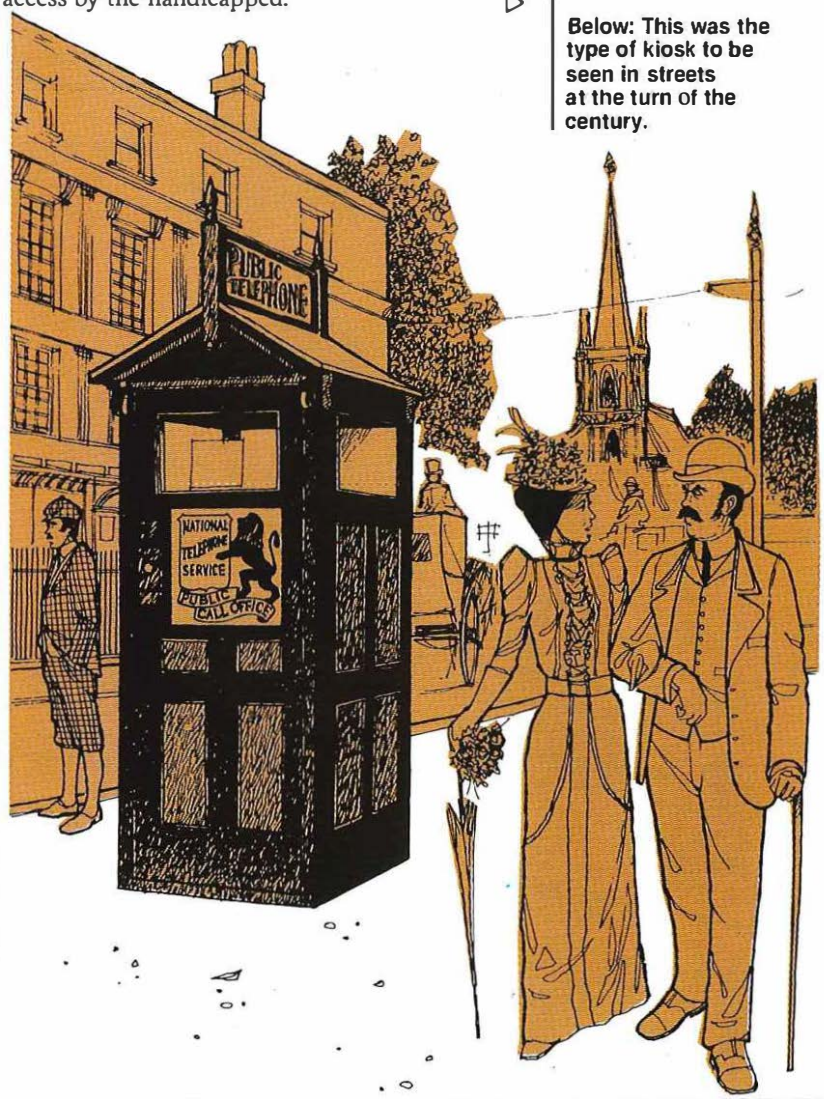
A month later the National Telephone Company issued a series of stamps (above) to avoid making cash payments to the call office attendant. The stamps were issued for sale to, and use by, subscribers and members of the public, and when the telephone was used at a call office, the stamps were attached to a form kept by the attendant. The stamps were issued in denominations which corresponded with certain of the company's fixed scale of charges, based upon the distance between the points of communication. They were: 1d (black); 3d (pale red); 4d (ultramarine); 6d (bronze); 1s (brown).

Each stamp bore a three-quarter face portrait of Colonel Robert Raynsford Jackson, chairman of the company. The stamps were at one time much used in Scotland, from where the company operated, but because of their confusion with and use by the public as postage stamps, they were withdrawn in 1891 at the request of the Postmaster-General.

The first kiosks, which appeared at the beginning of the 20th century, were made from wood with glass windows. Because local councils considered kiosks unsightly and a cause of street congestion, most were to be found in railway stations or inside shops. Even the introduction of a standard design in 1921 (the Kiosk No. 1) did not completely overcome the objections.

In 1924, a competition, held to produce an improved kiosk design, was won by the eminent architect, Sir Giles Gilbert Scott. His Kiosk No. 2 was well received in London, while a less grand Kiosk No. 3 found widespread use elsewhere. In 1935, as part of King George V's jubilee celebrations, Sir Giles was again commissioned to produce a new design. His red jubilee kiosk (No. 6) proved suitable for all locations, and soon became a familiar sight throughout the country. It remained the standard kiosk until the introduction of the current model (Kiosk No. 8) in 1968.

In recent years, British Telecom – recognising the important image projected by the appearance of its kiosks – has been looking closely at a new range of kiosks to cater for any location. Major considerations have included modular capability, maintenance and cleaning aspects, and ease of access by the handicapped. ▷



Below: This was the type of kiosk to be seen in streets at the turn of the century.

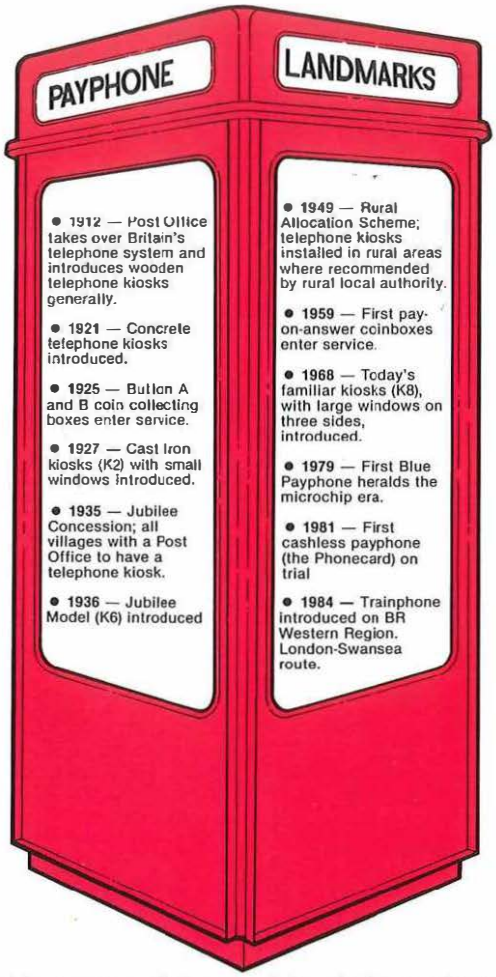
Above: The famous button 'A' and 'B' coinboxes were introduced in 1925 and lasted well into the 1960s.

Telephone instruments have also changed significantly over the years. The Ericsson coinbox (circa 1911) required the caller to insert coins one at a time under the direction of the operator, before a call was connected. With the introduction of the Button 'A' and 'B' coinboxes in 1925, callers could dial their own local calls, having inserted the correct fee. When the called party answered, Button 'A' had to be pressed before a two-way conversation was possible. In the event of no reply, engaged tone, or a wrong number, the caller could have his call fee returned by pressing Button 'B'.

Towards the end of the 1950s, the Button 'A' and 'B' pre-payment payphones began to be replaced by the first versions of what are now known as Pay-on-Answer (POA) payphones. The POA design was made necessary by the introduction of Subscriber Trunk Dialling (STD) and its introduction to service was phased to coincide with STD access. To offer a fully automatic service to payphone users, the POA system had to work in conjunction with local-call timing and multi-metering equipment, and had to enable subscribers to extend calls by inserting additional coins as they spoke.

The introduction of decimal coinage in 1970 resulted in some fundamental changes to the payphone mechanism, which had been designed in the early 1950s to take up to three different duodecimal coins in the value ratio 1:2:4. To use decimal coinage, however, a 1:2:5 value ratio was required and, to achieve this, modifications to both the payphone and the coin and fee check circuitry were necessary.

When decimal coinage was introduced, the unit fee of the payphone was changed from 6d to 2p, and much anticipatory design and piece-part manufacture was necessary before the availability of the new coins. In the event, the challenge of D-day (15 February 1971) was met by telephone area staff, with industry's help,



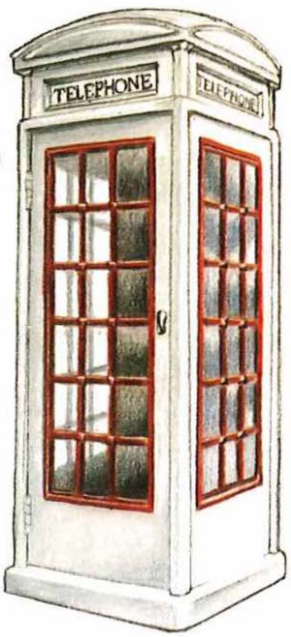
How the modern kiosk has evolved since 1921.

with a near total change of the whole payphone system in the space of three weeks.

During the 1970s it became apparent that the viable life of the POA system was limited. Inflation had exposed a need to provide for greater flexibility in design to cope with tariff adjustment and to obtain the unit fee charge from a given combination of coins. As metering rates increased – particularly with the

K1

K2



K3

widespread availability of International Direct Dialling – the enforced breaks in transmission while additional coins were inserted became more obtrusive. Also, as the system aged, the concept of a payphone with its coin-validation mechanism linked to a controlling coin and fee check relay set in the local exchange did not help the quick localisation of faults between the payphone and the exchange-based equipment.

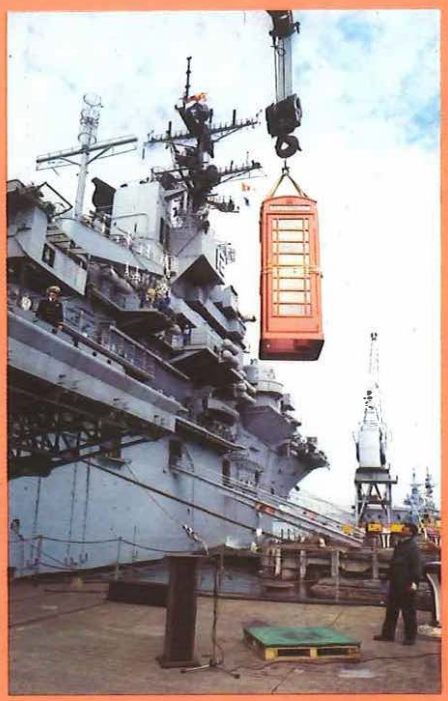
Plans were drawn up in 1978 to update the whole system by exploiting the advantages of electronic technology. In planning the change, note was taken of the need to harmonise the operating characteristics with most other European countries. The decision was taken that the system would be based on the pre-payment approach, with refund of unused coins where appropriate. It was also decided to dispense with the two-part concept of POA, and to opt instead for an integral design with logic control vested in the payphone itself. A trial began in 1979 of a high-revenue-earning payphone, known as the Blue Payphone 1. This and the current version (Blue Payphone 2), are now replacing all POA payphones.

In 1981 the Phonecard Service was introduced, and so began the cashless calling revolution using phonecards which employ holographic techniques. Following a successful trial, this service is now being extended nationally. As well as being easier to use, there are no coins to collect and it is hoped that vandalism and attempted theft will decrease.

Trainphone was introduced earlier this year, and the service is now in regular use between London and Swansea. Future cashless services may include the automatic charging of telephone calls to a specified telephone number, and the use of commercial credit cards to pay for calls.

In 1884, a major Government decision changed the whole future of the public call office service. Today there is liberalisation and competition, and an Operating Licence which requires British Telecom to maintain its Public Call Office Service. British Telecom is confident that during the next 100 years it will continue to meet the needs of its customers. ⓣ

K6 K8



Old telephone kiosks are highly popular with collectors both at home and overseas. They are put to a variety of uses ranging from shower cubicles to 'greenhouses' for plants. This particular model was a gift from Portsmouth to Portsmouth, Virginia where it was re-erected on the waterfront at the city's ferry terminal.

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Autumn 1984
Call office centenary

Mr D J Wenlock is a head of group in Local Communications Services Payphone Services Division.

Below: The look of the future . . . this kiosk outside Westminster Abbey in London is one of the latest designs adopted by British Telecom.

British Telecom Journal
Autumn 1984

Getting the message with Voicebank

Steve Roberts

Voicebank, the first open public voice message service to be provided in the UK, was launched by British Telecom earlier this year.

The separation of British Telecom from the Post Office, its subsequent reorganisation and most recently its privatisation, have had a profound effect not only on the environment in which the business operates but also on its approach to customers and services.

The creation of the five major divisions provided a new structure and British Telecom Enterprises (BTE) was set up to handle the new business opportunities which presented themselves. BTE itself is broken down into Consumer Products, Merlin (responsible for business products), Value Added Systems and Services and Mobile Systems and Services and it is the last of these which operates Voicebank.

Voicebank, in fact, is a development from British Telecom's Radiopaging service which had its origins in a market trial carried out in a 1,000 square mile area around Reading in 1972. In 1976, a London service was opened, and two years later, on the strength of that experience, it was decided to expand the service nationally.

Initially it was provided to Bristol, Cardiff, Birmingham, Manchester, Liverpool, Glasgow and Aberdeen but a truly national service was opened in 1981. The service is now the largest national radiopaging system in the world and last year the Display Page service was launched whereby a customer could receive a ten digit numeric message on a liquid crystal display on his pager. Voicebank was launched in May this year, enabling the receipt of recorded spoken messages.

Voicebank was conceived by the British Telecom Radiopaging service after it became apparent, in 1980, that 'tone with voice' paging was being successfully marketed by the radio common carriers in the United States. This service recorded spoken messages from callers and alerted customers by bleeping them every time a message arrived. In the United States, tone with voice paging appeared to be taking the place of tone and voice paging, where the spoken message is transmitted directly from the pager.

Commercial

The first Voicebank system was installed in London early this year. A trial service began soon afterwards and then full commercial service was opened with access from almost anywhere in the world. Once British Telecom has gauged the demand for the service and refined its parameters in response to the needs of the users, it is intended that, in liaison with Local Communications Services (LCS), Voicebank will be offered in all the major centres throughout the UK.

But what exactly is a voice message service? According to a frequently used description 'voice messaging is the automatic recording of telephone messages on centralised voice mailbox equipment with alerting of the recipient by radiopaging.'

British Telecom Voicebank, however, takes a

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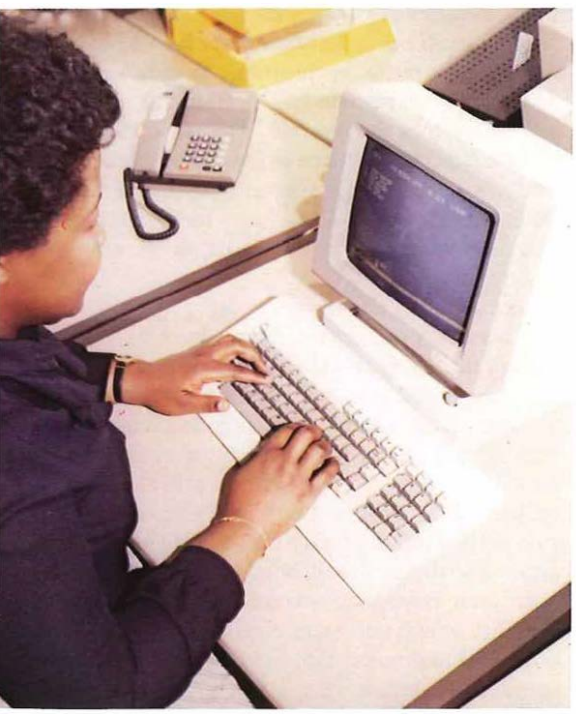
much less specific view of the voice message arena. It encompasses answering machines, corporate voice mail facilities provided as adjuncts to private telephone exchanges, voice mail bureau services provided to closed communities of interest, and open public voice message services such as Voicebank.

Although the Voicebank service currently addresses just one aspect of the voice message services market it is intended that the service should cater for other aspects including applications which do not require radiopaging. The market for the service is seen as users whose business generally takes them out and about. Typical customers therefore are likely to be one-man businesses, small companies operating without a secretary or from home, and field sales or engineering staff.

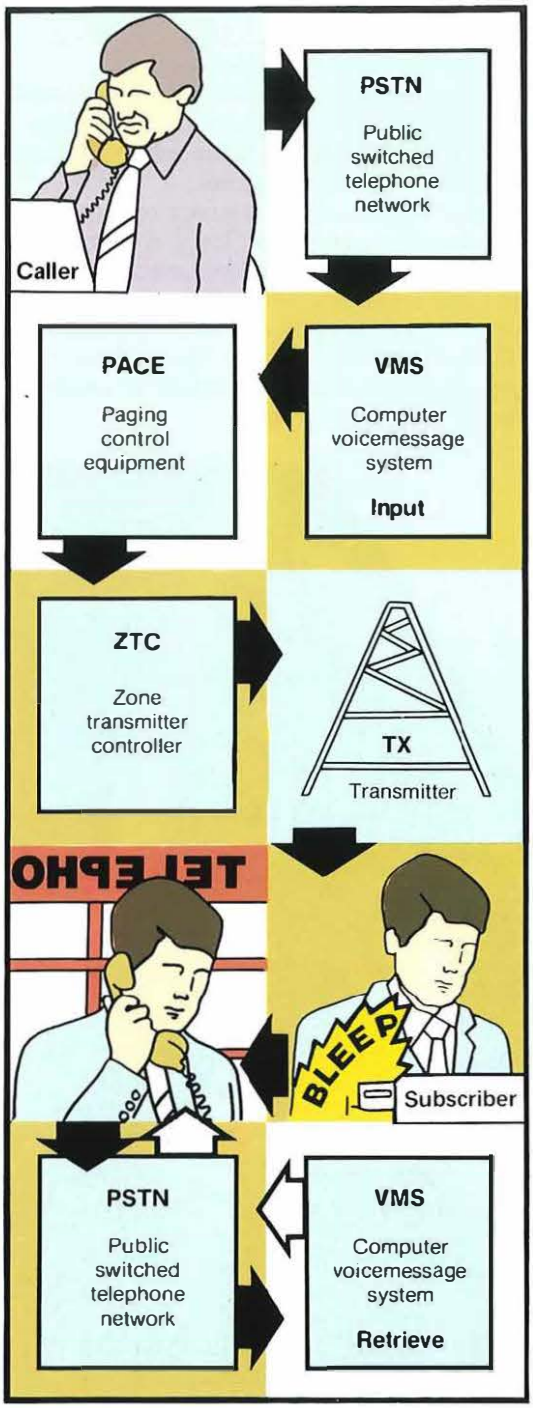
But already Voicebank is receiving interest from unexpected markets. For example, large companies which see a possible need for an in-house voice mail system regard Voicebank as an inexpensive, low risk entry into the voice mail arena through which they can gain experience of the principles of the facility and ultimately refine their requirements for their own equipment. In this respect, Merlin, the business products arm of BTE, markets a PBX voice message facility, the Merlin Voice Mail system, which is British Telecom's offering to the in-house voice mail system market.

Every Voicebank mailbox is identified by a unique telephone number. To the caller the service behaves similarly to a telephone answering and recording machine. A caller wishing to leave a message for a Voicebank customer dials the customer's Voicebank number and, after hearing a greeting spoken by the customer, speaks his message and hangs up. The service will then bleep the customer's radiopager to alert him to the fact that a message has arrived in his mailbox.



Voicebank offers two methods of retrieving messages. The first is by dialling the same number as callers and using dual tone multi-frequency (DTMF) signalling to control the way in which messages are replayed. The signals can be sent from a standard tone signalling telephone or from an acoustically coupled keypad. Using DTMF signalling, the customer enters 0 to indicate that he wishes to retrieve a message rather than leave one.

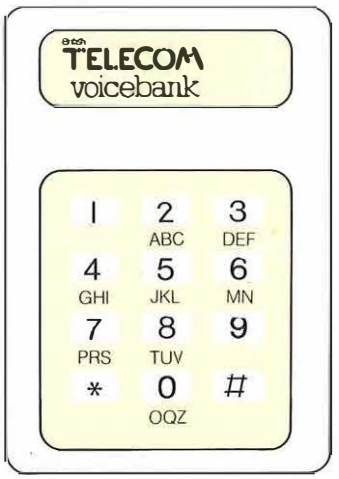
The system then requests a four-digit password and once accepted, will indicate the number of messages stored and allow him to listen to them. Three retrieval commands are available. Keying '3' will delete the message that has just been heard and play the next, '5' will save the message that has been heard and play the next and '7' will repeat the message that has just been listened to. ▷



Far left: A Voicebank customer uses a DTMF keypad to retrieve his messages.

Centre: Clerical officer Lacy Green checks a customer's reference at the Voicebank headquarters in London.

Left: How Voicebank turns the telephone into a complete message service.



Voice retrieval commands on Voicebank keypad

3 CANCEL
Play next message

5 SAVE
Play next message

7 REPEAT
Last message

Voicebank also offers an alternative to message retrieval using DTMF signalling. Customers can rent a second, 'retrieve only', telephone number from which their messages are automatically played back in the order in which they are received, Once the system has played through the messages each one will be held until the expiry of its retention time.

The standard Voicebank service offers a 25-second message length. Up to seven messages can be held in a single mailbox at any one time and each message will be held for up to 12 hours unless it is deliberately deleted by the customer. There is, however, scope for more generous parameters and Voicebank will offer extended facilities at premium tariffs.

Mr S Roberts is manager of voice message services in British Telecom Enterprises/Mobile Systems and Services.

Technical officer John McGrory tests a trunk card on the Voicebank direct dialling-in circuits.

Currently the joining fee is £10 and basic service rental is £35 per quarter, with an extra £5 per quarter charged for a second retrieve-only number. Portable DTMF tone senders which use the same signalling standards as Voicebank are now becoming available in the UK. Voicebank's tone keypad costs £45 and is approved for connection to the British Telecom network.

The current Voicebank installation consists of two voice retrieval systems (VRS) connected to the London 01-725 exchange. The systems are connected by private wire to the radiopaging control equipment where the interface is provided by DTMF to dial pulse converters. A terminal, two printers and a tape drive for customer database backup are supported at a local engineering centre, and two further terminals, connected via modems and private wires, are supported at a remote customer services centre.

The trunk section of the VRS consists of trunk interface cards, each of which can handle two trunks. The interface answers incoming calls, accepts digits from the public telephone network to identify the particular mailbox being called and recognises call control signals from the network. In particular it recognises pay-tone 'pips' from post-pay coin boxes so that messages and greetings are not replayed until the pips have finished.

Speech to and from the trunk interface passes through the buffer section of the equipment. Each buffer card can handle two speech channels. The cards perform analogue to digital conversion on incoming speech so that it can be stored on magnetic disc, and they carry out digital to analogue conversion on outgoing speech so that it will be intelligible to callers.

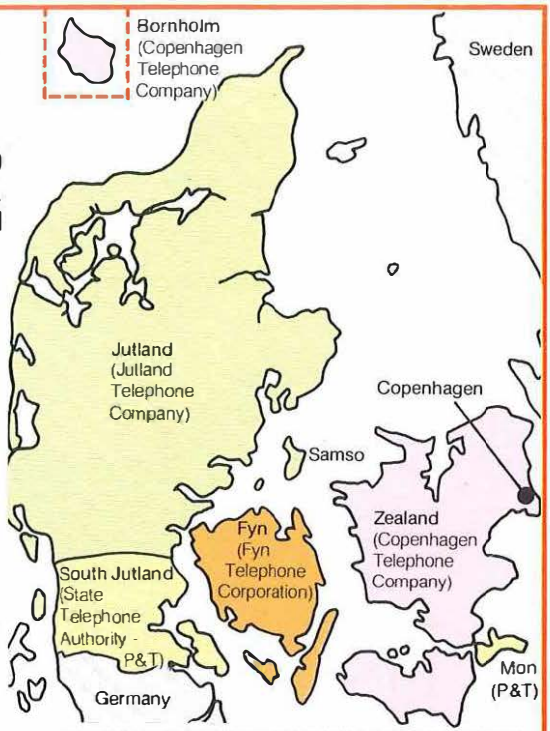
The encoding scheme used is Continuously Variable Slope Delta (CVSD) modulation. Unlike the more familiar Pulse Code Modulation (PCM) scheme where the analogue signal is sampled periodically and the amplitude of each sample is coded into eight bits, CVSD uses a single bit for each sample to indicate whether the amplitude has increased or decreased since the last one. The reason for using CVSD rather than PCM is that it can produce an acceptable speech quality at a much lower bit rate than PCM. This effectively means that more messages can be stored on the same amount of disc.

Voicebank has already proved popular and a number of service developments have been identified. It will soon be possible to listen to a newly recorded personal greeting without having to hang up and re-dial. It is intended that every message will be tagged with the time and date of its arrival which the user will be able to hear spoken by the system. Users will also be able to switch the outdial facility on and off to their own pager. Finally, it should soon be possible to transmit a message to several mailboxes at once, a facility which will enable bulletins to be broadcast to groups such as sales forces and maintenance teams. Ⓣ

Situated between the North Sea and the Baltic, Denmark consists of the Jutland peninsula which is joined to the Continent by a frontier with the Federal Republic of Germany, and more than 400 islands – of which only 97 are inhabited.

The capital, Copenhagen, is on Zealand and other important islands include Funen, Lolland-Falster and Bornholm. Excluding Greenland and the Faroes – also part of the kingdom of Denmark – the country has a land area of about 43,000sq kms, and is about one-sixth the size of the UK.

With a coastline of more than 7,000kms, none of its five million inhabitants live more than 50kms from the sea and Danish history, from Viking times to the present day, has had close maritime links. Fishing and agriculture have been vital for centuries but despite an absence of raw materials, Denmark produces a variety of goods from pharmaceuticals to furniture, and electronic equipment to diesel engines.



Principal operating areas of the State Telecommunications Authority and the Telephone Companies in Denmark

Private ownership of shares in British Telecommunications pic may be new but this article, the nineteenth in our series on telecommunications in other countries looks at Denmark which has relied on a mixture of state and private ownership since 1922.

'The State of Denmark...'

Since 1897, the Danish Government has had a monopoly for the establishment and operation of telegraphs and telephones in Danish land and sea territory, and is also responsible for the granting of licences for radio communications. Nowadays, overall responsibility for telecommunications lies with the General Directorate of Posts and Telegraphs, a department of the Ministry of Public Works, whereas responsibility for local services is divided between the Post and Telegraph Office, and the three concessionary telephone companies of Copenhagen, Jutland and Fyn.

As well as responsibility for local telephone services in South Jutland and Moch, the Danish Post and Telegraph (P&T) Office provides the trunk routes between exchanges in different telephone companies, and runs the data, telex and international telecommunications services. The Copenhagen telephone company (KTAS) covers telecommunications services in Zealand, Lolland-Falster and Bornholm; the Fyn Telephone Corporation (FKT) is responsible for Funen and its associated small islands; and Jutland Telephone Company (JTAS) for the rest of Jutland.

The largest of the three companies, KTAS, is a limited company in which the government owns▷

Telephone House in Copenhagen contains an international exchange, a directory enquiry bureau, a data exchange and a radio tower. It is shared by KTAS and P & T.

Copenhagen's earth station plays a vital role in the Danish network.

a 51 per cent share. JTAS is also a limited company with the majority share held by the government, while FKT is a co-operative owned by the island's councils and municipalities.

Although share yields are fairly low, good profits achieved by the telephone companies together with their involvement in modern technology, have resulted in share prices doubling in less than a year.

A Telecommunications Council under the Minister of Public Works exists to ensure effective co-ordination of telecommunications in Denmark and to supervise the concessionary telephone companies. The council is assisted by a joint management committee consisting of two representatives from the P&T Office and from each of the managements of the concessionary companies. In addition to its supervisory role, the council keeps the Minister informed on matters of fundamental importance to the development and operation of public telecommunications.

This well equipped coach is used for mobile exhibitions of telephone equipment.

Penetration

At the end of 1982, Denmark had about 2.4 million telephone connections and 3.6 million telephones. Telephone penetration averaged 47 connections per 100 population – second only to Sweden in the world 'league table'. In comparison, penetration in the UK during the same year was 34.5 and in the USA, 41. The calling rate per connection is also higher in Denmark than the UK with 1,418 calls per year per connection as against 1,109.

Modernisation of the telephone network is going ahead with the replacement of existing trunk circuits by Pulse Code Modulation and microwave links, and the introduction of a digital network in 1980. The telex network for the fully automatic inland telex service has also recently been completely modernised to cope with increasing traffic of which 80 per cent is now international.

In addition to the telephone, telegraph, telex and data services, Danish customers are now being provided with some of the new modern services which include:

★ a computerised directory enquiry service (similar to British Telecom's proposed DAS system) which has been available nationally since 1980;

★ a public automatic mobile telephone system, developed jointly by the telecommunications administrations of Denmark, Finland, Norway and Sweden and known as the Nordic Mobile

A similar service to Prestel is operated by the Danish administration.

Telephone. This was implemented early in 1982;

★ a public paging system over the public telephone network which was launched in five large cities in October last year, and is expected to be extended to the whole of Denmark during 1986;

★ a circuit switched public data network, opened in 1981, and now serving 4,300 customers;

★ a teletex service, introduced in April; and an electronic mailbox service, accessible from different types of computer, telex or teletex terminals opened in June this year.

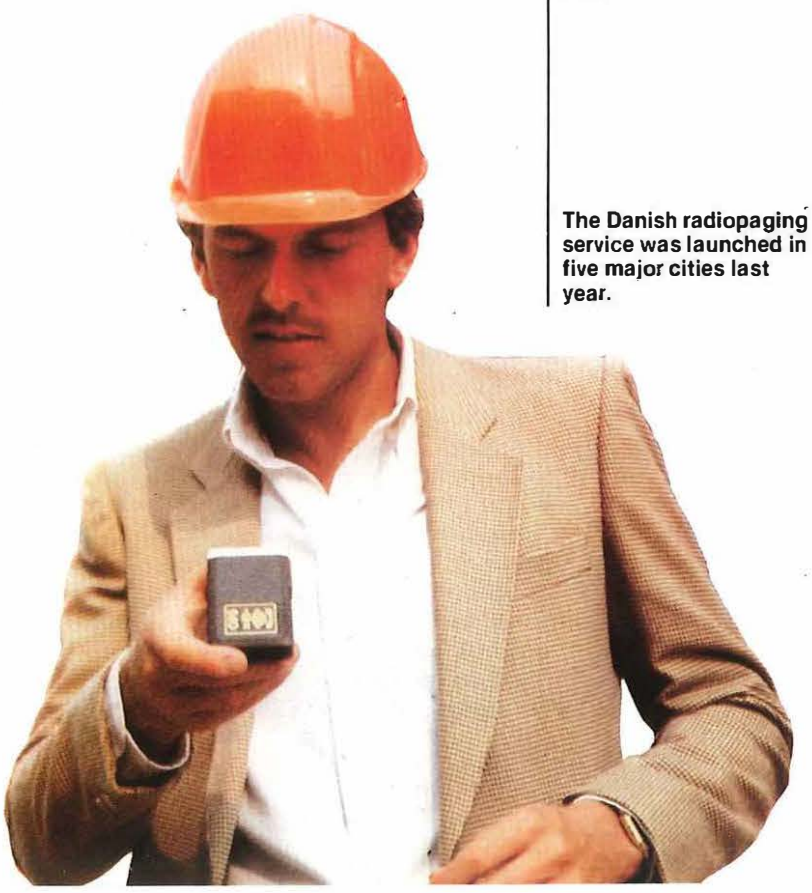
Although the P&T and the concessionary companies have a monopoly for the supply of all telephone instruments, only the P&T is allowed to supply PABXs and to provide modems with transmission speeds above 1,200 bits per second. Danish telecommunications companies are liberal in their attitude towards tenders from foreign manufacturers for their exchange equipment requirements, and ITT and Ericsson have been chosen as the suppliers for digital exchanges.

Concentration

Almost half the population of Denmark is concentrated in the three large islands covering an area roughly five per cent of the size of the UK. The cost advantages of providing telephone service to a high concentration of users have contributed to a situation in which Danish customers benefit from telephone charges which are lower than in most other countries.

Danish people enjoy high incomes and it is not surprising therefore that Denmark has such high telephone penetration and usage. The busy hour trunk call failure rate was about 2.8 per cent in 1982 compared with 2.2 per cent (8am–6pm average) in the UK and speeds of answer on calls to the operator assistance and directory enquiry services were 4.4 seconds and 3.3 seconds respectively. As well as enjoying an inexpensive telephone service, Danish customers also have good service quality. ⓣ

The authors – Messrs **P H Dabbs** and **F Cassidy** and **Mrs S Rudman** and **Miss L Cunliffe** – are members of the international comparisons group in the organisation, performance and systems department of Local Communications Services. They acknowledge the help of **Mr Ejgil Sjogaard** of the marketing and service development department of the Danish PTT.



The Danish radiopaging service was launched in five major cities last year.

British Telecom Journal
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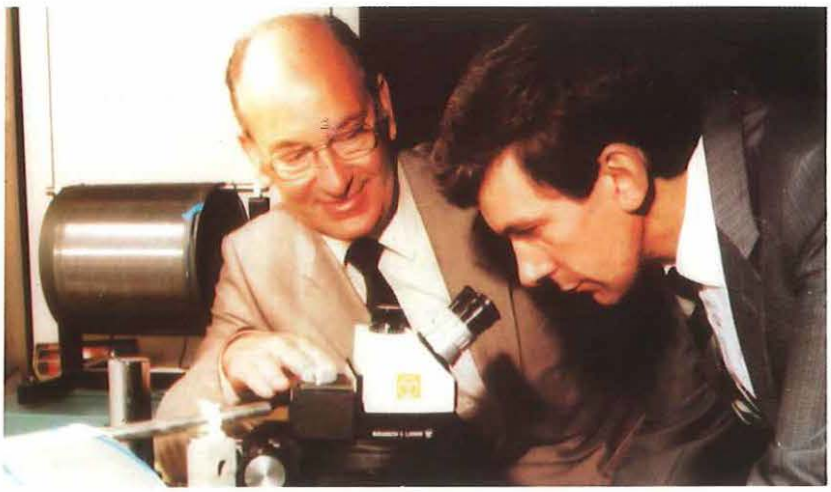
Martlesham on show



Director of British Telecom research, Mr David Merlo looks on as a visitor examines a laser chip – part of a research project to use laser amplifiers to increase the distance along which messages can travel by optical fibre.

More than 2,000 visitors from Parliament, industry, government departments, universities, the press and other research centres were able to glimpse for themselves the breathtaking world of tomorrow's technology and the ever-increasing range of today's products and services during Martlesham's Open Week in September.

The exhibition was the biggest ever staged by British Telecom Research Laboratories and was divided into two sections – Telecom Today featuring current achievements and Telecom Tomorrow showing the scale and breadth of research and development.

Among the VIPs who made the trip to East Anglia was Secretary of State for Trade and Industry Norman Tebbit, who said that in the new liberalised markets the pursuit of successful research and development and the provision of up-to-the-minute technology was a necessary part of maintaining a viable commercial position.

Earlier British Telecom Chairman Sir George Jefferson said that British Telecom, in its new status as a public limited company, was at the threshold of a challenging future.

"In the period we are now entering," he said, "we may see the telephone replaced by information itself as the main money maker for British Telecom. The data which is already travelling down the telephone lines could inherit the starring role that the telephone has held for so long. The arrival of what is being called 'the intelligent network' is inevitable and necessary for customer and information technology business development. We are resolved that Britain will be at the forefront, and British Telecom's skill and financial resources are essential elements in bringing this about."

Sir George went on: "We are competing both at home and abroad. And the only way to command success in such a climate is to sustain inventiveness, constantly honing the technological edge as well as looking for new products and services to offer our customers when they want them and at the right prices. We must never cease trying to increase the effective exploitation of Martlesham's work."

Recent achievements at what is Europe's most advanced centre for communications research include:

- a voice-activated telephone which will automatically dial home when told to do so.
- a doubling of the 100km "four-minute mile" record distance for optical fibre communications.
- high-reliability microchips to be used in undersea optical fibre cable.
- radio links for local networks operating at the highest frequency used so far for civil communications.

The major thrust of present-day research and development follows three main paths:

- exploring new techniques and technologies for switching, transmission and network management.
- creating or improving customer apparatus (past successes include the Monarch PABX and Sceptre telephone, the first in Britain with a digital display).
- providing or enhancing value-added services, for example, Voicebank (see page 18) and picture Prestel.

The Open Week exhibition itself provided a clever combination of high technology and eyecatching displays.

Mr Charles Hughes, the British Telecom engineer whose idea it was to use what has become familiar as the microprocessor for telecommunications, is the 1984 winner of the Martlesham Medal. It was presented to Mr Hughes by Mr Norman Tebbit, during his visit to Open Week.

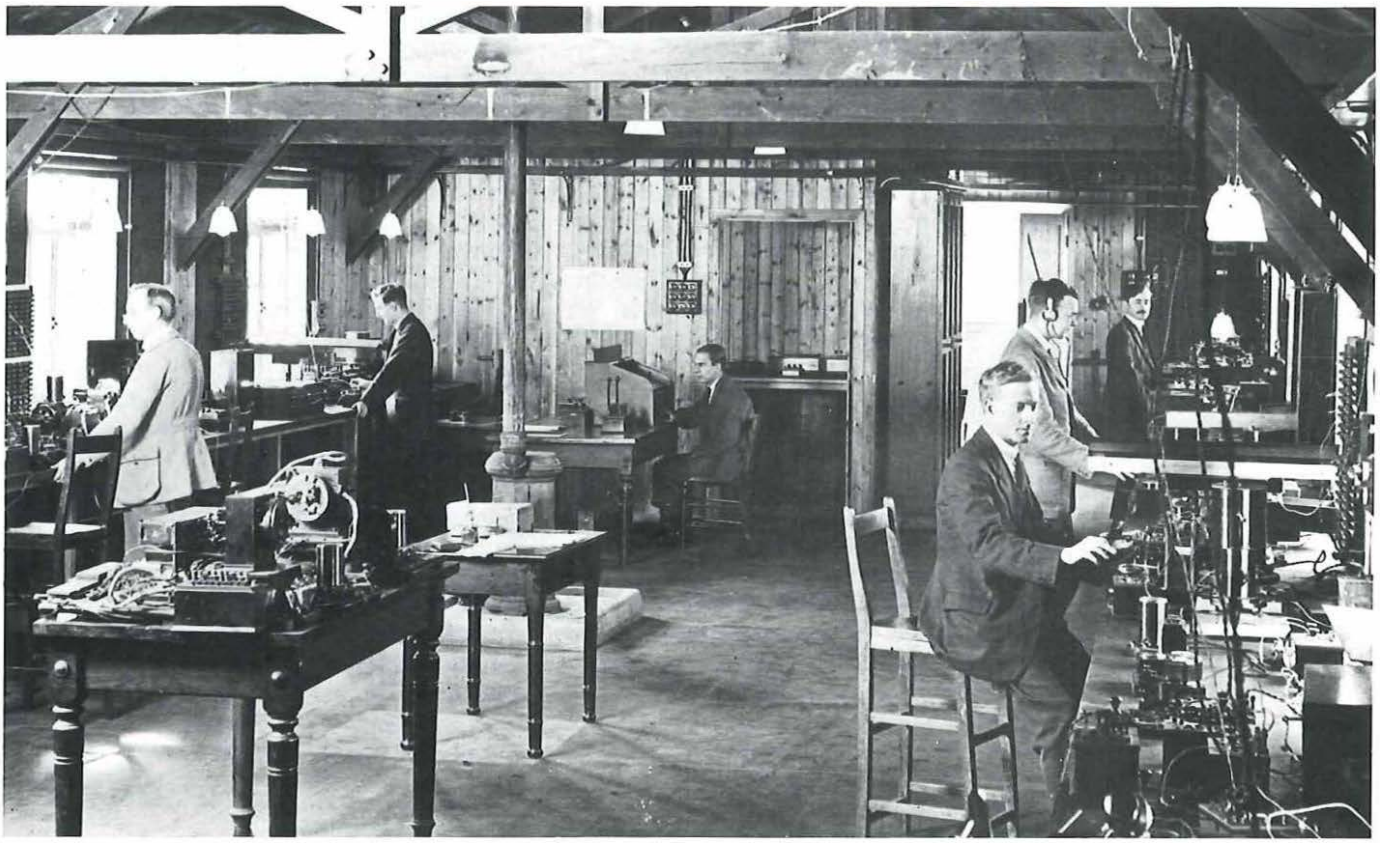
Mr Hughes was awarded the medal in recognition of outstanding and innovative work including:

- the idea of using programmable logic in microelectronic form for telecommunications;
- managing the successful installation of the world's first operational time-division digital switching project;
- guiding the development of digital switching systems in forms such as the Monarch PBX call-connect system.

MARTLESHAM'84

British Telecom Journal
Autumn 1984

...but in the beginning



Modern Martlesham technology (below) embraces optical fibres, lifelong undersea transistors and advanced satellite techniques. Years ago, however, the facilities were not quite so sophisticated.

Fashioning tomorrow's world today has a price and British Telecom's research laboratories at Martlesham Heath, near Ipswich, spent £172 million maintaining its world-beating performance during 1982/83. But the research department, set up 76 years ago, had humble beginnings and in this, the first of two articles, departmental record officer Pat Panton traces the history of those early days.

A special research section was first established by the Post Office in 1908 and according to the engineer-in-chief's annual report. . . 'A great deal of experimental work had been carried out and it promised good practical results'.

But even he could not have envisaged what has happened since, culminating in Martlesham's enviable record of success over the last decade or so, with such innovations as Prestel, the world's first viewdata system, and long-life transistors which make possible today's high capacity undersea cables. Other triumphs have included the development of optical fibres, digital transmission systems and advanced satellite techniques

Inventions and developments have, of course, been the hallmark of the department's 76-year history. But as early as 1904, four years before a separate department was set up, much research ▷

Central Telegraph Office building in St Martins-le-Grand. The use of thermionic valves for telephone amplifiers, for instance, was then being experimented with and cathode ray phenomena studied.

Even before the researchers had any premises at all, many improvements were made to telegraph plant following the introduction of the minimum 6d (2½p) telegram rate in 1885. Facilities were provided for Marconi in 1896 by the Post Office through its engineer-in-chief, Sir William Preece. Marconi conducted experiments in wireless telegraphy by hertzian waves, and the trials demonstrated the practicability of his system. Several engineers were lent to help the experiment.

The impetus given to scientific research by the 1914–1918 War was reflected in a rapid increase in the section's workload, and closely associated was a growing need to provide adequate training for engineering staff. A valuable contribution was made by scientists and engineers during the war. Up to 1916, the enemy interception service had nullified the main means of communications in forward front areas. But the Fullerphone, invented by Captain Fuller (later Brigadier-General) used a small direct current for signalling, so that the overhearing range was negligible. Research branch engineers made the 'sound ranging' system practical, and it was this that gave the Allies artillery superiority in the latter years of the war.

There were many changes in buildings and policies during the half-century which led up to the opening of the all-embracing research centre at Martlesham. But work continued apace throughout the period, and in the 1920s research concentrated on the transmission of telephony and telegraphy by cable and radio.

Many noteworthy contributions to communications were made, including the design of the radio transmitters for the long wave station at Rugby, and in 1926 West's historic measurements of the acoustical impedance of human ears, which led to the design of the first artificial ear to provide a realistic termination for measuring the performance of telephone receivers.

Also in those days of electric tramways, a serious problem was the protection of Post Office cables from corrosion by the electrolytic action of stray currents, and effort was devoted to developing accurate methods of measuring such currents.

The early 1930s, however, brought the slump and qualified engineers and scientists were not finding jobs easily in industry. With foresight, the Post Office went ahead with recruiting, and this became an era of many new developments such as the first speaking clock – using photographic sound recordings on glass discs and controlled to a guaranteed accuracy of a tenth of a second by a master pendulum.

These were the years which saw the pioneering work on quartz crystals for the frequency control of oscillators and radio transmitters, the work on frequency standards and the development of voice frequency signalling for the telephone network. They also saw the development of wideband transmission systems for frequency division multiplex telephony and television, using co-axial cables first installed between London and Birmingham.

In the early days of television, Post Office engineers played a large part in providing the links for outside broadcasts such as the first direct televising of the Cenotaph service in 1937. The Second World War, however, gave another major impetus to research and work done then sowed the seeds of the computer age.

The move to Dollis Hill

In March 1914 the Postmaster-General, Mr Hobhouse, while visiting the Post Office's experimenting rooms attached to the research section in St Martins-le-Grand, was shocked by the cramped conditions and inadequate facilities, and asked that a scheme be prepared for better accommodation. A report was submitted which recommended the setting up of a new laboratory in a suburban and 'virgin' locality where land was plentiful and relatively cheap.

The eight-acre site selected in north west London was roughly rectangular and owned by a Mr R A Finch, who had leased it to Neasden Golf Club. It occupied a commanding position at Dollis Hill, and although the Treasury had authorised its purchase, they did not agree to sanction the proposed building work at a cost of £40,000. And then events were overtaken by the outbreak of war. . .

By February 1919 the research section accommodation had increased considerably, and occupied parts of GPO (West), King Edward Building, Newgate Street Building, Denman Street Building, Tall Exchange, New Barnet Exchange and Threadneedle Street Telegraph Office. The case for improved accommodation was raised again in March 1919, and in the following August the Treasury gave the go-ahead for work to begin at the Dollis Hill site.

Far right, top: This was the scene at Dollis Hill in 1926.

Far right, centre: A few years later this was the more imposing front entrance.

Far right: Equipment used for the early days of the speaking clock.

Right: The first pulse code modulation tandem exchange was designed and developed at Dollis Hill.

A Treasury minute dated 5 February 1920 to the Postmaster-General gave authority for £26,500 and £18,000 for engineering plant and apparatus, half chargeable to the Post Office Vote and half chargeable to the Telephone Account. Possession of the Dollis Hill site was taken on 12 July 1920.

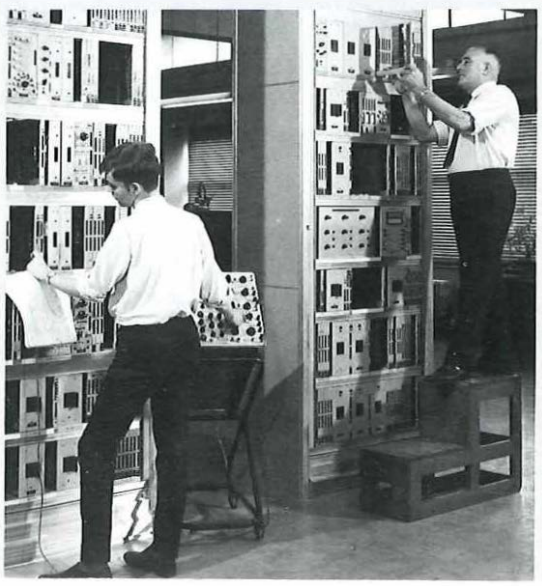
Authority was given for the purchase of a number of ex-War Department huts to provide a floor area of about 36,000 square feet, and the first were occupied in December 1920. Complete transfer of all research work took place by early October 1921, but special provision was made for research in Wireless Telegraph and Telephony with two small experimental wireless stations, one at Dollis Hill and the other a former War Office wireless station at Peterborough.

The first permanent building to be erected at Dollis Hill was the garage and life testing laboratory, which was completed and occupied in October 1924. Over the next nine years followed accommodation for carpenters and millwrights, a chemical laboratory, radio laboratory, central block, oil store, training school, workshops and radio assembly, demonstration and general research block.

The main permanent block of the research station was opened by Prime Minister Ramsey MacDonald in 1933. An adjoining farm site of 2.5 acres was later acquired in 1939. After the 1939–45 War, further buildings were added including a new block housing a modern drawing office together with a machine shop. With the continuing expansion of scientific research and development, training work had to be separated, and the Central Training School was moved to a site near Stone, Staffordshire, in 1946.

By 1960, however, it had become clear that Post Office research demands could no longer be met by the 12-acre site at Dollis Hill, and plans were made to move the department to a country environment with the space essential for large-scale field experiments and modern laboratory buildings.

After discussion between staff and management, a 100-acre site on the disused Martlesham airfield, near Ipswich in Suffolk, was approved and the proposed move was announced by the Postmaster-General in the House of Commons on 28 July 1964.



The site was leased by the Post Office in December 1965 and subsequently purchased on 6 January 1978 for £1,160,000 – three years after the research centre was officially opened by the Queen on 21 November 1975. In the same year, research outstations at Backwell near Bristol and Castleton near Cardiff closed after more than 30 years, to concentrate all research efforts at the new centre. ⓣ

British Telecom Journal
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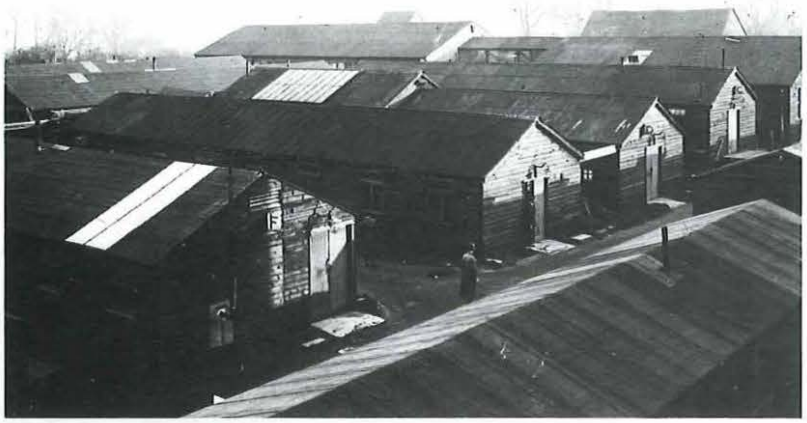
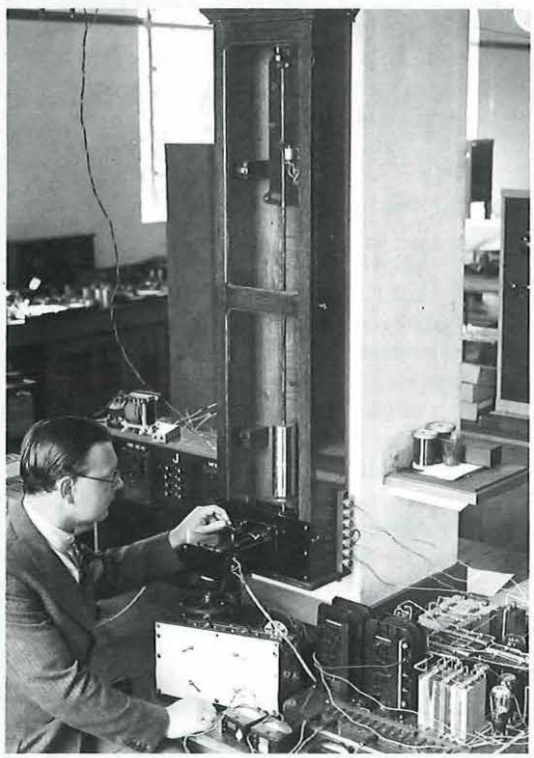
The move to Dollis Hill





In his second article in the Winter issue of British Telecom Journal, Pat Panton looks at the development of research in the post-war years leading up to today's high technology achievements.

Repair service boost

Brian Maddox

The speed and efficiency of British Telecom's fault repair service has been given a multi-million pound boost by the introduction of computerised records and specially trained staff to deal directly with customers.

One of the cornerstones for the successful operation and management of British Telecom's nationwide telephone network is the smooth and efficient running of its fault repair service (FRS), set up to deal with the maintenance and repair of customer equipment and local line plant. The aims are to provide a courteous and effective response to customer fault reports, and to clear at least 95 per cent of reported faults by the end of the next working day.

While the performance achieved so far has usually been acceptable, it has been recognised that there is room for improvement, particularly to meet current and future customer needs in the new competitive environment. And so it was in Autumn 1982 that a strategy for the modernisation of the FRS began being implemented. The strategy has three main constituents:

★ the reorganisation of the RSC, and in particular a significant improvement in the customer interface;

★ the provision of computerised data bases to eliminate the inefficient card record scheme;

★ the provision of computerised test equipment, with powerful analytical software.

In addition, there was to be a general improvement in communication facilities and the methods of progressing fault reports through the RSC.

The new strategy demands that only the direct fault reporting route be used (see panel) with concentration at night and weekends to a 24-hour manned RSC (typically one per telephone area). In addition, incoming 151 calls are queued to ensure that they are acknowledged in strict rotational order, and are received by Customer Service Officers (CSOs). The aim is to answer at least 85 per cent of calls within 25 seconds.

The current network comprises more than 19 million exchange lines, with over 28 million telephones connected. During 1983/84 there were more than 21 million fault reports.

Currently the FRS employs about 24,000 staff, nearly 90 per cent of whom work in the field. About half of these are employed on customer apparatus and line maintenance, while the other 50 per cent are responsible for external plant maintenance. The remaining 3,000 work in 370 Repair Service Controls (RSCs), where they deal with customers, diagnose fault conditions, control the deployment of field staff, and maintain RSC records.

RSCs cover widely differing geographical areas, not only in size, but also in terrain, exchange connection density, and climatic conditions. Typically, the size range varies from a few square miles in central London, to several hundred square miles in northern Scotland. There is a similar variation in the number of exchange connections served per RSC – from a few tens of thousands, to several hundred thousand. About 25 per cent of all RSCs are located in the London area.

The number of fault reports per RSC each year also shows a wide variation according to the number of exchange connections served, but also varying with geographical location. In addition, there are seasonal variations and winter peaks may be some 25 per cent up on the summer figures.

Customers report faults by dialling 151, and such calls may either terminate with an engineer at an RSC (direct reporting), or with an operator at an Auto-Manual Centre (AMC) (indirect reporting). In the latter case, the reported details have to be passed by the operator to the RSC staff. About 30 per cent of the total number of fault reports are handled in this way, and at night and weekends, nearly all are dealt with via the indirect route.

Obviously, operational problems in providing an effective and efficient service are not insignificant, and any national scheme must have sufficient flexibility to allow alignment to the particular local environment as well as being capable of dealing with the seasonal variations.

The CSO, often a female ex-telephonist, is not only trained to provide a courteous and responsive interface to the customer, but also to carry out diagnostic questioning aimed at providing more comprehensive and accurate information at the time of the initial customer contact. Details of the fault are entered, in a pre-defined format, at a visual display unit (VDU), and the CSO is able to perform an initial test on the reported faulty line from this same terminal. The results of the test are automatically recorded in the fault report record.

Because the CSO is located in the RSC, and has 'instant' access to up-to-date information on the customers' equipment and line details – as well as previous fault history and the current work load situation at the RSC – she can frequently provide the customer with an indication of how long the repair will take. She can also arrange details of access to the customer's premises. The initial testing of the line can be taking place automatically while the CSO is still talking to the customer, and she can therefore also indicate that the line has been tested and verify whether a fault exists.

Satisfaction

This initial contact with the customer can therefore be responsive and informed, and is clearly a significant step forward in achieving improved customer satisfaction. It can, however, be achieved only with the aid of a computerised data base and test system back-up, and needs to be followed through with appropriate action to ensure that the fault is rectified quickly and efficiently.

The administrative data base facility is provided by a mini-computer based system known as Administration of Repair Service Controls by Computer (ARSCC) (*see British Telecom Journal, Winter 1982/83*). This system replaces the previous card records typically compressing what was 200,000 records on to two discs, and provides instant access to customer records and fault histories. It also generates electronically the fault record 'dockets'. These are initially displayed on the CSO's VDU, and once the relevant fault details have been entered, are 'filed' for recall by other RSC staff when performing diagnostic testing and dispatching the relevant field staff to effect the repair.

New customer records are easily input to the system via a VDU, and similarly, existing records can be amended or updated. The maintenance of accurate records is in itself a considerable undertaking for RSC staff.

To complement the ARSCC system, modern computerised test equipment is also being introduced and integrated with the administration system. This means that from a single VDU the diagnostic technician has access to both the ARSCC and the test system, and this avoids the need for any paper records, as the results of the automatic testing and subsequent diagnosis can be automatically transferred into the fault record. The test system usually consists of a central minicomputer housed at the RSC, and intelligent test and measurement equipment at the exchange. The two communicate via a message-based signalling technique.

The diagnostic technician is able to carry out much more comprehensive testing than the CSO, either in the form of pre-programmed test sequences, or as individual tests under manual control. The software of the system not only diagnoses the likely fault, but by analysis of the test results is also able, for certain faults, to indicate the likely location. As a result, the dispatch duty, which is responsible for issuing the faults to the field staff for clearance, is provided with accurate information that not only ensures that the right skills are dispatched, but that they are also sent to the right location. This avoidance of double or even triple handling of the same reported fault, which can otherwise ▷

Top: Staff at Portsmouth RSC carry out diagnostic tests before sending out field staff.

Above: The ARSCC system is used by the CSO to enter a fault report from a customer.

occur in the event of inaccurate diagnosis, is also a significant contribution towards increasing the efficiency and service provided by the FRS.

The test equipment is also capable of performing overnight routining of the lines to detect faults even in advance of the customer. It can also identify trends where plant may be deteriorating towards a fault condition, and a remedy can be effected before the customer needs to complain. This routining activity has the overall effect of improving the quality and reliability of the network.

Of the total number of faults reported, about:

* 45 per cent are traced to customer equipment faults;
* 27 per cent are found to be non-faulty when tested;
* 21 per cent are attributable to local cable plant (about 60 per cent to underground cable and 40 per cent to overhead cable);
* 7 per cent are the result of exchange faults.

Once field staff have cleared a fault, they telephone the details to the RSC where the appropriate information is again recorded, via a VDU, on the ARSCC data base. The ARSCC system therefore has a complete and up-to-date record of the fault situation at the RSC, and the software enables work lists to be generated, and relevant statistics to be produced for management purposes.

By mid-1984 about 190 RSC sites had ARSCC systems installed, or were awaiting commissioning and the setting up of the necessary data records. These sites cover about half of the country's telephone lines. In addition, some 130 RSC sites have been converted to operate with the specially trained CSO staff to improve the reception and handling of faults. These sites cover about 40 per cent of the total number of exchange connections.

A number of proprietary test systems have also been installed in the field for evaluation purposes, including the testing of the integration with ARSCC. Tenders were invited from a number of test equipment suppliers earlier in the year, and it is expected that the responses will have been evaluated by the autumn so that recommendations on a preferred system or systems can be made. This recommendation is expected to result in orders for equipment for installation in some 100 RSC sites covering about 30 per cent of the network.

There is ample evidence to confirm that the introduction of the new organisation, particularly where supported by modern computerised administration and test systems, is achieving an improvement in efficiency and service. This is borne out not only by the improved performance of the RSCs in responding to and clearing faults, but also in an improvement in the level of customer satisfaction as independently assessed by Telcare.

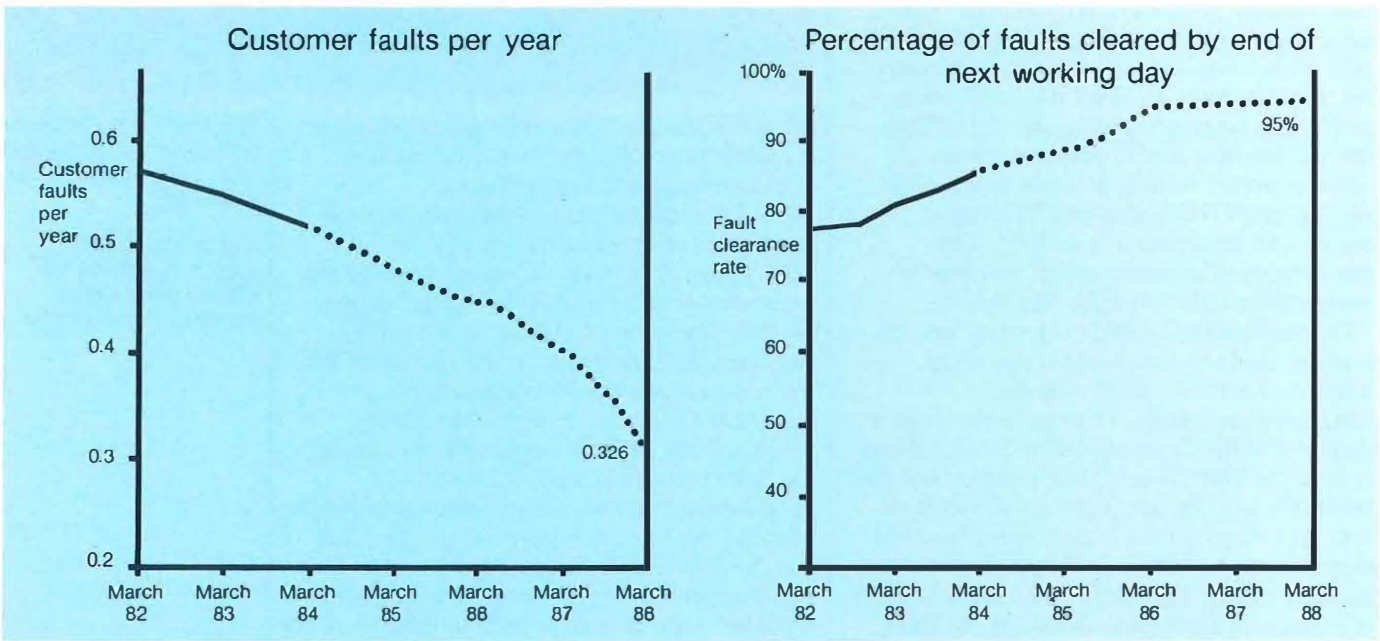
In addition, there has been an improvement in the quality and reliability of the network, particularly underground plant, as a result of the improved network surveillance and subsequent maintenance activity.

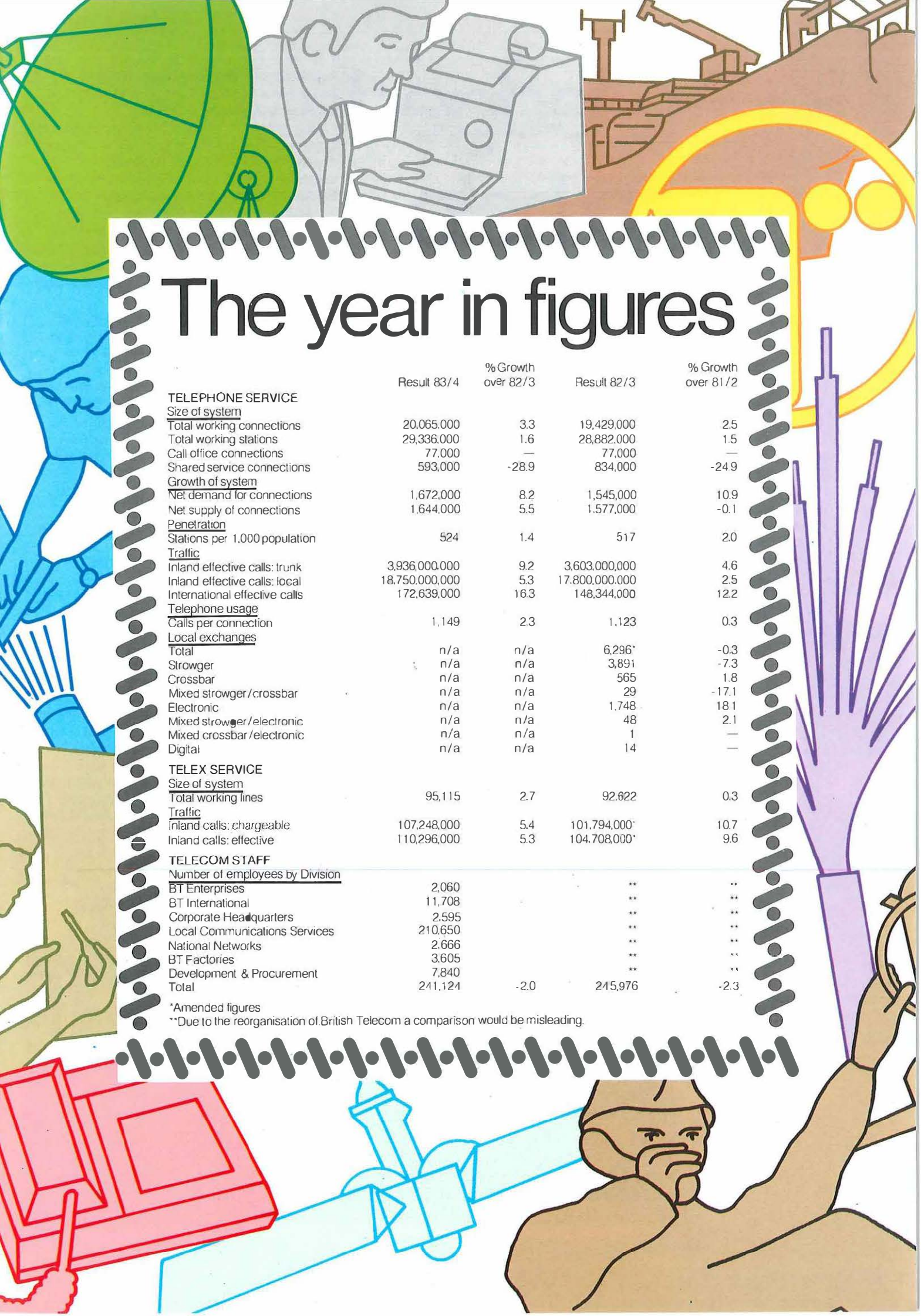
With the improved working environment and status, the morale and interest of the RSC staff has also considerably improved. This has contributed to an improvement in customer satisfaction by making the staff more aware of, and responsive to, the need to provide a courteous and efficient service.

There is a continuing programme of implementation to complete the modernisation of most RSCs within the next three years. At the same time, consideration is being given as to the best way of linking these systems into the Customer Service System (CSS) as this is introduced into the new Districts from next year.

Thus it can be seen that the Fault Repair Service is not only moving into the computer technology era in a big way, but also responding to the changing competitive and commercial environment. Positive benefits are being achieved, not only to the business, but also to the customer. ⓣ

Mr B E A Maddox is head of administration and Operation Support Division in Local Communications Services Local Network Strategy Department. He has special responsibility for modernisation of the Repair Service.





The year in figures

	Result 83/4	% Growth over 82/3	Result 82/3	% Growth over 81/2
TELEPHONE SERVICE				
Size of system				
Total working connections	20,065,000	3.3	19,429,000	2.5
Total working stations	29,336,000	1.6	28,882,000	1.5
Call office connections	77,000	—	77,000	—
Shared service connections	593,000	-28.9	834,000	-24.9
Growth of system				
Net demand for connections	1,672,000	8.2	1,545,000	10.9
Net supply of connections	1,644,000	5.5	1,577,000	-0.1
Penetration				
Stations per 1,000 population	524	1.4	517	2.0
Traffic				
Inland effective calls: trunk	3,936,000,000	9.2	3,603,000,000	4.6
Inland effective calls: local	18,750,000,000	5.3	17,800,000,000	2.5
International effective calls	172,639,000	16.3	148,344,000	12.2
Telephone usage				
Calls per connection	1,149	2.3	1,123	0.3
Local exchanges				
Total	n/a	n/a	6,296*	-0.3
Strowger	n/a	n/a	3,891	-7.3
Crossbar	n/a	n/a	565	1.8
Mixed strowger/crossbar	n/a	n/a	29	-17.1
Electronic	n/a	n/a	1,748	18.1
Mixed strowger/electronic	n/a	n/a	48	2.1
Mixed crossbar/electronic	n/a	n/a	1	—
Digital	n/a	n/a	14	—
TELEX SERVICE				
Size of system				
Total working lines	95,115	2.7	92,622	0.3
Traffic				
Inland calls: chargeable	107,248,000	5.4	101,794,000*	10.7
Inland calls: effective	110,296,000	5.3	104,708,000*	9.6
TELECOM STAFF				
Number of employees by Division				
BT Enterprises	2,060		**	**
BT International	11,708		**	**
Corporate Headquarters	2,595		**	**
Local Communications Services	210,650		**	**
National Networks	2,666		**	**
BT Factories	3,605		**	**
Development & Procurement	7,840		**	**
Total	241,124	-2.0	245,976	-2.3

*Amended figures

**Due to the reorganisation of British Telecom a comparison would be misleading.

British Telecom Journal
Autumn 1984

Pledged to help

John Wood

Despite the many changes which it has recently undergone, British Telecom remains firmly committed not only to maintaining its service to disabled and elderly customers but also to extending and improving it. British Telecom Action in the Interest of the Disabled (BTAID) has been set up to help achieve this.

It is a simple fact that in all human endeavour, communication plays a central role. Unfortunately the ability to communicate freely is not shared by all. Disablement or age may result in the loss or impairment of sight, hearing, speech or touch, and the mobility even to answer the door. But with 77 per cent of households in the UK now enjoying telephone service, it is, perhaps, appropriate to consider how the latest developments in technology are enabling more people to use a device which most take for granted.

For nearly 70 years British Telecom has been a driving force behind helping disabled people. As long ago as the First World War it began adapting switchboards for blind ex-servicemen and now is involved in the latest in electronic voice synthesis devices. During this time British Telecom has built up a wide range of aids and services enabling more disabled people to use the telephone.

For those who are hard of hearing there are amplifying handsets with adjustable volume control, lamp signalling devices and extension bells of varying tone. In addition, inductive couplers are available which fit into handsets to help make conversations clearer for users of hearing aids and these have now been fitted in all public telephones in the UK.

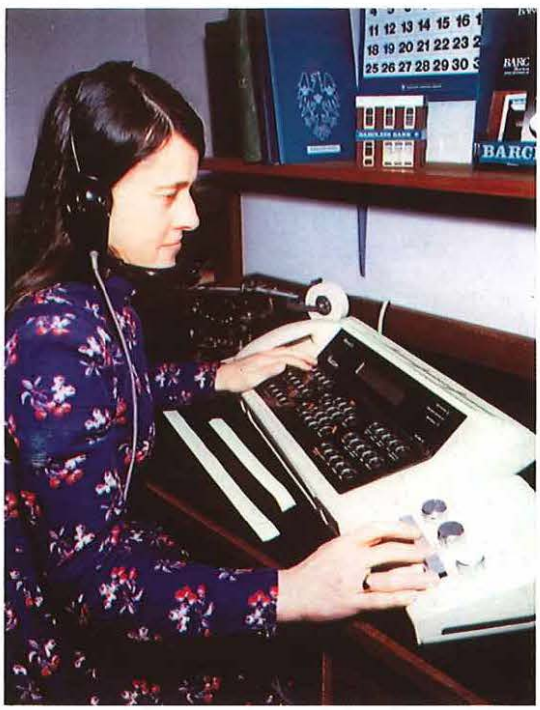
Many of the new range of telephones with their easy-to-use features are particularly suitable for disabled people. There are loudspeaking telephones to help those who have difficulty in holding a handset; cordless telephones to provide freedom for those who are bedridden or confined to wheelchairs, and telephones which can store and redial numbers automatically by pressing a button. These are useful for those who suffer from arthritis or have difficulty with hand movements.

Research into and development of new aids continues and a number of projects have been started which show how the power of telecommunications and computing are combining to provide benefits. Deaf people are being given the opportunity to assess the merits of new facilities and services which give them access to the telephone for the first time. These important systems include deaf communicating terminals (DCTs) which link telephones with keyboards and visual displays; electronic mail systems like Prestel's Mailbox, Dialcom from Telecom Gold and the various Packet Switched Systems.

Technology

British Telecom has always been conscious of the importance of new technology to the disabled where they work and has sought to safeguard them. Many blind switchboard operators can now operate highly sophisticated call-connect systems with the aid of voice synthesis devices and other solutions are being sought to help them on the smaller key systems.

For those who are both deaf and blind, communication might seem an insoluble problem but experiments are taking place involving electronic braille machines which one day may achieve a breakthrough in this field.



Support for such work comes from those associations which represent deaf and blind people and from central Government but British Telecom will also continue playing a major role.

Physically disabled people are also being helped by new technology. A word processing microcomputer, printer and telephone can provide all the equipment necessary to work from home. For those able to leave their homes, kiosks are being redesigned to allow wheelchair access and the equipment positioned at a suitable height. Disabled people themselves, are involved in advising on all these changes.

Confidence

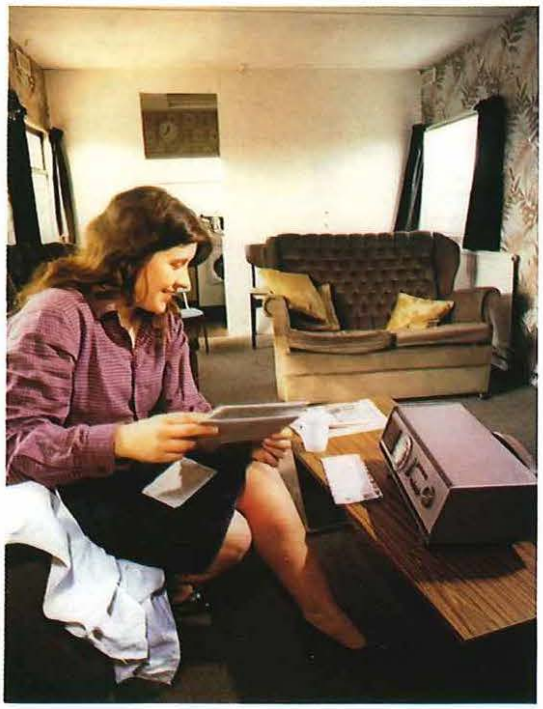
For the elderly or infirm and those at risk in their homes British Telecom has developed a community alarm system known as Monita (see page 2) which, by means of a trigger or other sensors in the home, can summon help through a central monitoring station. This highly sophisticated system will do much to restore confidence to the elderly and those living alone and will allow them to maintain their much-valued independence.

Home banking and shopping facilities are already available via television and the arrival of new cable TV systems will further accelerate this trend and bring considerable benefits to elderly, housebound people as well as those suffering from handicaps.

To safeguard and encourage all these developments, BTAID has a number of far-reaching aims which will be vigorously followed up with the operational divisions concerned. A first step is to ensure that with the resources available, maximum help in the field of telecommunications is given to disabled customers.

While demand for aids seems insatiable the resources to provide them are necessarily finite so that it becomes a matter of establishing priorities among the most genuine needs which exist. This will be no easy task for BTAID is not primarily a source of charitable support and there is no new 'pot of gold' for it to draw on. British Telecommunications plc is a business in a highly competitive market place with a responsibility to see that money is wisely and effectively spent. Products which help the disabled must be developed, marketed and priced in a way that takes account of all relevant factors and does not place too heavy a burden on other customers.

Traditional British Telecom policy requires that where products are designed solely for disabled customers' use or are 'one-off' modifications, they are sold at break-even prices. Managers with a day-to-day responsibility for running the business at a profit will be encouraged to develop mechanisms for pricing ▷



British Telecom Journal
Autumn 1984
Pledged to help

Confined to a wheelchair this customer can enjoy the freedom of his garden thanks to the Hawk cordless telephone.

From left to right:
A blind operator at Barclays Bank uses a modified Monarch switchboard with voice synthesiser.

This special kiosk at Shrewsbury is designed to accommodate wheelchairs.

Amanda Strang suffers from a multiplicity of allergies which includes the materials used in an ordinary telephone. To enable her to keep in touch British Telecom have supplied her with special loudspeaking equipment.

A reassuring word from a British Telecom engineer as well as special equipment is of great help to the elderly and infirm.

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Pledged to help

products and services in ways which take into account the needs both of disabled and able-bodied customers.

At the same time the Government, its agencies and relevant charities will be urged to recognise that the provision for telecommunication facilities is a legitimate call on its funds by those who otherwise cannot afford them. Indeed the 1970 Chronically Sick and Disabled Person's Act empowers local authorities to provide exactly this kind of assistance.

BTAID will also seek out and improve links with all relevant organisations and through mutual co-operation make the most of the resources of those working in this field. It will provide a convenient point of contact for organisations representing disabled people and maintain an open-door policy on problems or difficulties.

The gathering of information about disabled people will further help the provision of the most effective aids. Accurate statistics on the number of disabled people in the UK are hard to come by. The actual figure is certainly higher than the one million mark currently registered with local authorities. More detailed studies will be needed to reveal the extent of the 'market' which exists.

BTAID must also encourage research and development likely to lead to new aids through British Telecom or in co-operation with others. Existing contacts with academic establishments will be strengthened, new links forged and there may well be opportunities to carry out projects which will provide 'spin-off' help for disabled people. Massive investment is going on all over the world but there is a clear need to avoid duplication: in short there is little point in re-inventing the wheel.

It is vital to ensure that members of the public, relevant associations representing the disabled and British Telecom staff are well informed about the aids available and how the special needs of disabled customers can best be met. The rate at which new products and services are being developed means that publicity material needs regular updating to bring as much information as possible to the attention of customers and staff.

Responsibilities

The recent introduction of a new sales force with specific responsibilities to visit disabled customers will be particularly welcomed in this respect and is a clear indication of British Telecom's determination not to overlook the needs of its handicapped customers in an age of advancing technology.

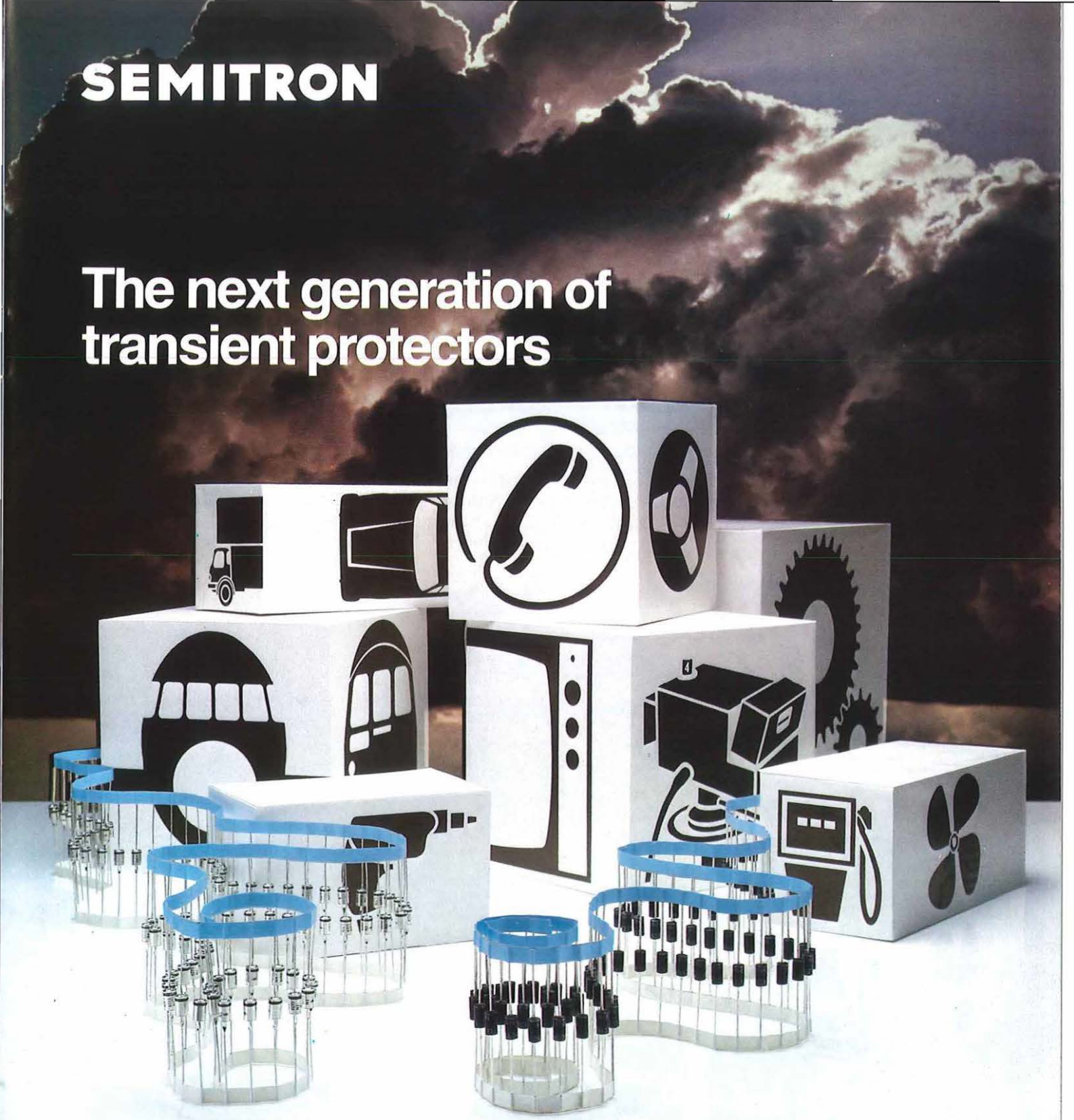
Through this programme of action British Telecom is maintaining its tradition of a caring organisation which aims to put something back into the community from which it draws its income. What BTAID will do for disabled customers is part of that drive. ◑

Mr J L Wood is general manager of BTAID

Members of the BTAID team at an informal discussion meeting at British Telecom headquarters.

SEMITRON

The next generation of transient protectors



Modern electronic circuits and equipment need better protection against voltage overloads and especially from high-energy transients. The Semitron foldback diode is the most up-to-date answer to transient protection, with its outstanding clamp capability. A simple, two-terminal construction, it is now widely used, especially in telecommunications equipment.

The unique Semitron design enables the reverse biased junction to avalanche normally. Enhancement from the forward-biased side of the chip lowers avalanche voltage by about thirty per cent when conducting 100mA. The voltage level is maintained even when the avalanche current exceeds this.

Semitron achieves cost savings by enabling the designer to use a narrow band between stand-off and clamp conditions, permitting the use of lower voltage transistors or circuits. Moreover the all critical turn-on time is very fast, typically as short as 1 ns – fast enough to protect tomorrow's high speed digital circuits.

Semitron foldback diodes are of simple construction, encapsulated in the majority of popular diode packages, glass-to-metal and plastic, and of 1 to 75W continuous dissipation.

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Exchange bids

British Telecom has completed its preliminary evaluation of digital electronic local exchanges to augment the modernisation of its network. Invitations to tender will shortly be issued to three companies following a six-month study of six possible designs.

The three selected companies – Northern Telecom plc, Thorn Ericsson Telecommunications Ltd and TMC Major Systems Ltd – will now be asked to submit detailed proposals for supplying exchanges in a range of types and volumes which will represent a modest proportion of British Telecom's accelerated exchange procurement programme for the next few years. The exchanges will be in addition to System X, which will remain the dominant system in the UK network.

British Telecom will evaluate the proposals with the aim of placing an order with one of the companies in the first half of next year. As part of the preliminary evaluation process, all three firms have undertaken that, following an initial build-up programme, a high proportion of the selected equipment would be made in the UK.

British Telecom has ordered 113 local System X exchanges from GEC and Plessey this year and is currently evaluating tenders for a second batch. These follow orders for 263 local System X exchanges already placed non-competitively up to March this year. In addition, British Telecom has ordered 59 trunk units of System X design.

These orders reflect the accelerated System X programme announced by the Chairman in January. The aim is to have two million System X exchange lines in service by the end of 1986, involving at least 51 trunk units and about 1,200 local exchanges.

Cable success

British Telecom International (BTI) has won a contract to distribute two new cable TV channels, Premiere, and the Children's Channel. The new services began in September, and between them have a 24 hour-a-day lease. This is the first full-time contract via Aerial 2 at BTI's London Teleport satellite earth station in the Docklands.

Premiere is a partnership of Thorn EMI, four major film companies and three cable TV firms. It will transmit films every night of the week. Thorn EMI Screen Entertainment Ltd plan to use the morning and early afternoon slots of the lease to transmit the Children's Channel.

The two new services now bring the total of cable TV customers using BTI's London Teleport to six. (See picture story, this page.)

Firebird takes off

A new range of home computer games – backed by a British Telecom guarantee of value for money and honest packaging – went on sale in High-Street shops in October at £2.50 per cassette. A full-colour picture of what players will actually see on their TV screen appears on the pack.

Published by British Telecom's new software house, under the label Firebird, these products will be available for the most popular home computers including the Sinclair Spectrum, Commodore 64 and the BBC Micro.

Twenty titles were included in the initial release and a series of premium-range programs will be available later.

On show in USA

British Telecom's new international digital business facilities were spotlighted at the Telecommunications Association (TCA) exhibition in San Diego, California during September. On show were SatStream, International KiloStream and International Videoconferencing.

Carphone costs cut

British Telecom has cut the cost of the direct-dial car radiophone service to the extent that the cost of running a carphone will be down to less than £10 a week, plus call charges, for the average user.

Equipment prices have also fallen with the price of the Telecom Emerald carphone going down by more than £500 to £1,800 and its sister model, the Telecom Sapphire, dropping to £1,700 – a cut of almost £300.

The sales success of the last 18 months is the principal reason for the price cuts.

Midland banks on BT

British Telecom London's City Area has signed a 12-month agreement with the Midland Bank relating to future orders of switching systems for branches of the bank throughout England and Wales.

The agreement, representing a special discount arrangement, covers British Telecom's popular Herald, Monarch and S6022 business switchboards. All Midland Bank orders for those systems in the next year will be placed with the City Area.

£400,000 grant

British Telecom is to receive a £400,000 grant from the Industrial Development Board of Northern Ireland to step up the recruitment of computing graduates at its Belfast Systems Software Engineering Centre.

During the next four years British Telecom's Technology Executive will take on an extra 50 graduate software engineers to meet the rapidly growing need for new telecommunications software.

The Centre was set up in 1981 with two others, at Newcastle-upon-Tyne and Ipswich. They provide resources needed as a result of the growing use of micorprocessors and other software-driven devices in telecommunications equipment of all kinds.

Hello, Norway

Offshore oil executives took part in the first ever videoconference between Norway and the UK in a practical demonstration of the advanced communications that British Telecom International's (BTI) small-dish business service, SatStream Europe, will bring when it is introduced in Western Europe next year.

Mr John Jeal, BTI's Director of Customer Services, was linked via SatStream from a new studio at BTI's City headquarters to Mr Knut Stafne on the Norwegian Telecoms stand at the Offshore Northern Seas Exhibition in Stavanger.

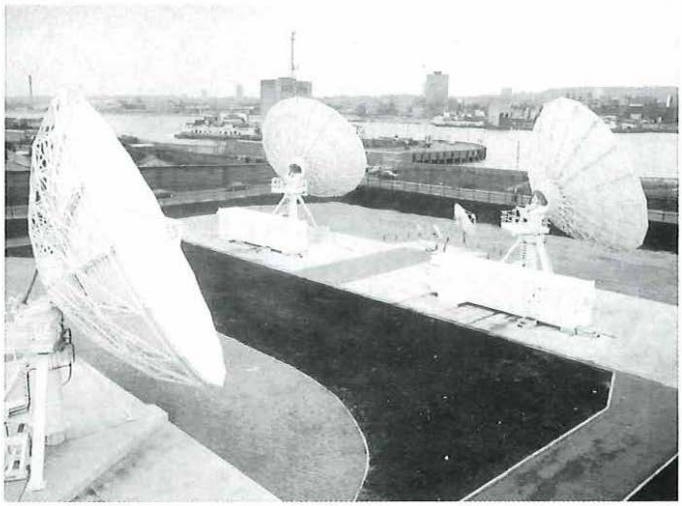
A second videoconference linked Aberdeen – Britain's oil capital – with the exhibition. This was the first international link from British Telecom Scotland's mobile Confravision studio.

Contracts

STC Telecommunications have won a £20 million contract to supply advanced telex systems to British Telecom. It is the third order awarded to STC for these systems since 1982 and it takes the total value of orders for them to more than £70 million.

The order covers the supply of display-based terminals which will ▷

TELEPORT OPENS



The London Teleport, British Telecom International's satellite earth station in the Docklands (above), was officially opened in October by two of Britain's astronauts, Christopher Holmes and Richard Farrimond.

The Teleport, the world's first international earth station to be installed in a city, currently transmits six television channels to cable TV networks around the UK and Europe. The programmes are beamed to satellites in geostationary orbit some 22,300 miles above the equator and received back by cable networks in the UK and around Europe a quarter of a second later.

As well as offering considerable potential for the development of further cable TV distribution, the Teleport will also be able to provide specialised communication services for London's business community, including videoconferencing and a wide range of digital communications facilities.

Currently three aerials are in place, and there are plans to install a further three in the future. Site clearance of the previously derelict site began only a year ago, and the first aerial was in operation by February.

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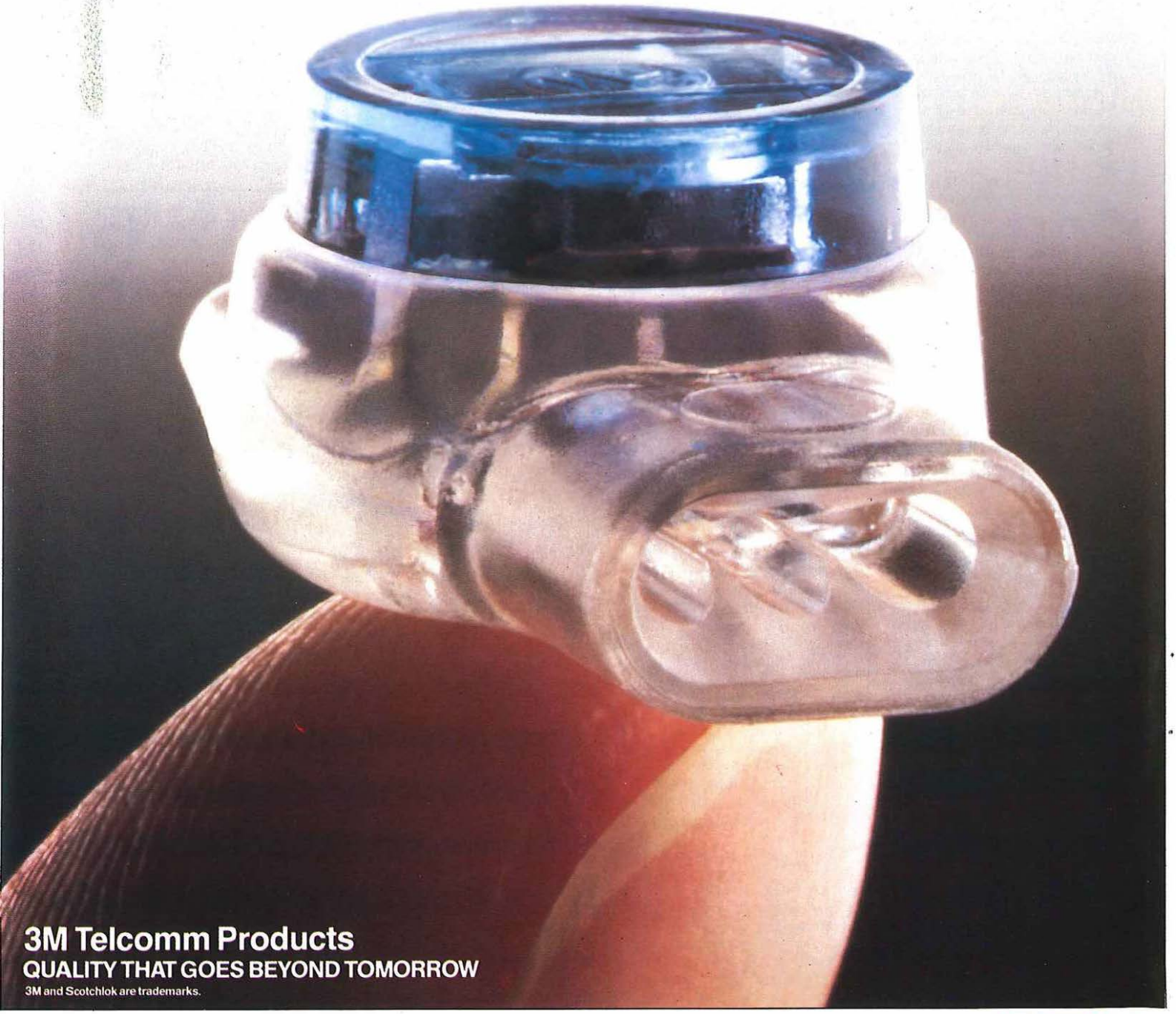

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3M

be sold under the 'Cheetah' trade name by British Telecom. The terminals are fully electronic and micro-processor controlled, with advanced facilities to bring the speed and versatility of word processors to telecommunications.

Comdial has won a contract from the Consumer Products Division of British Telecom to develop a new variant of the Ambassador telephone which will have many new features relevant to business use.

Picturephone debut

A versatile new wall telephone will be available this autumn. Called the Picturephone, it consists of a compact telephone handset and key pad which fits neatly into the corner of a box picture frame. The rest of the frame can be used to display any photograph or illustration beneath a perspex cover to create a decorative effect. It can also be used to display notices, essential phone numbers or an advertisement.

The perspex cover can be replaced with a cork pin board for messages, or a mirror board, which are provided as optional accessories.

The new phone was designed for British Telecom by industrial design group Jones Garrard Limited, for exports.

Two new channels

British Telecom is to provide all its 26,000 cable television customers in Milton Keynes with two new channels, at no additional cost. Transmissions of Sky Channel, the family entertainment service, and Your Channel, a text channel carrying local news and information, are scheduled to begin in mid-November.

The new services mark the start of MKTV, the cable television operation wholly run by British Telecom in the city. Satellite TV's Sky Channel offers films, serials, music, adventure and comedy. Programmes will be transmitted from British Telecom's London Teleport in Woolwich, via the ECS-F1 satellite to television receive-only dishes (TVROs) sited at the operations centre at Bradwell Abbey, Milton Keynes.

Your Channel is a community text channel which carries news, information, entertainment and advertising for everyone in Milton Keynes. The service is being provided by British Telecom's New Information Services.

Price changes

The first price changes to main telephone services for a year became effective at the beginning of November after a period during which the movement in RPI will have exceeded five per cent.

Under the RPI-3 formula in British Telecom's Licence, British Telecom is required to contain increases in the price of a basket of specified charges, including line rental, local and national (formerly trunk) calls, to a level at least three per cent below the RPI movement. Increases for the services governed by this requirement average 2.1 per cent.

The minimum charge for calls from payphones, unchanged for four years, is being increased, but customers will get more time for their money on some payphone calls.

The payphone service has lost around £50 million in each of the past two years and the increase is designed to set the public payphone business on a sounder financial footing as part of an overall strategy to modernise and improve the service, in which British Telecom is investing £160 million.

Main price changes are:

*quarterly rentals increased by £1 for residential customers and by £1.50 for business customers

*call unit charge increased from 4.4p to 4.7p

*customers to benefit from longer time allowances for peak and standard rate national (formerly trunk) calls over 56kms; the allowances are extended by between 20–25 per cent

*the low user rental rebate increased from 3p to 3.2p for each unused call unit below 120 units a quarter

*the minimum charge for a call from a payphone increased to 10p.

New Minister appointed

Mr Geoffrey Pattie is the new Information Technology Minister in succession to Mr Kenneth Baker.

Mr Pattie, 48, was previously Minister of State for Defence Procurement. He is MP for Chertsey and Walton, a barrister, and former managing director of an advertising agency.

Chip challenge

A million components on a single chip – that is the challenge facing British Telecom's Research Laboratories at Martlesham, who are involved in 14 projects which have been awarded £21 million by the Alvey Directorate as part of its programme to promote new microchip technology.

The overall programme has been designed to research the new materials and processing techniques needed to reduce the size of individual components in integrated circuits and to develop advanced techniques for their interconnection on the chip.

When Toby Setchfield from Woodbridge, Suffolk was just four years old he saw a Mickey Mouse phone and vowed to have one of his own. Now three years and £150 worth of small change later, his dream has come true – and he still has money to spare!

Local British Telecom staff were so impressed with Toby's effort that they fitted free a socket attachment to plug Mickey into.

IDD links up

Introduction of direct dialling to Ghana, Syria and Sudan has brought to 161 the number of countries which can now be dialled direct from Britain.

All three countries are in BTI's Charge Band F which means that a three-minute cheap rate call will cost £2.23. A three minute operator call would cost £5.38 to Sudan and Syria and £9.98 to Ghana.

Newly appointed

Mr Anthony Booth, managing director, British Telecom International, has been appointed to the Board of British Telecommunications plc as a corporate executive director.

He was previously Director of British Telecom London and, before that, Director of International Networks, responsible for planning and providing international telephone, telex and data services.

Mr Dudley Fielding has been appointed Director of Operations, British Telecom Enterprises (BTE) but will continue as Finance Director, BTE, a position he has held since 1982.

Mr Fielding's role will be to develop and expand new operations as information technology develops in the UK and overseas. He joined British Telecom from GEC, where he held a variety of senior management posts for 15 years.

Mr Christopher Bull has been appointed Corporate Treasurer at British Telecom headquarters. He was formerly with BICC plc where he was Finance Director of their electrical and electronic components division.

Mr Bull, a chartered accountant and Cambridge economics graduate, held the post of Head of Financial Analysis with BICC's corporate finance department and will assume major responsibility for British Telecom's treasury, economic and corporate financial planning functions.

Monitoring at Madley

British Telecom International's satellite earth station at Madley, Herefordshire, has won a £1 million contract to monitor the performance of the recently launched European Communications Satellite, ECS 2.

A new dish aerial at Madley will be used to send a pilot signal to ECS 2 to help other users aim their aerials accurately at the new satellite. The ▷

aerial will also monitor transmissions on the satellite's special business services transponder, checking that signals to the satellite are within the frequency limits set by Eutelsat – the body established in 1977 to administer the European satellite system. British Telecom is the joint-largest shareholder in Eutelsat.

Jumbo order

British Telecom is modernising British Airways' entire internal communications system at Heathrow Airport in the largest single exchange order it has ever received from a private company.

The contract – worth up to £5 million over two years – was won in the face of stiff competition. It involves replacing six electro-mechanical exchanges, some of which have been in use for more than 30 years, with fully digital equipment. A completely new exchange is also being provided to serve the new Heathrow Terminal Four.

The contract, expected to be completed by the end of next year involves installing new exchanges which will take up only one-fifth of the space of their Strowger predecessors and provide a total communications package for both voice and data.

The system also includes the world's largest Auto Call Distributor which automatically distributes incoming calls to British Airways' new reservations set-up. It will handle 500 lines, serving 380 operator positions. A total of 7,000 extensions will eventually be connected, and the system involves 13,000 kms of wiring.

There will be digital links to the airline's main centres in Bristol, Cardiff, Birmingham and Manchester over British Telecom's MegaStream network.

The first exchange is already installed and working at Hatton Cross.

Informal meetings

The new season of British Telecom London informal meetings is now underway.

Speakers will include:

- Malcolm Argent, secretary of British Telecom, on the Background to the BT Licence and Other New Licences and how the Director General of Telecommunications is expected to operate (14 November);
- Bill Morley, director of Sales Operations, British Telecom Enterprises, on the Inphone campaign and how advertising is assessed (6 December);
- Keith Gorton, Customer Service Systems Programme Director, on the latest developments in customer service systems and commercial management (15 January) and;
- Douglas Oram, Director of a large hotel group and member of POUNC on his appraisal of British Telecom (13 February).

All meetings will be held at Camelford House, Albert Embankment. They begin promptly at 5pm.

20-digit display

British Telecom Radiopaging's Display Page – the pager which can be seen as well as heard – can now accept longer messages which can be sent direct to the pager by telex or datel.

Display Page uses a liquid crystal display to communicate a numeric message – typically a telephone number or a coded message – to people on the move.

The new Display Page is capable of receiving messages of either ten or 20 digits length. This means that customers can now receive a message that includes an extension number as well as the telephone number, or international telephone numbers.

The new Display Page service is available nationwide immediately. It can be equipped with two additional tone-only signals, for regular callers such as home and office.

Doubling up

The number of pages sent on international facsimile in Britain has doubled in the last year. Now, latest forecasts by British Telecom International (BTI) predict that by the end of this year the number of facsimile terminals in operation in the UK is expected to exceed 30,000 – more than double the 1981 figure.

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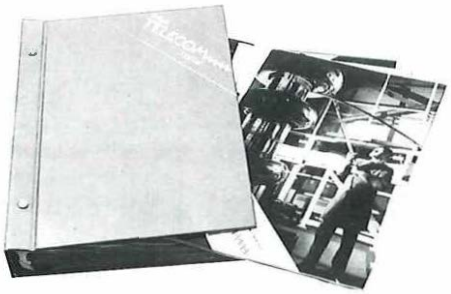

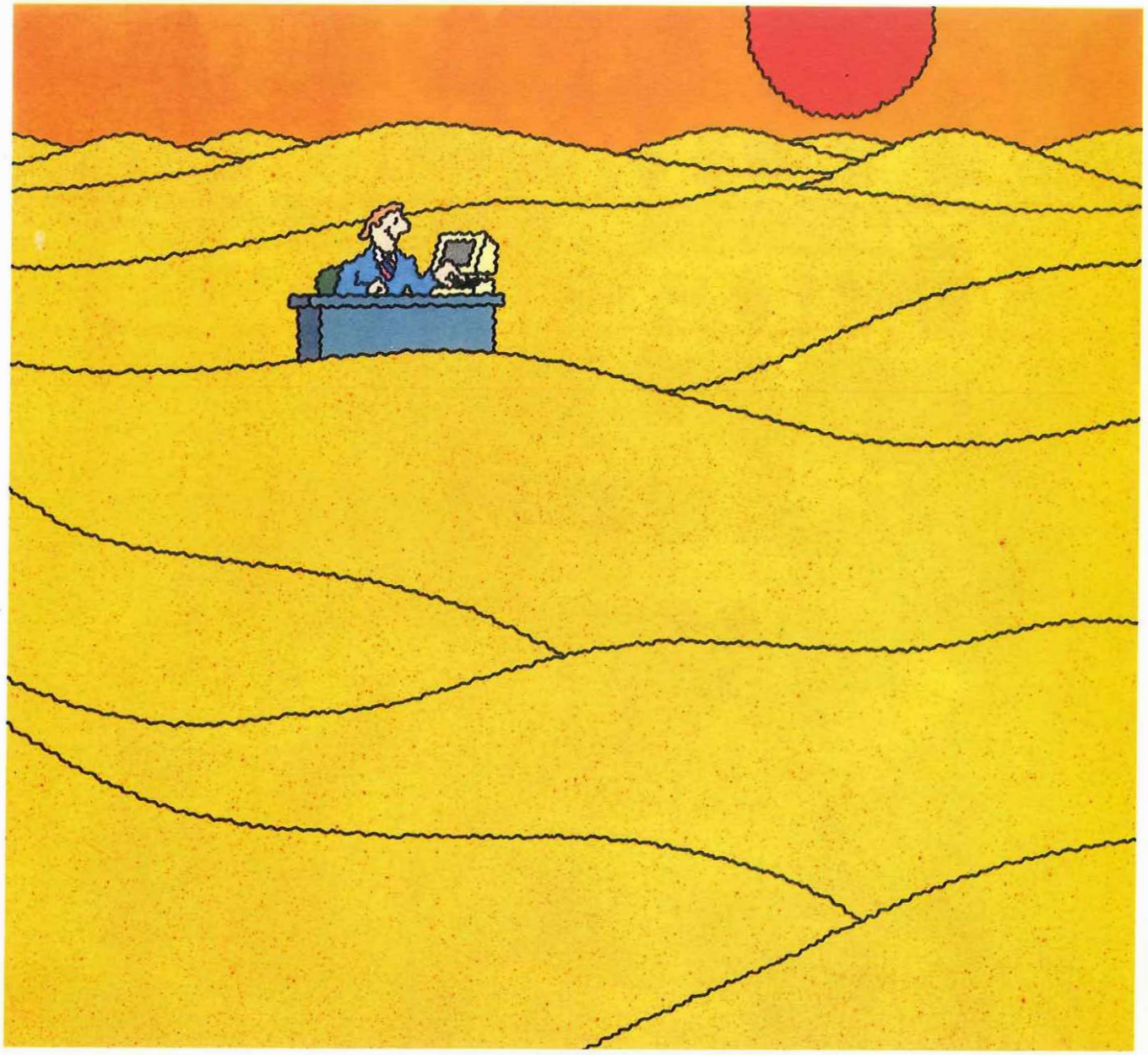

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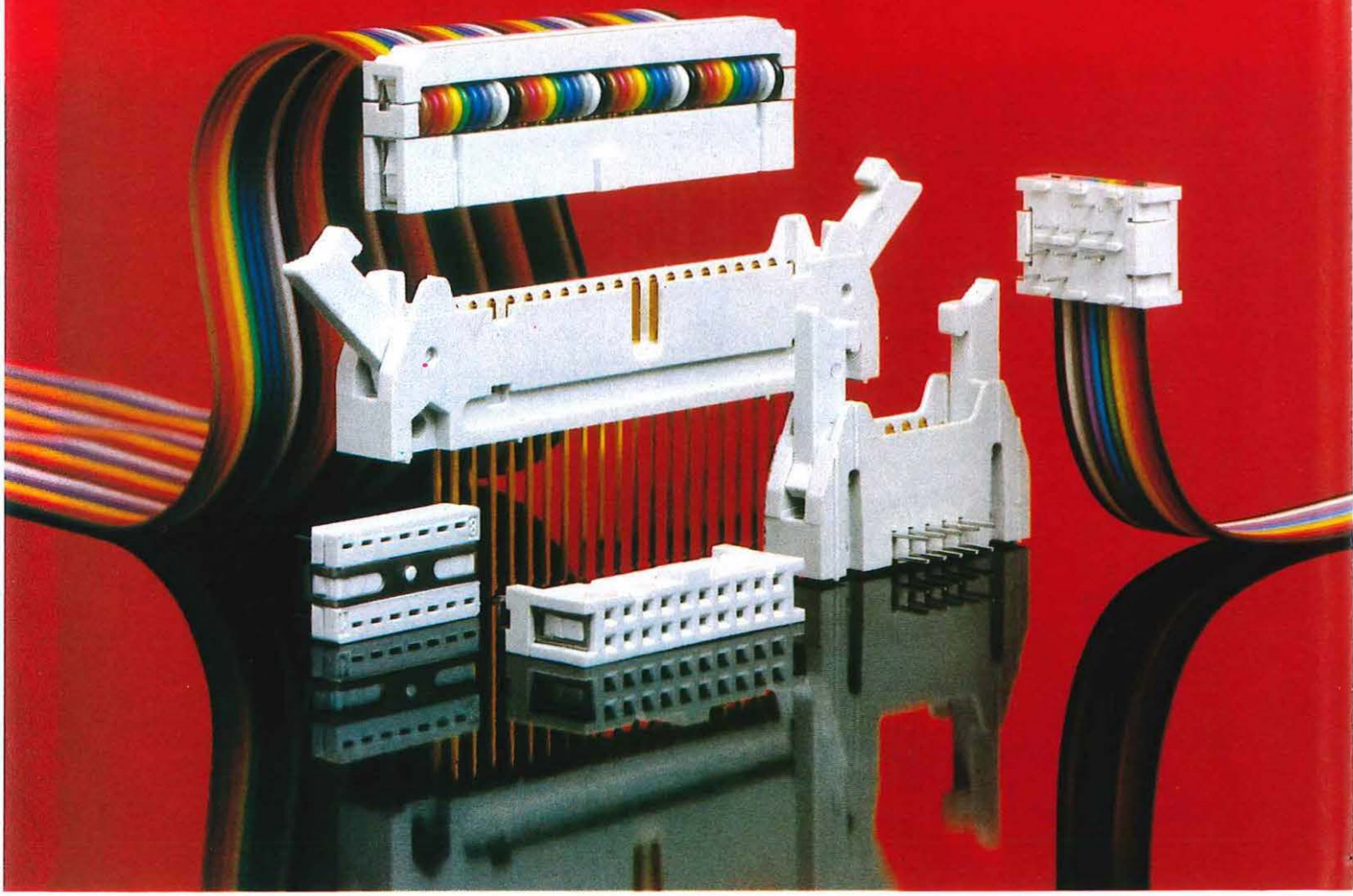

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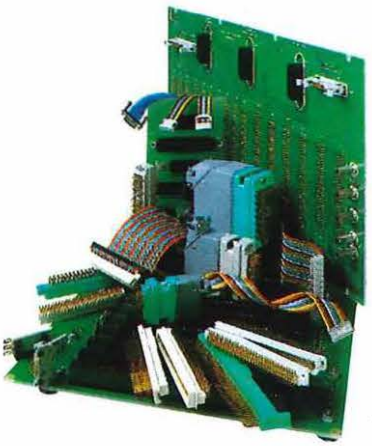

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The ideal length of such articles is between 1,000 and 1,500 words. Views of contributors are not necessarily those of the Board.

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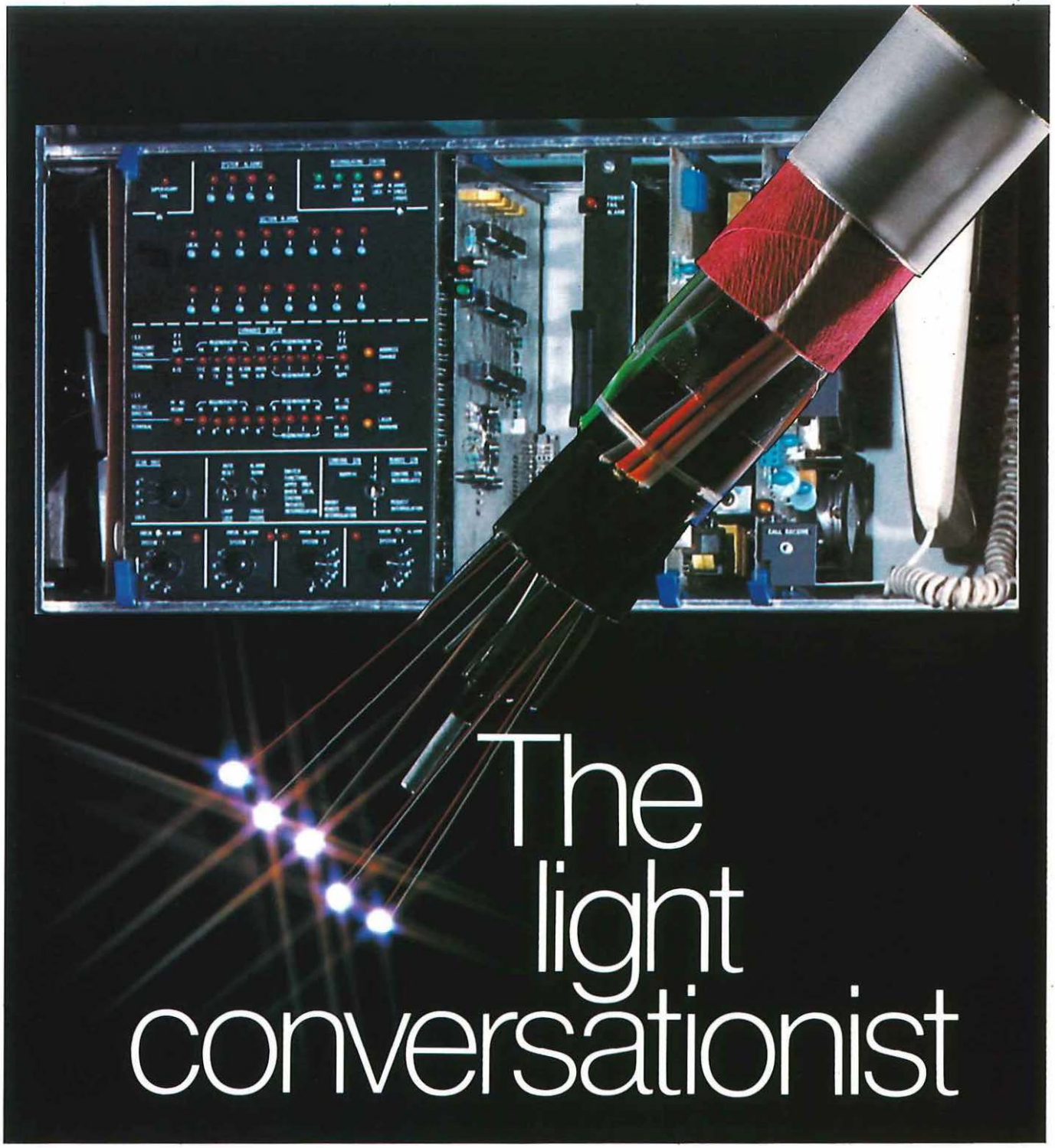

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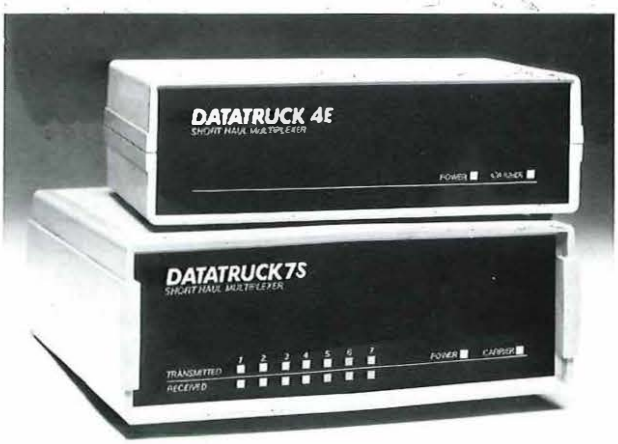

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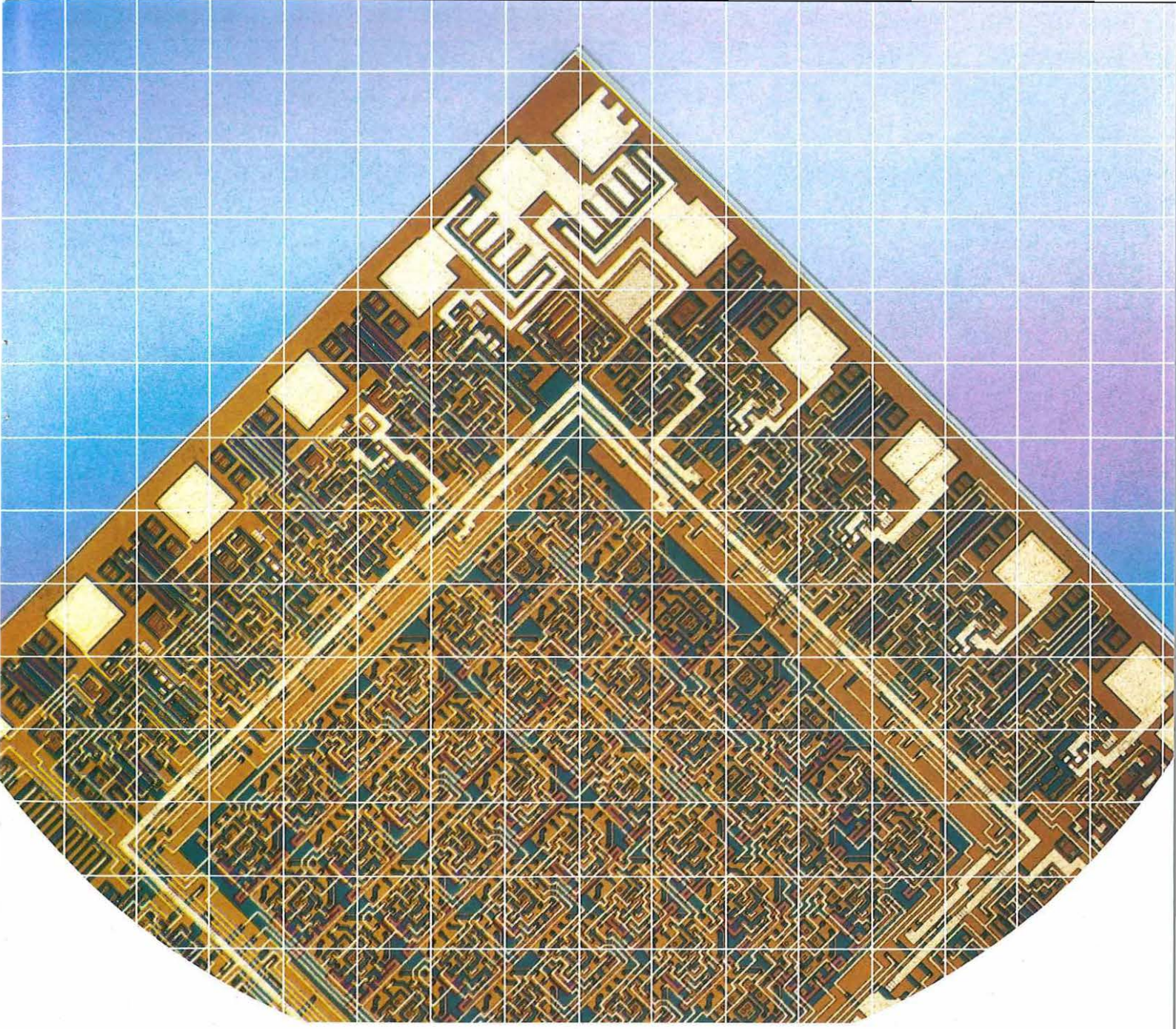

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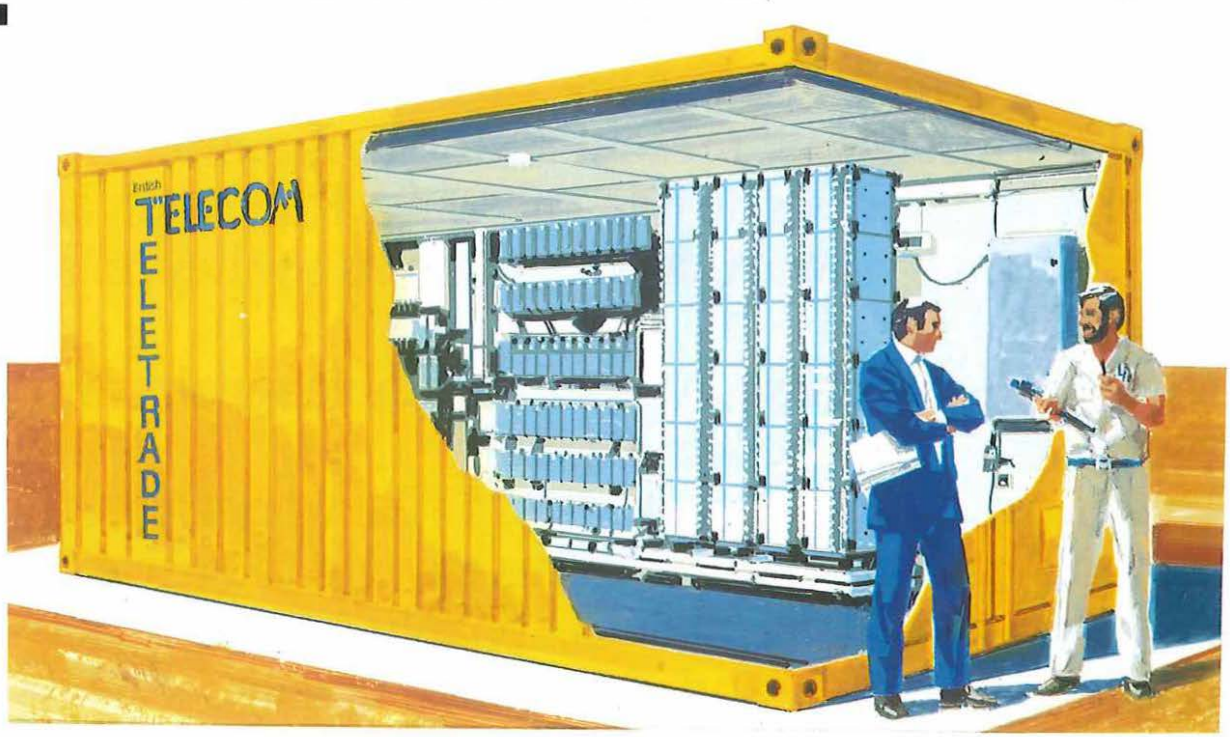

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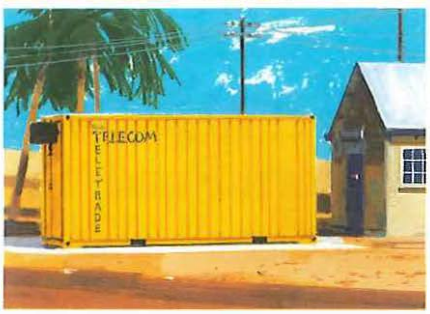

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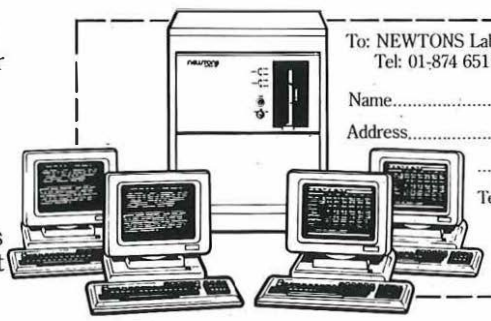

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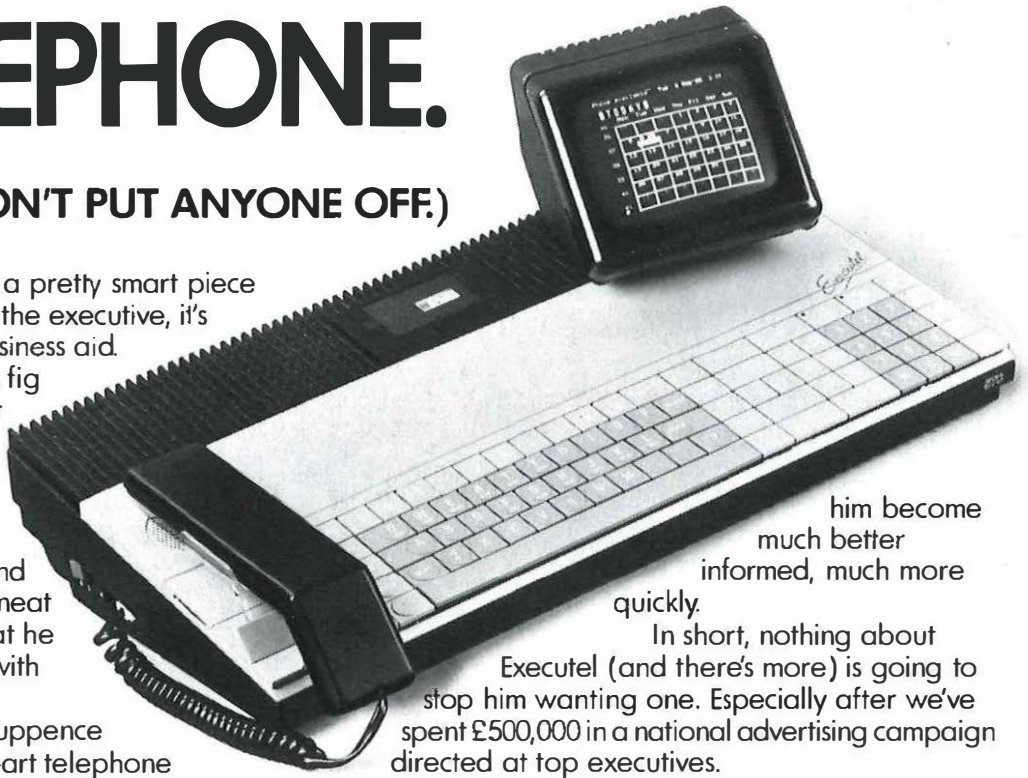

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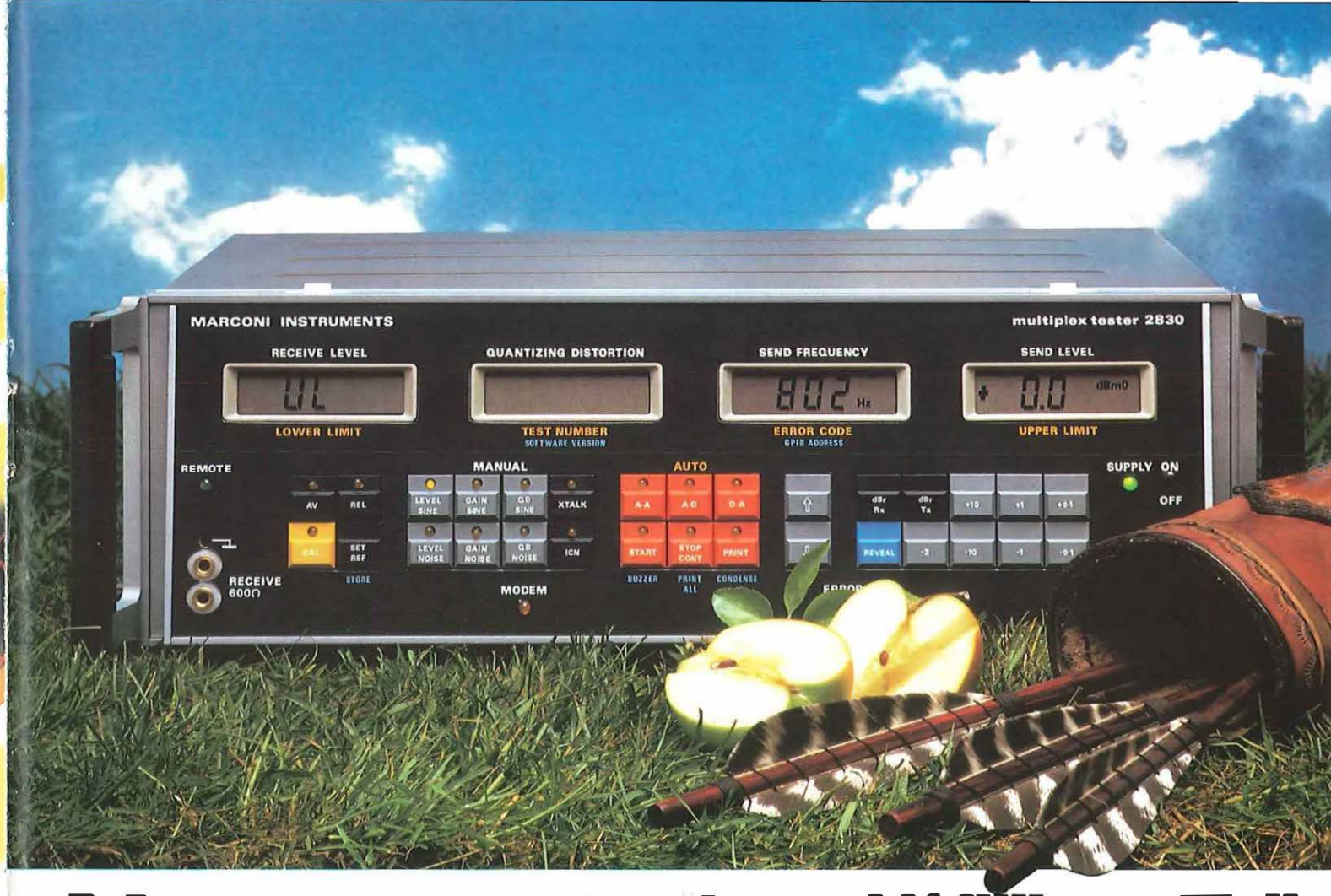

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Which are the exact qualities that put the Marconi Instruments 2830 PCM Multiplex Tester head and shoulders above the competition.

The 2830 is a simple to operate unit providing a wide range of test functions including frequency response, gain, linearity, quantizing distortion, idle channel noise and crosstalk.

When combined with Channel Access Switch 2831, the capabilities of the 2830 are extended to provide readings of impedance balance, return loss and signalling distortion.

The 2830 can handle four programmable automatic test sequences as determined by the user. They can even be repeatedly recycled.

Although intended for use as a stand-alone unit for A/A measurements (it needs no external controller) in either automatic or manual modes, the 2830 Multiplex Tester can also be used in conjunction with Marconi Channel Access Switches, Digital Simulators and Digital Analysers to provide a complete test set in D/A and A/D applications.

Other features include:

* Automatic calibration function
* Level measurement accuracy of ± 0.025 dB at 850 Hz from +20 to −60dBm. Speed approximately 2.5 readings per second.
* Quantizing distortion measurement accuracy of ± 0.2 dB over 0 to 40 dB measurement range.
* Results may be printed out under GPIB control.

The 2830 PCM Multiplex Tester from Marconi. Check it out today.

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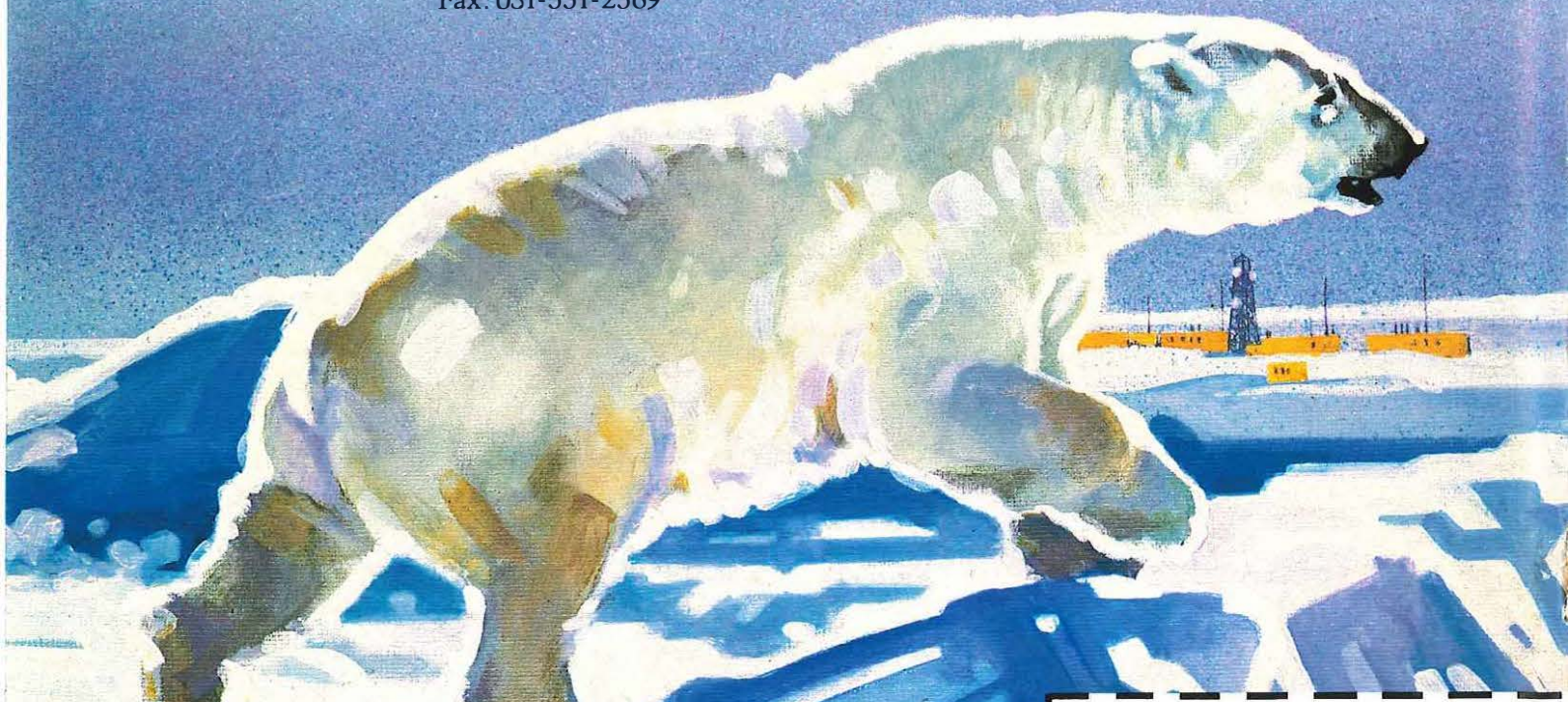

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