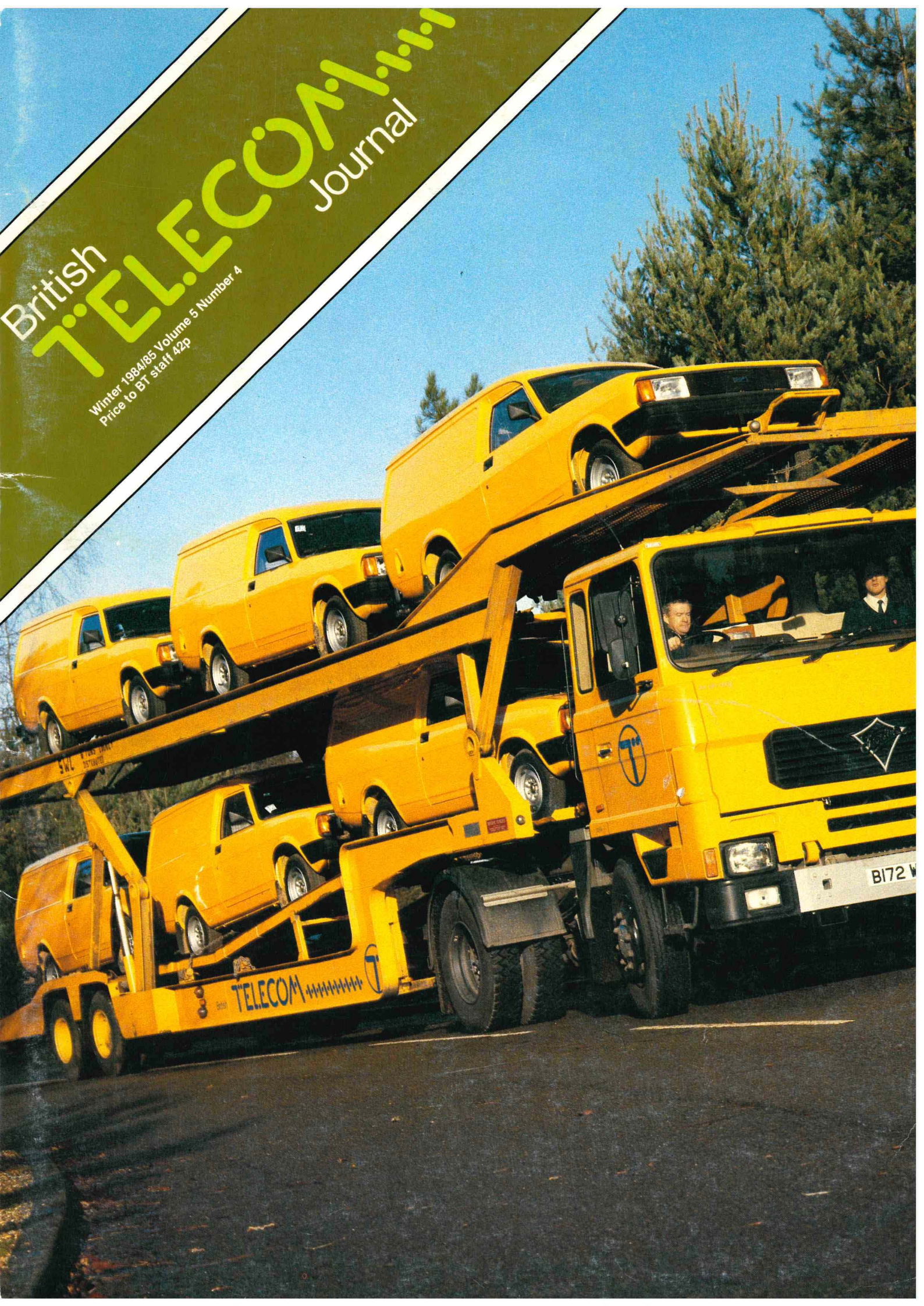
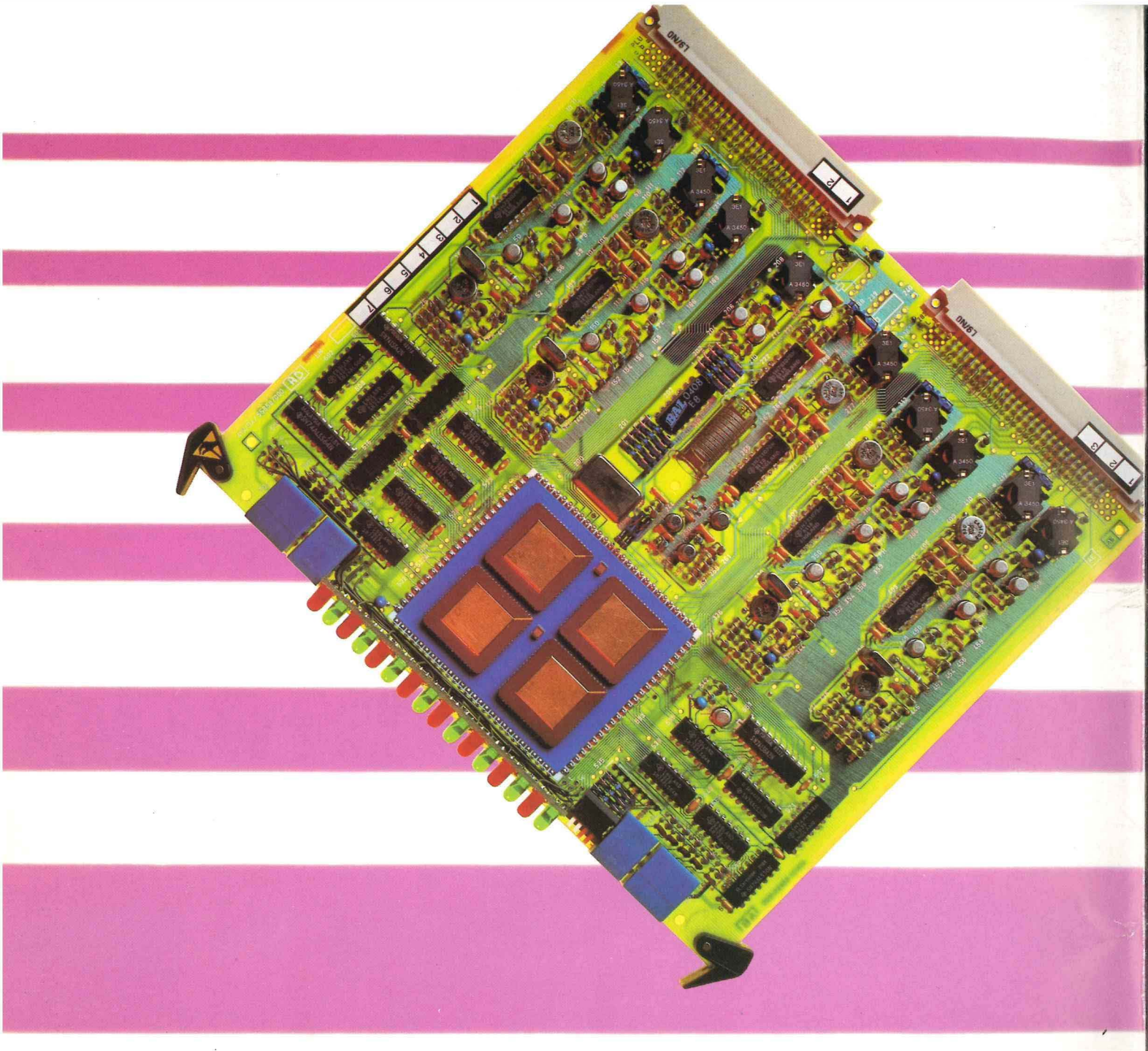
British TELECOM Journal

Winter 1984/85 Volume 5 Number 4
Price to BT staff 42p





Giving you transmission speeds from 2 to 565 Mbit/s.

It's a range few if any companies can offer.

Plessey can. The latest addition to the Plessey range is a 565 Mbit/s system. It will operate on the UK's Nottingham-to-Sheffield link—believed to be the world's first commercial contract for a 565 Mbit/s optical fibre transmission system.

Plessey single-card muldex use the latest custom-designed LSI circuitry which means you can now have a smaller product that gives higher speeds, uses less power and keeps costs down too.

You can fit eight 2nd/3rd order or four 4th order muldex plus power units, or any equivalent combination on a single shelf of a Plessey equipment rack.

And it is standard Plessey practice to design signal units that interface with any type of exchange or signalling system.

For applications in fibre optics, coaxial or radio systems at data speeds up to 565 Mbit/s—people around the world trust one name for a wide range of muldex.

That's Plessey in transmission. Giving you more.

Plessey Public Networks Limited, Transmission Division, Beeston, Nottingham, United Kingdom NG9 1LA.
Telephone Mike Hocking for information on:
Nottingham (0602) 254831 Ext 3542. Telex: 37201.

PLESSEY

Performance, versatility — and it looks good.

Precision, engineering excellence and strong aesthetic appeal are the accepted Schroff trademarks but when it comes to 19" cabinets we like the word 'versatility' too. Versatility to build a system at exactly the size, cost and complexity you perceive it. Consult us early in the design cycle — the better your system works, the better we look.

All Schroff 19" cabinets conform to DIN 41494 and IEC 297-1/-2. For the most comprehensive range of cost effective, quality cabinets, such as Minirack and Eurorack, see Schroff first.

19" Systems for electronics packaging

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Schroff UK Ltd., formerly T. Foxall + Sons Ltd.
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Manufacturing and distribution

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.

WORD PROCESSOR

ELECTRONIC TYPEWRITER

PUMA TELEX PLUS 'MAILBOX' OPTION

PERSONAL OR BUSINESS COMPUTER

1½ MILLION TELEX USERS WORLDWIDE

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!

® PUMA – trademark of British Telecom

TREND®

Trend Communications Limited

Head Office:
Knaves Beech Estate, Loudwater, High Wycombe, Buckinghamshire HP10 9QZ, England.
Telephone: Bourne End (06285) 24977.
Telex: 849408 TREND G.

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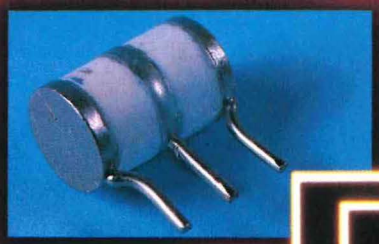

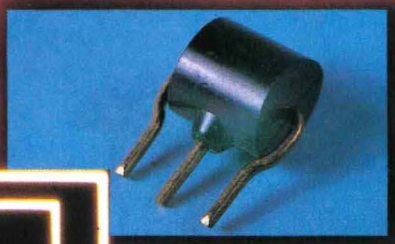

High Surge Rating but is it fast enough?

More than fast enough and with good surge rating!

Clearly when choosing Surge Suppressors there are 'horses for courses' but now available to deal with today's transient problems is the NEW LUCAS FOLDBACK DFP000 series giving the high speed associated with modern silicon technology, with 750A 8/20 µs and 5KV 10/700 µs surge rating.
Lucas offer the 19A version giving full MAINS FAULT capability and with full BRITISH TELECOM APPROVAL.

A complete range of other surge suppressors is also available.

Lucas Transhield® Surge Suppressors

For full technical manual and guidance on Surge problems contact Sales and Marketing Department.

Lucas Electrical

Lucas Surge Suppressors
Lucas Electrical Electronics & Systems Ltd.
Mere Green Road, Four Oaks, Sutton Coldfield, West Midlands B75 5BN
Telephone: 021-308 3501 Telex: 338461

Ferranti. Helping telecommunications come through loud and clear.

Our ZN470 AE microphone amplifier was developed in conjunction with British Telecom for use with an electret transducer to replace the carbon transmitter in telephone handsets.

The reason is clear in the voice of every caller.

There are clear technical advantages too. Dual polarity operation and full lightning surge protection are both on chip, so external components are minimised.

We've now come up with other versions for moving coil and piezo electric transducers, and these can if you wish be located away from the transducer.

ZN470 Series operates from 1mA to 100mA current on telephone supply lines.

Contact your Ferranti distributor, or

IC Marketing,
Ferranti Electronics Limited,
Fields New Road, Chadderton,
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Tel: 061-624 0515, Telex: 668038.

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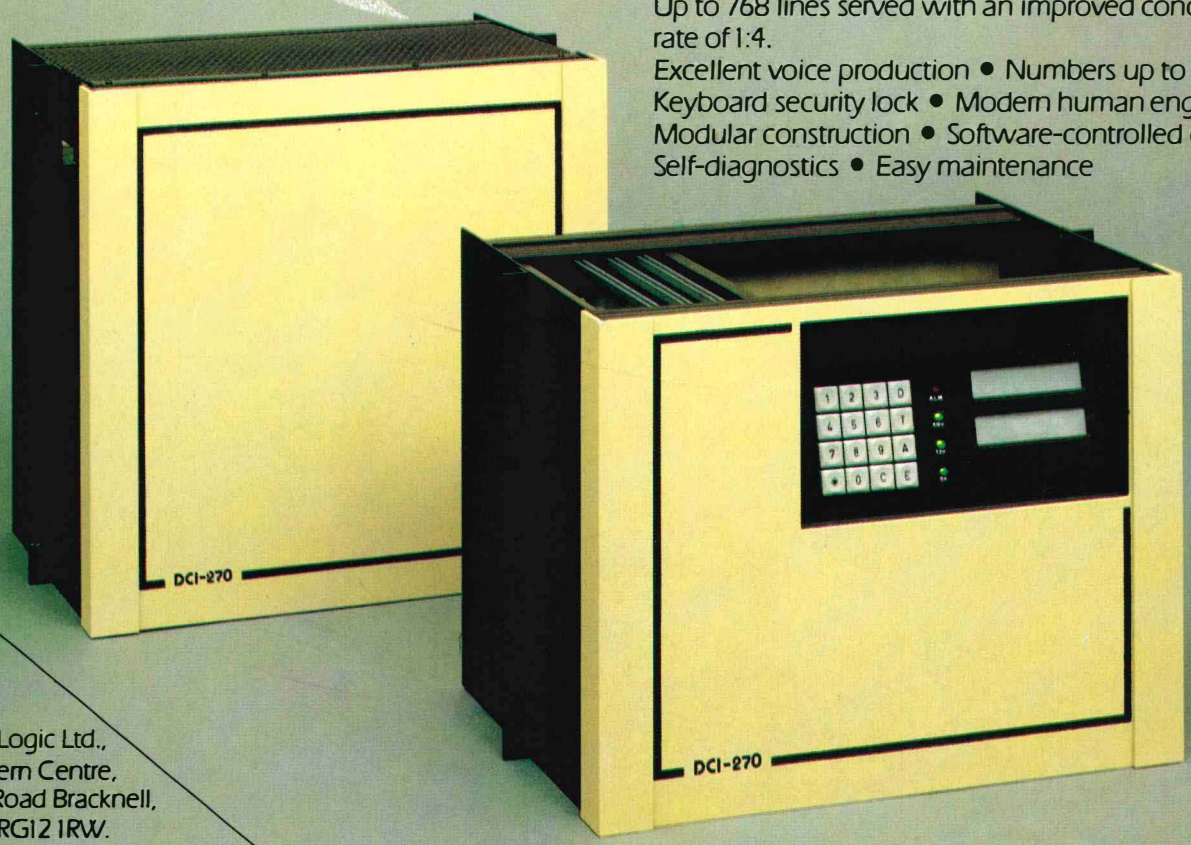
THE NUMBER YOU HAVE DIALLED IS NOT IN SERVICE. PLEASE DIAL 0344-51915

Tadiran's DCI-270 Digital Changed Number Interceptor in action. The central office installed computer controlled system that is easily programed for directory changes. Up to 768 lines served with an improved concentration rate of 1:4.

Excellent voice production • Numbers up to 10 digits • Keyboard security lock • Modern human engineering • Modular construction • Software-controlled charging • Self-diagnostics • Easy maintenance



Dynamic Logic Ltd.,
The Western Centre,
Western Road Bracknell,
Berkshire RG12 1RW.
Telephone: 0344-5195.
Telex: 849433.

Details please.

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Position _____

Company _____

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PCD TM7800
TM7800-M1
TRANSMUX
ATTENTION
STATIC SENSITIVE
DEVICES

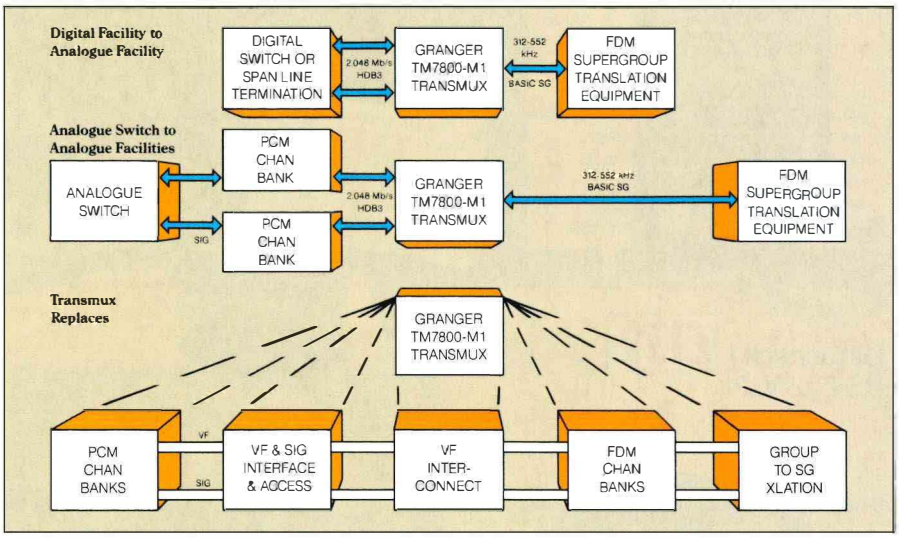
The new Granger CCITT TransMux.™

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.
- Converts FDM to TDM without demodulation to voice.
- Saves power with low current HCMOS IC's.
- Saves space by packing 60 channels into 311 mm of rack height.
- Saves time. All digital circuitry is software controlled. No screwdriver adjustments or routine maintenance necessary.
- 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.



All digital design.

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.

Delivered in 60 to 90 days!

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

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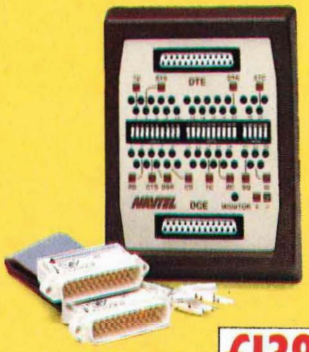
In Europe, Granger Associates, Ltd., 1 Brooklands Road, Weybridge, Surrey KT13 OSD, England, phone BYFLEET (09323) 51541, telex 261780, cable ANSOUND.

Granger Associates

INTERFACE PROBLEMS?

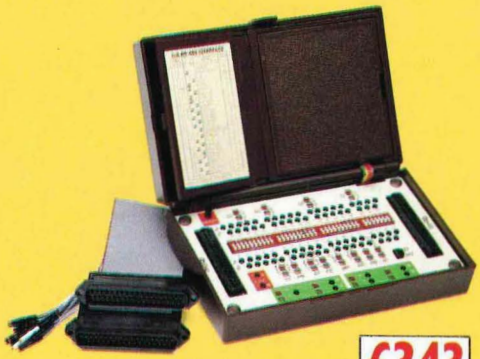
The Datacheck line of breakout boxes lets you identify problems on all the interface disciplines.



Datacheck I £139
RS-232/**V.24**

Datacheck II £242
The ultimate breakout box

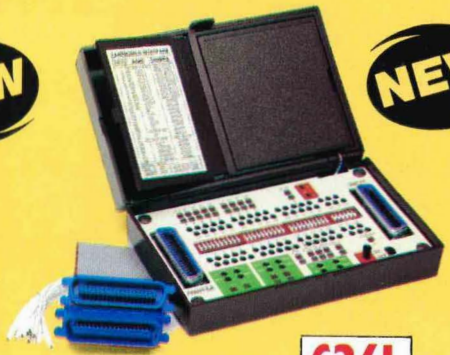
Datacheck III £242
RS-422/423 **X.21** (15 Pin)



Datacheck IV £343
RS-449/**V.36** (37 Pin)

NEW

Datacheck V £621
V.35



NEW

Datacheck VI £361
Centronics parallel interface printer tester

Prices subject to current Pound/Dollar rates

2400, 4800, 9600			
BAUD RATE COUNTER ● Measures data rate accurately £184 (Not applicable for DC VI)	**VOICE FREQUENCY MONITOR** ● Tap into the analogue side of the signal £93 (Not applicable for DC VI)	**V.24 MONITOR** ● Allows monitoring by V.24 devices £138	**V.24 CONVERTOR** ● For interactive working between standards £157

CAE GROUP

General Audio and Data Communications Ltd.
64-82 Akeman Street, Tring, Herts. HP23 6AJ. Telephone: Tring (0442 82) 4011/5551
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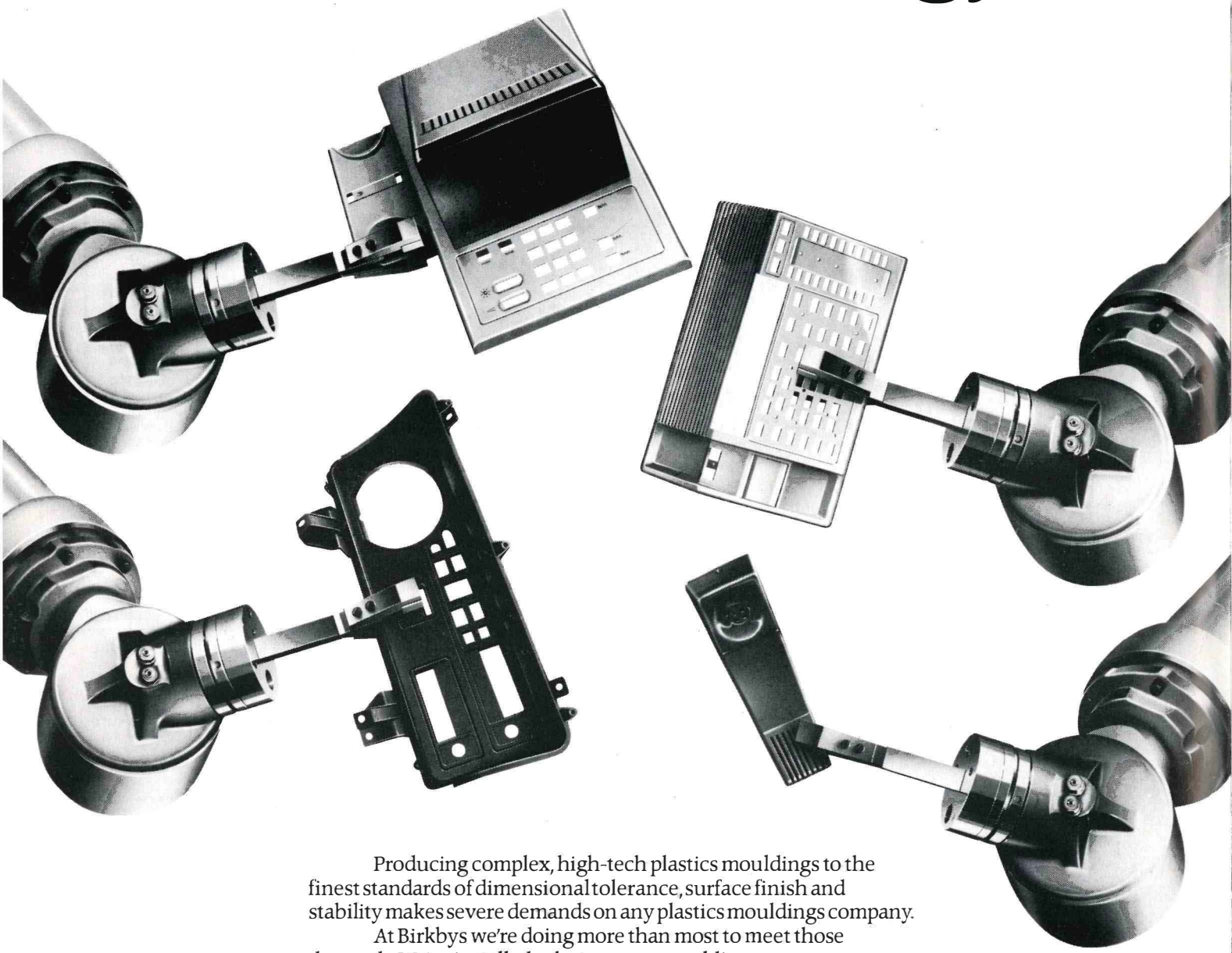
Better equipped for the demands of the new technology.



Producing complex, high-tech plastics mouldings to the finest standards of dimensional tolerance, surface finish and stability makes severe demands on any plastics mouldings company.

At Birkbys we're doing more than most to meet those demands. We've installed robots on our moulding presses so we achieve higher quality, more cost effectively, in less time.

But our service doesn't just stop there, as we will also handle your assembly, finishing, printing and delivery schedules (and how many other suppliers can say that?).

Bringing in new technology is a big investment. But, as our customers agree, it's a wise one.

Birkbys Plastics Limited, PO Box 2, Headlands Road, Liversedge, West Yorkshire WF15 6QA. Telephone: Heckmondwike (0924) 403721. Telex: 55332.

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Find out if the CSMA can save you money on motor insurance

John Kelly, 33 years old, living in Dunfermline.
Frizzell premium: £29.52.
Previous insurer's renewal premium: **£36.72.**

Brian Davies, 40 years old, living in London.
Frizzell premium: £122.87.
Previous insurer's renewal premium: **£146.84.**

Paula Miles, 41 years old, living in Kent.
Frizzell premium: £48.00.
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George Poole, 65 years old, living in Cumbria.
Frizzell premium: £83.20.
Previous insurer's renewal premium: **£122.00.**

The examples above are real. We've changed the faces and the names for the sake of confidentiality.

Every year thousands of new CSMA members discover that they can make substantial savings on their motor insurance, because they qualify for the very advantageous terms offered by Frizzells – the official Motor Insurance Brokers to the CSMA since its formation over 60 years ago.

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CSMA Membership is available to all past and present BRITISH TELECOM PERSONNEL

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For insurance quotation complete the remainder.
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Date of birth_____
Occupation_____
Employer's name_____
Details of vehicle: Make_____
Model_____ cc. ____ Year ____
On what date did you pass the UK motor car driving test?
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How many years no claim discount do you expect to receive at next renewal?
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Have you had any accidents/convictions? If so, please give details:
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Expiry date of present policy_____

(Please tick appropriate boxes.)

Do you wish driving to be restricted to:
(a) Yourself only ☐
(b) Yourself and Spouse only ☐
(c) Social/Domestic/Pleasure only (which includes driving to and from a permanent place of work). ☐
Comprehensive cover only – do you wish to bear a first amount of each accidental damage claim? £25 ☐ £50 ☐ £100 ☐
I require cover for COMPREHENSIVE ☐
THIRD PARTY FIRE THEFT ☐
THIRD PARTY ☐ MOTOR PREMIUMS BY INSTALMENTS ☐

Please note that Insurance is not available in N. Ireland.

BTJ

The success of the Monarch phone system isn't just talk.

Over 10,000 phone system users, from Sony to the Midland Bank, know that the perfect system is the one with the future built in. The Merlin Monarch system from British Telecom.

The Monarch digital switching system has been designed from the outset to offer the flexibility your business demands. The latest version, the 250C2, has the ultimate capacity of 252 extensions, up to 64 lines and incorporates direct dialling in (D.D.I.). Easy to operate, it has every feature necessary to ensure that your office functions with maximum efficiency.

Your Merlin Monarch system, backed by British Telecom's nationwide support service, has the capability to become the centre of your company's voice and data network.

Here are some comments from existing customers about their Monarch phone systems:

Royal Insurance and Midland Bank have both selected Monarch for their communications needs. "The system meets our needs very well and provides the features to aid our business operation" (Cliff Bailey, telecommunications manager, Royal Insurance). And AFA-Minerva were delighted with British Telecom's sales, engineering and installation. "The speed at which they generated action was quite remarkable. There was no break in our 24 hour service to our clients" (D. E. Inch, administration manager).

To find out more ring Freefone Merlin or complete the coupon.

To: Victor Brand, British Telecom Merlin, FREEPOST, London SW19 8BR. Please send me a representative ☐
Please send me further information ☐ (Monarch)

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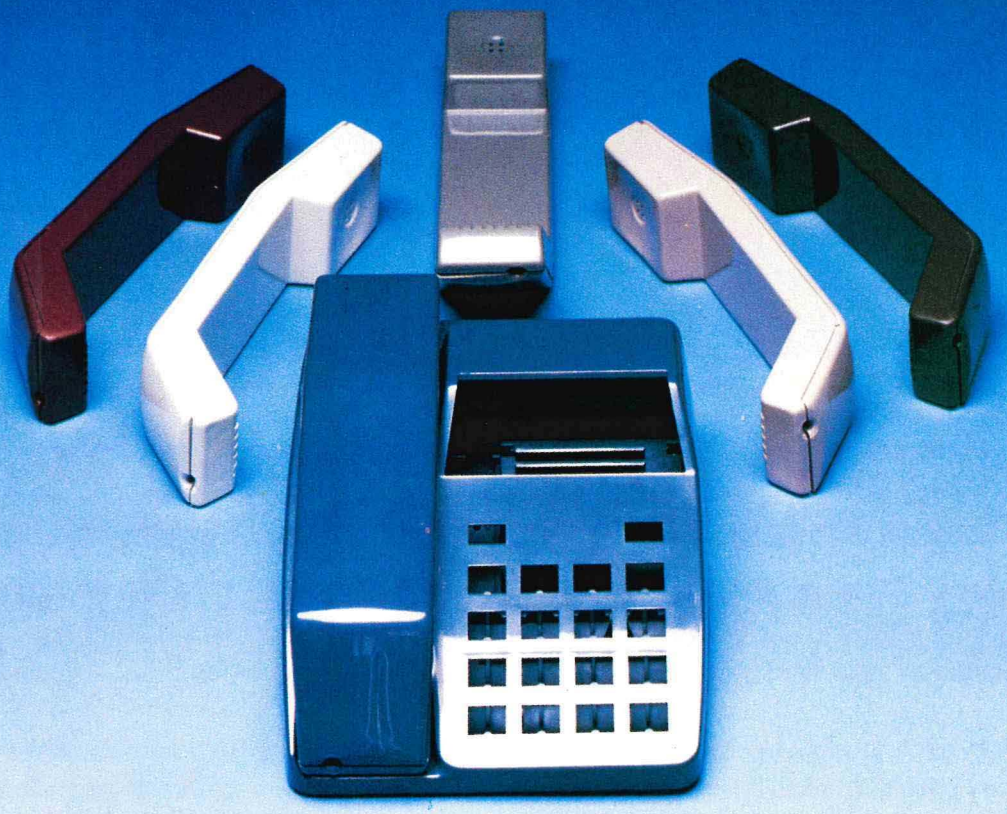
A Division of Crystalate Electronics Ltd



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British Telecom Approved Moulder.
Chosen for our
Product Development, Component, and
Tool Design expertise.
With Manufacturing Approvals to
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let us mould..... your future.

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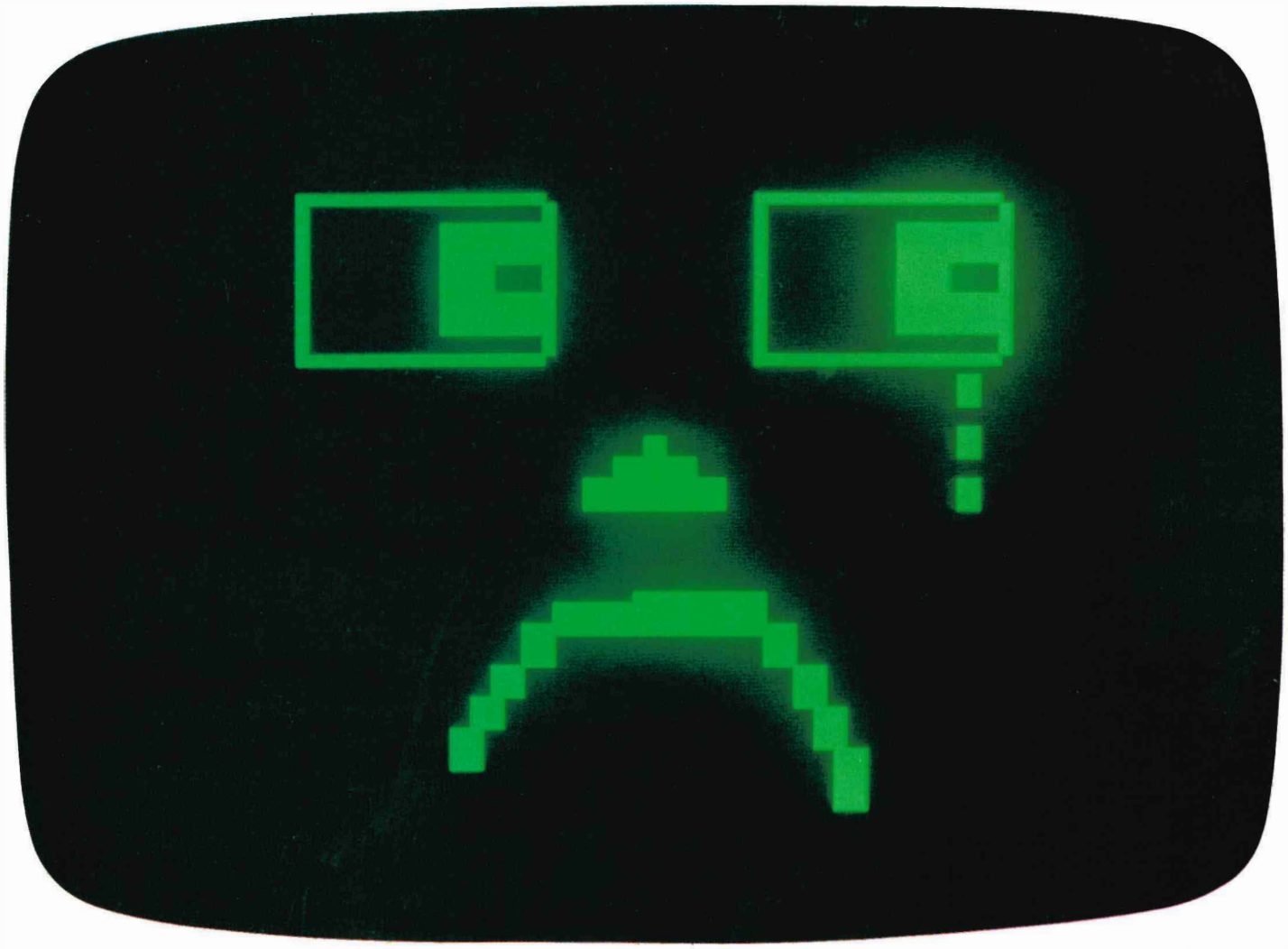


OTHER LINE-TESTERS ONLY GIVE YOU THE PROBLEMS.

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.

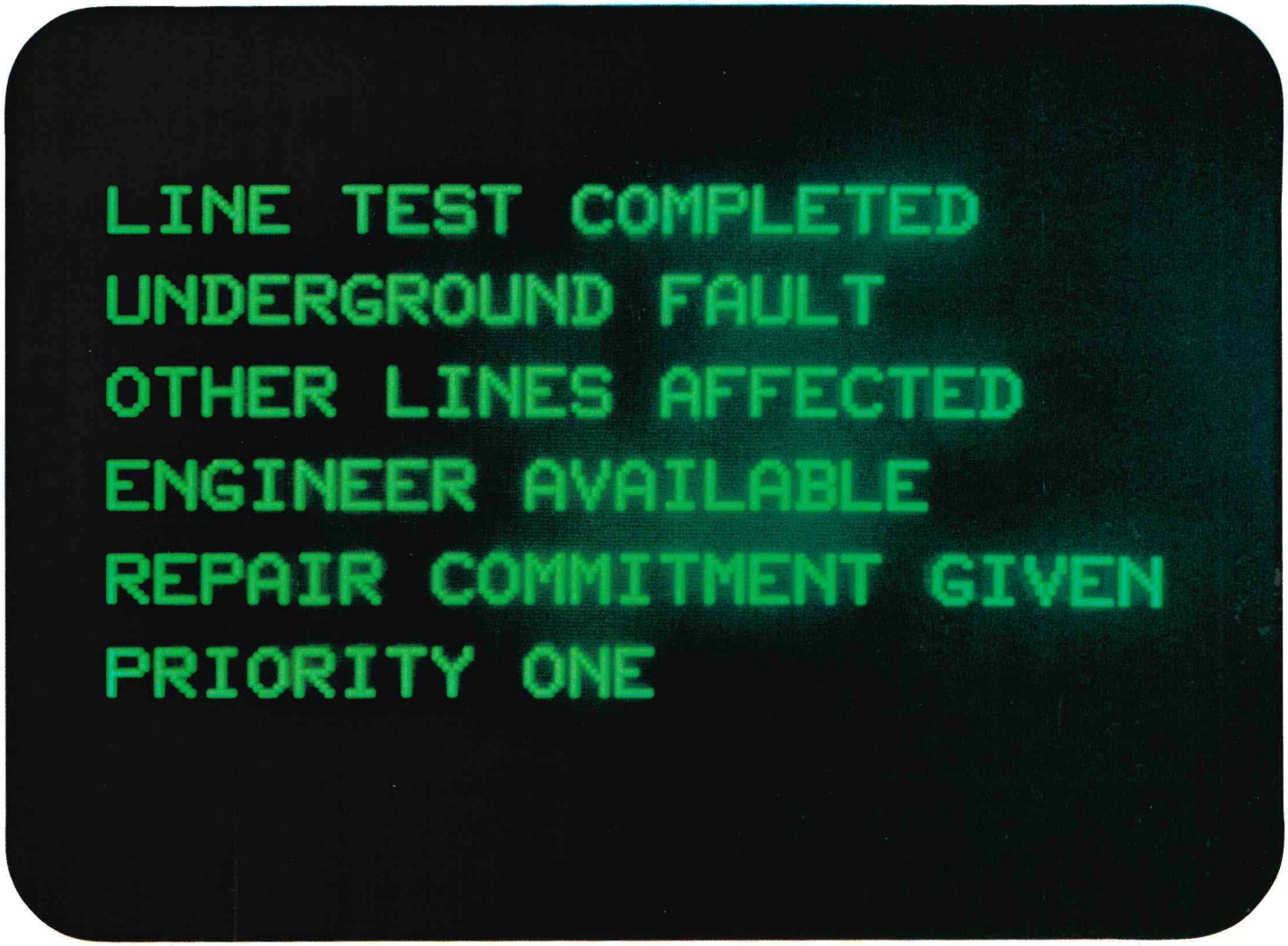
Also, the LRS compares the condition of the line it's testing with other available information, and produces a System Recommended Action.

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 Clasgow, where LRS will cover seven RSC's), and BT's longer term plans with Customer Service Systems (CSS).

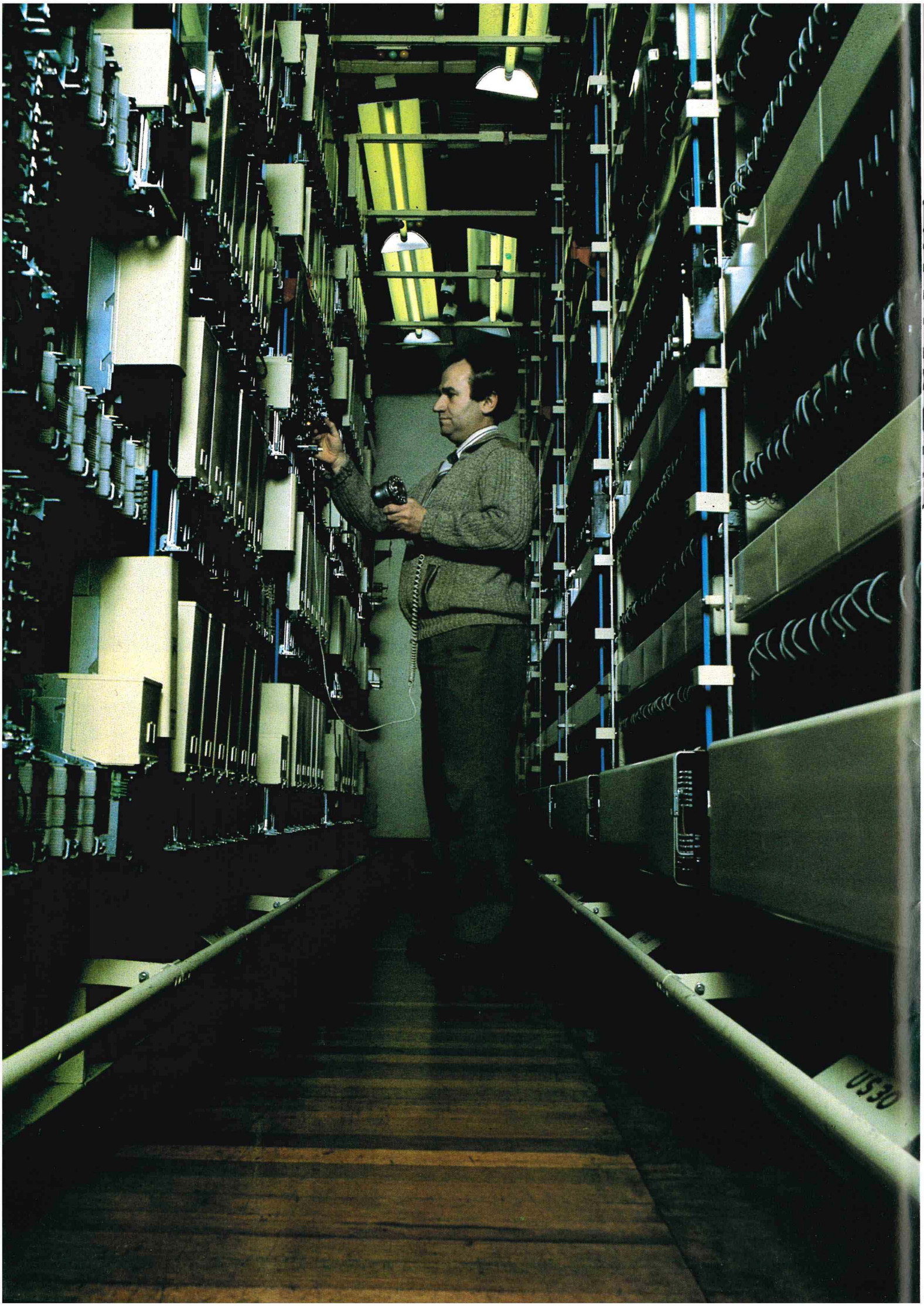
This adaptability together with our vast experience in telecommunications makes sure the LRS-100 won't become obsolete.

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.

nt northern telecom

THE LARGEST SUPPLIER OF FULLY DIGITAL TELECOMMUNICATIONS SYSTEMS IN THE WORLD.


US30

Answering your needs – the ELF terminal

Already in use within British Telecom, supporting the ANSWERS project, the ELF miniaturised visual display offers:

- compatibility with ANSWERS and SEQUIN projects and Newbury 8009 terminals
- reduced viewing fatigue from the extra large display, 40 characters wide, 12 lines deep
- 50 volt dc option, permitting operation from existing switchboard power supplies – reducing power cabling requirements and operator hazard
- compact numeric keypad, easily accommodated in CSS1 and COARD type switchboards
- choice of two QWERTY software-configured keyboards
- nationwide 8 hour response for on-site service and repair
- special BT prices

Drive data to your desk – economically

Liberate terminals and printers from the confines of the computer room

Access data from any on-site office

Reduce cabling costs by transporting up to seven channels of data over a single twin twisted pair cable with

- **Datatruck short haul multiplexers**

  4 & 7 channel asynchronous and 7 channel synchronous/asynchronous

For single channel high speed links

- **The DataExpress Line Driver**

  56/64bps full duplex synchronous link, with optional kilostream buffer and data rates to 125kbps

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for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

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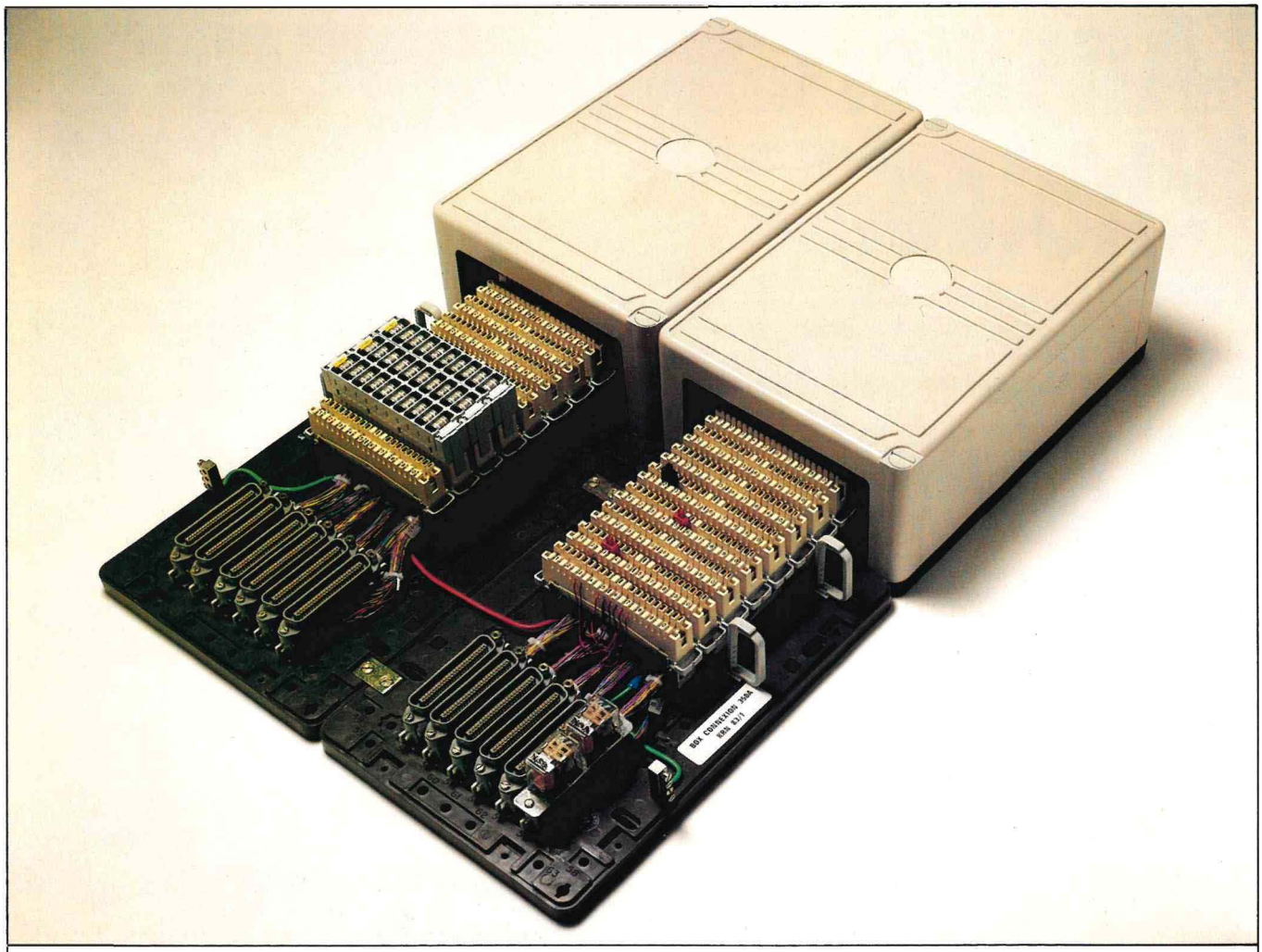
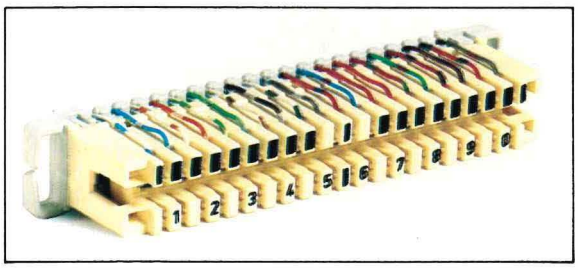
Kangley Bridge Road, London SE26 5AH
☐ Please send me your product catalogue
Name _____ BT6/K/16
Tel No _____
Address _____



THE MODULAR CONCEPT



KRONE-LSA-PLUS-Kontakte ®*

However good we believe our products to be, we are still firmly convinced that you, our customer, should have a say in the format our products take.

Modular Box Connexions Series 300 (a combination of four boxes shown above) are designed to accommodate the KRONE-LSA-PLUS modules — British Telecom code as Strips Connexion 237.

Strips Connexion 237 are simply and quickly installed and offer – because of their compact size – a flexibility and cost effectiveness that far surpasses conventional connection systems.

This second generation box, even more versatile than the very successful 100 series Box Connexions used by British Telecom is a further step into the 80's and the requirements of the telecommunications industry.

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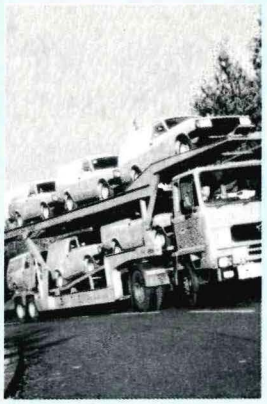
British Telecom Journal
Winter 1984/85 Volume 5 Number 4

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

In this issue



Cover: A new Foden transporter with some of the latest light vans to join British Telecom's fleet of vehicles and machines. The fleet is probably the largest and most diverse commercial fleet in the world, equipped for everything from the mundane to the most specialist task. See 'The driving force' on page 16.

British Telecom Journal costs 42p per issue for staff. External subscribers pay £15 for two years including post and packaging. Full details on page 47.

Record launch

Superlatives abound in any description of British Telecom's launch as a public limited company. The sale of 51 per cent of British Telecom's shares broke all records on the London Stock Exchange to become the biggest and most successful flotation of any company anywhere in the world and the 3,012,000,000 shares issued could have been sold four times over.

But the most remarkable aspect of the transfer of majority holding from the State to the private sector was the sheer volume of support from ordinary people who opened their chequebooks to buy a stake in British Telecom's future. More than two million people, many of them first-time shareholders, invested in the company to give British Telecommunications plc about six times as many shareholders as any other UK company.

Staff also backed their company in a big way and some 96 per cent of those eligible took up the Employee Share Offers. About 222,000 took advantage of the offer of 54 free shares but more significantly 183,800 people — 79 per cent of those eligible — invested some of their own cash under the terms of the matching offer which gave two free shares for each share bought up to a total of 77 purchased shares. An offer of a ten per cent discount for staff buying up to £2,000 worth of shares was taken up by 63,000 employees, or 26 per cent of the staff, and about 30,000 pensioners applied under their priority arrangements.

The institutions bought the majority of the shares issued and were allocated 47.4 per cent. But the general public took 34.3 per cent and employees and pensioners a sizeable4.6 per cent to give an unprecendented vote of confidence in British Telecom's activities from the widest cross-section of people ever to support a private sector enterprise.

In London, launch day had a carnival atmosphere and according to Stock Exchange chairman, Sir Nicholas Goodison, a 'touch of frivolity' is traditional when dealers welcome a new launching to the trading floor.

The share issue was strictly policed and, to ensure as broad a base of ownership as possible, shares were rationed and a special team of sorters weeded out the multiple application speculators. Allocations were scaled down in favour of the small investor and applicants for more than 100,000 shares received none at all.

The success of the launch followed a massive £7 million publicity campaign but as the initial 'share fever' subsided, British Telecom chairman Sir George Jefferson called for a redoubling of efforts to satisfy customer needs during 1985 when competition will extend to the first telephone on any line.

And the outlook for British Telecom as a plc looks bright with increased trading and business opportunities both at home and abroad.

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Winter 1984/85

KiloStream links up

Graham Briggs

International KiloStream, British Telecom International's new digital data transmission service is providing both cheaper and faster links for a growing number of business customers.

Two complementary services: a main earth station at Madley used for International KiloStream and a transportable SatStream earth station.

International private circuits for data have been available from British Telecom International (BTI) for a number of years via the major satellite earth stations at Madley in Herefordshire and Goonhilly in Cornwall, but the introduction of International KiloStream with bit rates of between 2.4 and 56 Kbit/s is a major step forward.

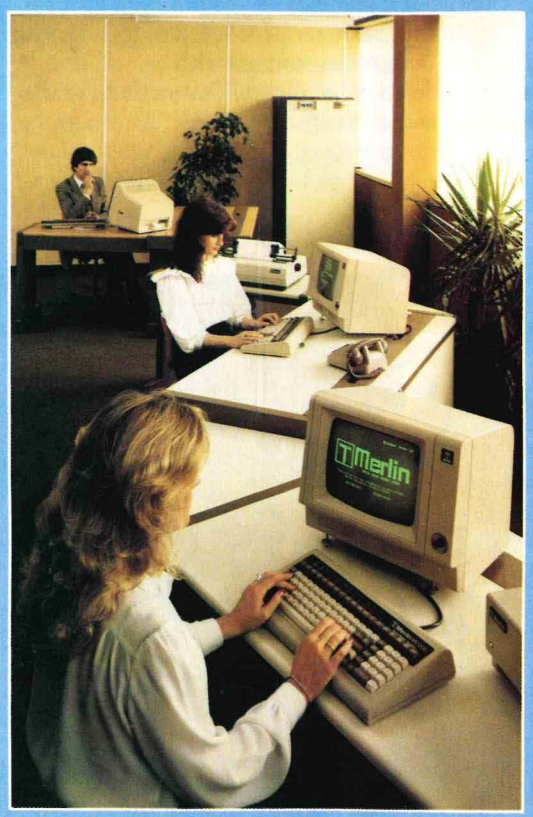
International KiloStream, which uses large dish aerials and undersea cables, offers links to a growing number of countries which already include the USA, Bahrain, Hong Kong, Singapore, and South Africa. This underlines the increasing importance of London as a centre of telecommunications beyond the traditional transatlantic areas. Europe should come on stream within two years, adding a fourth continent to International KiloStream's growing network.

The customer is provided with a Network Terminating Unit (NTU) as his interface to International KiloStream. From the NTU a four-wire circuit routes the signal to a KiloStream exchange and then over British Telecom's trunk digital network to the international gateway in London. There the circuit is multiplexed onto one of the high order digital line systems (120/140 Mbit/s) which run to Madley and Goonhilly earth stations, or possibly on to an international cable system.

The earth stations transmit signals to satellites over the Atlantic or Indian Oceans using single channel per carrier (SCPC) modulation which is widely used for other satellite services. This is a

major advantage because when a customer requests service to a 'new' country it can usually be provided quickly once agreement has been reached with the overseas administration.

International KiloStream provides full duplex synchronous data at user rates of 2.4, 4.8, 9.6 and 56 Kbit/s. Many applications at high speeds do not require full-time facilities. To meet and stimulate demand for part-time facilities, International KiloStream offers a time-assigned service at 56 Kbit/s to the USA. This is particularly attractive for uses such as slow-scan videoconferencing, remote printing, bulk data transfer, batch processing and so on.



For the time-assigned facility, a full-time local circuit from the UK site to the international gateway in London is required. At the gateway BTI's switching arrangements will ensure that customers only pay for the international part of the circuit when it is actually booked. Charges for time-assigned services are based on a sliding scale depending on use.

One of the main advantages of digital services is that they can be used for virtually any purpose and International KiloStream is no exception. The complex networks operated by many multinational companies need telecommunications that have the facility to handle almost any type of information – data, image or voice.

International KiloStream is ideal for use as a backbone for an international communications network. Whether a customer has a single workstation in the UK or a large communications centre at the hub of a global network, this service meets the need. By using sub-multiplexors, customers can maximise flexibility while keeping line costs down.

The use of low rate circuits is ideal for:

★ database interrogation and update;
★ remote job entry;
★ private messaging or packet switched networks;

Higher speed circuits can combine these applications with those which demand more capacity, such as interactive data transfer, file and database bulk transfer and mainframe load sharing. ▷

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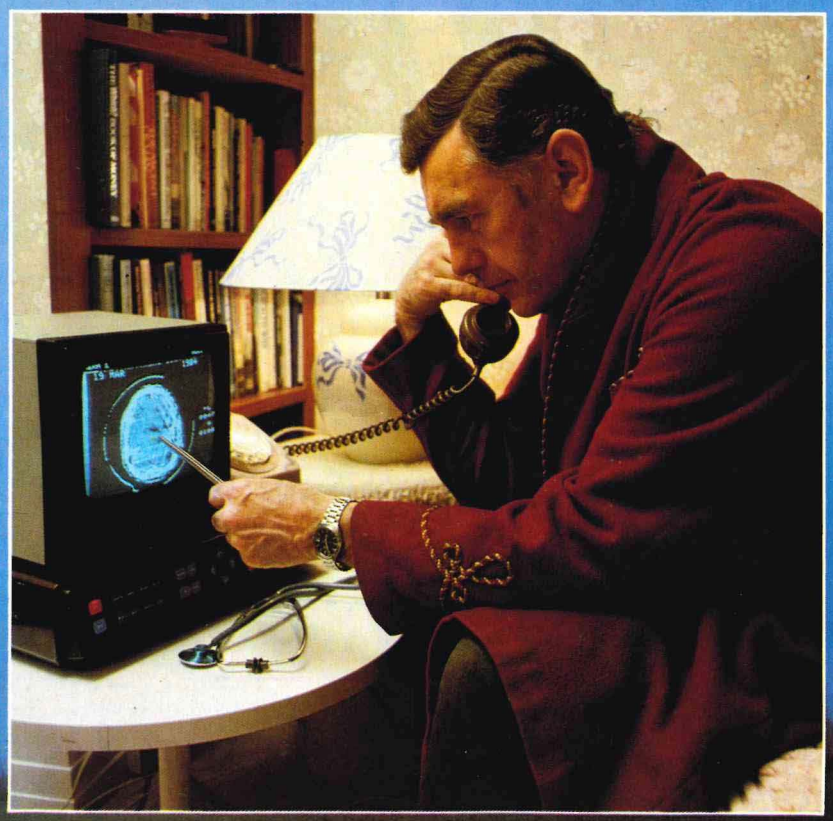
KiloStream links up



Applications of International KiloStream include (left) data transfer and (right) the transmission of slow-scan images which allows inspection of visual data.

Mr G R Briggs is a marketing executive in BTI responsible for International KiloStream and leased digital services.

The use of International KiloStream is not confined to 'data'. With the availability of high user rates, many other facilities can be supported. These include computer-aided design and manufacture, which cuts out the need for expensive stand-alone facilities at every location, remote printing, which enables newspapers and journals to be distributed more rapidly and reliably than by air freight, and slow-scan images for remote diagnosis or videoconferencing, which saves valuable staff time and energy.

International KiloStream is, in fact, part of a growing family of international digital services. The first member of the family, SatStream (BTI's small dish and specialised satellite service), opened to Canada early last year and will shortly be extended both to the USA and Europe.

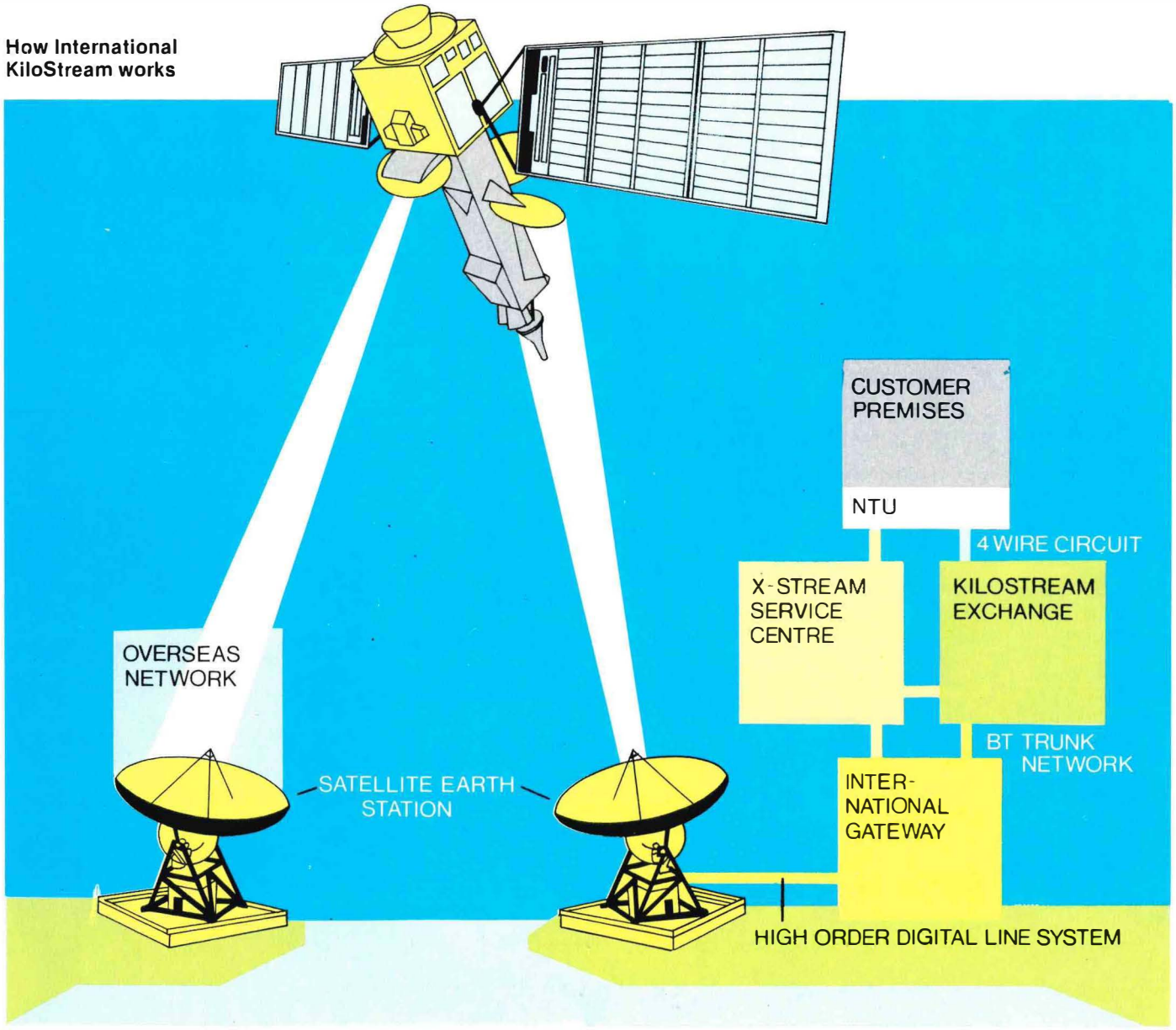
Both systems have been specifically designed to complement each other. Between them they offer a wide range of overseas destinations and facilities of unusual scope. In addition, customers concerned about having 'all their eggs in one basket' can use a combination of both services to provide different levels of diversity, giving a system of extremely high reliability from one supplier.

Technology is, of course, ever changing, and International KiloStream is no exception. One new development will be the introduction of a time division multiple access (TDMA) system on satellites this year. This will increase the performance of the service by using satellite capacity specifically designed for digital services, which cuts out the need for much of the interface equipment between the UK digital network and the satellite system.

Of equal significance will be the use of submarine optical fibres across the Atlantic and the English Channel within the next four years. This will eliminate satellite propagation delay, increasing the opportunities for large private networks and new applications.

International KiloStream offers multinational businesses a high quality, cost-effective service. It can support virtually any application and together with its sister product, SatStream, provides business customers with an unparalleled combination of destinations, facilities and diversity. Ⓣ

How International KiloStream works



Still making fair comparisons

This the 20th and final article in our series on the world's telecommunications administrations looks at some of the changes which have taken place during the past five years both within the countries surveyed and in the factors which have to be taken into consideration when making international comparisons.

Five years ago British Telecom Journal began its 'World of Telecommunications' series with an article explaining why British Telecom needed to be fully aware of developments in the rest of the world and the need for care in producing fair comparisons.

Today the reasons for undertaking international comparisons remain much the same. They are to:

- examine the performance of other telecommunications administrations operating under similar conditions so that British Telecom management can make judgements on whether the business is making the best use of its resources;
- provide a yardstick to assess whether British Telecom customers are getting as good value as they are entitled to expect;
- learn from the experience of other countries using different methods and practices about the likely effects of taking similar approaches in British Telecom;
- enable the business to provide informed responses to questions raised by British Telecom management, its customers, and outside organisations about telecommunications facilities, tariffs and performance in other countries.

To achieve as many of these aims as possible, British Telecom's international comparisons group is charged with collecting up-to-date information on other countries' organisation, system size and usage, quality of service, charges, manpower and finances, as well as details of facilities and services available.

Organisation

One of the areas of greatest change is the organisational structure of telecommunications administrations. In the UK, following the separation in 1981 of the postal and telecommunications businesses of the Post Office, British Telecom has itself changed from a state-owned telecommunications administration with a near monopoly, to become a public limited company last year, competing in many areas of telecommunications.

In the United States there have been major changes too – AT&T has been required to divest itself of its 22 Bell telephone local operating companies, and over the past 12 months these have been re-organised to form seven independent regional companies. AT&T continues to be the major long distance carrier, and competes with other telecommunications common carriers in this area of its activities. ▷

Table 1 - International comparisons of system size, density and penetration

Country	Area (sq.kms)	Population (millions)			System size (connections) millions			Density (connections per sq.km)			Penetration Connections per 100 population)		
		1978	1982	% growth	1978	1982	% growth	1978	1982	% growth	1978	1982	% growth
Australia	7,680,000	14.2	15.4	8.5	4.2	5.6	33	0.5	0.7	33	29.2	36.4	25
Austria	84,000	7.5	7.6	1.3	1.9	2.4	26	22.4	29.1	26	25.1	32.3	29
Belgium	31,000	9.8	9.9	1.0	2.2	2.8	27	70.3	90.3	27	22.1	27.9	26
Canada	9,220,000	23.6	24.6	4.2	9.3	10.3	11	1.0	1.1	11	39.3	42.0	7
Denmark	43,000	5.1	5.1	0.0	2.1	2.4	14	47.8	55.7	14	40.2	47.1	17
Finland	337,000	4.8	4.8	0.0	1.6	1.9	19	4.6	5.6	19	32.8	39.6	21
France	544,000	53.4	54.3	1.7	11.9	19.3	62	21.9	35.5	62	22.4	35.6	59
FR Germany	249,000	61.3	61.6	0.0	17.3	23.0	33	69.5	92.5	33	28.2	37.3	32
Hong Kong	1,000	4.7	5.3	12.8	1.1	1.5	36	1,082.0	1,420.0	36	22.9	27.9	22
Italy	301,000	56.8	56.8	0.0	11.5	14.7	28	38.1	48.8	28	20.2	25.9	28
Japan	378,000	114.6	118.6	3.5	35.8	42.0	17	94.8	111.2	17	31.3	35.4	13
Netherlands	34,000	14.0	14.3	2.1	4.3	5.3	23	125.9	156.5	23	30.6	36.9	21
New Zealand	269,000	3.1	3.2	3.2	1.1	1.2	9	3.9	4.5	9	33.5	37.1	11
Norway	324,000	4.1	4.1	0.0	1.0	1.4	40	3.2	4.4	40	25.3	34.5	36
Portugal	92,000	9.8	10.1	3.1	0.9	1.1	22	9.8	12.0	22	9.2	10.9	18
Spain	505,000	36.8	38.0	3.3	6.2	8.0	29	12.2	15.9	29	16.8	21.1	26
Sweden	412,000	8.3	8.3	0.0	4.6	5.0	9	11.1	12.2	9	55.1	60.2	9
Switzerland	41,000	6.3	6.5	3.2	2.7	3.0	11	65.5	72.9	11	42.4	46.5	10
United Kingdom	244,000	55.8	56.3	0.9	15.2	19.4	28	62.2	79.6	28	27.2	34.5	27
United States	9,360,000	223.9	232.0	3.6	88.4	95.0	7	9.4	10.2	7	39.5	41.0	4
USSR	22,402,000	262.4	271.2	3.4	17.5	24.5	40	0.8	1.1	40	6.7	9.0	34

Note: All figures are approximate and as at end of financial year. (31 March for Japan, New Zealand and the UK; 30 June for Australia and Sweden; 31 December for all other countries.)

There have been many significant developments throughout British Telecom during the past five years including:

Top left: optical fibre advances.

Centre left: City Business System.

Bottom left: in-house production of the Slimtel phone.

Top right: BTI's dockland earth station at Woolwich.

Centre right: System X exchanges.

Bottom right: a whole range of new telephones.

Other countries including Japan are also in the process of making changes to their organisation.

System size and penetration

In the past, the number of telephones has been used as the main indicator of system size, but as more telecommunications administrations lose their monopoly for providing telephones connected to their network, this data is becoming more difficult, if not impossible, to determine accurately. Information on the number of telephones will therefore become increasingly less reliable, and the number of exchange lines served by the overall telephone system is now regarded as the most suitable, and readily available, measure of system size.

The six countries currently with the largest numbers of connections in the world are USA, Japan, USSR, FR Germany, France and the UK. At some stage in the future, countries such as China, India and Brazil, are also likely to number among those with large telephone systems because of the vast potential for growth in these heavily populated countries.

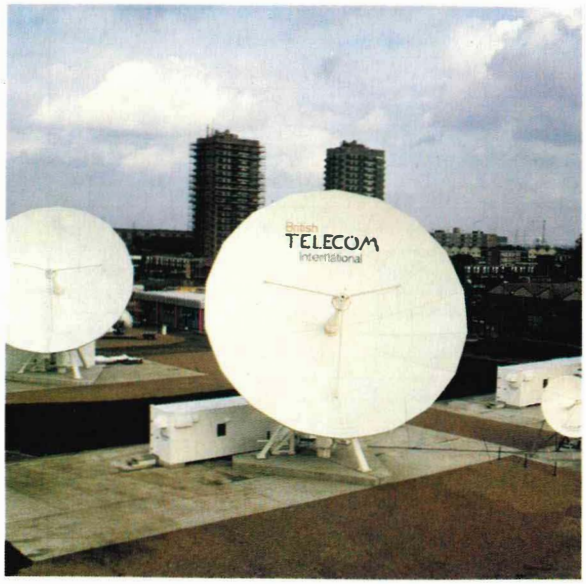
By taking account of a country's population and geographical size, as well as its system size, information on telephone density and penetration can be derived. These are more useful measures of the stage of telecommunications development reached, and can be indicators of those areas of the world which would be likely markets for exchange equipment and the telecommunications expertise available in the larger administrations. For British Telecom, these services are provided by British Telecom International's Telconsult Executive, incorporating Teletrade which supplies new or refurbished surplus equipment to overseas administrations.

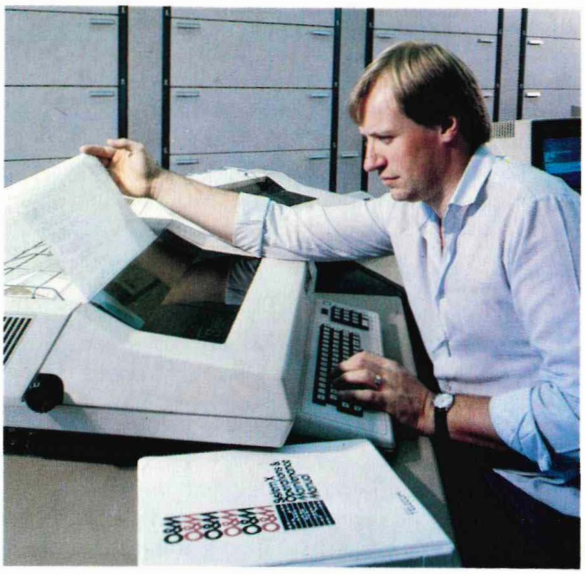
Although details of organisational structure and system size are readily made available by overseas telecommunications administrations, some of the information provided is regarded as confidential and is supplied for other administrations' internal use only. Included in this category is information on quality of service and productivity. For these items, no comparative data is provided here, but mention is made of the factors which need to be borne in mind when international comparisons of these areas of performance are attempted.

Quality of telephone service

The incidence of telephone faults provides one measure of the quality of service. Differences exist between administrations in the content of fault report statistics, in that some count initial fault reports only, while others include second and subsequent reportings: some exclude PBX faults while others exclude those on coinboxes. Similarly, a cable failure may be counted as a fault for every customer reporting difficulty, or as only one fault irrespective of the numbers of customers affected.

Bi-lateral comparisons of quality of service results therefore need careful interpretation. The expertise available within the international





comparisons group ensures that, as far as practicable, any differences in definitions or measurement methods are taken into account. By bringing to notice areas in which the quality of service performance achieved by another telecommunications administration appears good, international comparisons can suggest those aspects which may justify closer examination to see if benefit might be derived from the adoption of similar working practices.

Productivity

Simplistic comparisons of manpower productivity, such as 'connections per employee', can be misleading. As well as differences in organisational structure, which in the case of joint ministries for posts and telecommunications can mean that a separate telecommunications staff figure is not available, differences occur in the range of facilities and services provided by other administrations, and in the range of work undertaken.

Few countries, for example, provide as comprehensive an operator service as the UK, and in countries where duct and cable installation work, or telephone wiring within a customer's premises is undertaken by private contractors, these differences can substantially affect manpower requirements, with the result that productivity, as expressed in terms of connections per employee, will appear high.

Geographical and climatic conditions, population density, modern and more reliable switching equipment, line plant, and subscribers' telephone apparatus, all influence the number of staff required, as does the number of hours worked.

Where detailed information can be obtained from the countries being compared, the international comparisons group makes allowances for these factors, for example, by adjusting staff numbers to include only those staff employed on the same work areas.

Price comparisons

Information on prices is the most frequently sought as well as the most contentious area of international comparison. To base price comparisons on individual telecommunications services, or on selected components, provides only a part of the picture.

In such comparisons no account is taken of factors such as cross-subsidisation between services (most administrations use the profits made from their trunk and international services to offset prices of other services such as local calls). Financial constraints imposed by external considerations outside the administration's direct control are another factor and a typical example is the requirement for British Telecom to limit the overall percentage change in the prices charged for a 'basket' of services to a level of three percentage points below the increase in the Retail Price Index. Included in this basket are trunk and local call charges and exchange line rentals for business and residential customers. ▷

In this series of articles on telecommunications overseas, the countries covered represent about 88 per cent of the total telephones in the world. It has been possible to give only a brief glimpse of the overall situation but the international comparisons group maintains a database which holds a considerable amount of information on other telecommunications administrations organisations, areas of monopoly, facilities and services provided. The group would be pleased to hear from people with experience of other countries' operations, and any reports of visits abroad would be a welcome addition to its database. Information may be forwarded to LCS/OPS 1.2.3. International Comparisons Group, 5th Floor, Block A, British Telecom Centre, 81 Newgate Street, London EC1A 7AJ (Tel: 01-356 6868).

Table 2 - International comparisons of prices - business

Country	Typical bill		Connection fee		Acutal rental		Call bill	
	Mar 1980	Dec 1984	Mar 1980	Dec 1984	Mar 1980	Dec 1984	Mar 1980	Dec 1984
Hong Kong	34	35	49	63	114	84	0*	0*
Denmark	46	38	116	83	72	48	31	29
Sweden	49	49	69	67	67	47	40	49
Finland	74	53	174	104	67	33	72	63
Spain	72	54	124	49	76	45	68	60
Switzerland	87	64	54	41	101	59	83	69
Netherlands	83	67	83	67	133	73	63	62
Belgium	89	68	116	76	101	67	82	68
Portugal	81	74	60	56	88	54	79	88
USA**	n/a	93	n/a	135	n/a	113	n/a	77
UK	100	100	100	100	100	100	100	100
Norway	118	101	113	134	117	71	118	119
Austria	n/a	102	n/a	33	n/a	76	n/a	124
FR Germany	141	103	81	20	160	89	136	117
Japan	98	106	264	305	125	107	78	93
Italy	133	119	227	116	141	86	125	142
France	146	121	91	26	126	53	158	174

(All figures indexed against the UK as 100)
* Free inland calls in Hong Kong
**New York and AT&T charges

The authors – **Messrs P H Dabbs** and **F X Cassidy, Mrs S Rudman** and **Miss L Cunliffe** – are members of the international comparisons group in the operations, performance and systems department of Local Communications Services.

Ideally, price comparisons should take account of the whole tariff structure, but to do so for all countries would be a daunting, if not impossible, task. Each telecommunications administration, telephone operating company, consultancy firm, or newspaper therefore tends to restrict its comparisons to a few selected items. As each selects different items and uses alternative methods of comparison, not surprisingly the results obtained also differ.

The method used by British Telecom's international comparisons group which corresponds closely to the real situation for many of British Telecom's customers, compares typical bills – bills which would be incurred by a typical customer if his or her telephone use were priced at the charges applicable in the foreign country.

Included in the typical bill comparisons are elements of connection fee, rental, and call charges. These elements are priced according to the tariffs applicable in the countries being compared, and the resultant total bills are converted to sterling using indices which reflect the relative purchasing power, in their own countries, of the currency concerned.

Looking at the international comparisons of prices for 1980 and 1984 (see Tables 2 and 3), the prices charged to UK customers, as measured by typical bill comparisons, indicate that British Telecom's overall position has moved slightly but its prices remain cheaper than those charged by other administrations in countries such as Italy, Japan, FR Germany and France.

Finance

In making international financial comparisons, information extracted from the published annual reports and accounts of other administrations is selected to allow, as far as possible, for any differences in accounting principles.

Comparisons of total income are relatively straightforward, but items included under expenditure can vary considerably. Financial performance can also depend on the objectives of the administration and on Government policies, and this, of course, affects any attempts to compare profits.

On the information available, however, British Telecom's performance in terms of return on total assets, and self-financing ratio, is among the best in the world.

Table 3 - International comparisons of prices - residential

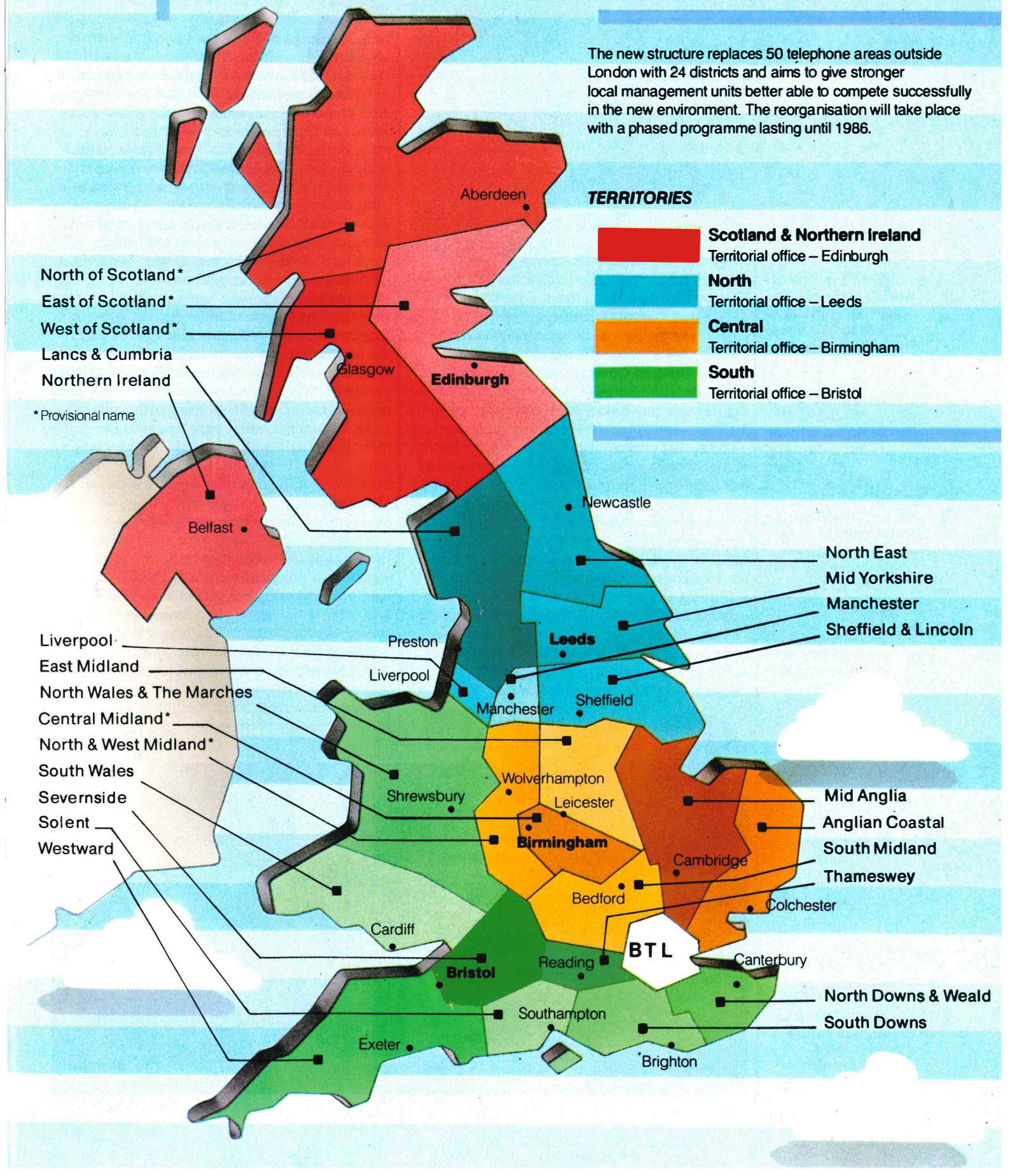
Country	Typical bill		Connection fee		Annual rental		Call bill	
	Mar 1980	Dec 1984	Mar 1980	Dec 1984	Mar 1980	Dec 1984	Mar 1980	Dec 1984
Hong Kong	38	38	49	72	90	87	0*	0*
Denmark	64	53	116	94	86	75	43	34
Sweden	77	66	69	76	80	61	75	69
Spain	63	71	124	56	52	70	65	73
Finland	111	71	174	118	79	51	128	82
Switzerland	127	90	54	46	119	91	140	93
Netherlands	114	91	83	76	158	114	85	75
Belgium	115	92	116	86	120	104	112	83
UK	100	100	100	100	100	100	100	100
Portugal	117	110	60	63	104	84	131	131
USA**	n/a	112	n/a	87	n/a	142	n/a	93
Italy	137	129	189	132	69	58	181	180
FR Germany	176	133	81	23	189	139	176	138
Japan	125	139	264	346	102	114	128	137
Norway	191	151	113	152	139	111	236	179
Austria	n/a	152	n/a	37	n/a	117	n/a	186
France	186	178	91	29	149	83	222	259

(All figures indexed against the UK as 100)
* Free inland calls in Hong Kong
** New York and AT&T charges

SHAPING UP FOR THE FUTURE

Map showing new Local Communications Services Territorial and District boundaries together with new names at the beginning of 1985.

The new structure replaces 50 telephone areas outside London with 24 districts and aims to give stronger local management units better able to compete successfully in the new environment. The reorganisation will take place with a phased programme lasting until 1986.



British Telecom Journal
Winter 1984/85

Spires scales new heights

John Cunnington and Phil Stoney

Spires Exchange in Coventry is pioneering a new installation which paves the way for better use of System X with streamlined digital links.

Coventry Spires Digital Main Switching Unit – which spearheaded System X development – recently celebrated its first birthday. One of the reasons it was chosen as the pioneer site is that the main contractor, GEC Telecommunications, has its offices and factory on the outskirts of the city. GEC was the prime developer of the new generation processor for the system with Plessey supplying the switching part of the exchange.

The initial installation handles STD and ISD calls from two local crossbar exchanges within the Coventry-linked numbering scheme of Bedworth and Exhall. These calls are routed through the digital switch which has direct routes to Birmingham Transit, London Mondial, Thames, Northampton and the adjacent Strowger switching unit of Coventry Leofric. Wolston local System X exchange, situated between Coventry and Rugby, will also be connected to Spires by a common channel digital signalling link called the Message Transmission Subsystem (MTS [G]).

The exchange is equipped with a single cluster of four central processing units which control all call activities. The digital switching subsystem comprises six time-switches and associated space switches and is equipped with 184 digital line terminations. The other main method of access to the network is through the system interworking subsystem which provides the facility for the exchange to work alongside the existing network using all types of signalling.

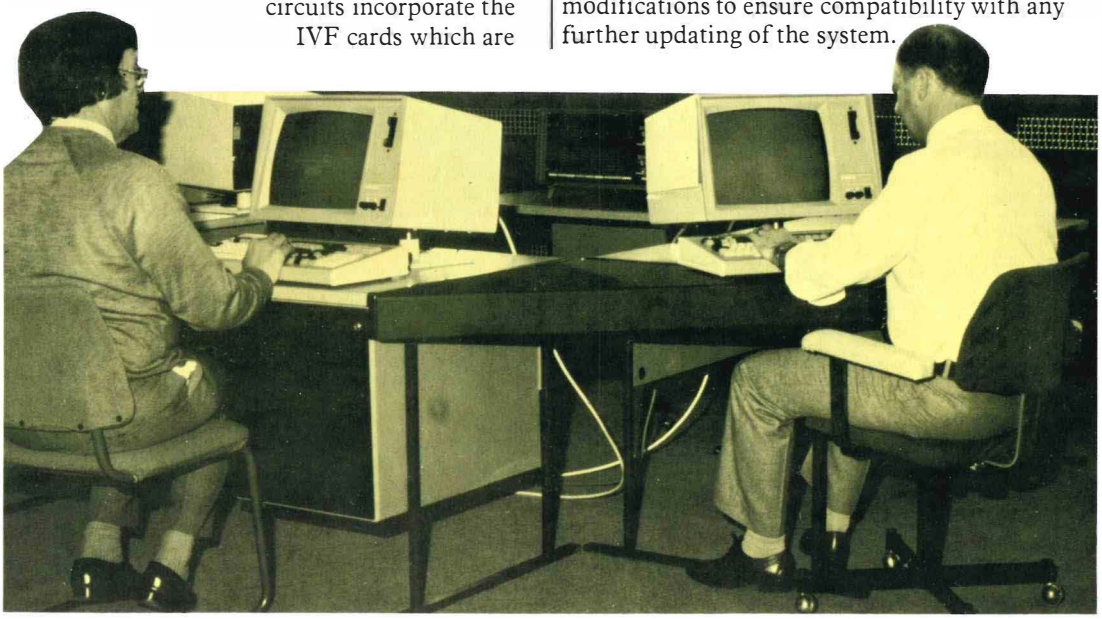
Most circuits in Spires are digital with pulse code modulation (PCM) but those terminating on the transit network use analogue circuits with frequency division multiplex facilities. These circuits incorporate the IVF cards which are accommodated in System X practice slide-in-units, while the MF2 signalling is generated by special circuits within the exchange hardware.

Other DMSUs, when brought into service, will have direct common channel signalling routes with Spires enabling them to 'talk' to each other about call details and supervisory facilities through the MTS(G). The speech paths will use channels in the PCM system while MTS messages will use a common signalling channel.

Equipment was initially installed on 30 racks with spare slide-in-units fitted into three unequipped racks. The job was tackled in a modular-construction format. The process began with the erection of racks followed by the overhead ironwork using 'unistrut' delivered to site in pre-cut lengths. Cables were in measured lengths to site requirements and together with the power supply were fed to the racks on a system of cable trays. Shelves, called wired shelf groups (WSGs), arrived on site pre-wired by the manufacturer. Once fitted into position on their racks, equipment cables were then plugged directly on to the pins at the back of the shelf unit.

Processor

Commissioning at Spires began at subsystem level in January 1983 and a simulator connecting the highways was used to provide and receive signals to prove paths across the digital switch. The processor was delivered in late February and, after initial testing, system commissioning started but the program took longer than normal because Spires was a 'pilot' site with exchange software under continuous development. It was also necessary to implement hardware modifications to ensure compatibility with any further updating of the system.



Two of the consoles in the operations and maintenance centre are used to gain access to Spires software.

As the software was updated, the performance of the system improved and additional facilities were made available. Dummy telephone data was used to allow the sending of test calls through the exchange. Once the 'in service' telephone data which contained all the information for routing and charging was loaded on to the exchange, the final commissioning stages began. At the same time, all data was verified to comply with the latest specifications at British Telecom Research Laboratories, Martlesham.

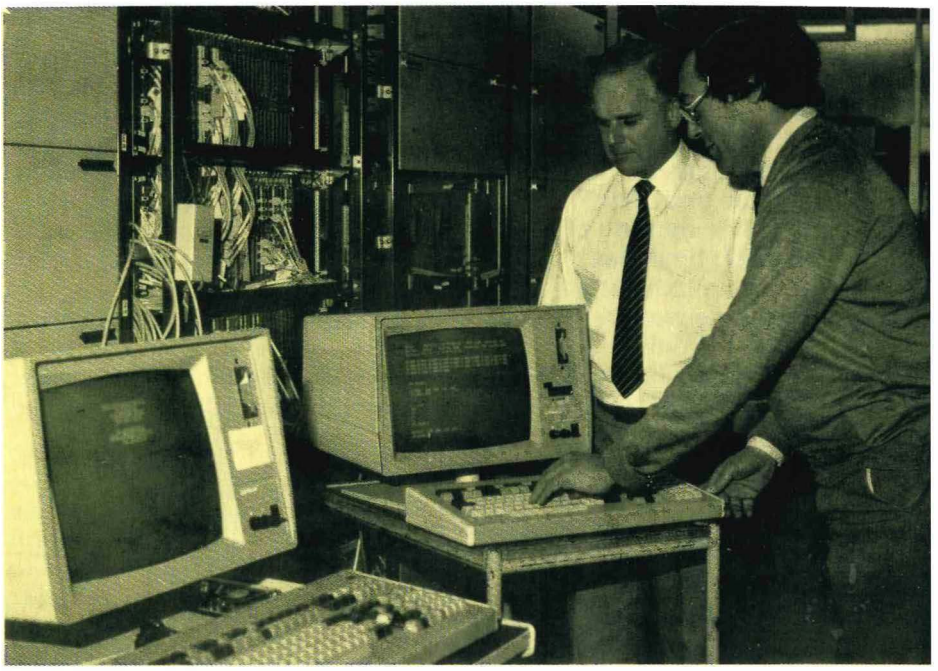
After commissioning, implementation of the pre-transfer testing of all junctions and codes through joint engineering traffic test was carried out. An operations and maintenance manual was validated on site by British Telecom maintenance staff. This contains all the information necessary to maintain the System X trunk exchange.

During commissioning, parallel activities were being carried out by Coventry Area staff to provide all the necessary PCM and junction equipment to connect Spires into the existing network. A local committee was formed to co-ordinate all aspects of internal work including circuit and data provision. The committee maintained close liaison with regional and telephone headquarters staff to ensure smooth progress.

A local control point, housed in a large room adjacent to the equipment area, contains peripheral equipment including the visual display terminals which allow remote interrogation of the system and updates of data to be inserted. A hard copy printer gives unsolicited reports on equipment and circuit faults and a second printer supplies information on the output of the management statistics subsystem. Most of this equipment is to be re-located in the near future into a new operations and maintenance unit.

Coventry Area maintenance staff quickly gained valuable experience when working on the new exchange. In July last year, Spires was taken out of service to enable a planned upgrade to be carried out, taking the exchange up to formal trunk build level under the System X development programme. Initially, Spires operated at an interim build level in order to gain early in-service experience. Upgrading work involved re-routing STD and ISD traffic from Bedworth and Exhall over the existing analogue network by using a 'fallback' arrangement.

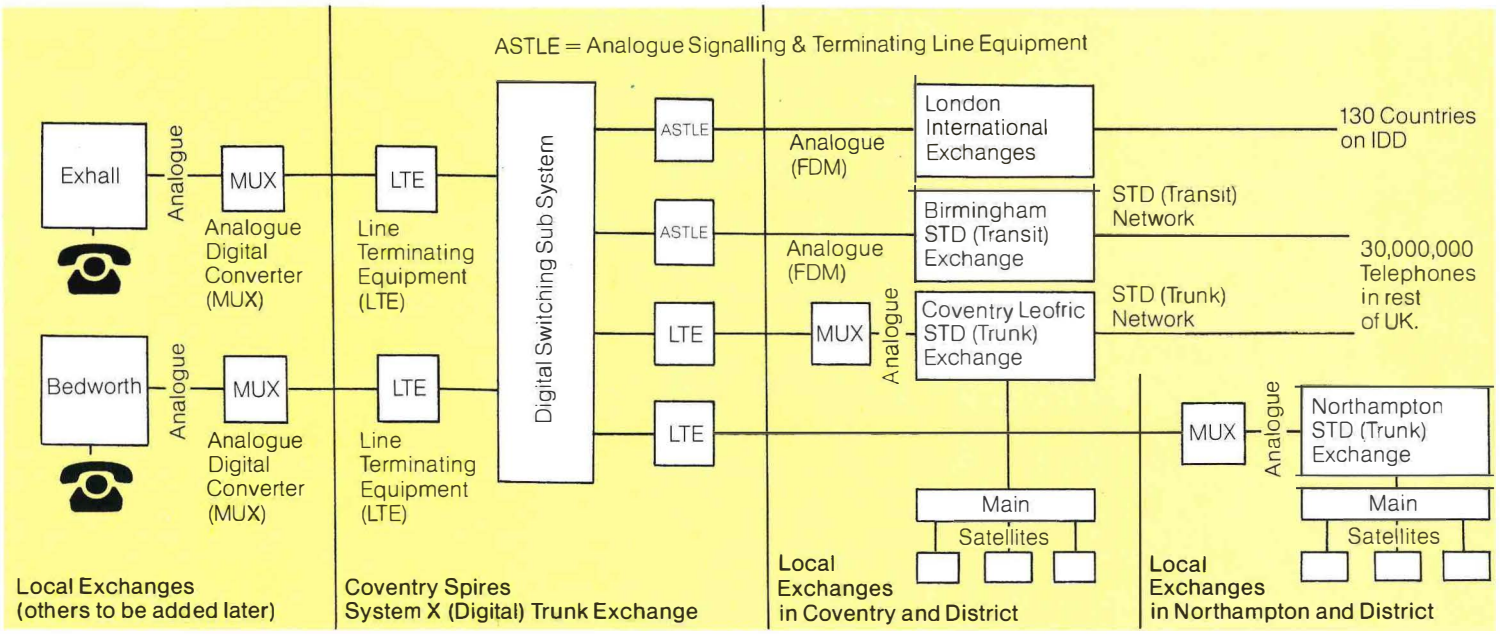
After modifications and digital network trials, Spires will link with other digital exchanges including Baynard House in London, Leeds, Wolston and Martlesham. Further equipment extensions will enlarge the traffic-carrying capacity and this will enable Spires to handle all level 'O' traffic in Coventry Telephone Area. Digital principal local exchanges are to be installed with circuits to the DMSU which will allow all subscribers on TXD local and remote (digital) control units to have access to the trunk and international network. Ⓣ



Co-author Phil Stoney operates a keyboard to manipulate the resources of the exchange.

Mr J Cunnington is now exchange maintenance and internal works manager at Northampton but formerly had overall responsibility for the co-ordination of the Spires project. **Mr P Stoney** is clerk of works on site.

How Coventry Spires exchange fits into the existing network.



A matter of fax

Malcolm Acres

Facsimile is the oldest form of electronic mail but only recently has the service emerged as a reliable and cost effective method of sending business communications arond the world using the public switched telephone network (PSTN).

Facsimile transmission, or 'fax' as it is popularly known, was first invented in 1842 by Alexander Bain, and by the 1920s pictures for publication in newspapers were being transmitted around the world. Interest in using facsimile continued and included such applications as the transmission of weather maps, engineering drawings and fingerprints.

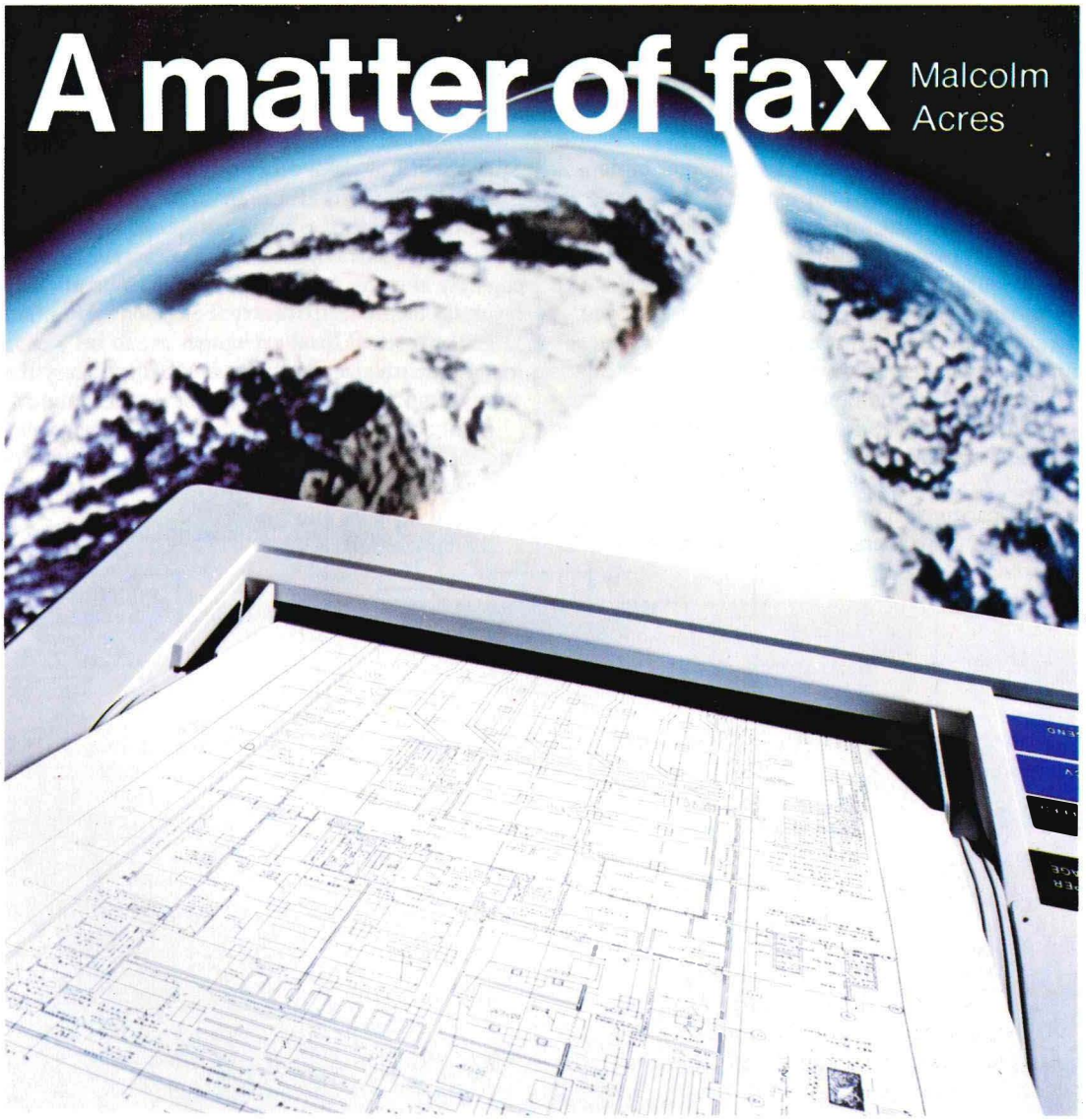
It was not until the early 1960s, however, that growth in the market for transmitting documents by telephone was stimulated by the declining postal service in the United States and in Japan by the pictorial nature of their alphabet.

Europe lagged behind the USA and Japan but early growth followed agreed standards on machine design by the International Telegraph and Telephone Consultative Committee (CCITT). The introduction of the Group 1 standard in 1968 was a significant step in the development of facsimile, despite slow and unreliable terminals and a lack of full compatibility. It took six minutes to transmit an A4 page, but the machine stimulated interest in the concept of sending text and graphic material by telephone around the world, instead of heavy reliance on the postal service.

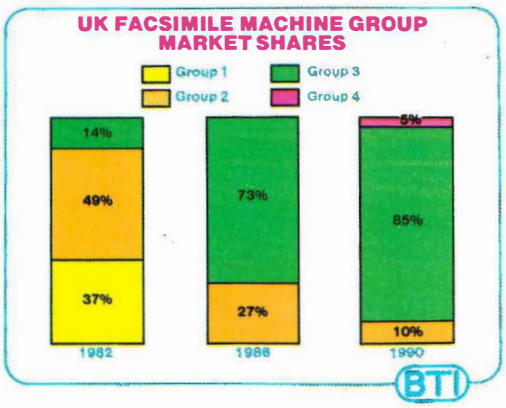
A Group 2 standard was agreed in 1976, which halved the time of transmission to three minutes and improved quality with a scanning density of 100 lines per inch. But the density remained unsatisfactory for sending documents containing small print and the time for transmission still meant that a ten page document took half an hour to receive.

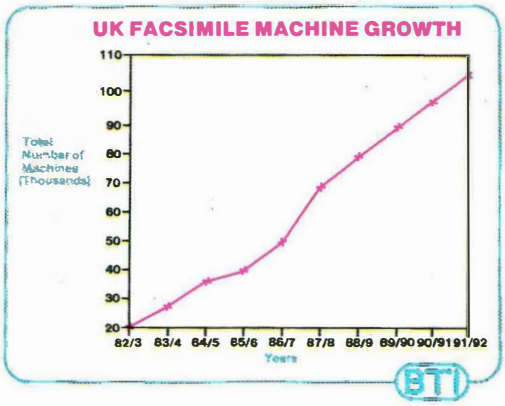
Today's most popular CCITT standard was agreed in 1980 for Group 3 machines, which use digital transmission techniques and take less than one minute per page. They are fast, reliable and capable of producing copies of high quality, with an improved scanning resolution of 200 lines per inch. The machines are all compatible and can communicate with each other as well as with most Group 2 machines, regardless of the supplier.

These machines have heralded a sudden and dramatic customer interest and demand in facsimile. Many of the problems of poor resolution, low speed and incompatibility which held up the development of a mass facsimile business market have been removed. At the end of 1981, there were about 15,000 terminals in use and growth in machine sales is currently running at up to 30 per cent a year. The number of Group 3 machines is expected to double in the next year or so to nearly 20,000 terminals, out of a total of 35,000 machines in the UK.



This dramatic illustration highlights the speed of international facsimile.





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Winter 1984/85
A matter of fax

During this period the UK facsimile terminals market is expected to be worth up to £30 million to equipment suppliers. The new machines have given a significant boost to international direct dialled (IDD) facsimile traffic, which increased by 30 per cent in 1983/84 and currently represents about three per cent of outgoing UK IDD telephone traffic.

Speed, accuracy, ease of use and the fact that the original format of the documents is retained are the main advantages of facsimile over teleprinters, viewdata screens or computer files. Text drawings, maps and photographs can be relayed around the world together with authorising signatures and company logos for complete authenticity. Terminals can be located in almost any environment, provided there is access to a power supply and a telephone line and any document sent does not have to be specially compiled or relayed through a keyboard.

Applications

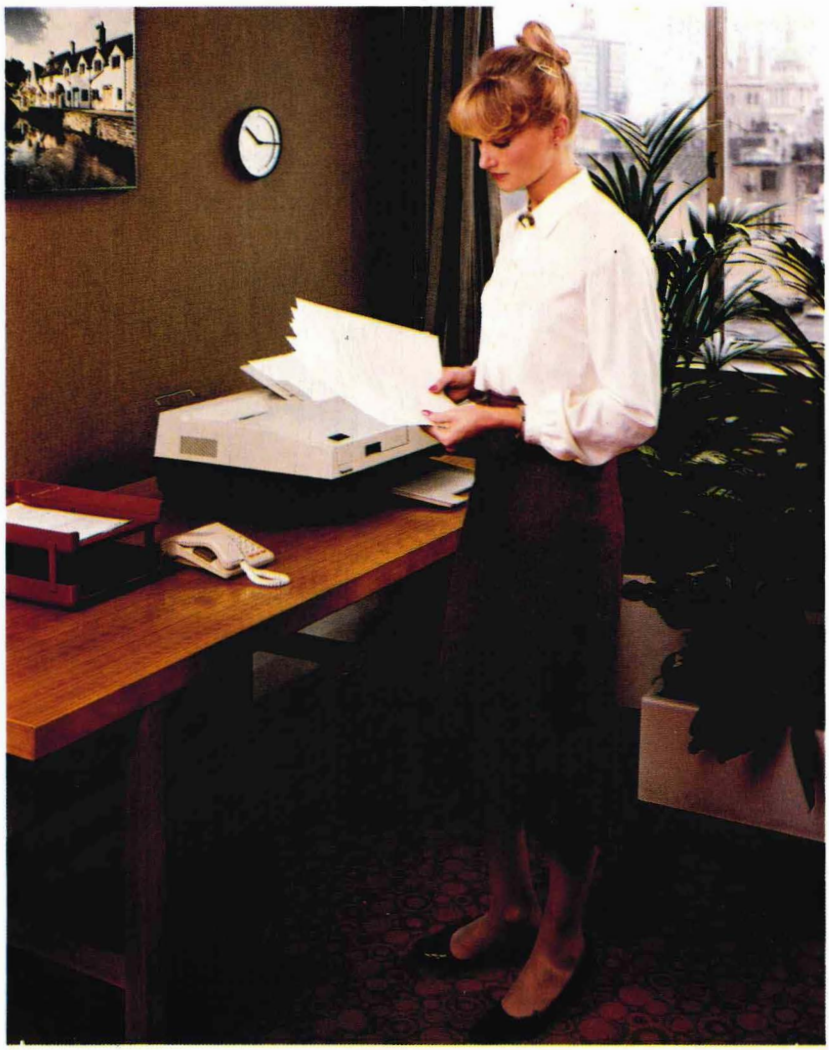
Most customers already operate a telex terminal and there is unlikely to be any substitution but Group 3 machines are a cost effective method of sending business communications for an increasing number of applications.

International standards have created the foundation for worldwide terminal compatibility and facsimile development, upon which telecommunications administrations and equipment suppliers can build. A number of European administrations have formed facsimile industry consultative committees with approved equipment suppliers and representatives from 25 countries recently attended a seminar on data communications and new telematic services in Tunis.

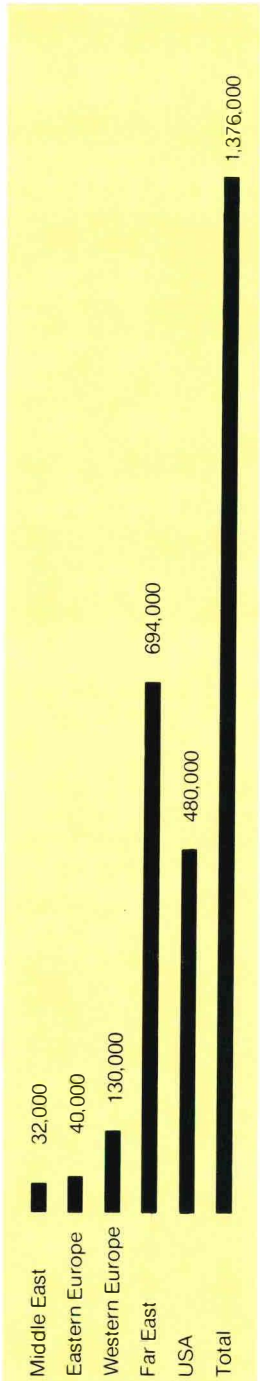
In the UK, the British Facsimile Industry Consultative Committee (BFICC) has been established to maintain and agree technical standards and to promote and market the benefits of facsimile. UK members include 14 equipment suppliers and British Telecom International (BTI) and the National Networks Strategy Unit.

A joint direct mail campaign to 70,000 businesses in the UK was conducted last summer and proved successful in increasing customer awareness and generating new machine sales. BTI provided further information on the use of international facsimile to more than 90 countries while suppliers followed up leads for potential machine placements. Future BTI marketing ventures are being considered with British Telecom districts who hold a franchise to supply machines direct to customers.

Machine compatibility and the availability of facsimile directories for a number of countries has provided the opportunity for businesses to extend their existing usage to international and inter-company communications. A joint advertising campaign is currently being conducted with AT&T Communications to promote the availability of the UK Facsimile Directory in the USA and similar ventures are planned with other overseas administrations. British Telecom has already published two ▷



A secretary prepares to fax a document from her office in the City of London to an overseas destination.



Global facsimile terminal population 1984

editions of a directory of UK fascimile users and a third edition is to be published this year.

In the longer term, plans are being formulated to build a database system of facsimile telephone numbers to offer a directory enquiry operator assistance and customer on-line access for number retrieval. Overseas facsimile directories will continue to be advertised in the UK to encourage machine owners to make greater use of this method to communicate with the rest of the world.

Bureaufax is a service which will accept documents for transmission or delivery using facsimile for at least part of the process from originator to recipient. BTI has 17 Bureaufax acceptance centres throughout the country and their London office is equipped with a range of fax machines to ensure any compatibility problems are overcome. The service is used frequently by both small and large companies but customers are generally advised to consider machine ownership once their Bureaufax traffic reaches around 45 A4 pages per month or less if many intercontinental destinations are involved.

Group 3 machines can receive documents automatically when unattended and can also function as low volume photocopiers. They are equipped with self diagnostics, paper-size reduction facilities, built-in telephone number storage, and multi-address facilities which allow the same message to be sent automatically to a number of different destinations. Other features include 'polling' which allows a central terminal to dial up consecutively and automatically and receive documents from remote machines. As a management system, terminals can also record all transactions and provide a status printout to assist the control of operations.

With 14 authorised facsimile suppliers a very competitive market exists and more than 50 approved models of terminals are available from the basic to sophisticated and from portable to heavy duty. Generally prices have fallen since the introduction of Group 3 machines and currently range from £2,500 to £5,000.

The overall level of international facsimile traffic is assumed to be entering a high gowth period. Group 3 terminal sophistication and machine compatibility are driving forces which lead the industry to predict that facsimile will grow to the same scale as the telex service within the next ten years.

Fully digital

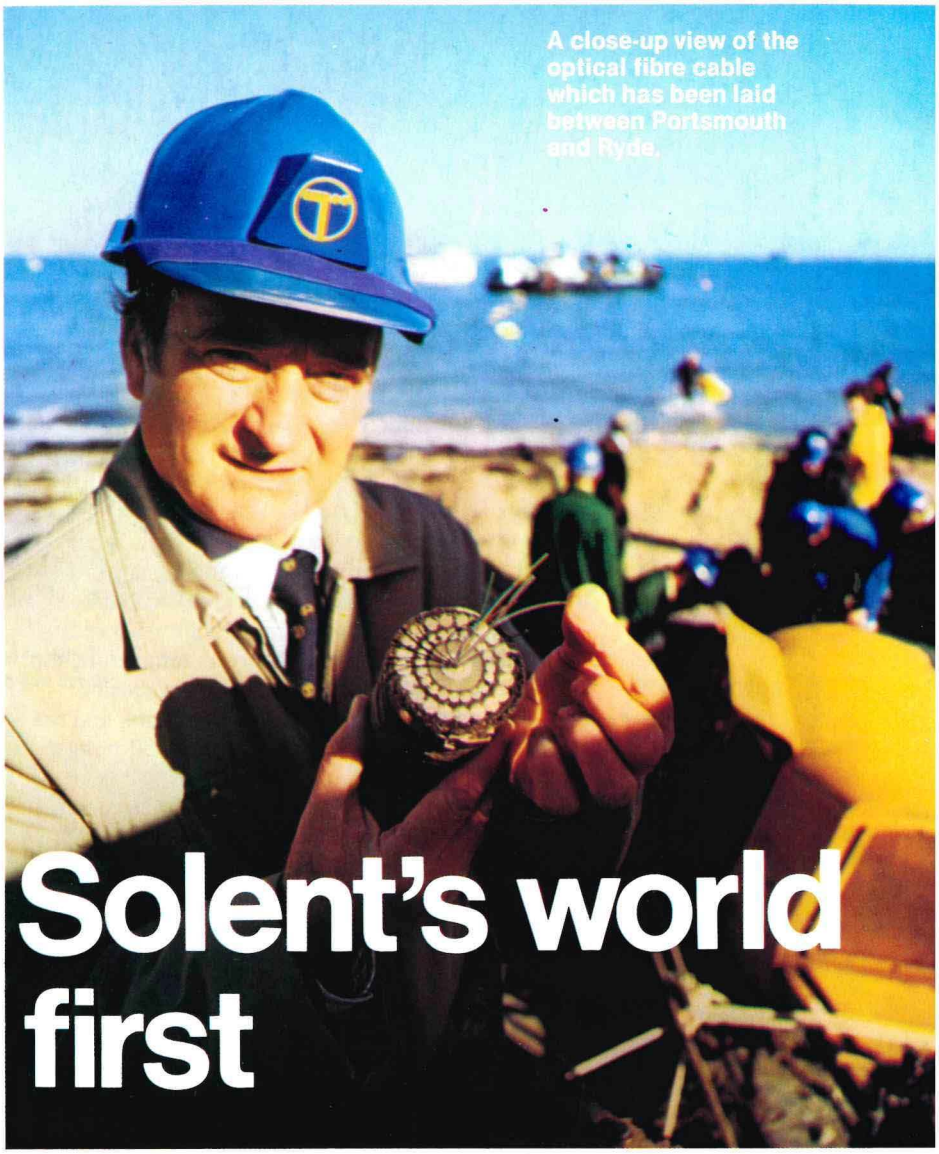
In a few months time, the first Group 4 machines are likely to become available and later models will have mixed mode working for fascimile and teletex. These will be fully digital machines, designed to work with the integrated services digital network (ISDN) or public data networks and to be part of a fully automated office. But a significant population of Group 4 machines will not develop until the early 1990s in the UK and Group 3 machines look set to become the standard for document facsimile for some years to come. Much depends on how the new machines will interwork with existing facilities but a market will undoubtedly develop for an error-free system which is capable of transmitting an A4 page in under five seconds with a high-resolution of 400 lines per inch.

As technology advances and the distinctions between different types of equipment are eroded, interworking between reprographic devices such as facsimile and computers are likely to become more general and the scope for using technology to improve the exchange of information is bound to increase. Use of the telephone line as the standard link between integrated terminals will bring additional revenue to the business through the international telephone network. Ⓣ

International facsimile directories are an important aspect of the service.

Mr M C Acres is head of facsimile and Datel marketing in BTI Business Services.

Solent's world first



A close-up view of the optical fibre cable which has been laid between Portsmouth and Ryde.

The world's first undersea optical fibre cable has been laid by British Telecom from Portsmouth to Ryde on the Isle of Wight. The £600,000 laser-powered Lightline has four pairs of fibres each of which can carry nearly 2,000 phone calls at once or the equivalent in data or other services. Initially three of the pairs will be used – two working, the other on standby.

The 23km (15 mile) cable – supplied by Standard Telephones and Cables – was laid by a specially adapted flat bottomed barge, The Murius, because the waters of the Solent are too shallow for British Telecom's own cableships. Great care was taken to position it along a sealed corridor where fishing and anchoring are banned.

The cable will enter service early this year. It needs no regenerators and can supply data, text, pictures and graphics to and from businesses on the Isle of Wight. As well as helping to keep down the cost of transmission, it will also improve reliability of communications to the island.

About a third of the Lightline is submerged and this part will use cable protected by a double covering of steel wire armour. The remainder consists of cable designed for use on land, laid in underground ducts.

The Solent crossing, though the first under the sea, is not British Telecom's first underwater Lightline. In Wales, 1.7km of optical fibre cable crosses a lake between Tywyn and Corris, and the Barrow to Millom route crosses the Duddon estuary.

Boost for Britain

A further boost for Britain's submarine cable communications was the inauguration, by the Queen, of the Anzcan cable which runs for more than 15,000km (8,100 nautical miles) across the Pacific between Australia and Canada.

British Telecom International has an 8.5 per cent share in the new cable – largely designed and made in Britain – and will use it primarily as a third route for communications to Australasia. Anzcan is linked to western Europe by a microwave system across Canada and then through the Cantat 2 transatlantic cable to England.

Anzcan can carry 1,380 simultaneous phone calls on the major route between Canada and Australia and its capacity is nearly 20 times bigger than the Compac cable it replaces. It will also cater for the growing intercontinental business demands for data transmission, telex and facsimile.

Anzcan has 22 co-owners from 14 countries worldwide. Australia's Overseas Telecommunications Corporation is the largest shareholder.

Pictured after the Anzcan opening ceremony with The Queen are Mr John Alvey, managing director, Development and Procurement (left) and Mr Jim Hodgson, British Telecom's vice-chairman.

The driving force

British Telecom operates the largest commercial vehicle fleet in Europe. The fleet comprises more than 60,000 vehicles of over 140 different types ranging from trench excavators and road sweeping machines to mobile automatic exchanges and pole erection units.

Set out on any road journey in the UK and chances are that within a mile or two, whether you're in a busy city street or a quiet country lane, you will meet a British Telecom vehicle at work. Most likely it will be one of the 20,000 or so light vans or perhaps one of the 17,000 medium weight type with 'lift off' bodies.

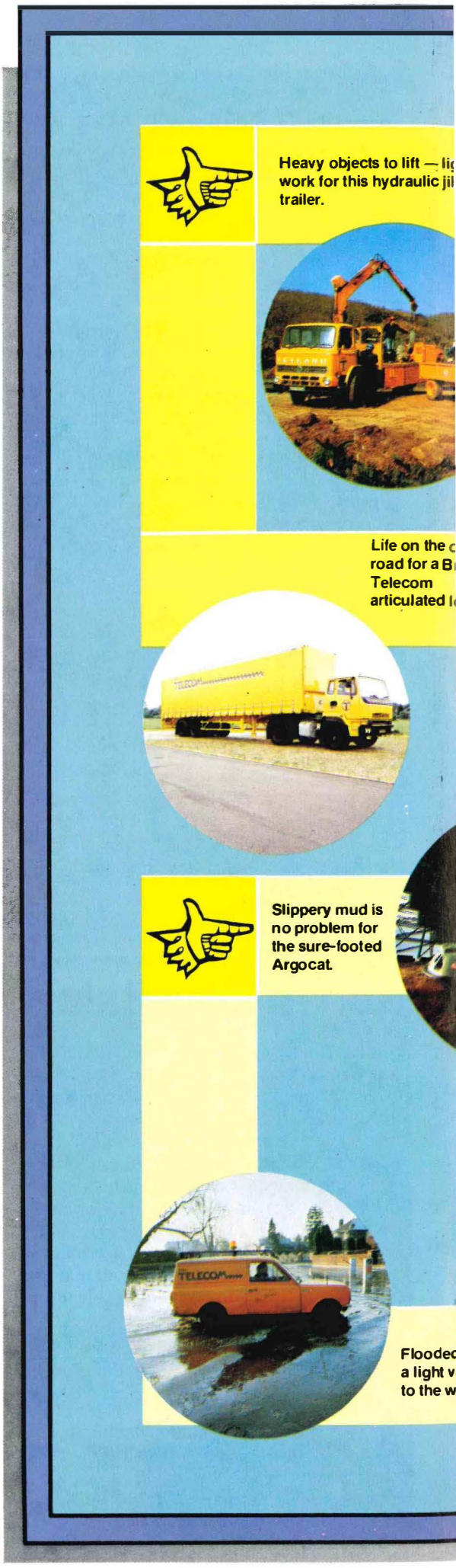
On the motorways, a common sight is the 32-ton articulated tractor unit and trailer. The latest Leyland tractor units are powered by a 265bhp diesel engine through a nine-speed gearbox. For driver comfort on long hauls, the tilt cab is equipped with radio, suspension seating and extensive sound insulation and the vehicle's operating range exceeds 750 miles from its 110 gallon fuel tank.

But British Telecom's transport needs extend well beyond road and even off-road use. Cableships are used to lay cables on the sea-bed, tracked vehicles are used to beat snow and mud and a host of special exhibition, outside broadcast and engineering vehicles have been developed to meet the ever-growing demand for British Telecom's diverse services. With the increasing importance of satellite communications, the organisation's transport requirements extend literally from the bottom of the sea to orbital space.

And at BTHQ there is a separate division to control every type of vehicle and a vast range of specialist tools and equipment as well. Responsibility extends to concrete mixers, motor winches for cable laying, welding sets, air compressors, hydraulic phone kiosk carrying trailers, excavators, pole erectors and fork lift trucks – a bewildering array of machinery with movement or transportation the only common link.

The division ensures that vehicles are supplied and operated legally and safely. A computer-based system is now being installed for the more effective supply and maintenance of vehicles and associated equipment. A full-colour guide to the fleet has been produced in ten sections to give staff concerned with the selection of vehicles, trailers and technical aids an appreciation of the range and scope available. The 1985 issue renamed 'Motor Transport Catalogue' is to be published in March and has been revised to give even more information to motor transport users.

Enquiries should be directed to regional transport managers or the Vehicle Provision Group, British Telecom Motor Transport, ETA2.2.1, River Plate House, 7–11 Finsbury Circus, London EC2M 7LY. Telephone: 01-357 5046.



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Snowdrifts are beaten by this unusual tracked Land Rover.

British Telecom in orbit with America's Space Shuttle.

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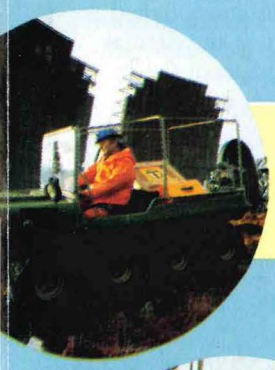
Repairs needed, but the lift-off body on this 750 kg van saves time.



Steep hills don't stand in the way of this four-wheel-drive Land Rover.

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Docking manoeuvres for a terminal transporter.

Deep water and a British Telecom cableship.

START

British Telecom Journal
Winter 1984/85

Budgeting boost gives quicker costings

Bruce McDonald

Two years ago, British Telecom Wales and the Marches began to computerise the time-consuming task of setting budgets and monitoring variances. The method has since been adopted extensively throughout British Telecom.

Before computerisation, the process of converting forecast resources into costs was slow and susceptible to error. A system was needed to provide quicker costings, automatic consolidation and the ability to model different sets of assumptions.

Initial development of the system, called 'NIMBUS', took place on microcomputers but it soon became clear that they lacked sufficient power to cope with the volume of detail involved. The complex calculations involve:

- ★ More than 300 types of work activity and accounts groupings, each of which can comprise separate elements for pay, stores, contract work and other cash payments.
- ★ Sixty seven grades of staff all with different pay rates.
- ★ About 250 management groupings.
- ★ Long term forecasts of up to seven years.

These factors give a theoretical figure of more than 100 million unit forecasts which have to be further analysed in terms of volume or price variances. In practice, invalidation reduces the figures considerably but they are still very large models.

A sophisticated but 'user-friendly' software package was needed to tackle the problem and BTWM chose Comshares' Wizard system. The first stage of modelling was performed on Sirius micro-computers, which then worked interactively with a bureau mainframe computer. Data input was direct from each of the five regional offices and consolidation, which used to take weeks, was performed within hours. The structure of the system utilised Wizard's multi-dimensional viewpoint facility with separate viewpoints for activity, grade and responsibility.

The original plan, however, was to transfer the system in-house as soon as possible and conversion work has now been completed with users operating IBM3179 workstations linked into an IBM4361. Integration was an essential part of the strategy and to complement the budget-building system a number of other systems were developed.

Systems analyst Liz Rigby makes use of the Cardiff computer terminal to analyse financial forecasts.

A calendarisation system breaks annual forecasts down into monthly figures taking into account inflation patterns, staffing levels and seasonal or other non-linear factors while monitoring the system provides a volume and price variance analysis between the calendarised budget for a manager and the actual costs. Costs are collated through an interface with the general ledger system which also runs on an IBM machine.

Comparisons

Manpower details of all 12,000 staff in BTWM are held in a data base and can be analysed by division or geographical location. A capital job breakdown system uses a similar database to hold records of each of BTWM's 8,000 investment jobs. Jobs can be inflated and calendarised according to different profiles and changes can be reflected in revised annual forecasts and analysed in terms of responsibility, location or type of work. Comparisons can then be made between budget, revised forecast and actual costs.

Quality output is important and extensive use is made of laser print reports which tend to be clearer and more manageable than traditional computer reports. Increasing use is also being made of colour graphics and while there are many graphics software packages about for micro or mainframe computers, the advantage of an integrated system is that graphs showing monthly results can be produced automatically from the monitoring model.

Managers also need answers to questions which cannot easily be incorporated into standard reports. Wizard's 'window' facility enables a manager to access the data directly from a terminal, select the appropriate results and carry out some manipulation of the data. This minimises the paper output and maximises the manager's freedom to view only relevant data.

Speed and accuracy are important features of the system but the ability to respond to a rapidly changing organisation is a particular bonus. Ⓣ

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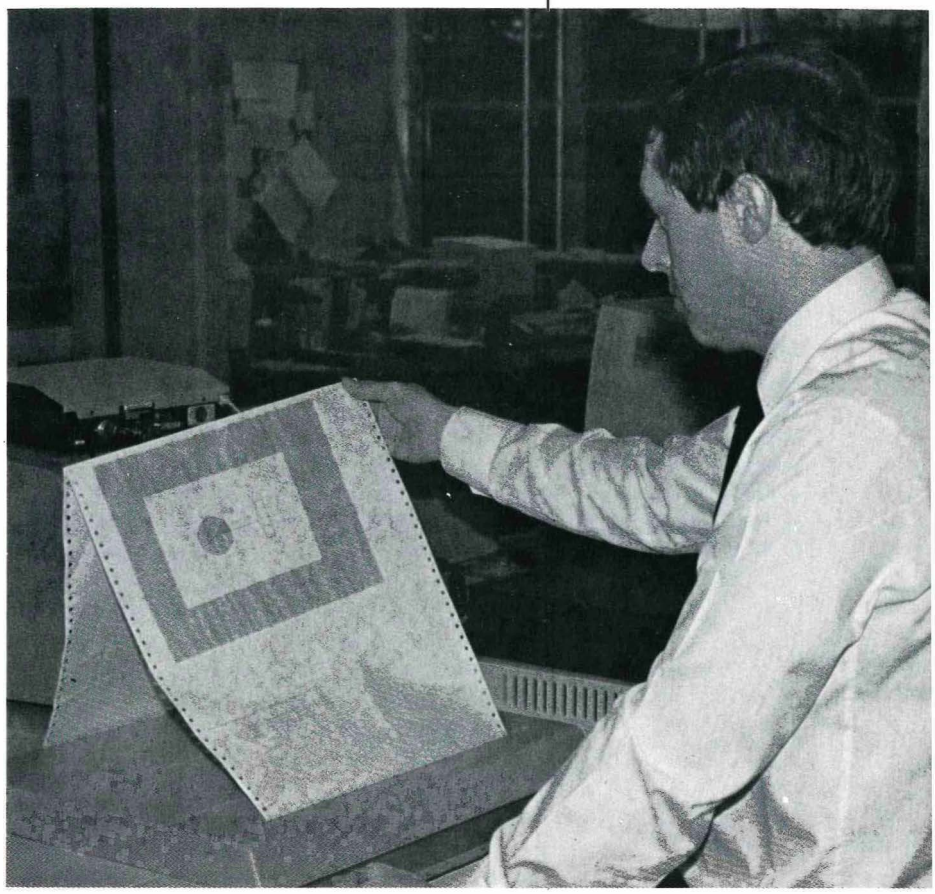
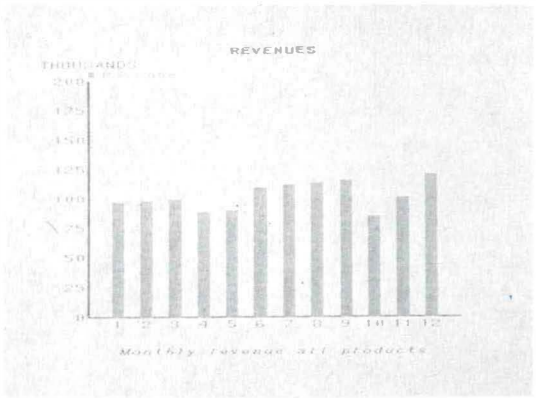
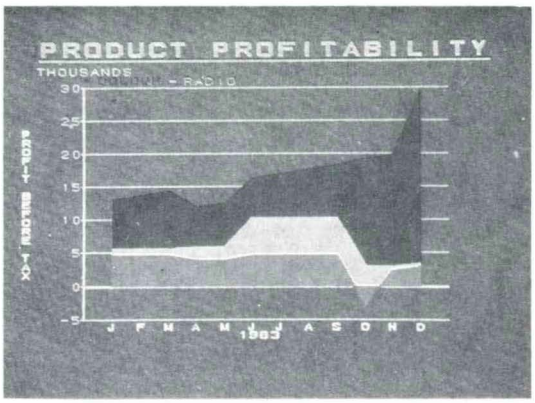
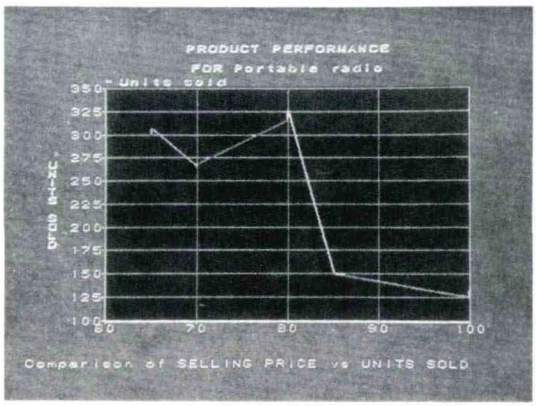
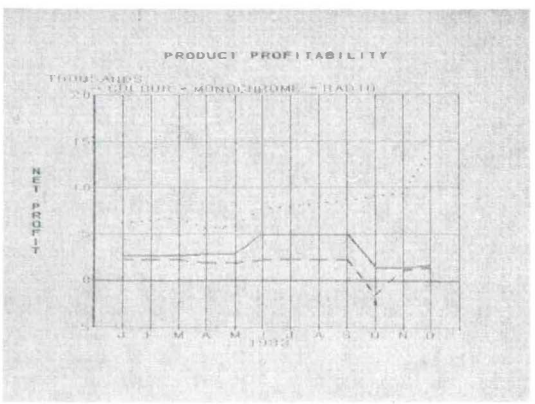






Above: Malcolm Roper, also a systems analyst, studies a chart produced by the computer.





Left: Some of the charts produced by the Wizard system.

Mr B B McDonald was formerly head of budgetary and business planning group for BTWM but is now head of strategic marketing for South Wales District.

British Telecom Journal
Winter 1984/85

Rewards of war

Modern telecommunications owe much to the desperate needs of war. In his second look at the background to British Telecom's Research Laboratories at Martlesham Heath, near Ipswich, departmental record officer Pat Panton looks back to the Second World War which paved the way for the computer age, silicon chips and optical fibres.

When the Second World War began, engineers whose qualifications and laboratory experience equipped them for experimental work devoted much of their time to problems which came directly from the fighting services. By February 1943, 55 per cent of research staff, then working at Dollis Hill in north west London, were fully employed on work for one of the services. In addition, another 20 per cent were entirely concerned with the development and provision of communications systems needed to provide circuits for service operations.

Despite this, normal work still went on and in 1943 the first submerged repeater to be installed in a working cable was laid in a telephone cable crossing the Irish Sea. It had been designed and made at Dollis Hill. The new Post Office cable ship, the 'Monarch' launched in 1945, was specially equipped to lay the new repeaters and this proved a significant development which paved the way, some years later for the first transatlantic telephone cable which was brought into use on 25 September 1956. Dollis Hill and the Bell Telephone Laboratories were involved in this joint enterprise.

Enterprise

The first pair of transatlantic cables was laid in 1956 and had 51 submerged repeaters in each cable on the bed of the ocean between Scotland and Newfoundland. It was vital for all the components in the amplifiers to have a long life, and work on oxide-coated cathodes showed that a major cause of failure of thermeonic valves was the growth of a resistive layer between the oxide cathode and its supporting core. Another major contribution to submarine cable technology was the design of a lightweight cable whose tensile strength lay in its central steel core.

Meanwhile, other teams worked in different fields. The electronic speech machine, known as ESME was developed. New surveys were made of the acoustic characteristics of human ears and mouths, and improved 'ears' and 'voices' were constructed for use in telephone measurements.

Research on trunk signalling systems formed the basis of the national trunk mechanisation scheme, and electronic techniques were applied to the development of new switching systems. With the expansion of the telephone network, the need arose for a telephone set of higher sensitivity for use on longer local lines, and in 1958 the 700-type set was evolved. This incorporated the automatic regulator, an ingenious device which reduced the sensitivity of the set when it is connected to a short line.

Milestone

Another milestone for the Dollis Hill team was the design and building of the world's first pulse code modulation digital tandem exchange. The Empress exchange in London's West Kensington was officially opened for public telephone traffic in 1968 and was capable of switching calls, in groups of up to 24 at a time, as a stream of digital pulses at a rate of 1.5 million bits per second.

In the radio field, great advances were made in microwave propagation and Dollis Hill played a major part in the design and testing of the satellite earth station at Goonhilly. There was important progress, too, in semi-conductors with studies into the use of transistors and micro-electronic circuits to improve telecommunications. Research also came to the aid of the postal services, and sophisticated mail handling devices were first designed and then constructed.

An enviable record of research success has continued throughout the last decade following the transfer of the department to Martlesham Heath, near Ipswich. Work has included the development of Prestel, long-life transistors, optical fibres, advanced semi-conductors, visual telephones, teleconferencing, digital analysis and speech synthesis and various digital transmission systems.

The wartime work of research staff led to many important developments the benefits of which were seen in the post war years. Pictured are a deep water repeater and an artificial ear.

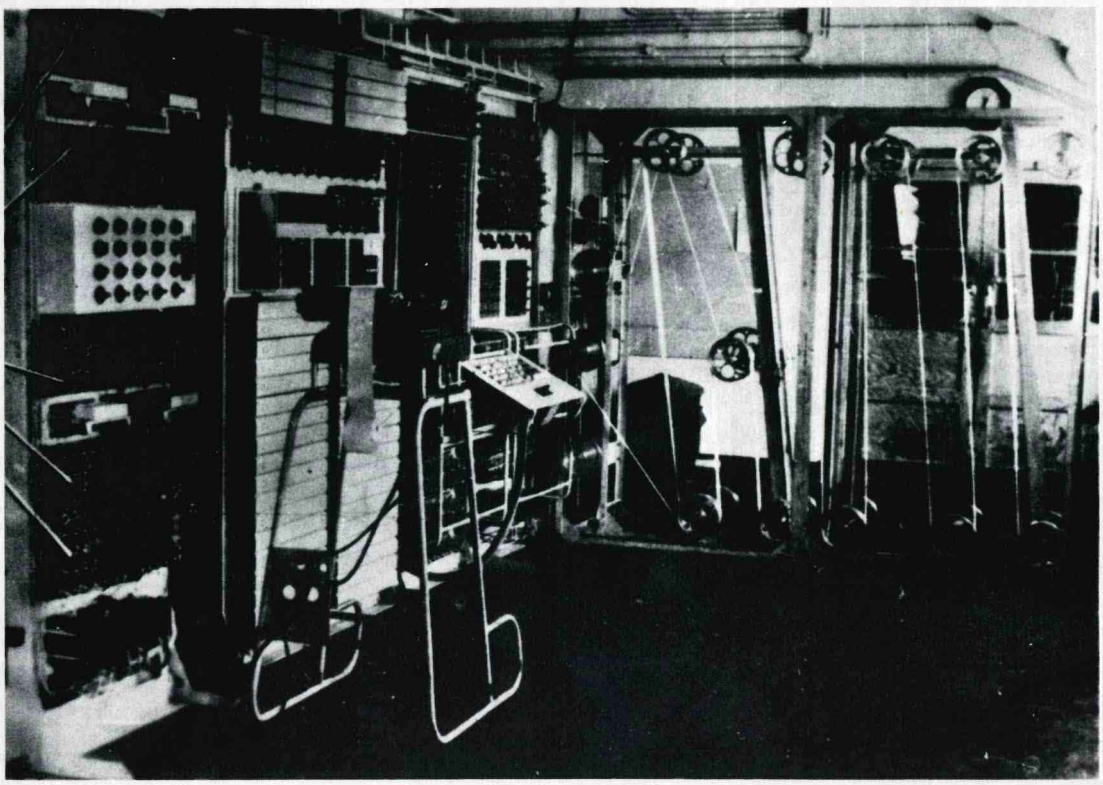
Other important post war work at Dollis Hill centred on the design of London's Empress exchange – the world's first pulse code modulation digital tandem exchange – and Goonhilly earth station in Cornwall.

Colossus - a giant step

One of the earliest computers used at the beginning of the 1939–45 war was an electronic machine called 'Heath Robinson'. Its input was from twin five-hole paper tapes which it read at 2,000 characters per second. The tapes were driven by their sprocket holes as well as by pulleys, and analysis was carried out by photo-electric readers and electronic circuits.

The main designer was Wynn-Williams of TRE with important help from E A Speight and A C Lynch, who designed the photo-electric readers, and D A Campbell and F O Morrell – all from Post Office Research at Dollis Hill. But so many things went wrong that the success rate was extremely low. After introducing more checks into the entire system and further research by D Mitchie and I J Good, the success rate improved enough to justify faith in it.

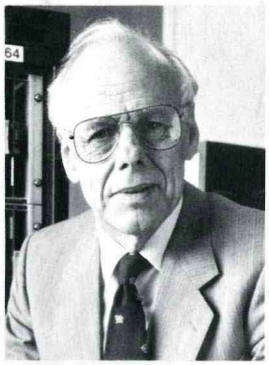
Funds were then made available for a more powerful machine, called Colossus. The main engineering design was made by T H Flowers of Dollis Hill and among other highly important engineers who worked on this machine were S W Broadhurst, W W Chandler and A W M Coombes. ▷



The Colossus computer

Dr Tommy Flowers

Dennis Baker



Charles Hughes

Below: Roy Harris and John Martin

Below, right: Dr George Newns and Dr Keith Beales

Colossus had only one tape input because the function of the other input tape was incorporated in the internal electronics of the machine. One important advantage of this was that it avoided the need for a great deal of additional tape preparation. Another was that the driving of the tape could be entirely by pulleys without the need to synchronise two tapes by any sprocket-hole driving.

The machine was programmed largely by means of plugboards, and it was capable of flexible Boolean operations. It read the tape at 5000 characters per second and, at least in Mark II, the circuits were in quintuplicate so that in a sense the reading speed was 25,000 bits per second which compared well with the speed of the electronic computers of the early 1950s.

The latter Colossi were capable of carrying out more than ten consecutive elementary Boolean operations without error, which is a tribute both to the engineering design and to the level of maintenance. The first Colossus had 1,500 valves, which was probably far more than for any electronic machine previously used for any purpose. This was one reason why many people did not expect Colossus to work, but it was installed in December 1943 and began producing results almost immediately. Most of the failures of valves were caused by switching the machine on and off.

In March 1944, the Post Office was told that more machines were required within three months. This seemed an impossible task, but by enormous efforts at Dollis Hill and Bletchley, the first Mark II Colossus was ready on time just a few days before D-Day. Half the facilities at Dollis Hill were devoted to the project.

Flexibility

One of the main uses of Colossus involved the type of synergy between man and machine that has been achieved with ordinary computers only during the last few years. The flexibility of Colossus was such that in principle it could tackle ordinary radix 10 multiplication. It proved to be a general purpose machine beyond its original design because ordinary calculations could be expressed in Boolean terms.

A further feature of Colossus which made it resemble a general purpose electronic computer, was conditional branching. Part of the programme could be changed quickly by means of toggle switches which were connected to produce circuits in series or in parallel.

Medal winners all

The Martlesham Medal, an award instituted in 1980, has recognised the work of some of British Telecom's post-war pioneers whose efforts have paved the way for tomorrow's technology. The medal is given to staff of British Telecom past or present who have made an outstanding personal contribution to science and technology and particularly to telecommunications. The candidate's contributions are judged by international standards for value in enhancing national prestige and their potential for increasing the prosperity of Britain either by benefits to customers or significance to industry.

The first recipient of the Martlesham Medal in 1980 was Dr Tommy Flowers, the man who invented Britain's – and possibly the world's – first computer and the acknowledged father of electronic switching. During the war Dr Flowers played a brilliant part with his invention, Colossus, which performed a major role in breaking German High Command codes.

The second recipient of the Martlesham Medal in 1981 was Dennis Baker who pioneered the introduction of the world's first silicon chip transistors used in submarine cable amplifiers, and also led the team which coined the term 'micro-processor'.

In 1982 there were joint medal-winners, Dr Keith Beales and Dr George Newns, who helped to steer Britain into a leading world position in optical fibres. In particular they developed the double crucible method of making fibre from a crude laboratory concept to a successful production process.

In 1983, the medal went to Roy Harris and John Martin, who masterminded for British Telecom the design and development of System X, Britain's advanced new electronic exchange which will revolutionise the nation's telephone service. Producing System X was Britain's largest single telecommunications development project and involved the creation of a complete 'family' of telephone exchanges virtually from scratch using the latest technology to replace existing equipment.

The 1984 Martlesham Medal winner was Charles Hughes (see British Telecom Journal, Autumn 1984) who received the award for outstanding and innovative work including the idea of using the microprocessor for telecommunications.

Designing manholes by computer

PJ King

British Telecom Journal
Winter 1984/85

Computers are now being used by British Telecom to help in the design of manholes and ensure that their construction is to the highest possible standards.

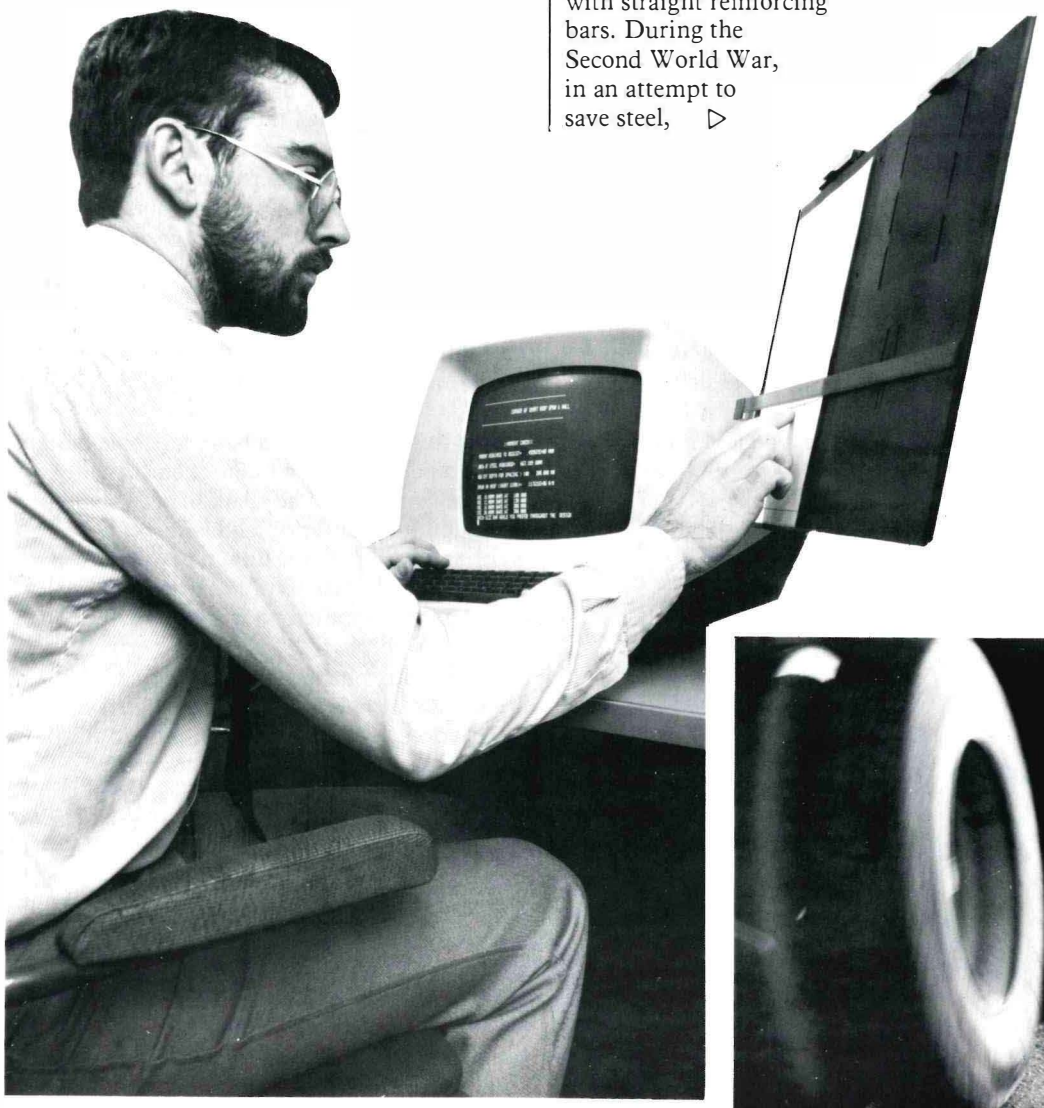
Thousands exist throughout the country, yet few ever see them. They are an essential element of British Telecom's vast cable network but they seldom warrant a paragraph when it comes to publicity. 'They' are the manholes which as soon as underground cables became a practical proposition for the transmission of telephone traffic, were necessary to facilitate the jointing of cables, and to house transmission equipment.

A typical modern manhole is made of reinforced concrete and is two metres high, three metres long and two metres wide. It has a hole in the roof, which allows access to the chamber, and it has 'windows' in the walls, which allow cables to enter.

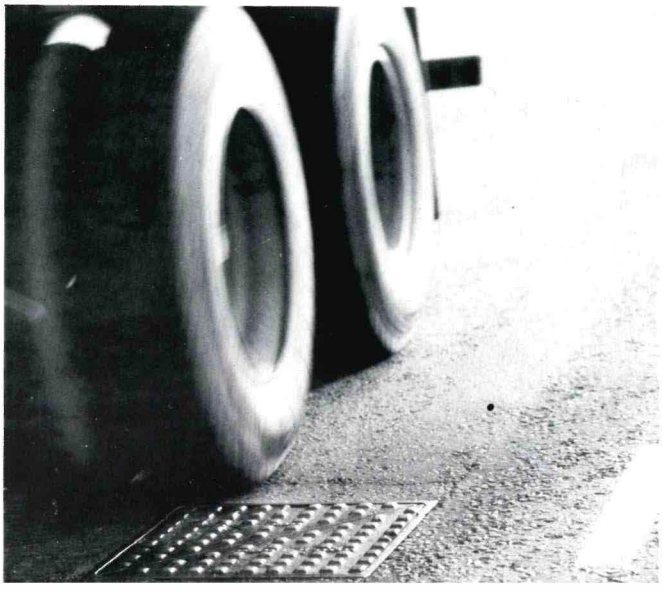
But manhole design has been through a number of historical phases. It began with the old National Telephone Company manholes – simply brick-walled pits roofed with slabs of York Stone which were sometimes supported with rolled steel joists. York Stone, like unreinforced concrete, is weak in tension and the supporting of a load causes the stone to bend and tensions to be set up which can lead to cracking. Neither material, it was discovered, is safe enough for the construction of manholes, particularly those which have to support a modern carriageway.

Between 1900 and the mid 1930s, manhole sizes increased and the roof was changed to unreinforced concrete placed on boiler plates which were in turn supported with rolled steel joists. These manholes have their own associated problems because the unreinforced concrete and boiler plate, which act simply as a shutter, leave all the load to be carried by the joists. Rusting of the joists has meant that many of these manholes are now reaching the end of their lives and many areas are involved in replacing them.

These were followed by a 'straight bar design' manhole built of reinforced concrete with straight reinforcing bars. During the Second World War, in an attempt to save steel, ▷



Left: Author PJ King enters data for a manhole design from a telephone area. The printout will specify a re-inforced concrete design to British Standards.



Below: Manhole design must be to the highest possible standard to ensure that the structures can withstand the increasing volume of heavy traffic which passes over them.

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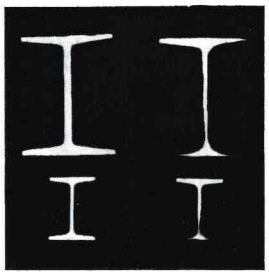
Below: Rolled sheet joists of the type used to support manhole roofs. On the left is a pair in good condition while those on the right have become badly corroded.



Mr P J King is a temporary executive engineer in LCS/Locals Lines Support Division and is responsible for structural engineering aspects of underground chambers and tunnels.

British Telecom's manholes vary greatly in size. This is part of one recently constructed in London's West End.

the so-called Harding or bent bar design was introduced featuring a number of reinforced concrete roofing beams. After the war, the straight bar design was reintroduced and is still used.

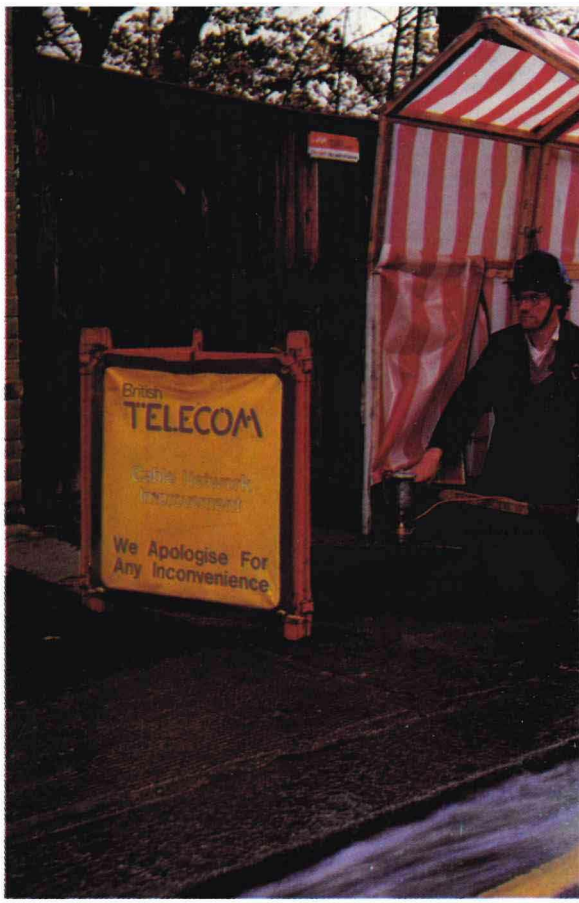
These reinforced concrete manholes have performed adequately as engineering structures and any problems have been identified as either material failures, such as the use of high alumina concrete (HAC) or construction faults including poor quality concrete and the incorrect placing of reinforcement. The basic design has stood the test of time, but a number of significant changes have had to be made.

Some local authorities, and consulting engineers with an interest in the siting of manholes, have insisted that designs meet the British Standard Code of Practice for Reinforced Concrete Structures (CP110) and this requirement rules out the straight bar design. Resolving such differences would delay underground works and a decision was made to produce a design which would circumvent objections by ensuring that British Telecom manholes meet the CP110 requirements wherever possible.

Economic design

Many factors have to be considered in both the analysis and economic design of a manhole and the process would be long and tedious without a specially written computer program to take the burden of the work away from the engineer. A design conforming to the British Standards could take a civil engineer a couple of weeks to complete, but with the program the job can be tackled in a few minutes.

Loads on manholes come from both the dead weight of the soil acting on the roof and walls and from vehicles passing overhead. British Standard 5400 (Steel, Concrete and Composite Bridges) recommends a standard type vehicle known as the 'HB' vehicle as the basis for the load analysis for roads and bridges. All roads and bridges are designed to take a certain number of



units of this basic vehicle and manholes should be up to the same standard. Motorways, for example, are designed to take 45 units of HB which means that each axle of the vehicle will take 450 KN and therefore each wheel takes 11.25 KN. The result of the dispersion of this load through the road and the soil, combined with the self weight of the soil above the manhole, is the load used in design work.

The computer program requires little information. Details on soil conditions and other variable factors are not necessary as it assumes the worst possible case. The program is interactive and prompts the operator for information on the basic internal dimensions, the depth below the surface to the roof and the number of units of HB load the road is designed to take.

Using this information a basic manhole design can be produced in five minutes on a small business computer. The result of each step in the design process is printed to allow the engineer to compare the design of the most highly-stressed portions of the structure, as given by the computer, with a fairly basic manual design.

New drawing practices are now being introduced to cope with the complexities of modern designs. Whereas in the past all the bars in a run were shown, now only one bar is illustrated. This is one part of the attempt to bring British Telecom into line with the methods used in the construction industry.

The checking of all computer designs is an important procedure as the widespread use of computers, especially in structural work, could lead to an unquestioning confidence in the results produced. An overconfident attitude can result in expensive and embarrassing failures as has been emphasised by a number of recent cases in the civil engineering industry. Ⓣ

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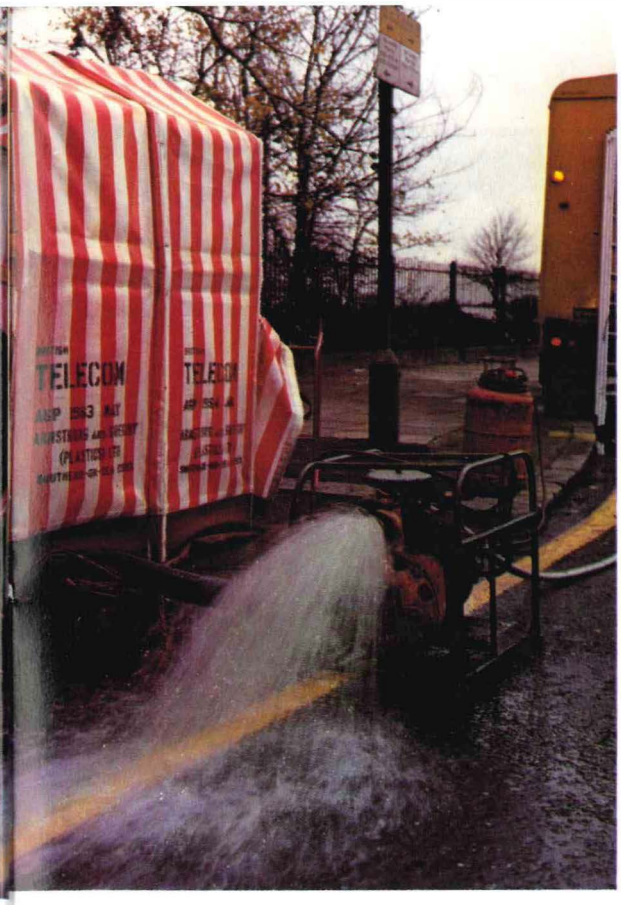

Left: Pump out the water and check for asphyxiating gas with a safety lamp – routine precautions for maintenance engineer George Everson before working underground.

Special team leads drive for underground improvements

Blitz on blackspots

Harry Brown
and Dick Erratt

The enormous, nationwide demand for telephone service since the Second World War has inevitably resulted in a growing number of faults in underground cable networks. Determined efforts to tackle the 'blackspots' have led to significant improvements.

Sophisticated customer products and advanced exchange equipment rely on the local underground network which connects them. Due to a combination of old cables, congested manholes and boxes, temporary repairs and other factors, failures had reached an unacceptable level. Maintenance staff were often fully stretched clearing faults as they were reported leaving little time for large scale cable renewals.

At British Telecom London (BTL) where the problem was particularly acute, headquarters staff presented a case for additional resources to be made available for upgrading the external network in their territory. Talks took place between the appropriate BTL staff and their opposite numbers in Transmission and Organisation, Performance and Systems Departments at Local Communications Services (LCS) headquarters and this resulted in a plan which required 150 additional staff to be allocated to the five London telephone areas with the highest underground fault rates.

Recruitment began in April 1983 but the new staff were not fully effective until several months later following local training as well as the normal jointing courses. Additional vehicles, tools and stores also had to be obtained.

The objective was to improve quality of service to customers, so two important matters of policy were to identify the most fault-prone plant items as top priority and renew only those parts of the network necessary to reduce the fault rate quickly. It was important to avoid expenditure on large scale renewal of cables which looked bad, but were giving good service, by carefully controlling resources and to give staff on faulting duties the opportunity to deal with any potentially faulty plant while on site as well as clearing the reported faults. To make this possible faultsmen were encouraged to carry out some preventative work to avoid the possibility of subsequent fault reports from customers in the same vicinity.

Maintenance

A sound preventative maintenance policy was essential to maintain the achieved improvements. Every telephone area has its own external plant maintenance centre (EPMC) and in all of the five London areas a computerised blackspot analysis system has now been installed.

Information is taken from the dockets completed by faultsman jointers at the time of fault clearance and each docket is marked to show precisely where the reported trouble has been cleared, the type of fault, and which item of plant failed. The hardcopy produced, together with external plant maps, is used to identify fault-prone parts of the external network. Additional information from the local line insulation routiner (LLIR) and outstanding maintenance forms forwarded by field staff are then used to decide whether further investigation is necessary.

The next step is a field survey to find out what plant renewal work is needed to clear the blackspot and an estimate of stores and labour costs is drawn up. To ensure the job is cost effective, another computer program is used to compare the cost of maintaining the plant at the present fault rate with the cost of renewal. Priority is given to those jobs which will reap the maximum benefit in terms of manhours spent and faults prevented.

Proper planning is essential for success and close liaison with planners is necessary, even on small renewal jobs, to avoid any duplication of effort and to ensure that the proposed work is in line with future network development plans.

Some areas have set up external planning groups to deal specifically with renewal work and they have provided a constant flow of work to the field staff with excellent results. Earlier methods of fault location often disturbed the network which caused more faults but this time-consuming task has been greatly reduced by new and accurate fault locating equipment which staff are trained to use as an aid to clearing faults ▷

Engineers start work on a joint box to bring it up to modern standards. Dave Pepper (foreground) re-checks the readings of a gas analyser whilst Chris Slade replaces an obsolete joint.

Clerical assistant Gary Milson runs a computer check on the underground fault statistics.

with minimum disturbance to the plant.

Moisture problems caused by poor cable sheath closures over joints have also been reduced by the relatively new 'shrinkdown' closure methods which have generated greater confidence in future reliability. Staff have received special training in these techniques and standards of workmanship have been stressed at all levels. Supervisors have also attended 'quality of work' inspection training courses to help ensure good standards of work on site.

Improvement

Staff in the Repair Service Controls (RSC) have contributed to the success of the project with accurate testing and diagnosis of faults, and using extra care when noting fault clearance details. Results are monitored at area and regional levels and, once a blackspot has been dealt with, a careful check is kept on the fault rate for that part of the network to make certain that the desired improvement has been achieved and is being maintained.

Overall, from a worsening fault rate in 1982 BTL has not only reversed the trend but shown a 16 per cent improvement during the past year. An average improvement of ten per cent has been achieved throughout the rest of the UK. During a period when total underground circuits rose by almost three per cent, total underground faults in London were reduced by 72,000 or nearly 14 per cent, and the trend is one of continuing improvement. The value of having clear objectives, well thought out plans, close monitoring, and above all, active co-operation of managers at all levels has been clearly demonstrated and further improvements are confidently expected. Ⓣ

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A modernised joint box looks neat with every cable coded and every joint protected against moisture.

Mr H W Brown recently retired from BTHQ but has been engaged as a consultant working in the field of external plant maintenance.

Mr R J Erratt is an executive engineer in BT London responsible for external work efficiency and for monitoring the additional staff involved in the improvement programme.

Maintenance engineer Ray Baker uses a blow-lamp to shrink-down a protective wrapping over a joint.

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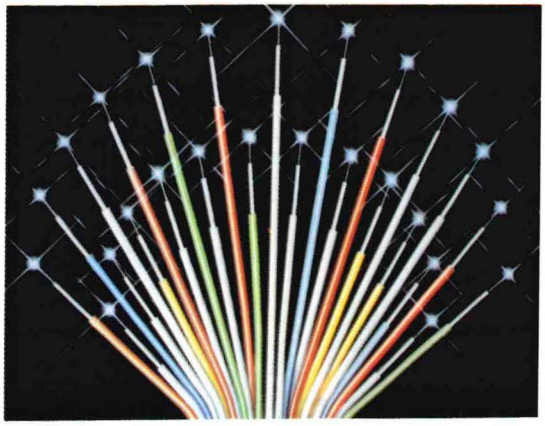


Fibres for the future

Ian Garrett

Since 1980, British Telecom has been using optical fibre cables for trunk and junction transmission on an ever increasing scale, and it is expected that within a few years two-thirds of the digital trunk routes in the country will be optical.

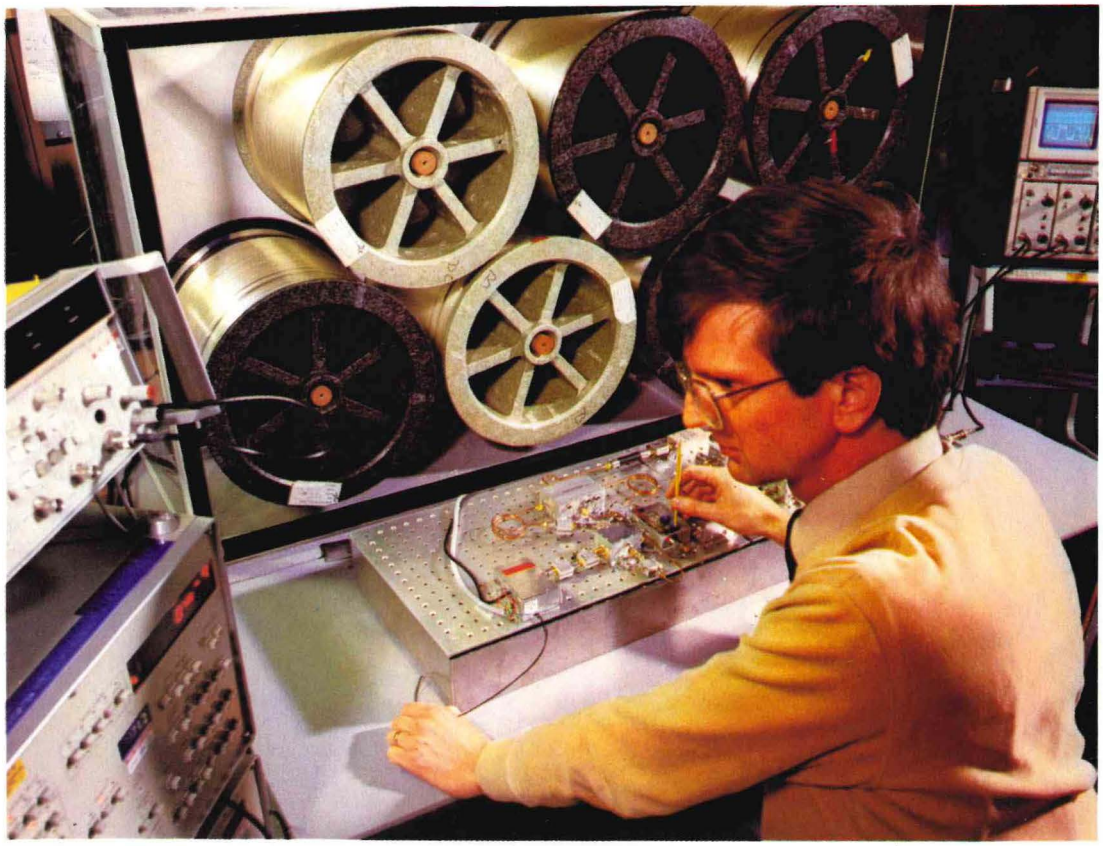
Existing optical fibre systems operate at 8, 34 and 140 Mbit/s with some later systems at 565 Mbit/s. Unlike coaxial and graded index fibres, the data rate of the single mode fibre systems now being specified for trunk transmission is not limited by the bandwidth of the cables but by the speed of the electronic circuits at the terminals. Experimental systems are currently operating at 1.2 and 2.4 Gbit/s at British Telecom's Research Laboratories at Martlesham Heath, near Ipswich, but even these fail to stretch the capacity of the fibre and a few years ago a project was started to investigate the ultimate transmission capacity of glass fibres.

In a system operating at 565 Mbit/s, the duration of each pulse is less than two nanoseconds (see illustration opposite), and the peak optical power is about one milliwatt. When the same pulse energy is compressed into a pulse 1,000 times shorter, the peak optical power is about one watt and sufficient to bring about a change in the properties of the glass fibre as the pulse passes.

Another development in optical transmission is the move towards highly coherent lasers as sources for transmission systems. The combined effects of high power, short duration, and high coherence in the optical pulse are responsible for several phenomena in the glass fibre. Some cause problems which have yet to be solved but others are useful such as the 'Soliton' – a name derived from the 'solitary wave' nature and the particle-like properties of the pulse – which has the property of travelling without distortion over very long lengths of fibre.

With the optical power levels and low coherence typical of today's practical transmission systems, the glass fibre behaves as a purely passive, linear medium. But when an intense, coherent pulse of light passes through a fibre, the fibre no longer behaves linearly – its properties are modified by the light pulse, and in turn the way that the pulse travels is also changed.

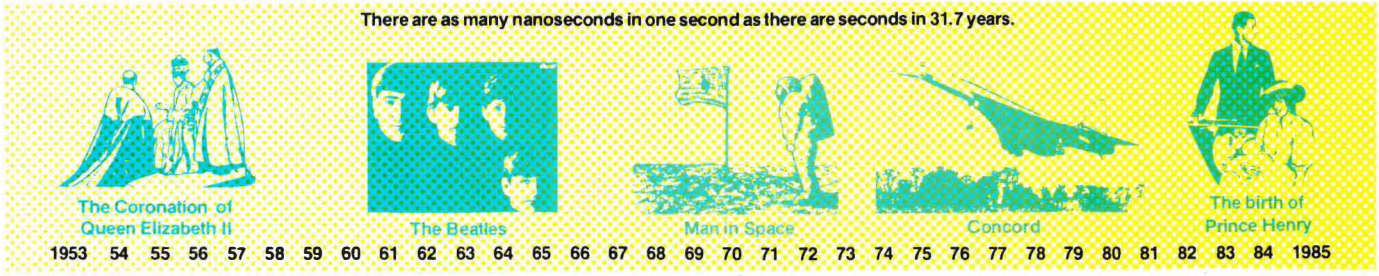
Passage of light through any medium is



Right: Ray Hooper, head of advanced optical systems group, adjusts a 1.2 Gbit/s optical regenerator in an experimental system being tested at Martlesham. In the background are reels of single mode optical fibre.

Far right, top: Executive engineer Peter Chidgey examines the effects of sophisticated semi-conductor lasers being modulated at 2 Gbit/s.

Far right, bottom: Mark Whittle, a BTRL technician, injects intense light pulses into a fibre in an experiment to investigate non-linear effects such as solitons.



governed by the refractive index of the medium, which is normally thought of as constant. But if the light is very intense, the refractive index is altered, and in the case of glass it is increased. This means that as the light pulse passes through the fibre, it increases the refractive index locally, where the light intensity is high. Since the velocity of light is inversely proportional to the refractive index, the phase of the optical field varies along the pulse. This is called 'self phase modulation'. The instantaneous frequency is the time-derivative of the phase and the optical frequency therefore changes across the pulse as a result of the non-linear refractive index.

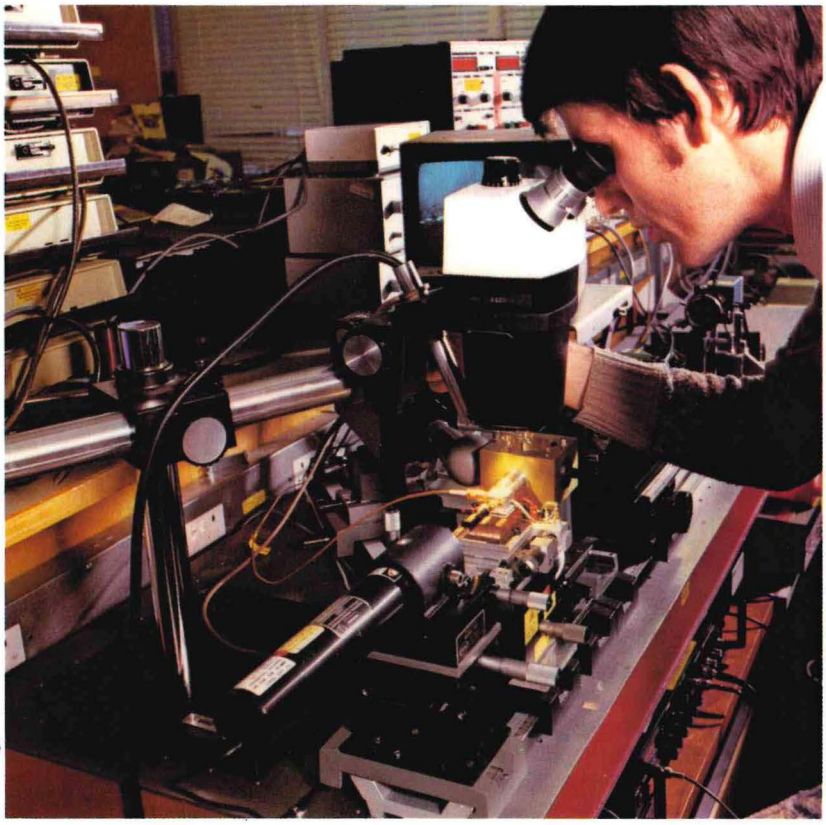
All fibres are dispersive so that the velocity with which a pulse travels depends on the wavelength of the light. Since the pulse is made up of a spread of wavelengths (often far greater than the Fourier spectrum of the pulse because of the linewidth of the optical source), each part of the pulse spectrum travels at a different velocity with the result that the pulse broadens as it travels. This dispersion, usually called 'chromatic dispersion', has a magnitude which depends on the centre wavelength of the pulse and on the range of wavelengths present in it.

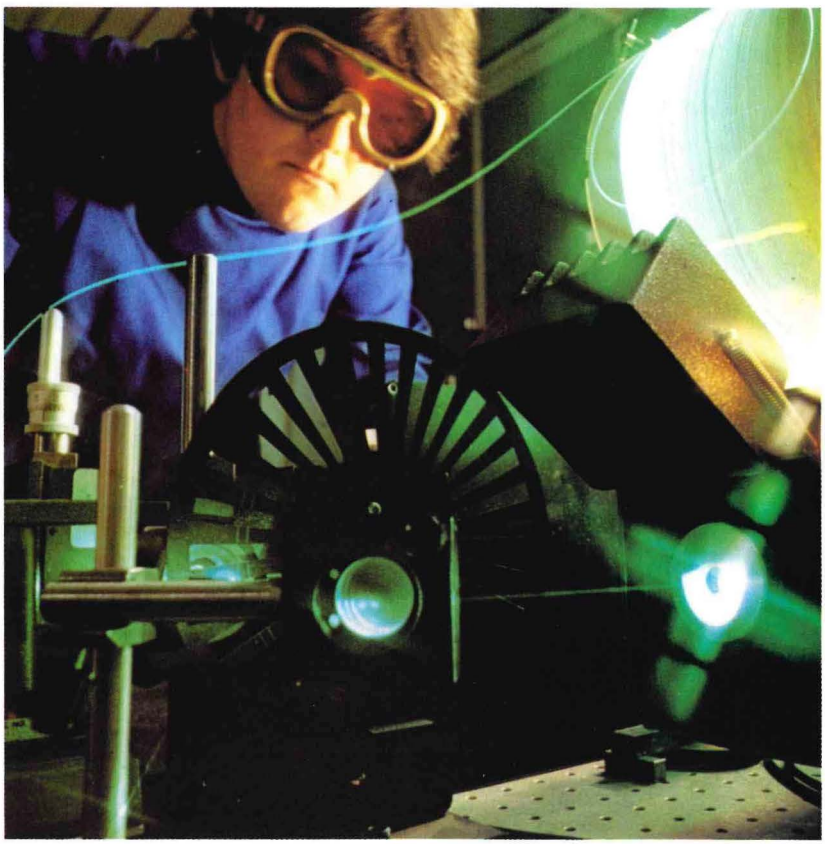
Chromatic dispersion can interact with the self-phase modulation caused by an intense pulse, to produce either pulse narrowing or broadening. If the centre wavelength of the pulse is below about 1.3 microns, the rear of the pulse, which has a shorter wavelength, travels more slowly than the front so that the pulse broadens quickly. If the centre wavelength, however, is above 1.3 microns the opposite happens, and the pulse can be compressed as it travels down the fibre.

Soliton

Under certain circumstances, the pulse can attain a stable shape and frequency distribution and the resulting soliton can travel along the fibre without any dispersion over very long distances. In a real fibre, attentuation will eventually take energy away from the soliton pulse so that the non-linear effect becomes negligible, and the pulse then broadens but generally to a lesser extent than would have occurred with linear dispersion alone.

In practice, a soliton pulse is only a few hundredths of an inch wide compared with a pulse in a 140 Mbit/s system which is nearer five feet wide. It is possible, therefore, that there could in the future be digital transmission at rates of 100 Gbit/s. Other applications include the measurement of fibre dispersion properties ▷





Dr I Garrett is head of optical phenomena and new technologies section at British Telecom Research Laboratories, Martlesham.

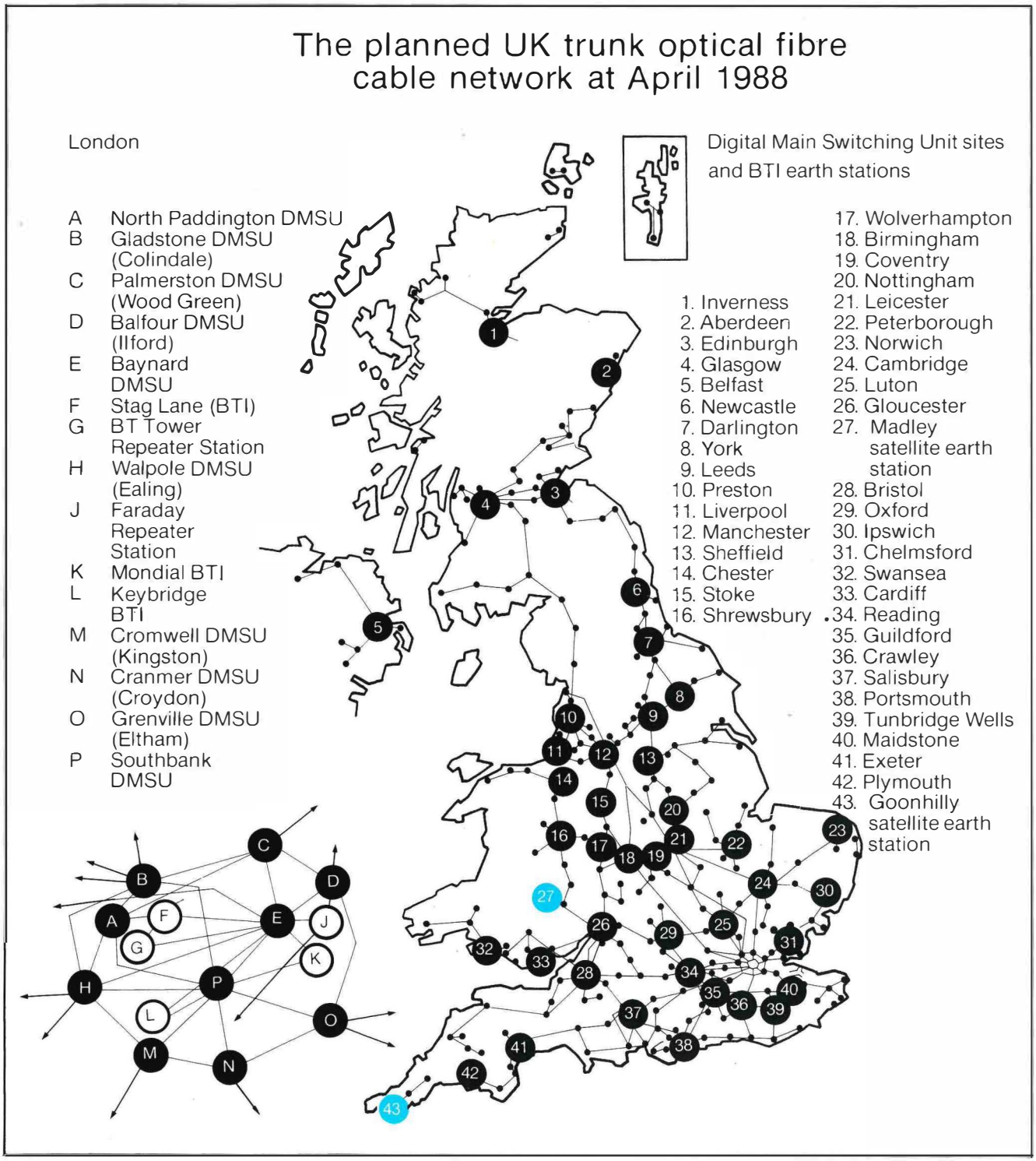
and the fascinating 'soliton laser' which was demonstrated recently at AT&T Bell laboratories.

Lasers are often controlled by feeding back some of the optical output power. If the laser is pulsed repetitively at a frequency equal to the time for a pulse to travel to a reflector and back, the optical feedback is synchronous with the pulsing and narrow, intense pulses are emitted at a frequency which can be controlled.

In the soliton laser, the path between the laser and the reflector is a fibre and the pulses are intense enough to produce solitons. As a result, the laser may become locked to these stable, narrow soliton pulses and in principle the repetition rate of the pulses can be controlled by altering the distance to the reflector. This could be a way of generating 'clean', narrow pulses which could be switched or modulated to form a digital data stream for very high data rate transmission systems.

Such a laser source could also be useful in fast optical logic, measurement systems, and for optical signal processing. So far, soliton lasers have been built on colour-centre lasers, but it may be possible to use semi-conductor lasers similar to those already used in optical fibre transmission systems. Martlesham's work on solitons, and on the soliton laser, may well enable British Telecom to make use of the huge capacity of the single mode glass fibres currently being installed in the networks. ⓣ

The planned UK trunk optical fibre cable network at April 1988



Hull–the lone survivor

CITY OF KINGSTON UPON HULL telephone DEPARTMENT

The Hull telephone network is today unique in UK telecommunications in that it is run not by British Telecom but by the local city council. Here telephone manager Ray Matthews traces a fascinating success story which began 80 years ago.

The second half of the 19th century was remarkable for its range of inventions and discoveries not least of which was the development of communications through the telegraph and later the telephone. In those early days, however, there was no overall control and, as with the railways a generation or so earlier, many companies set themselves up hoping to secure a profitable share of the market.

The initial formation of a telephone company in Britain was usually based on the possession of rights in some patent for a new design of transmitter or receiver which was thought not to infringe the Bell patents. Litigation over those patents was the most usual cause of failure of these companies and then their consequent absorption by the Bell companies.

Matters were complicated further in 1880 when legal action was taken by the British Government against the United Telephone Company which had just been formed by the amalgamation of the Bell and Edison companies. The Government's contention that the telephone was a telegraph within the meaning of the Telegraph Act 1869 was upheld by the Court, and thus the Post Office acquired control over all telephone activity in Britain. This it exercised by giving licences to companies in return for a ten per cent royalty on their business in the UK.

Monopoly

The pattern of company formation, amalgamation, reformation and the setting up of subsidiaries, not to mention Post Office activities, was very complicated, but by 1889 the National Telephone Company (NTC) had almost a monopoly of private company local telephone business.

It was against this background that the Hull City Council's undertaking was formed. As the result of agitation by the Corporation of Glasgow for municipal authorities to be licensed to set up telephone undertakings, a Select Committee of the House of Commons was formed in 1898 and reported in favour of local telephone systems being operated by municipalities in competition with the NTC. The recommendation of the Committee was accepted, and the Telegraph Act of 1899 was passed conferring upon municipalities powers to use rates and borrow for the establishment of ▷

Hull's cream coloured telephone kiosks are one of the most obvious and distinctive features of the Department.

local telephone systems under licence from the Postmaster-General.

There were 1,334 bodies who could have taken out a licence, but only 55 wrote to the Post Office. Thirteen took out a licence, but only six – Brighton, Glasgow, Hull, Portsmouth, Tunbridge Wells and Swansea – set up telephone services. Tunbridge Wells promptly sold out to the NTC and Swansea followed suit in 1907. The Post Office bought out Glasgow and Brighton while Portsmouth eventually sold out in 1913. Thus only Hull survived.

Hull City Council was pressed into applying for a licence by the Hull Chamber of Trade in 1899, and a special committee was formed to deal with the matter. Eventually a licence to operate a service for ten years was granted in August 1902.

Between 1902 and 1978 the Department successfully negotiated five licences to operate a telephone network under the Telegraph Act of 1899. The last of these licences, issued in 1978, covered a term of 18 years and brought major changes in the conditions under which the Department operated. The ten per cent annual royalty payment was revised and an annual licence fee was set based originally on £100 and updated annually in proportion to changes in the Retail Price Index. Another important change was that the Department had to give up the five per cent revenue it had previously received from all the trunk traffic originated in the area.

The Department's response to the British Telecommunication Act 1981, under which the supply of certain apparatus connected to the public network is open to free competition, was rapid and extensive. Reorganisation of the Department into product-related divisions took place immediately and its sales force was geared to provide customers with advice and services on the ever-growing products available to both the residential and business customer. In advance of Government legislation, the Department opened a phoneshop in preparation for 'over-the-counter' selling.

Negotiations

The introduction of the Telecommunications Act 1984, however, meant almost a year of new and detailed negotiations taking place with the Government's new licensing authority, the Department of Industry. These were concluded last August when the Secretary of State granted the Hull City Council a licence to cover a period of 25 years, expiring in 2010.

The conditions of the licence are almost identical to those granted to British Telecom, other than clauses relating to maritime and international services.

Hull Telephone Department has long recognised that an efficient modern telecommunications system is an essential part of commercial and industrial infrastructure. There is an ever-increasing demand by business for access to the latest communication technology and this trend is particularly marked with the advent of digital technology for both voice and data communications.

In 1983, the Department embarked on a five year modernisation programme aimed at major improvements in the telecommunications services and facilities provided in the Kingston-Hull area.

An invitation to tender attracted worldwide attention in 1983 and bids came from six consortia. The adjudication was based purely on technical and commercial considerations, and a long-term contract for the supply of System X was entered into. The handover of the first of the System X exchanges took place late last year.

First stage

The exchange, at the Department's city centre headquarters, is part of the first stage of the System X programme which will provide for 37,000 lines at three exchanges. Orders have been placed for delivery early next year of a further 46,000 lines at all other exchanges. By the end of 1988, all Strowger equipment will have been replaced, the TXE2 mobiles will have been retired leaving only two Crossbar exchanges to be replaced in the future. A new Operations and Maintenance Centre for System X exchanges has also just become operational.

As for telex, a new 1,000 port exchange with

When ships berth at Hull, they can 'plug' into the telephone network by means of a special dockside connector.

Hull's first exchange was opened in November 1904.

Two years later the City Council was faced with a momentous decision. An offer had been received from the National Telephone Company (NTC) to buy the Council system. The Telephones Committee, mindful of the fluctuating fortunes of other municipal telephone undertakings reluctantly recommended the Council to accept the offer. But at a special meeting in 1906 the Council referred back the Committee's resolution and it was the casting vote of the chairman which eventually decided the future of the Hull Telephone Department.

By 1911, Hull Telephone Department's area included five rural exchanges and its subscribers numbered nearly 4,000. But then major changes occurred and private companies, including the NTC had their licences withdrawn and the Post Office took control of all telephone activity in the country. The only exceptions were the municipally owned undertakings at Hull and Portsmouth.

At the time of the Government's take-over of private companies, Hull's licence was under review. The Post Office offered a renewal conditional upon the Council buying all the ex-NTC plant in the area for a sum of £192,423. The Post Office also agreed to relinquish its small local interest. Again it was a crucial decision for the Council to take, and one that attracted considerable local attention. The Council voted 42 to 12 in favour of the offer and thus the Corporation became the sole controlling telephone authority in the district.

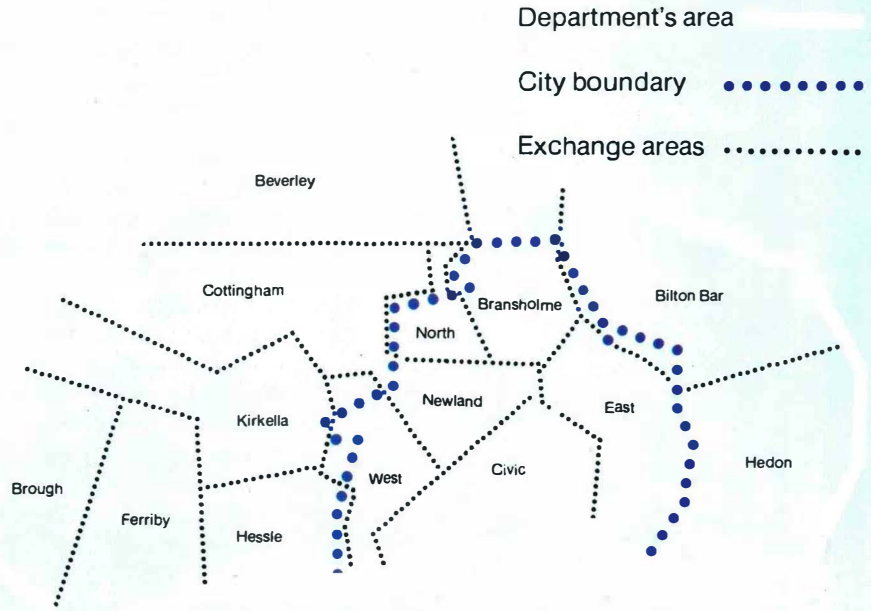
Conditions

With the new licence, Hull, whose area of 120 sq miles had already been determined by the conditions of its first licence, and covered the same area as the NTC's Hull operation, took over the responsibility of providing service for more than 12,000 subscribers.

An important stage in the technical development of the Department came in 1922 with the introduction of automatic telephony and the opening of the first automatic exchange. Step-by-step switching was adopted in 1934 and eventually installed throughout the area. The old Western Electric Rotary equipment was finally phased out in 1975, and, as it was the last of its type in the UK, part of it was handed to the South Kensington Science Museum.

Recorded information services, with the exception of the speaking clock, were first introduced to the UK when Santa Claus came on the telephone in Hull in 1952. The Department currently runs 14 services, including a job line and two local radio lines.

The Department's headquarters and main exchange is situated in the city centre in a building opened in 1964. It also houses the switchboard for local services and the area's national and international outlet is through British Telecom's group switching centre, adjoining their main exchange. The area's digital network access will be initially via the British Telecom Digital Main Switching Unit at Sheffield.



Map showing the 310 sq kilometres administered by Hull Telephone Department, local exchange areas and the city boundaries. The area is unaltered since the boundary was determined by the first licence conditions.

Maintaining customers' PBX equipment is an important role of Hull Telephone Department's technicians.

single channel voice frequency (SCVF) working, broadcast and conference facilities, and store and forward capabilities as standard features, has been ordered and will be available by the middle of this year. The requirement for a new telex exchange is a result of the Public Telecommunications Operator's licence granted to Hull under the 1984 Telecommunications Act which enables the Telephone Department to provide telecommunication network services in the Hull Area.

Also planned for this year is a packet switching exchange to handle data transmissions in conjunction with an expanding fibre optic cable network enabling industry in the area to have a wider range of services, including 64 Kbit/s and 2 Mbit/s high-speed data transmission. A complete new range of test and maintenance ▷

equipment needed to handle the fibre optic cables and digital transmission equipment has been ordered, and the Department also plans to have a teletex gateway by 1986/87.

Last year, the Centralised Line Testing Equipment introduced in 1982 was enhanced with the installation of a Voice Response System (VRS). In addition, Step-by-Step Central Office Test (SCOT) equipment was installed to help in the maintenance of existing changes during the transition to digital switching. Subscriber fault records are now held on a database and are instantly available to Repair Service Centre staff, providing a further improvement in service.

The main strategic aims of modernisation include the availability on demand throughout the area of 64 Kbit/s and 2 Mbit/s private circuits by the end of this year; the transfer of 65 per cent of business customers to digital exchanges; the provision of digital switching at all exchanges by the end of next year; the provision of a fully interconnected digital transmission network by the end of 1987; and the elimination of all shared service lines by the end of 1988.

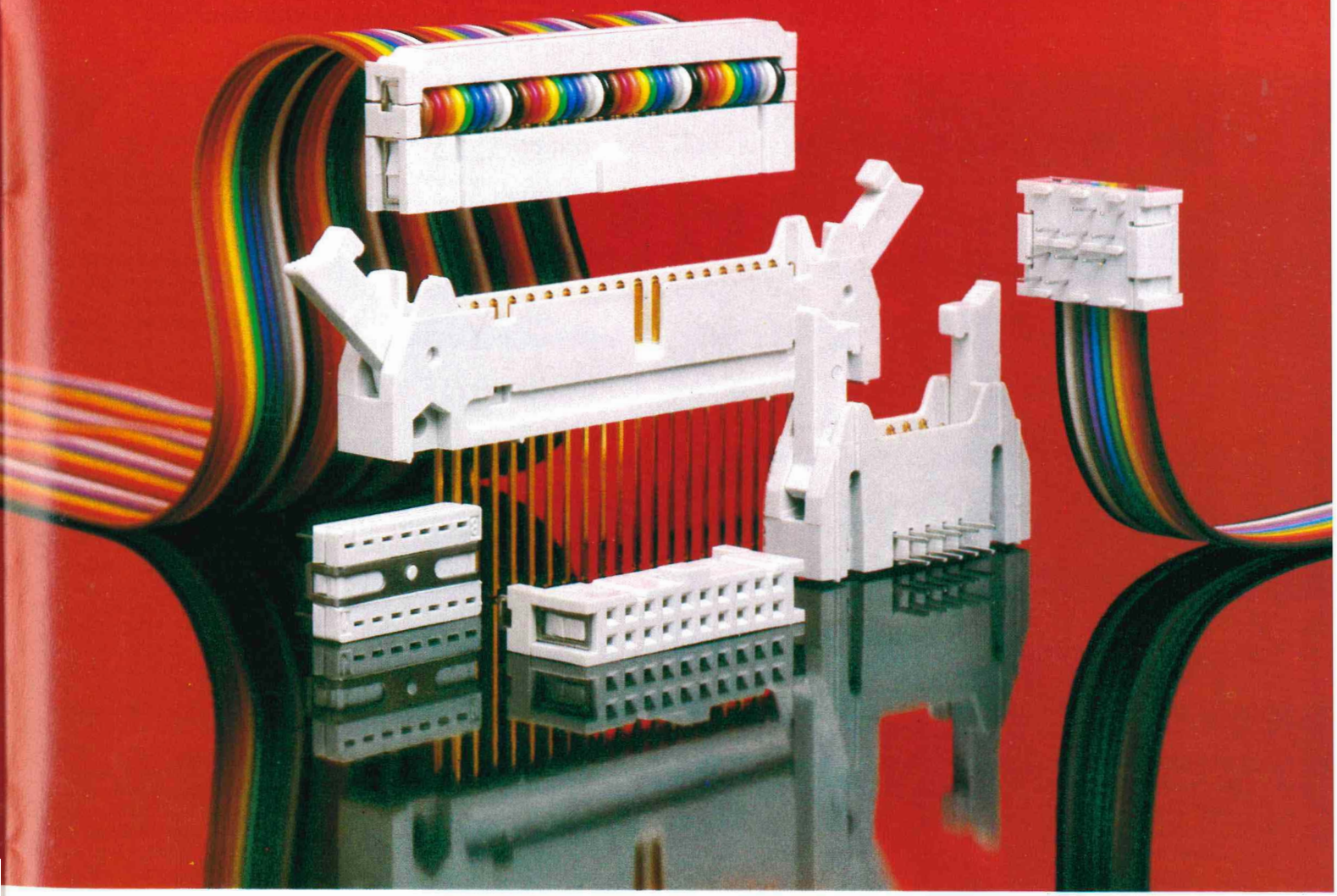
While the Hull telephone undertaking is a department of the City Council, it has always had its own separate accounts and, since its inception, it has never been financed from the general rate fund. It has always been Council policy to put back into the service all the accrued profits of the business and, as a result, the department has always been a viable business. In its dealings with the Council it charges full commercial tariffs for telecommunication services and in turn pays the Council at full cost for all central services which the Council provides, in addition to normal rates on its properties.

Being a department of a local authority has its difficulties when engaging in such a capital intensive business and current limitations arising out of Government policy on the Public Sector Borrowing Requirement equally apply to the Department as to any other sector of the City Council's activities. In spite of recent problems, however, the capital programme has been maintained and the future of the Hull Telephone Department seems assured. The Council Chairman whose casting vote made it possible all those years ago was clearly a man of vision . . . Ⓣ

Mr Ray Matthews has been telephone manager at Hull for more than 13 years.

Exactly 80 years after the opening of Hull's first exchange, the hand-over took place in November of the city's first System X exchange. Left to right are Mr E Clark, managing director, Plessey, Cr Mrs F Brody, Lord Mayor and Mr F Kent, Hull project manager.

Total Connector Capability



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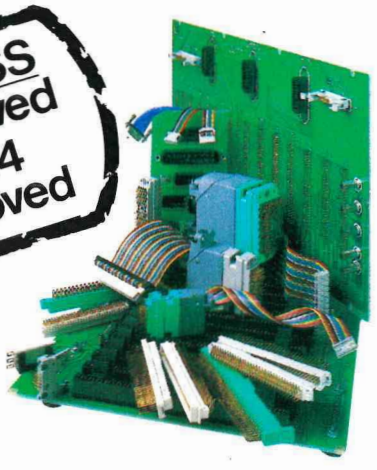

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Talking to computers

Computers which recognise the human voice are to be developed in a £2 million research project headed by British Telecom's Research Laboratories at Martlesham. The study, which will run for three years, will be undertaken in collaboration with Logica and Cambridge University, and is being funded by the Alvey Directorate.

The aim of the project is to simplify the use of computers by non-technical people, particularly for tasks such as searching databases. Speech has long been recognised as the most natural and convenient means of communicating with computers, but at present computers can only understand simple, one-word commands. Voice recognition at the man-machine interface (MMI) would enable users to give spoken commands.

To be useful to non-specialists computers must also be capable of conducting sensible conversations to clarify users' requirements and explain what they are doing.

British Telecom Research Laboratories (BTRL) scientists will be providing expertise in the use of Intelligent Knowledge-Based Systems (IKBS) for dialogue control and man-machine interaction will be analysed by the Human Factors division of BTRL so that results of early trials can be used to refine the dialogue.

Miami cargo deal

A £1.5 million contract has been won by British Telecom's commercial computing business – the National Data Processing Service (NDPS) – to supply software for a cargo clearance scheme to be introduced at Miami International Airport and the Port of Miami.

The prime contractor, Computer Sciences Corporation (CSC), has a four-year contract with Dade County, Florida – responsible for Miami's air and sea ports – with annual renewal options which can extend it to April 1992. CSC and NDPS have previously joined forces to develop cargo systems for major airports in Britain and France.

When it begins operations next winter, the Miami International Cargo System (MICS) will be the first fully integrated cargo clearance system in the United States.

It will be based on the highly successful ACP80 (Air Cargo Processing in the 80s") developed by NDPS to serve Britain's Heathrow, Gatwick and Manchester airports. These airports account for about 90 per cent of Britain's international air cargo traffic.

With its ability to reduce paperwork and speed up cargo clearance, the Miami international cargo system will be an important element in plans to continue the expansion of the area's foreign trade.

Emergency calls

British Telecom donated all profits from calls to its Discline service on 20 December to the Ethiopian Appeal.

For most of the day the record-breaking Band Aid single, 'Do they know it's Christmas?', was featured on Discline and the charity day is expected to raise around £10,000 for Ethiopia in calls alone.

About 90 million calls are made each year to Discline, the second most popular of British Telecom's Guidelines after Timeline, the Speaking Clock.

Teletrade success

Teletrade, British Telecom's overseas equipment sales division, has won contracts totalling £5 million from Telemalta, the Maltese telecommunications authority, and the Zimbabwe Posts and Telecommunications Corporation.

Both contracts are for the supply and installation of telephone exchange equipment once in use in the United Kingdom network and refurbished to full operational efficiency.

The Telemalta contract, worth £1 million, is for an extension to the existing network of automatic telephone exchanges. When fully installed, the equipment will boost Telemalta's domestic system by 11,000 exchange lines, a ten per cent increase over the present capacity.

Valued at £4 million, the Zimbabwe contract is for the supply of 50 small-capacity automatic exchanges to replace existing manual exchanges in the country's rural network. ▷

Time for a change

Brian Cobby, the new voice behind the speaking clock warms to his new work soon after winning British Telecom's golden voice competition. On hand to offer a few tips is his predecessor Miss Pat Simmons who is 'retiring' after more than 20 years of telling the time to the nation.

Brian, an assistant supervisor at Withdean Exchange, Brighton, also received a cheque for £5,000. He was the only man among the 12 finalists all of whom were regional winners.

Runners-up were Faith Hammond, a telephonist at Lowestoft and Christine Coad, a clerical officer in Middlesbrough, who received cheques for £2,500 and £1,000 respectively.

The search for a new voice began last June with nearly 5,000 entrants. For the final, the 12 hopefuls all had to record a test piece – "At the third stroke it will be nine fifty-nine and twenty seconds".

Judges were British Telecom vice-chairman Jim Hodgson; actress Susan Hampshire; actor Robert Morley; Pat Simmons herself; and Frank Bough, the BBC Breakfast Time presenter.

The new speaking clock is digital, has no moving parts, is easier to hear, and is more reliable and accurate than the old one.

Fast fault checks

Automatic line test equipment worth £20 million is to be bought by British Telecom to speed telephone fault detection and repair for about 10 million customers.

A programme to install the equipment in about 100 of British Telecom's 360 repair service controls begins next month and by 1988 all 360 RSCs will be similarly equipped. Customers' lines and equipment will be automatically tested overnight to pinpoint degradation before it develops into faults which could affect telephone service.

The equipment will also be operated by customer service officers (CSOs) to test lines reported faulty by users dialling 151. The calls will be increasingly answered by women, many of them former telephonists who have been specially retrained. There will eventually be 3,000 CSOs, forming the front-line staff of a total repair service workforce of 24,000.

As part of the modernisation programme, about 200 RSCs have been converted to computer administration, or are awaiting commissioning. The remaining 160 are expected to be computerised by the end of the year.

The second stage of modernisation will involve automatic microprocessor-controlled test equipment which is to be integrated with the administrative computer to enable CSOs to use their visual display units to access both.

In many cases, the CSO will then have enough information to estimate how long it will take to repair the fault, and will often be able to arrange an engineer's visit.

As well as making routine night-time tests, the equipment can also repeatedly test a line subject to intermittent faults. This will help to eliminate engineers' repeat visits to customers' premises.

Triple success

The winter has proved a period of triple success for Merlin – British Telecom Business Systems.

First, the Midland Bank and its subsidiary Thomas Cook, decided to use Merlin Fourth Generation modems to equip the branch data network which forms part of the Midland Group's private packet-switched network – MIDNET. The contract is valued at more than £3 million and is the largest of its type gained by British Telecom for data communications.

The modems will be used to link over 1,600 branches throughout England and Wales to the MIDNET network.

Secondly, the popular and versatile Monarch phone system has notched up its 10,000th installation just four years after the first was put in. This latest landmark was achieved at Sony (UK) Limited's newly-built National Operations Centre at Thatcham, Berks.

Finally, now that the British Telecom share offer is completed and constraints are lifted from public statements about future activities, Merlin has announced its position as the UK distributor for Tonto, the new personal information centre. This is British Telecom Merlin's version of the recently announced ICL product whose development was aided by significant contributions from British Telecom development engineers.

Tonto is specifically developed for the business user who requires a multi-task desk top terminal which is responsibe to the many and varied office needs of today. While Tonto is likely to have obvious attractions for larger organisations it will also have considerable appeal to small businesses and self-employed individuals with communications and computing needs.

BTI agreements

British Telecom International (BTI) has reached agreement with two United States companies to operate both-way telephone services between the UK and the USA. The companies concerned are MCI Communications Corporation and GTE Sprint,

MCI is a long established carrier in the USA, having provided long distance voice telephony services there since 1969, and is now the second largest long distance telephone carrier in the USA after AT&T. GTE Sprint is a subsidiary of the GTE Corporation, one of America's leading suppliers of telecommunications services and equipment.

Until now, BTI's international direct dialling (IDD) service with the USA has been provided exclusively with AT&T Communications.

British Telecom International is responsible for providing telecommunications services to 217 countries worldwide, as well as to ships at sea and oil and gas production platforms in the North Sea, through a network of satellite, submarine cable and microwave radio systems.

Digital standard

A new signalling standard for use between digital call-connect systems (PABXs) and System X telephone exchanges has been announced by British Telecom.

Called DASS2 – digital access signalling system no. 2 – it is intended for use on the next generation of PBXs linked to British Telecom's integrated services digital network (ISDN). Its adoption will enable extensions on integrated services PBXs to be used as digital information technology workstations.

ISDN, which is based on the System X 'family' of digital-electronic telephone exchanges, will set up digital communications paths between customers for data, text, facsimile and graphics.

Customers will connect into ISDN through integrated digital access (IDA) links in the local network.

IDA is available in two sizes to meet the wide range of customers' requirements. One size will serve PBXs (called multi-line IDA) and the other size, for smaller installations, is known as single-line IDA which will provide two parallel digital paths, one capable of being used for speech or data and operating at 64,000 bits a second (64 kbit/s) the other for data only, at 8 kbit/s.

New appointments

Dr Peter Troughton, 41, has been appointed managing director, British Telecom Enterprises. He was previously director British Telecom London and also had certain operational responsibilities throughout the organisation's Local Communications Services Division.

Dr Troughton is well known in London for his dynamic leadership and his involvement with technological projects, such as the City Business System, the dealer board successfully marketed within Britain and overseas.

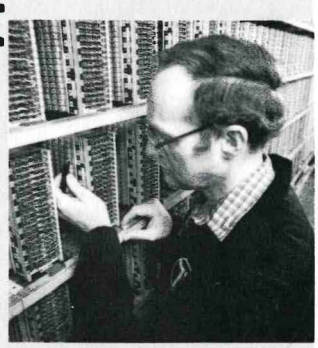
Mr Clem Jones, 43, has been appointed head of public data networks for National Networks, and will be responsible for the continuing expansion of Packet SwitchStream and the range of MultiStream facilities.

Mr Jones, joined British Telecom from ICL where he was divisional director for the Networking Business Centre. In addition to his responsibilities for marketing, he has also been closely committeed to the adoption of Open Systems Interconnection standards.

Mr Roger Bates, 44, joins British Telecom as business director, Trunk Services, National Networks. The post includes responsibility for identifying and developing new products and services for the trunk network, as well as the preparation and maintenance of the Trunk Services business plan.

Mr Bates was formerly marketing director of Philips TMC, the telephone instrument and switching systems manufacturers. His career brought him into close contact with British Telecom, particularly with System X and digital transmission systems. He was also a director of Plessey Telecommunications (Exports) Ltd and served as an alternate director on the board of British Telecommunications Systems.

Improved jack test equipment



An improved range of jack test equipment featuring five-point lightning and mains protection facilities has been launched by British Telecom. A development model is currently undergoing field trials at the new exchange at Howard House, Norwich, which will become operational in spring.

The highly-durable 44 – 47 range replaces 37 – 40 equipment and fits existing rack and pre-rack main distribution frames. It features front-facing jumper terminations which greatly simplify the engineer's task by enabling convenient and solderless connections to be made with a special termination tool. Teeing facilities avoid disturbing existing connections and help with the difficult job of identifying circuits. Wire-wrapped posts remain a standard size and existing British Telecom tools for cut and wrap, and strip and wrap, can be retained.

A selection of protection modules is available to suit individual exchange systems and can be colour-coded for easy identification. A circuit can be tested, without the module being removed, with a module test link and headphones. Development work is continuing to produce a true five-point protector later in the year.

Pictured is construction engineer Barry Wadham working on the 30,000 pairs development model at Norwich.

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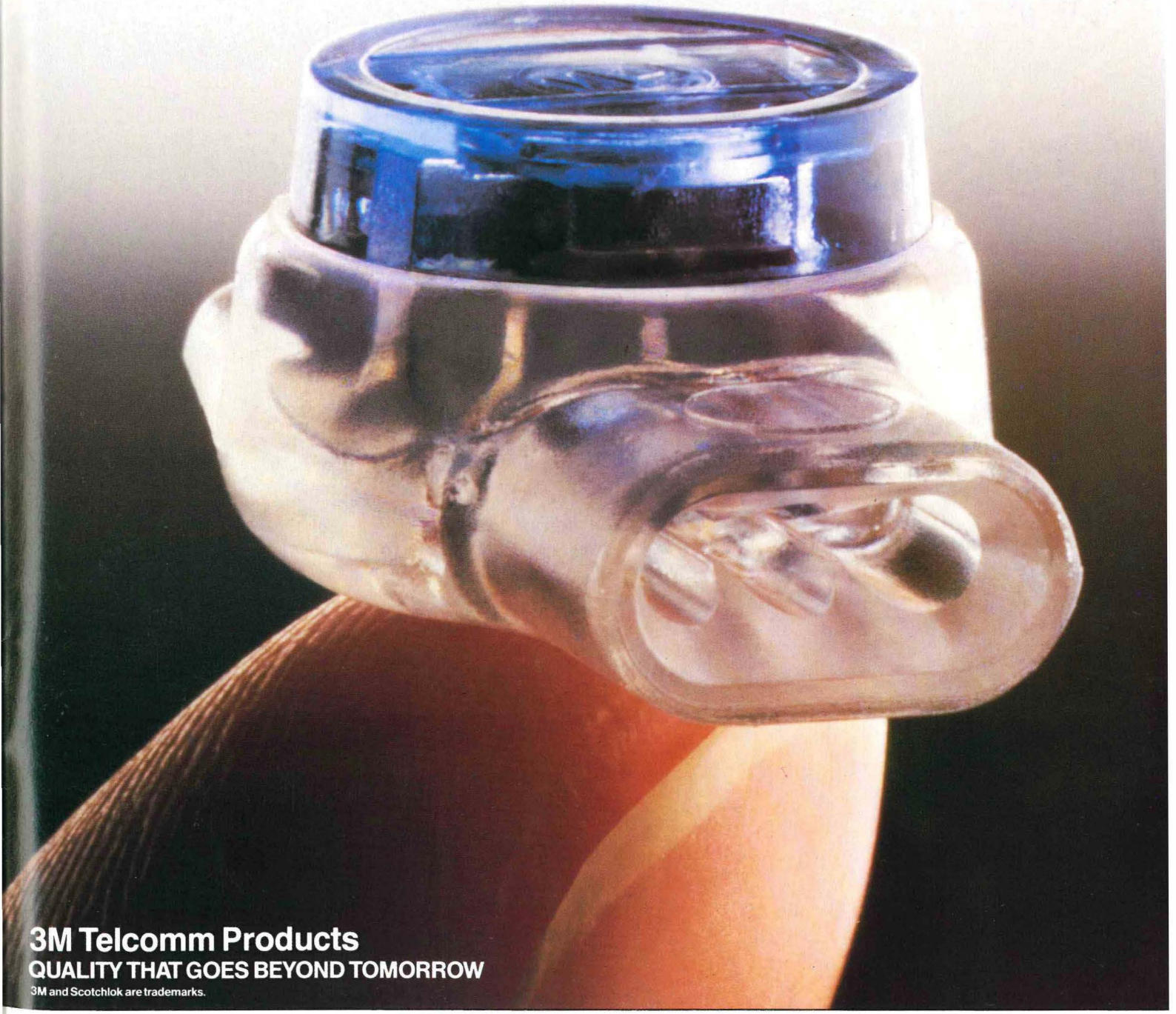

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Halley hotline

British Telecom will be first with day-by-day news of Halley's comet which is currently streaking towards Earth from the depths of the solar system. The Halley hotline was launched in January and the comet will become visible in Britain from the end of the year.

Shop opens

The first new-style British Telecom Shop has opened in Southend-on-Sea, Essex, to sell a wide range of telephones, business equipment and telephone accessories. Customers can also pay their telephone bills at the shop and make general enquiries about British Telecom's services.

The new shop represents a major extension of British Telecom's retailing activities. It forms part of a trial of competitive retail outlets in 'High Street' sites.

Two more British Telecom Shops will be opening soon – in Newcastle and Plymouth – and if they prove popular British Telecom will be looking for further sites.

Compared with these new shops, British Telecom's present chain of 53 Phoneshops are limited operations, mostly sited within department stores or telephone area offices.

The new shop in Southend covers 1,000 square feet of floor space. It will carry a full range of telecommunications equipment and accessories as well as a large range of related goods such as directory indexes and stationery items. The range of phones available for sale will not be restricted to the British Telecom Inphone range and customers will be able to try out equipment before they buy.

Government says 'no'

The Government's refusal to license a proposed joint venture to provide a data network management service was a 'disappointment' to both British Telecom and IBM United Kingdom Ltd.

A joint statement said: 'We believe that our proposal offered the best possible stimulus to the emerging marketplace for value added telecommunications services. The consultation process has clearly demonstrated that there is considerable user interest in the services that the joint venture was proposing.

'The refusal represented, in our view, the loss of an important national opportunity for the UK, since the development of an Open Systems Interconnect (OSI) market and of a bridge between OSI and Systems Network Architecture (SNA) must be based on an assured commercial foundation.'

Access at sea

Direct access to Telecom Gold's electronic mail service is now available to ships operating worldwide. This high seas extension has been made possible through British Telecom International's INMARSAT maritime satellite communications service.

With suitable on-board computer equipment and the adaptation of the satellite communications terminal (the ship's earth station), an authorised Telecom Gold customer can access the full range of Gold features from any part of the world.

The new service is identical to that already offered by Telecom Gold to customers in the United Kingdom who link their microcomputer (or other communicating terminal) to telephone modems or acoustic couplers to send data and information to other terminals over the ordinary telephone network or through British Telecom's Packet SwitchStream data service.

Circus arrives

A microprocessor-based traffic flow analysis system, known as Circus (Central Information Retrieval and Cartridge Update System), is to be installed at more than 60 sites throughout the UK following completion of a £1 million, four-year, multi-phase development project by British Telecom and Scicon Limited.

Circus analyses traffic loading in both electromechanical Strowger equipment and the newer electronic TXE-4 exchanges. Information on peaks and troughs in call rates is used to identify requirements for extra lines and, in the longer term, to determine appropriate sizes for replacement digital exchanges.

Fully automated traffic recorders developed by British Telecom and utilising tape cartridges, will replace manual sampling methods previously used with Strowger equipment. The same units, with Scicon software, will supersede papertape recorders used on TXE-4 exchanges.

No-bleep pager

British Telecom Radiopaging's latest pager provides a unique advantage – it doesn't make a sound. Where normal pagers bleep, 'Silent Page' vibrates and so can be used where bleepers would previously have caused the user embarrassment – in a theatre, cinema or restaurant.

The pager can be pre-set to receive up to four different alerts from four separate locations. A light flashes at different speeds to indicate which location is calling.

Contracts

BGS Systems has been awarded a three year contract by British Telecom for a series of software products to analyse computer performance.

The contract, worth £80,000, will enable BGS to evaluate and upgrade both hardware and software systems as well as solving some of the more mundane tuning issues.

Trend Communications has received a further order worth £4.5 million from British Telecom for its Puma Display Telex Terminal with Mailbox option. This brings the total value of British Telecom orders to nearly £30 million.

You rang, Mr Bell?

There was a special guest at the opening of British Telecom's new phoneshop in Southend – inventor of the telephone Alexander Graham Bell, alias actor Jack Crosby. With him is Eastern Region director Mr Ken Leeson. See 'Shop opens'.

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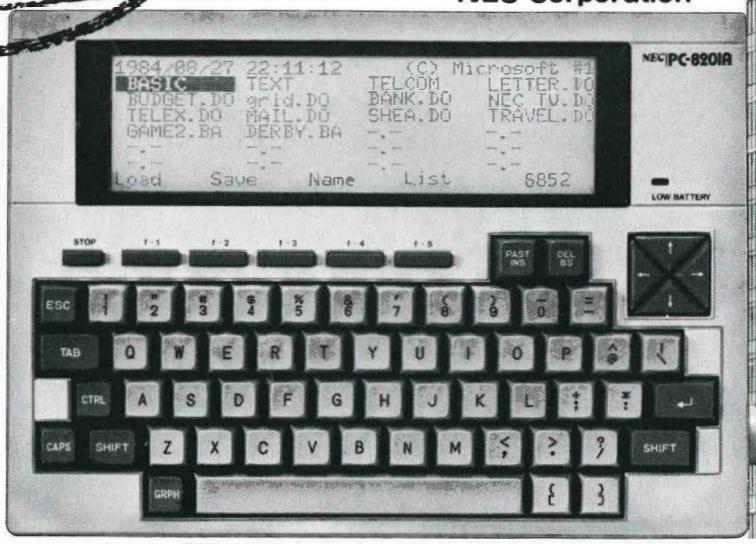

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2. Bloomsbury Crest Hotel, Coram Street, Russell Square, London WC1
   Date: Tuesday 5th March 1985
   Time: 10.00 – 16.00

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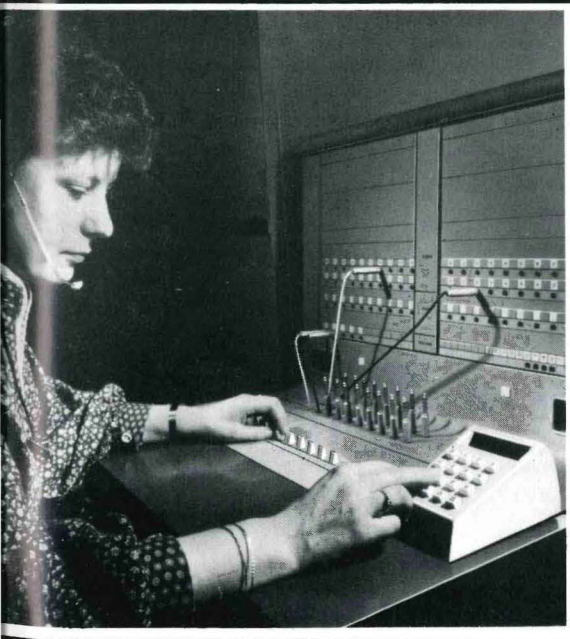

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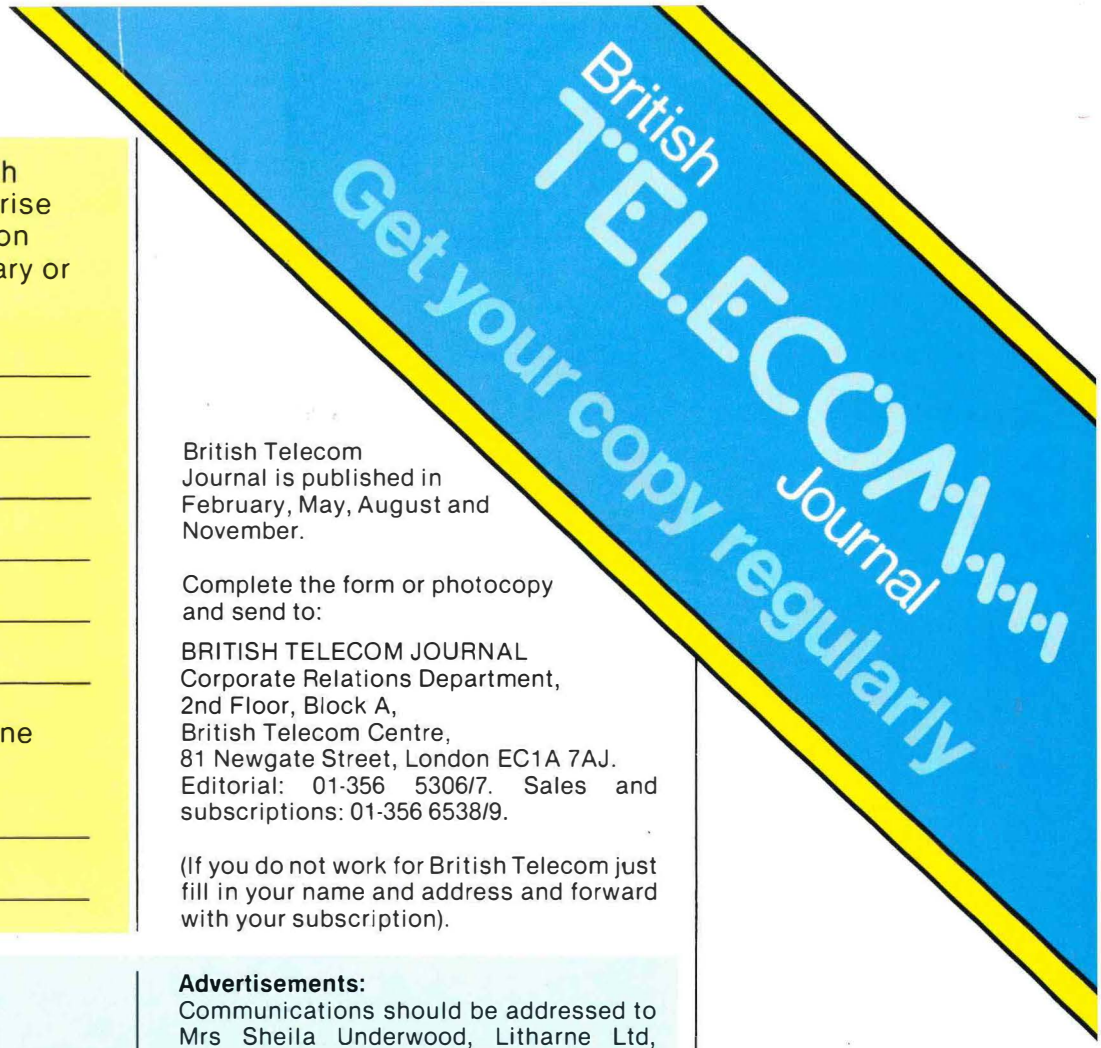

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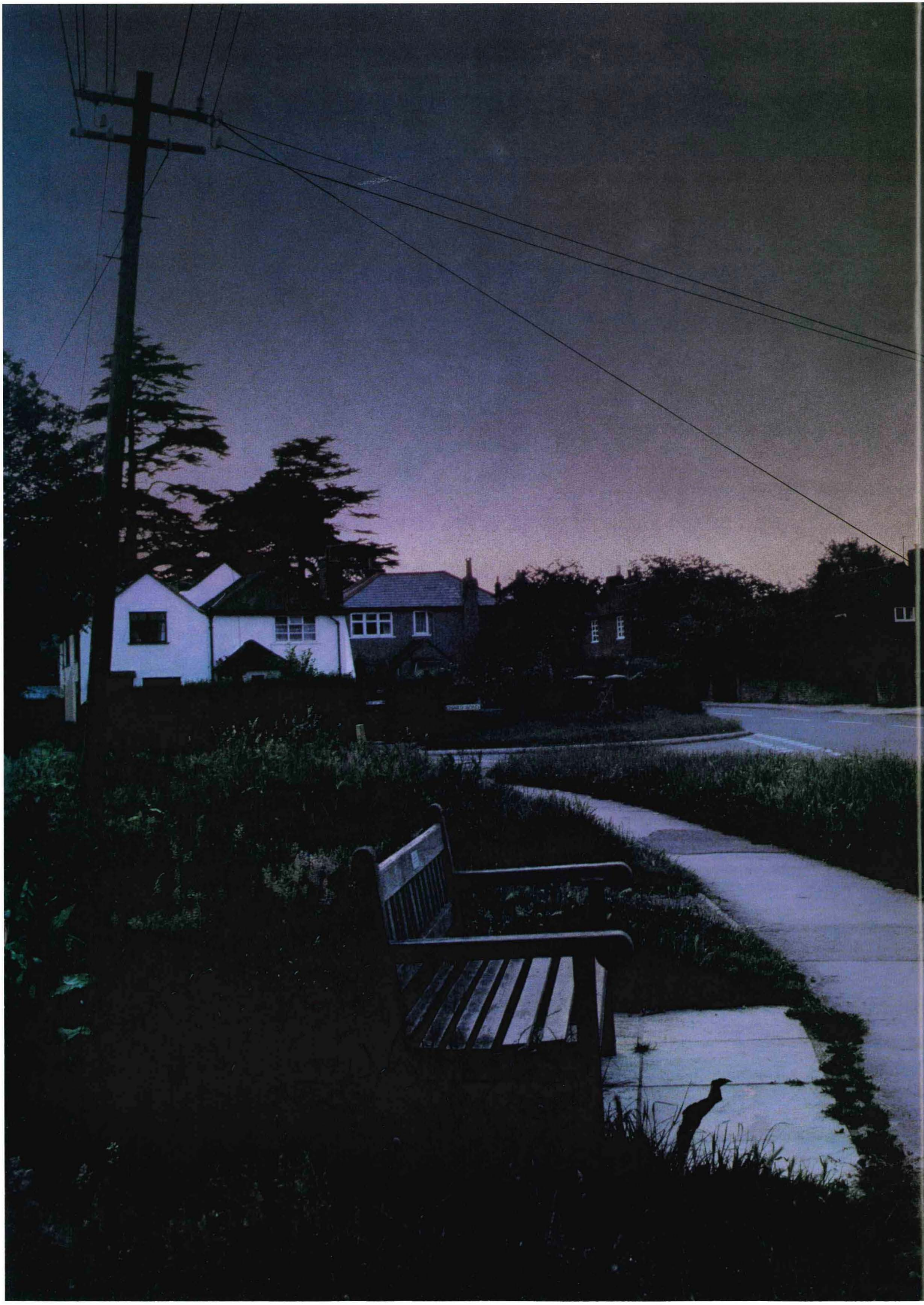

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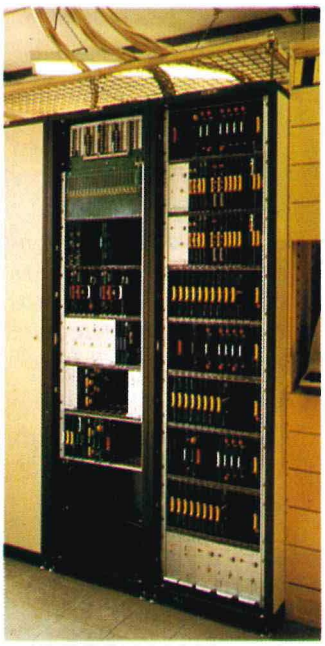

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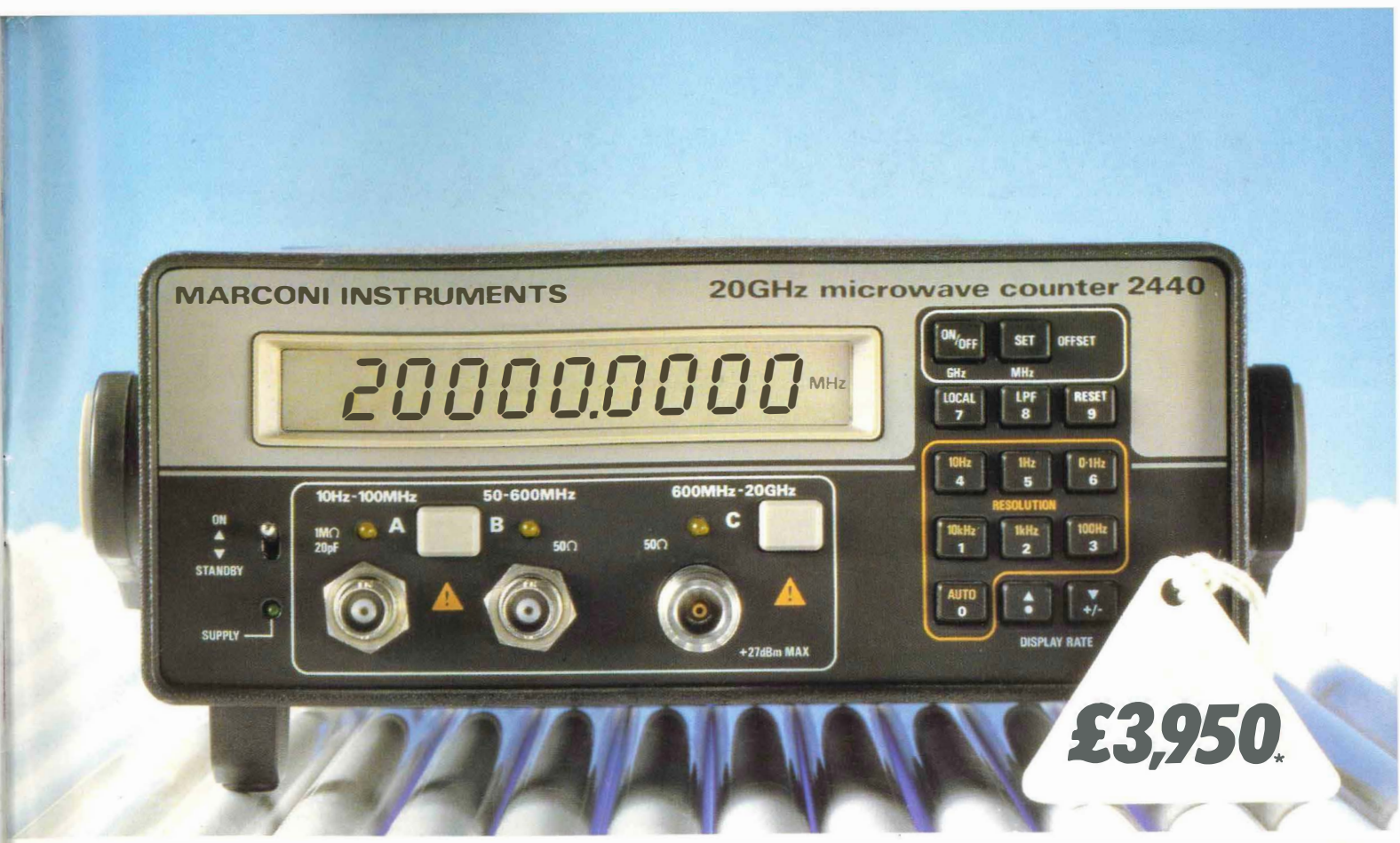

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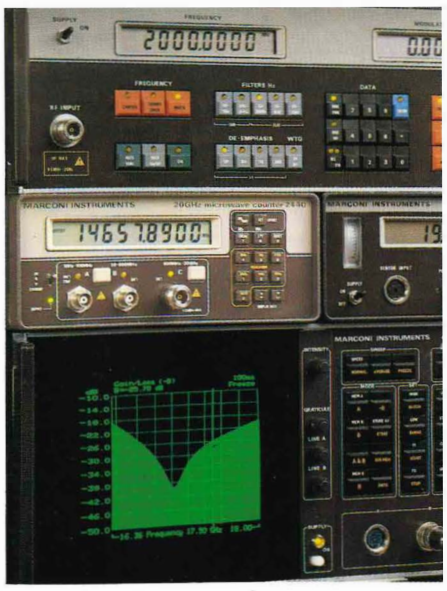

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