

British

Price to BT staff 42p
Summer 1985 Volume 6 Number 2

TELECOM Journal



First 3 phases completed in Florida Lightwave network.

Plessey Transmission Division is right on schedule with its 140Mbit/s Lightwave programme for the United Telephone Company of Florida.

Plessey was awarded a contract in October 1984 to supply 140Mbit/s Lightwave optical fibre system and M34E Muldex systems for Phases 1, 2 and 3 of United's four-year programme. These first three phases, from Winter Park, Orlando to Kissimmee, Fort Myers to North Cape Coral, Fort Myers to Port Charlotte, Ocala to Leesburg and Avon Park to Kissimmee — a total system length of 290 km — were completed on schedule, by the end of June 1985.

Each 140Mbit/s optical fibre system, which includes line terminals, intermediate stations and full supervisory systems, is capable of carrying 2016 telephone channels or the equivalent in video or data on a single fibre pair.



The Phase 4 link will also be equipped by Plessey.

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

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

Today, worldwide, there are over 11,000 km of Plessey optical fibre systems carrying traffic, under installation or on order. In achieving this, Plessey has notched up a string of firsts such as the first optical fibre system put into normal traffic in the UK, the first long wavelength optical fibre system in normal traffic service in the world, Britain's longest optical fibre link, the longest

operational unrepeated optical fibre link in the world and the world's first commercial contract for a 565Mbit/s optical fibre highway.

Phase 4 of United Telephone's programme, the Fort Myers to Avon Park link, will be equipped with the Plessey 565Mbit/s optical fibre systems, each system being capable of carrying 8064 telephone channels or the equivalent in video or data.

For further information, contact Mike Hocking, Transmission Division, Plessey Networks and Office Systems Ltd, Beeston, Nottingham, United Kingdom NG9 1LA. Tel: Nottingham (0602) 254831, ext. 3542. Telex: 37201.



PLESSEY

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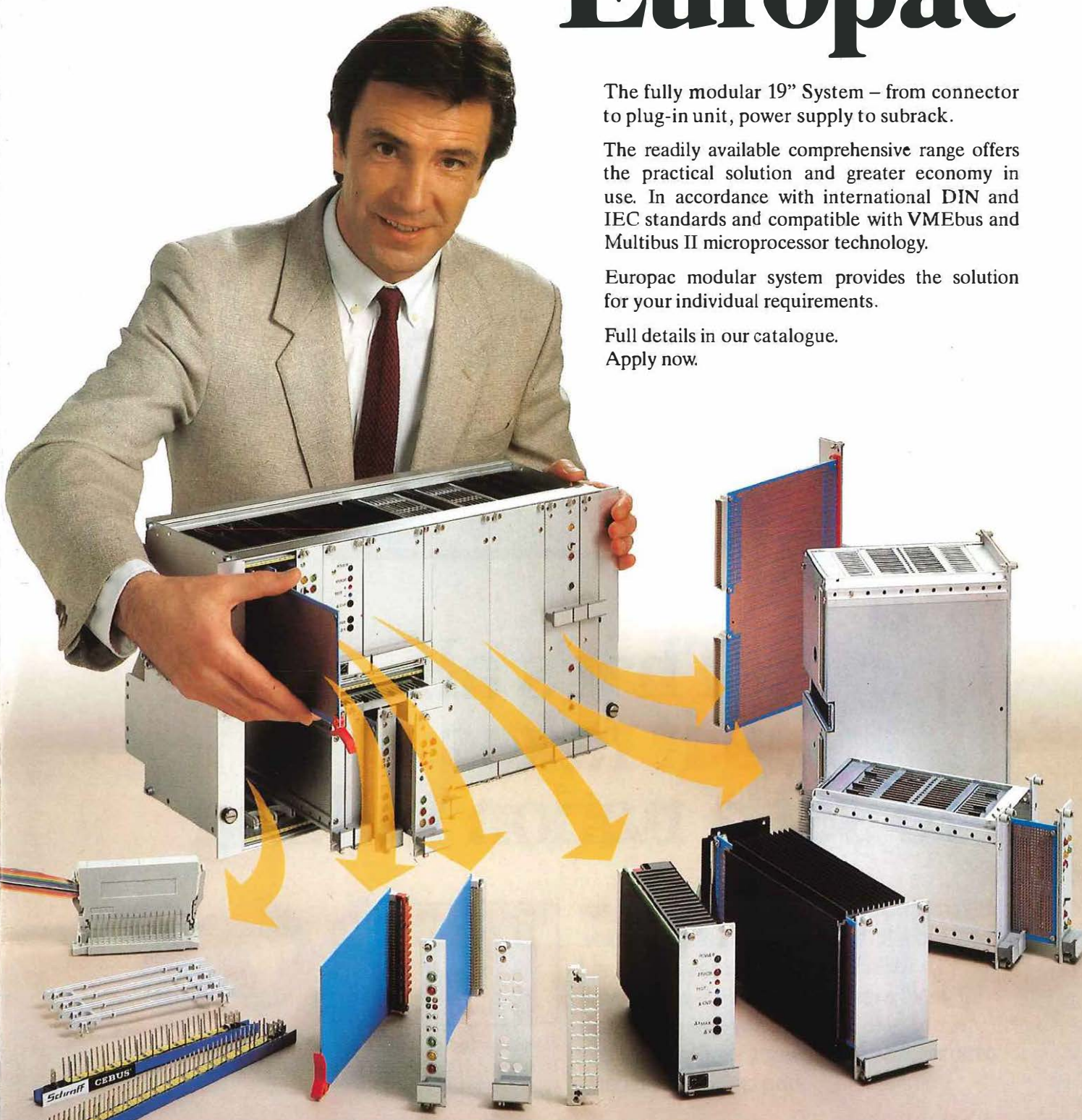
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The fully modular 19" System – from connector to plug-in unit, power supply to subrack.

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Telephone: 01-592 6611. Facsimile 01-592 3876.
Telex: 896216 Drycor G

Now this Plessey payphone can provide a cashless call service.

How do you make a phone call with no money, and no special telephone card? Plessey has the answer with cashless calling.

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

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

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

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

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

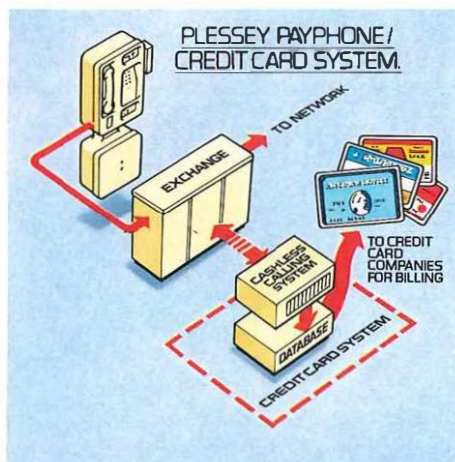
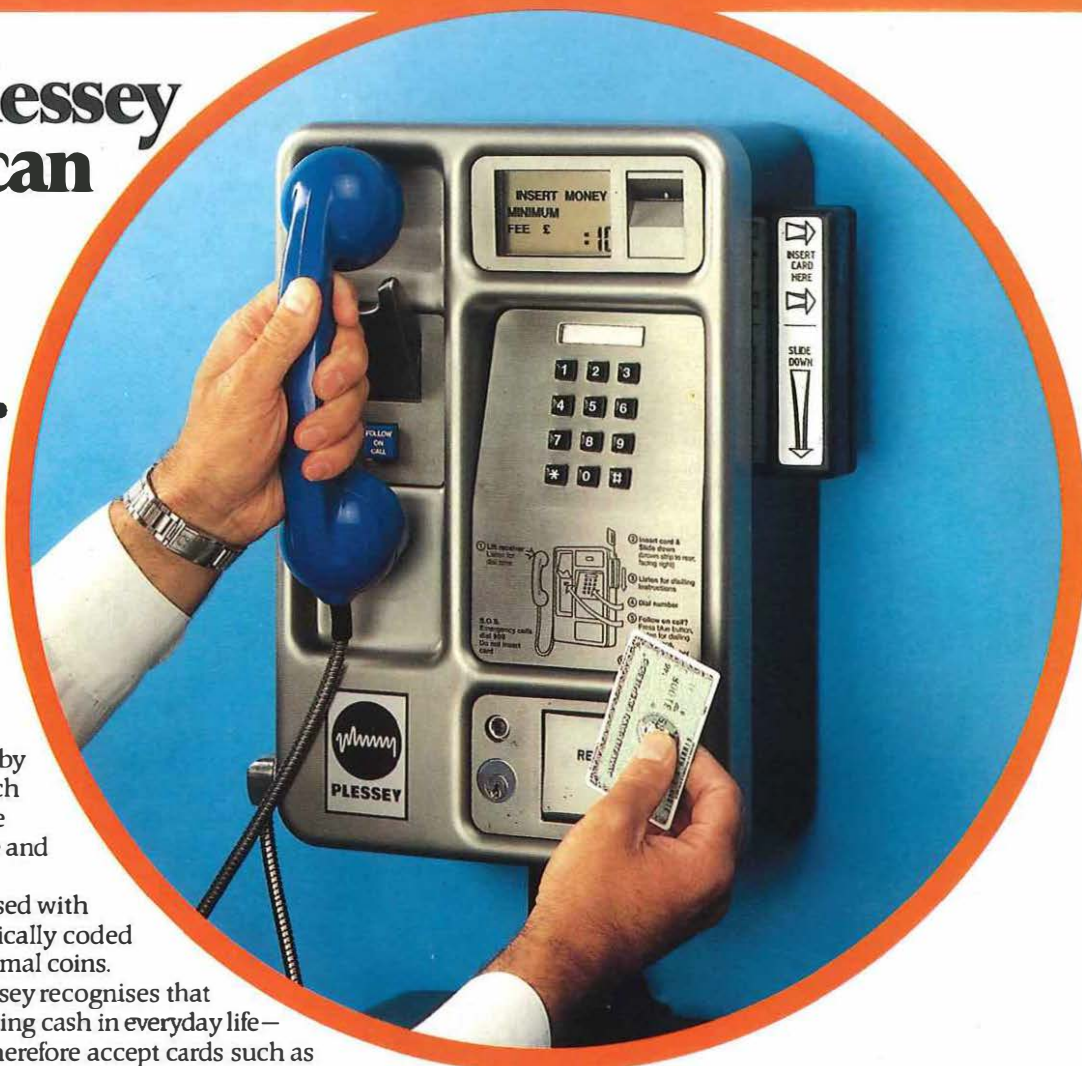
It's just one of a range of cashless calling solutions from Plessey.

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

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

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

The system also automatically compiles a call record for subsequent



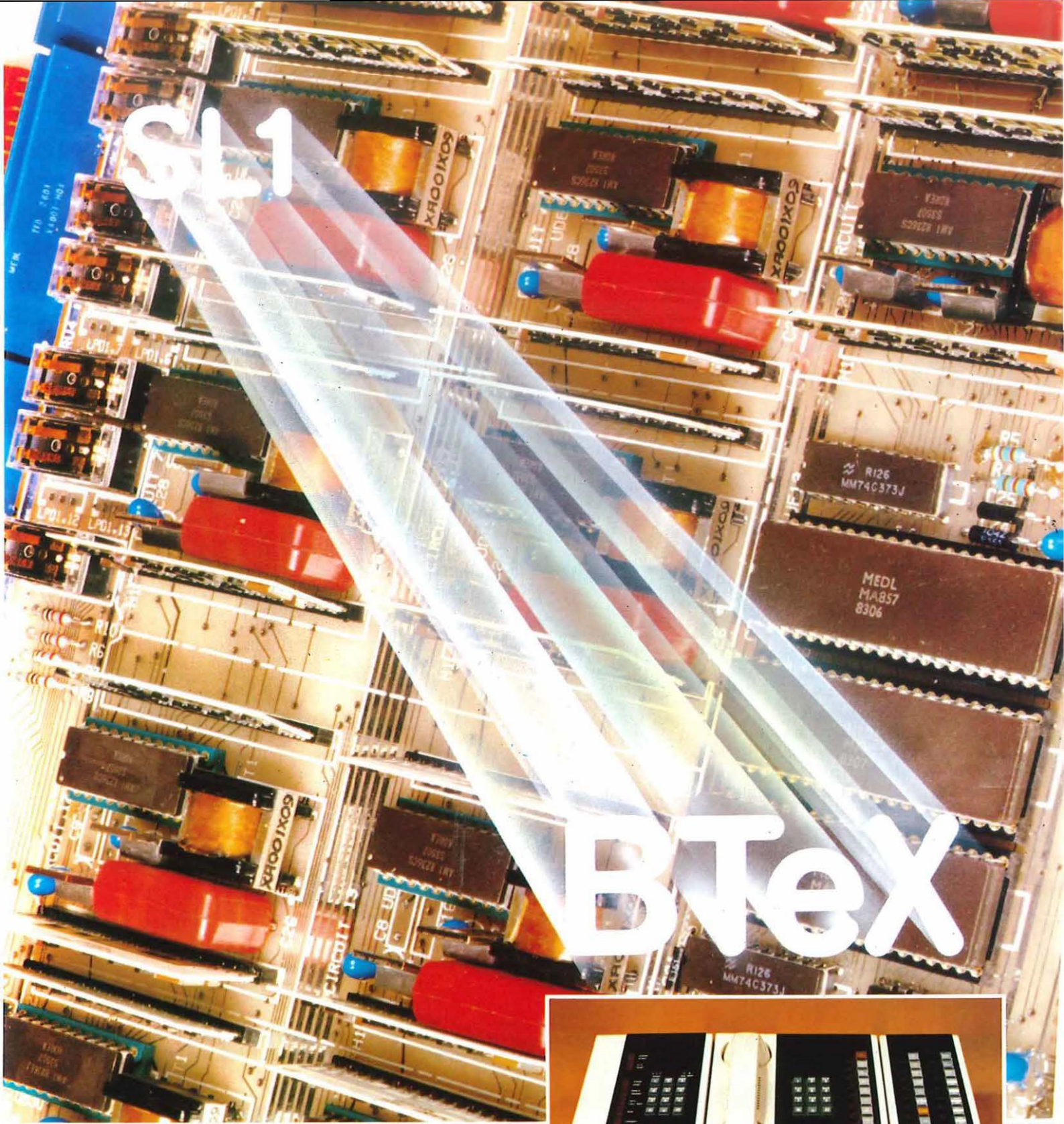
transfer to the administration and the credit card company for charging.

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

For further information, contact Plessey Telecommunications Products Limited, Edge Lane, Liverpool L7 9NW. Telephone: 051-228 4830. Telex: 629267.



PLESSEY



The name in advanced telecommunications

When British Telecom wanted a new 10 000-line integrated voice and data network for its headquarters operations in London it naturally chose the world's leading digital PABX – the SL-1/BTeX made in Britain by GEC.

GEC is working closely with the BTHQ Communications Section in the design of the network that will embrace the new BTHQ building in Newgate Street and other main office sites in central London. GEC is supplying six SL-1/BTeX total communication systems, combining voice and data switching with the latest digital PABX developments, for main and satellite operation, and a seventh operating as a tandem exchange.



GEC

GEC Telecommunications Limited

A Management Company of The General Electric Company, p.l.c. of England
Private System Division, P.O. Box 6, Coventry CV1 5PU
Telephone: 0203 554400

BTEx is a trade mark of British Telecommunications plc.

STEP 1-TOWARDS TOTAL CONTROL OF ESTATES AND SERVICES

More than 9,000 buildings. Millions of square feet.
Tens of thousands of pieces of equipment.

The cost of running the British Telecom Estates is enormous. Energy costs, maintenance, security – all run into well over six figures.

As overheads go up, and with the introduction of TXD, costs are set to go higher still.

That's where Margaux comes in. With Total Building Services Management Systems.

Margaux systems have been developed specifically to solve the key estates management needs of the telecommunications business. These systems have been proven in the demanding environment of North America with Bell.

Now Margaux systems are being installed to meet the needs of British Telecom.

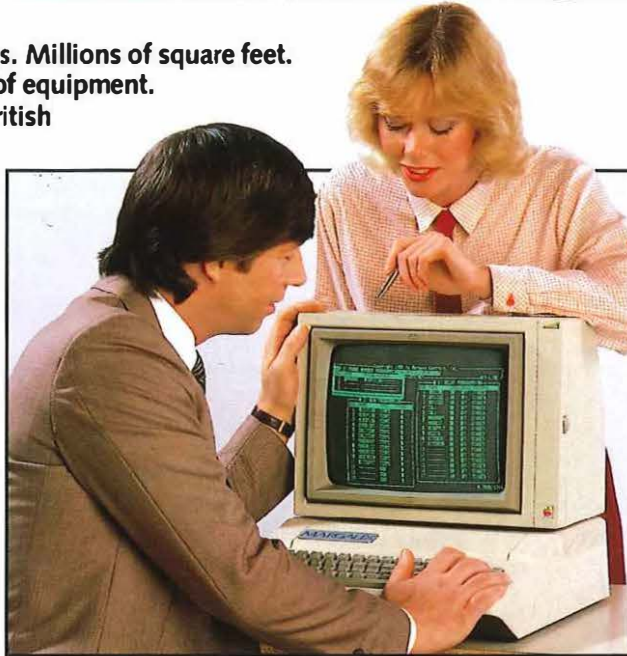
The Margaux track record

In the late 1970's USA's Michigan Bell identified 4 key Estates problems: Services Monitoring; Energy Management; Maintenance Management; Security.

Michigan Bell chose Margaux to solve the problem, as established experts in energy control and building management. Margaux developed the understanding of telecommunications business needs, adapting hardware and software to solve the complex management and operational problems.

Margaux engineers worked as partners alongside Michigan Bell's estates specialists to produce a tailor-made integrated telecoms energy/security/maintenance control system. The result is the Margaux 8600.

It works! Of Michigan Bell's 655 buildings, 50 now have Margaux 8600 systems installed. 40 more are in installation. Long term – they'll be in all 655.



CURRENT ACCOUNT

SERVICES MONITORING

The 8600 can monitor services like electricity, gas and water. It can encompass everything from lights to TXD's, with total usage monitoring, logging, reporting and analysis.

ENERGY MANAGEMENT

The 8600 monitors and controls consumption from light levels to humidity to temperature. It checks and corrects unnecessary use of power; cuts energy consumption significantly, maintaining the desired conditions at minimum cost.



MAINTENANCE MANAGEMENT

The 8600 provides plant usage monitoring and reporting, and can be operated in conjunction with AMPERE.



SECURITY

Networks need to be secure. So do your buildings. The 8600 provides integrated security: Card access – Central Control – Surveillance.

The Margaux 8600 makes it all possible. Integrated. And highly cost-effective: all the capabilities you need in a single system.

It's happening here in Britain now. Read more about it overleaf . . .



MARGAUX

ESTATES MANAGEMENT SOLUTIONS

eMargin what A harrised teLex opeRater could do to yoUr set of 5 figures.

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.

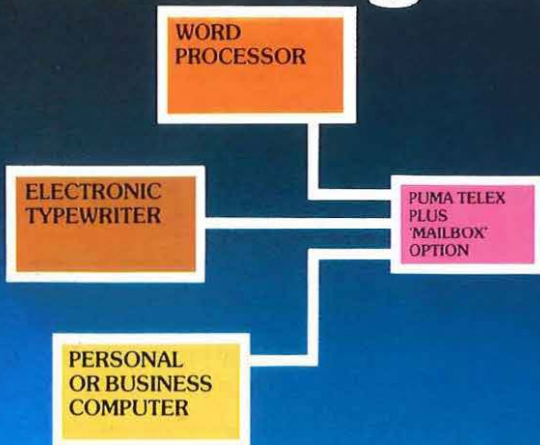
And mistakes occur.

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.

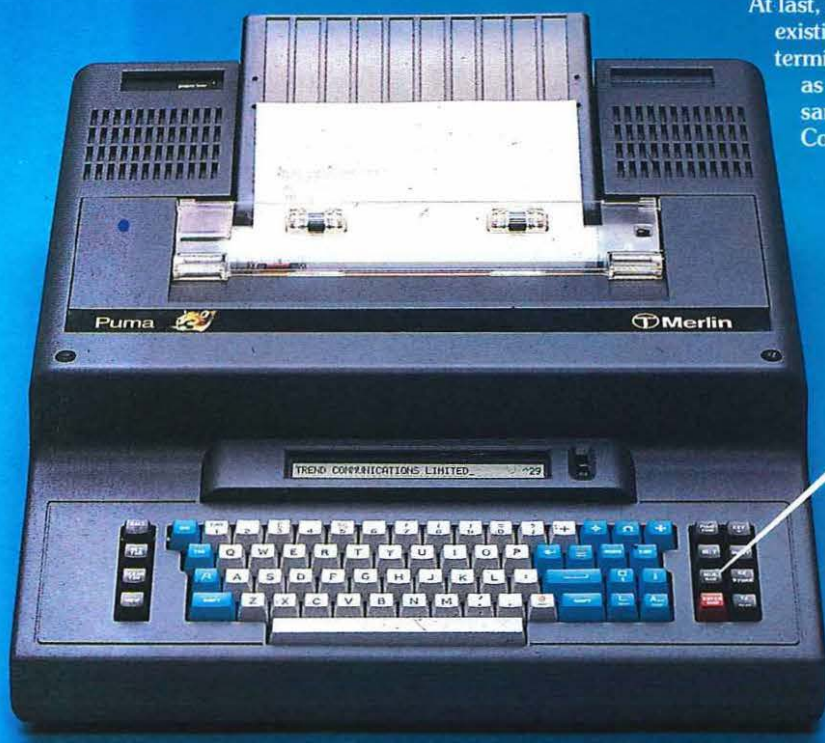
1½ MILLION
TELEX USERS
WORLDWIDE



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®

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Head Office:
Knaves Beech Estate, Loudwater, High Wycombe,
Buckinghamshire HP10 9QZ, England.
Telephone: Bourne End (06285) 24977.
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Northern Office:
Manchester International Office Centre,
Styal Road, Moss Nook, Manchester M22 5WB.
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PHICOM DATA COMMUNICATIONS DIVISION
applied technology

...and distributors throughout the world.

STEP 2-HOW THE 8600 ADDS UP

Energy control – maintenance management – security: the problems facing BT Estates Management are large, complex and costly.

But the solution to many of them is small, simple and low-cost . . .

THE MARGAUX 8600

The Margaux 8600 has already proved itself in the demanding environment of the Regional Bell Operating Companies in the USA, with a major programme under-way in Michigan, and further systems being installed for more Bell Companies.

It's already working – and making an impression with British Telecom.

What does it do?

The Margaux 8600 Building Services Management system is built round a system of stand-alone networked microcomputers, each with an array of sensors capable of reporting and acting on many different energy, maintenance and security functions in a building.

Through distributed processing, any number of buildings can be linked to a Central Management Control Unit. Each "micro" monitors and controls its own building: anything abnormal is reported to Central Control.

The Margaux 8600 approach makes it economically feasible to "automate" a large number of geographically dispersed buildings whilst maintaining centralised reporting and management.

Four key estates management problems are solved by a single system:

MONITORING

Power supplies and services are monitored – even down to individual pieces of equipment, and if need be within them. The supply is constantly checked – and totalised.

The 8600 reports on how power has been used, so that costs can be analysed and attributed, and when possible – reduced.

ENERGY CONTROL

Sensors continually feed information to the system on light intensity, humidity, power consumption and ambient

temperature inside and out.

The 8600 manages the usage of the electricity and fuel you're consuming, continually fine tuning to ensure correct conditions at the minimum cost.

Regular reports show how you're doing – and allow you to modify programs to improve performance yet further.

MAINTENANCE MANAGEMENT

The Margaux 8600 works alongside AMPERE to record every minute's usage on every item of equipment. Working to pre-set maintenance intervals, the 8600 can trigger maintenance visit requests, which can in turn be scheduled through AMPERE.

Equipment breakdown and failures are immediately reported over standard telephone lines to VDU or printer at Central Control.

AND NETWORK PROTECTION

The Margaux 8600 incorporates the "Man in the Can": card access and 24-hour-a-day surveillance of the premises to ensure no unauthorised entry into the building takes place. Both the network and the equipment are protected.

Surveillance can be further extended to normally unguarded spaces within buildings too. Electrically locked doors can be fitted and automatically controlled. Entry can be restricted to card holders at any given point, at different times, or for specific periods.

With card access integrated into the building management system, you have greater flexibility and adaptability – and it's self-financing through your energy savings!

The cost of the system, as British Telecom is already discovering, can be remarkably low. Turn the page to find out more . . .



MARGALUX

ESTATES MANAGEMENT SOLUTIONS

INTERFACE PROBLEMS?

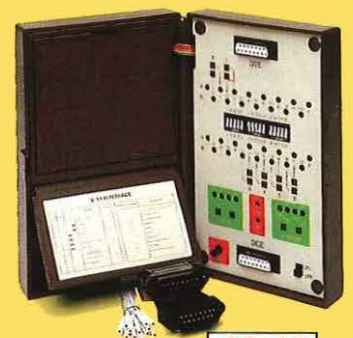
The Datacheck line of breakout boxes lets you identify problems on all the interface disciplines.



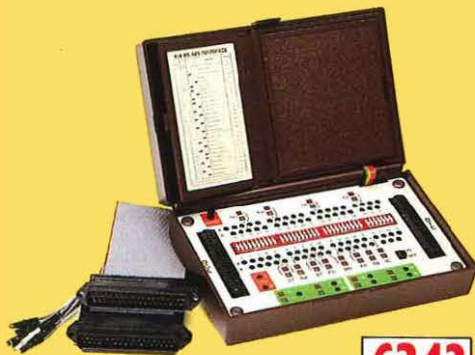
Datacheck I **£139**
RS-232/V.24



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)



Datacheck V **£621**
V.35



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



General Audio and Data Communications Ltd.

64-82 Akeman Street, Tring, Herts. HP23 6AJ. Telephone: Tring (0442 82) 4011/5551

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Regional Sales and Service: Manchester, Unit 5, Fivefold Industrial Park, Manchester Street, Oldham, OL9 6TP. Manchester (061) 626 3371.

Associated Companies Teleprinter Equipment Ltd. Communication Accessories and Equipment Ltd. Morse Equipment Ltd. Teleprinter Rentals Ltd. Datacare - a division of Teleprinter Equipment Ltd. Parent Company: William Batey & Co (Exports) Ltd. (Founded 1946).

STEP 3 - TOWARDS TOTAL CONTROL OF THE CURRENT ACCOUNT

Margaux Building Management Systems solve the most pressing problems in estates management.

With over 9000 buildings, and a huge inventory of equipment, British Telecom's Current Account runs into millions of pounds.

Margaux has the means to reduce your Current Account, and to provide rapid returns on investment.

The mathematics are very attractive

Margaux systems normally pay their way within 24 months.

Whether retrofitting or re-fitting in existing buildings, or undertaking a new construction programme like TXD, Margaux systems can be installed quickly and simply – to start saving you money from day one.

Experience with Bell – and now with British Telecom – has shown that Margaux can also achieve significant reductions in the Capital Budget too.

The effective control technology provided by Margaux will highlight over-sized heating, refrigeration and power systems. On future projects, these can be reduced. Some components will even be eliminated completely!

Margaux gives you four management benefits . . .

- ★ Reduced costs on the Current Account.
- ★ Reduced Capital Expenditure.
- ★ Better control of your budgets.
- ★ Better property management of the Estate.

And we work closely with you to solve your problems . . .

Before we install, we look at your site – or sites – with you.

We define the problem and the need. Then we establish objectives, priorities and targets.

Your system is planned to meet your needs.

The Margaux 8600 gives you all this:

- ★ Electricity and services usage monitoring and reporting.
- ★ Energy targeting and cost control.
- ★ Equipment usage and maintenance scheduling with AMPERE.
- ★ Optimised maintenance – and therefore longer equipment life.
- ★ Security of the Network and the Buildings.
- ★ Direct Control of Heating and Cooling Plant.

Proven where it counts

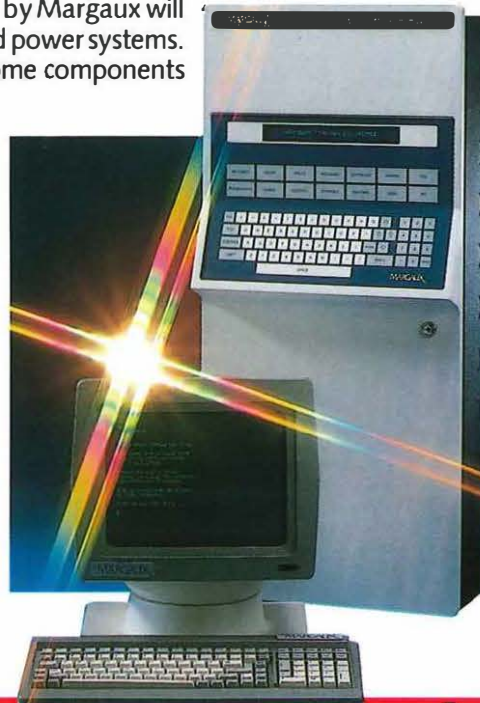
Margaux has a proven track record in telecommunications – systems working hard and saving money in the highly cost-conscious environment of Bell USA.

Following initial installations, British Telecom is beginning to see the benefit too.

The 8600 is a solution for many estates management problems.

Call us for a presentation. We can give you a progress report – and an appraisal of how the Margaux can help you.

Call Peter Zeun or Chris Jackman on 0784 31101 to find out more.



MARGAUX

ESTATES MANAGEMENT SOLUTIONS



SCOT PUTS THE NOISE FREE PHONE CALL WITHIN REACH

Now Teradyne introduces the SCOT[™] noise detection system to locate noise faults in strowgers before your customers complain. And, using proven SCOT technology, finds them without a time consuming and expensive search.

Noise tests are performed as SCOT carries out regular automated routines. Details of failures (giving priority to those that require urgent attention) are printed out for analysis and on demand test calls are generated to locate the faulty switch.

Users can vary both the noise detection period and the failure threshold level. In the process, efficiency is increased significantly by this most cost effective means of improving service.

SCOT noise detection system from Teradyne. It's something that both you and your customers will appreciate.

To find out more about how to offer the quiet call, contact Teradyne, Telecommunications Division, Teradyne Limited, The Western Centre, Western Road, Bracknell, Berks. RG12 1RW. Telephone: Bracknell (0344) 426899. Telex: 849713.

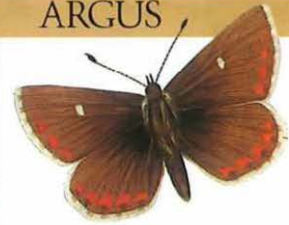
®SCOT is a registered trademark of Teradyne Inc.

The logo for Teradyne, featuring the word "TERADYNE" in a bold, blue, stylized font. The letters are blocky and interconnected, with a slight shadow effect.

Circle 2 for further information

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Then there's Telex Manager, Teletex Manager and Message Director for multi-terminal interaction, using the public networks and private lines. And don't forget the Ferranti Document Manager, which

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Argus office products by Ferranti are providing British Telecom and others with complete solutions to their office requirements. Each product is designed for specific needs, which makes all the difference to your office productivity.

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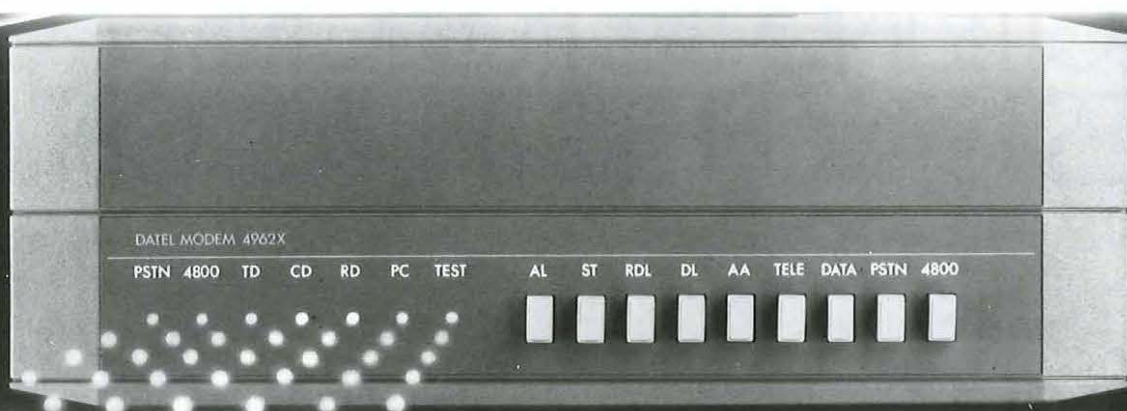
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The long list of other features includes automatic calling and answering, soft-configuration, high density racking, a powerful adaptive equalizer and echo cancellor and optional four port multiplexer.

The DM 4962X is the ultimate in modem technology.

Designed to the highest standards of quality and performance, the Merlin DM 4962X is just one of the extensive range of state of the art 4th generation modems from British Telecom.

To find out more, dial 100 and ask for FREEFONE MERLIN or send the coupon to Victor Brand, British Telecom Merlin, FREEPOST, London SW19 8BR. BTDM1

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

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

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

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

Hardly the solution for today's network requirements.

With 5ESS-PRX, telephony power is concentrated in the exchange periphery. Enabling local telephony requirements to be satisfied locally. As a result, when

switching modules are remoted they become, to all intents and purposes, stand-alone exchanges with a minimal dependence on the host.

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

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

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

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



PHILIPS





&T and Philips Telecommunications Ltd., Swindon Road, Malmesbury, Wiltshire SN16 9NA. Telephone 06 662 2861. Telex 44208.

Information from a very reliable source...

If you are relying on an ordinary telephone answering machine to give out information to a large number of telephone enquirers, you are probably having to minister to it on a regular and expensive basis.

And what about all those frustrated callers who don't get the information they require and you promised?

The Storacall Multi Line Announcer is a professional answer-only system capable of coping with just one line or many hundreds. It is designed to operate year in, year out without problems.

The Storacall Multi Line Announcer is the only machine of this specification and quality that can be bought outright and at a price that is comparable with its competitor's annual rental.

If your business involves you in giving out information over the

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49 High Street, Cheltenham, Gloucestershire GL50 1DX 0242 33181. 55 Eastern Esplanade, Southend-on-Sea, Essex 0702 63326.



telephone reliably — then get details of "the reliable source".

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Please send me the brochure and details about the MULTI LINE ANNOUNCER

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Company _____
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BTJ8 85

Keep your business from blacking out.

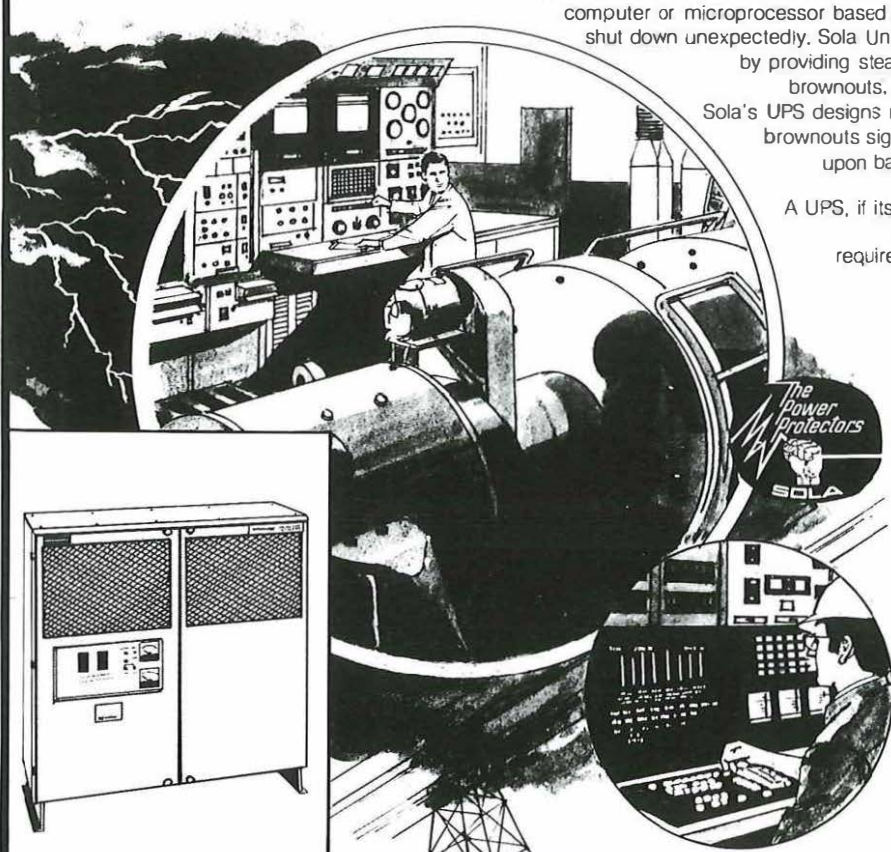
Short term power failures can damage your business with costly delays and errors by causing computer or microprocessor based equipment to lose its memory, generate data errors or shut down unexpectedly. Sola Uninterruptible Power Systems (UPS) end these problems by providing steady regulated, no-break power unaffected by blackouts, brownouts, voltage spikes and other external power disturbances. Sola's UPS designs maintain full rated power output during voltage sags or brownouts significantly below nominal mains voltage without drawing upon battery reserve - a feature that assures availability of full battery capacity when a blackout follows brownout. A UPS, if its a true UPS, offers more than just blackout protection. Because its always 'on line', a true UPS protects your requirement or system and data against all kinds of irregular voltage conditions including brownouts and blackouts.

Sola UPS systems using fully sealed maintenance free batteries are in 'world wide' service providing uninterrupted power for Industry, Commerce, Banking, Government and Military applications.

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For more information contact:

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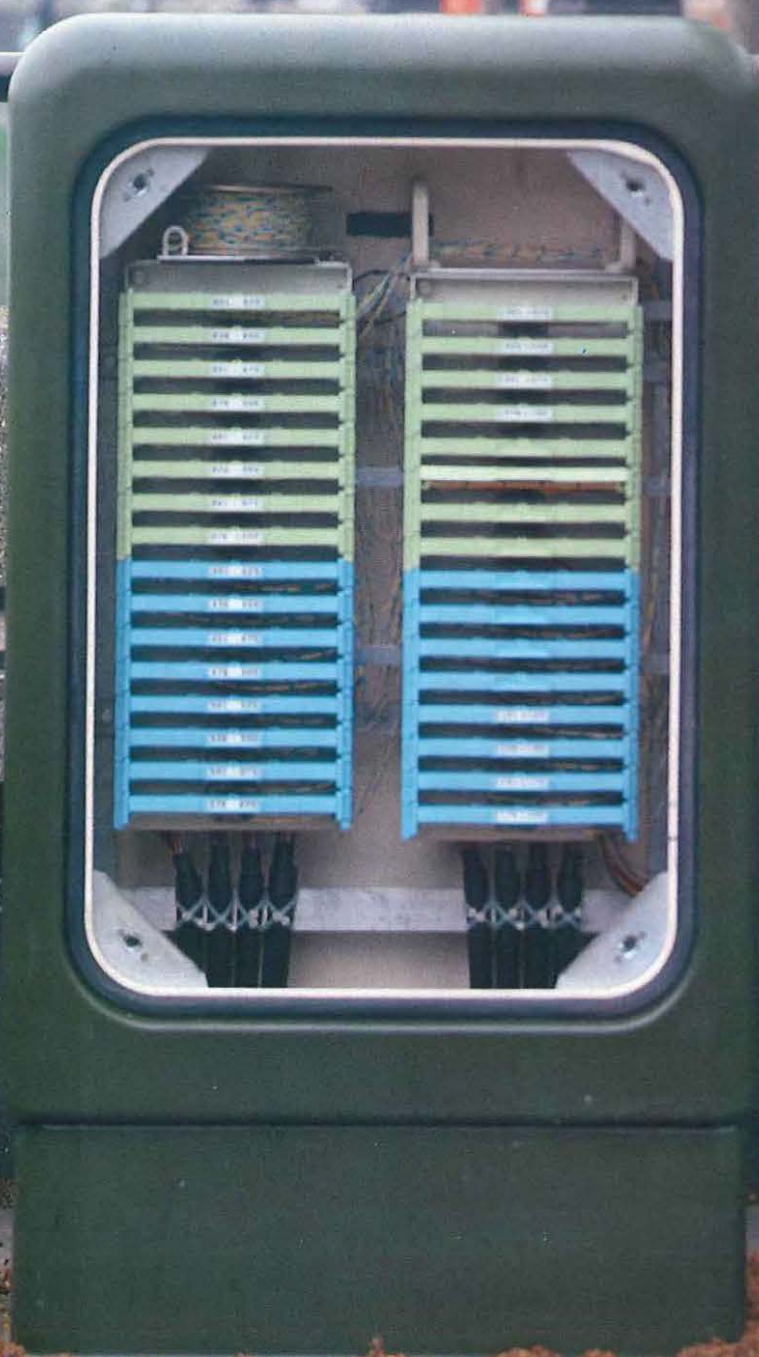


"wire and cross connect
this cabinet
in less than a day"

NEW

OUTDOOR

BIX

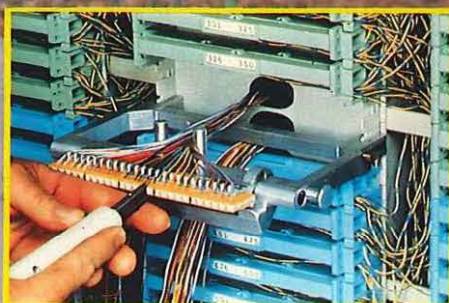


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- Protective retainer.
- Self-closing cover.
- Moulded-in hinge.
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- Performs in all climates.

TIME SAVER

- I.D.C. connection.
- Colour coded terminating fixture.
- Dual purpose connection tool.
- Colour coded retainers.
- Modular system.
- Designation labels.



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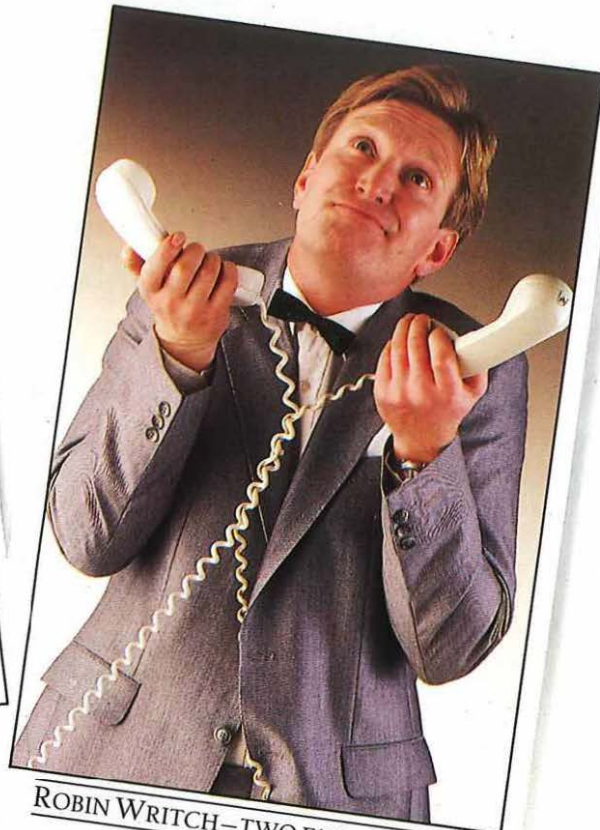
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REV. PARSONS - FAULTY LINE.



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MICK MORRIS

You've got 25 seconds to in order of

If your Repair Service Centre takes longer than 25 seconds, you've got a problem.

Because while all your customers are important, some, such as business lines, are more so than others.

So how do you decide which repairs need priority?

Your administration system can help to an extent, by organising your engineers properly and sending them to the right place with a clear picture of what they have to do.

But to do that, it needs to have accurate, reliable details on the condition of the line, the type of fault, and its location.

And most of all, it needs them quickly. Which is where the LRS-100 fits in.

Because as an advanced line-tester, it will do everything that's expected of it, and more.

As well as giving superior information about existing faults, it'll test groups of lines overnight to locate potential faults.

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

But perhaps its biggest advantage is in producing a 'System Recommended Action.'

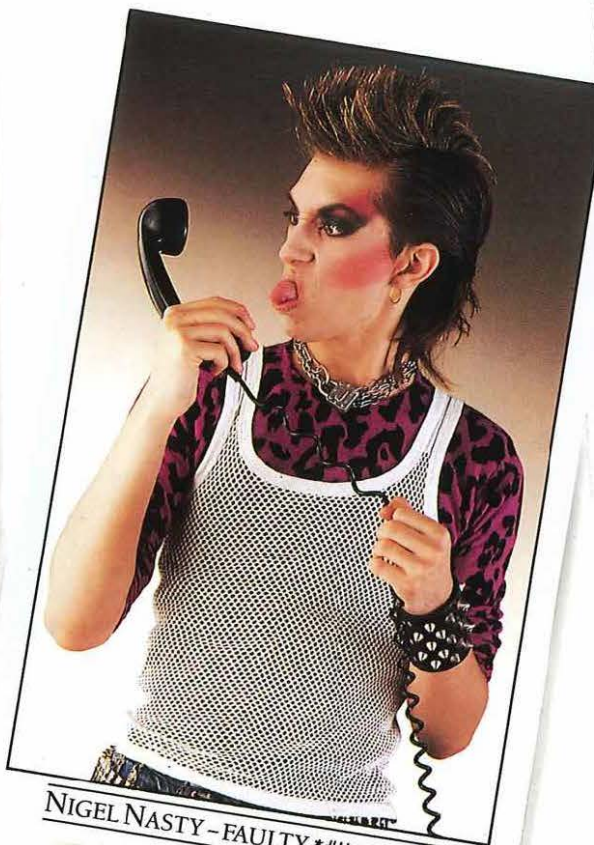
This means the LRS has the ability not only to identify, analyse, and determine the severity of a fault, but also to assign it to the appropriate work group.

All within 25 seconds.

Combined with the quality of its testing,



- FAULTY LINE.



NIGEL NASTY - FAULTY *#!*o! LINE.



MS PRIMM - FAULTY LINE.

arrange these customers importance.

that's why the LRS-100 will help reduce 'double-handling' of faults by engineers, and the number of repeat reports.

In turn, the performance of your existing administration system is improved, no matter which one you use.

LRS is compatible with current BT RSC administration systems, and in a few months will be integrated with CSS.

And at this moment, it's operational in BT London South, Glasgow, and soon in Belfast, Middlesbrough, Sheffield, plus several other Districts.

Making LRS the BT approved line-test system with a track record.

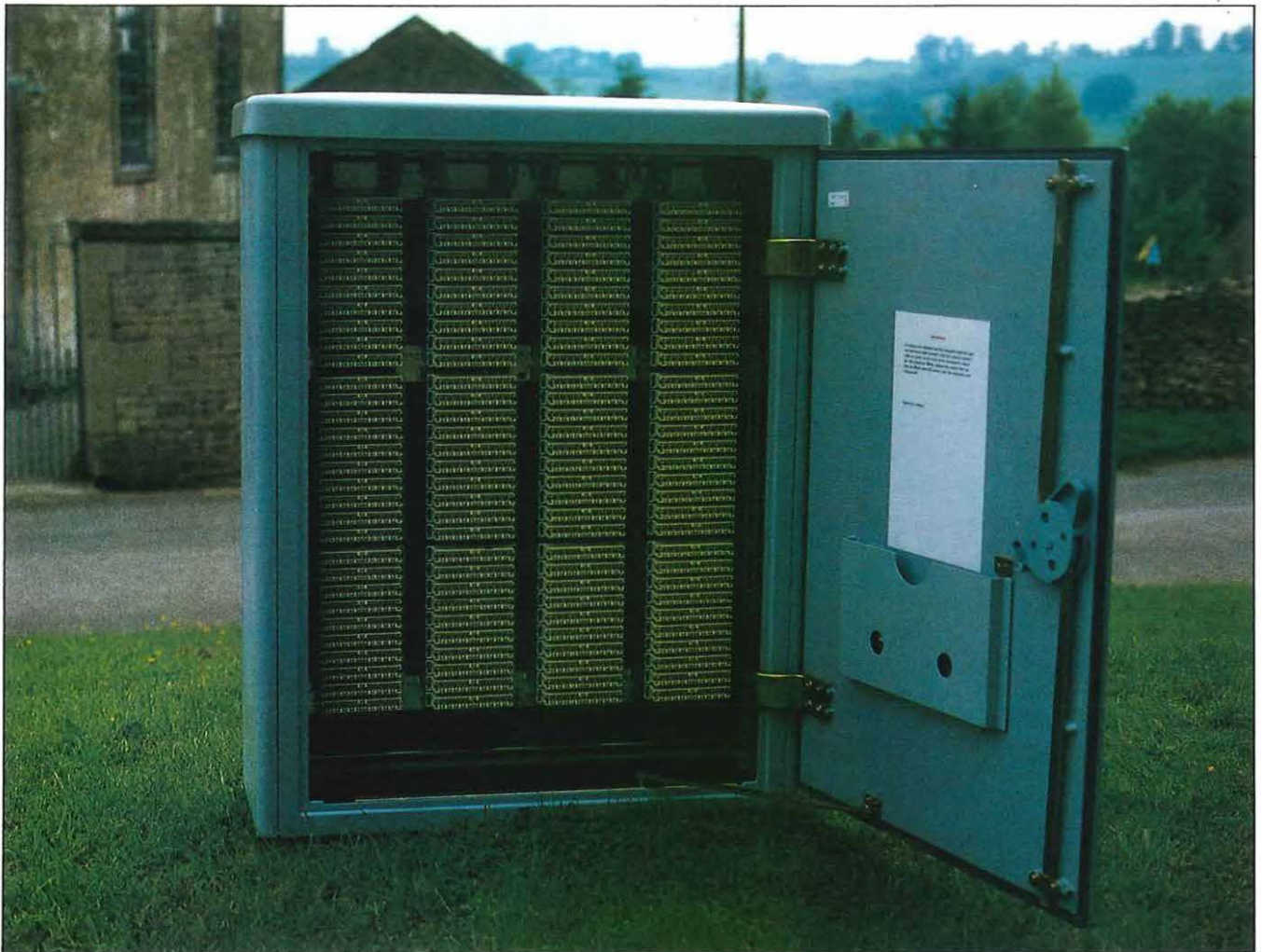
If you'd like to work with a line-tester that

gets the best out of your RSC, ring Tony Hart on 0628 72921. Or write to Northern Telecom plc, Langton House, Market Street, Maidenhead, Berkshire SL6 8BE.

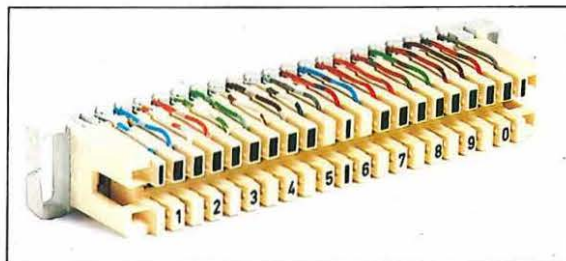
Because with the LRS-100, you'll be putting each and every one of your customers first.



— LRS 100 —
ADVANCED LINE - TEST SYSTEMS



EXTERNAL TECHNOLOGY



KRONE-LSA-PLUS-Kontakte®*

The KRONE Cross Connection Cabinet is uniquely designed to overcome operational and environmental problems associated with external locations. Constructed throughout in heat-pressure moulded glass fibre reinforced polyester, the KRONE Cabinet is proof against impact and corrosion and is maintenance-free.

Its pressure compensation and high thermal insulation qualities prevent the formation of internal condensation.

Also—it is capable of being equipped with up to 2400 pairs using British Telecom Strips Connexion 237, which will solve the problems associated with Designation, Test Access and Disconnection—as well as allowing Overvoltage Protection at external locations.

So, why not install a well proven IDC Connection Technique to solve your external problems?

Also available in our range of External Technology are mounting frames to equip the standard B.T. Cabinets Cross Connexion Nos. 2, 3 and 4 with Strips Connexion 237 and all of the KRONE-LSA-PLUS accessories.

Contact us now, at our Cheltenham Headquarters with your external requirements.

Ideas Creating Products

KRONE

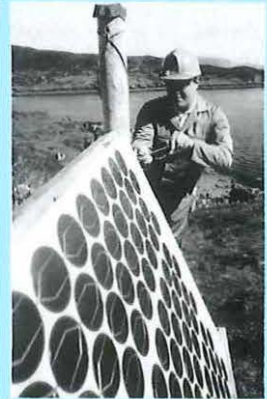
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Cover: Customers on the isolated island of Soay off the south coast of Skye depend on solar power for their link with the rest of the world. Energy cells on an eight foot pole keep batteries sufficiently charged to cope with calls to and from the island's eight private connections and one kiosk. Routine maintenance is carried out by Mallaig engineer Hugh Macdougall who has to make the five hour trip by boat.

A very good year . . .

The British Telecom success story continues. In the year which saw transition from state corporation to public limited company and the rise and rise of share prices making front page news, pre-tax profits rose to £1,480 million - £130 million more than the prospectus forecast and up almost 50 per cent on the previous 12 months.

Describing the period as one of 'notable achievements', chairman Sir George Jefferson said British Telecom had improved its efficiency and the quality and range of its services while significantly enhancing its profitability through growth in the volume of business. There was, however, still much to do and British Telecom would strive to achieve further improvements.

Turnover for the financial year grew by 11 per cent to £7,653 million with a nine per cent increase in the volume of calls being a major factor. Prices for regulated services were increased overall in November by slightly more than two per cent, which was three per cent below inflation rate, while British Telecom had more than realised its agreed target of reducing job numbers by 15,000 over a three-year period.

Referring to the success of the flotation which had seen the largest share issue ever undertaken anywhere in the world, Sir George said the company now had 1,750,000 shareholders on the register with 96 per cent of eligible employees taking an interest in the company's shares and more than 80,000 joining the Sharesave scheme.

Looking to the horizon, Sir George said the future looked good given the continuation of current trends. The strategy was to develop British Telecom into a top class information technology business operating around the world; as an early example of this it had been decided to buy GTC Inc., a North American distributor of information technology products and agreed in principle to acquire a controlling interest in Mitel Corporation.

Sir George said the Secretary of State's decision to refer the proposed purchase of the latter to the Monopolies and Mergers Commission was 'disappointing' and 'surprising' but it was hoped that the matter would be quickly dealt with.

Overall, the lasting impression is that 1984/85 has been a very good year . . . ①

British Telecom Journal costs 42p per issue for staff. External subscribers pay £15 for two years including post and packaging. Full details on page 41.



The business of quality

Phil Gillam

“Responsibility for achieving competitive quality rests squarely with top management, but everyone involved in industry must recognise that quality is their business too”

Quality is our business – that’s the motto of British Telecom’s Quality Assurance Division but it is a phrase that every business needs to bear in mind. A business that strives for quality is more profitable and has more chance of succeeding than one that does not.

Quality can be defined in a number of ways, such as doing things right first time, or the conformance of a product/service to its specification/target. It should not be confused with luxury. It is often said, for example, that a Rolls Royce is a better ‘quality’ car than a Mini when what is really meant is that it is a more ‘luxurious’ car.

Another aspect relates to ‘fitness for purposes’ and the British Standards Institution defines quality as: “The features and characteristics of a product or service that bear on its ability to satisfy a given need.”

The way in which quality impinges on British Telecom can be viewed in terms of the company’s primary objective, which is to provide a telecommunications service that customers want and are prepared to pay for. In order to do this, British Telecom uses products, employs people, and defines procedures and processes for their operation. Only if all of these are in harmony will the service provided be of good quality.

Continual monitoring is essential to ensure that everything is working as it should. If problems are found then appropriate corrective action should be taken (see figure 1).

The provision of a service, therefore, depends upon the products and people employed together with their interaction. The procedures and processes in an organised application are to:

- define the service objectives
- determine the resources and equipment needed
- obtain and implement them
- measure the resources and equipment against their specifications/objectives
- measure the service performance against the service objectives

The recognition and management of quality is becoming an increasingly important factor in the running of major businesses. British Telecom, with its wide range of products and services, is no exception.

Margaret Thatcher
Prime Minister

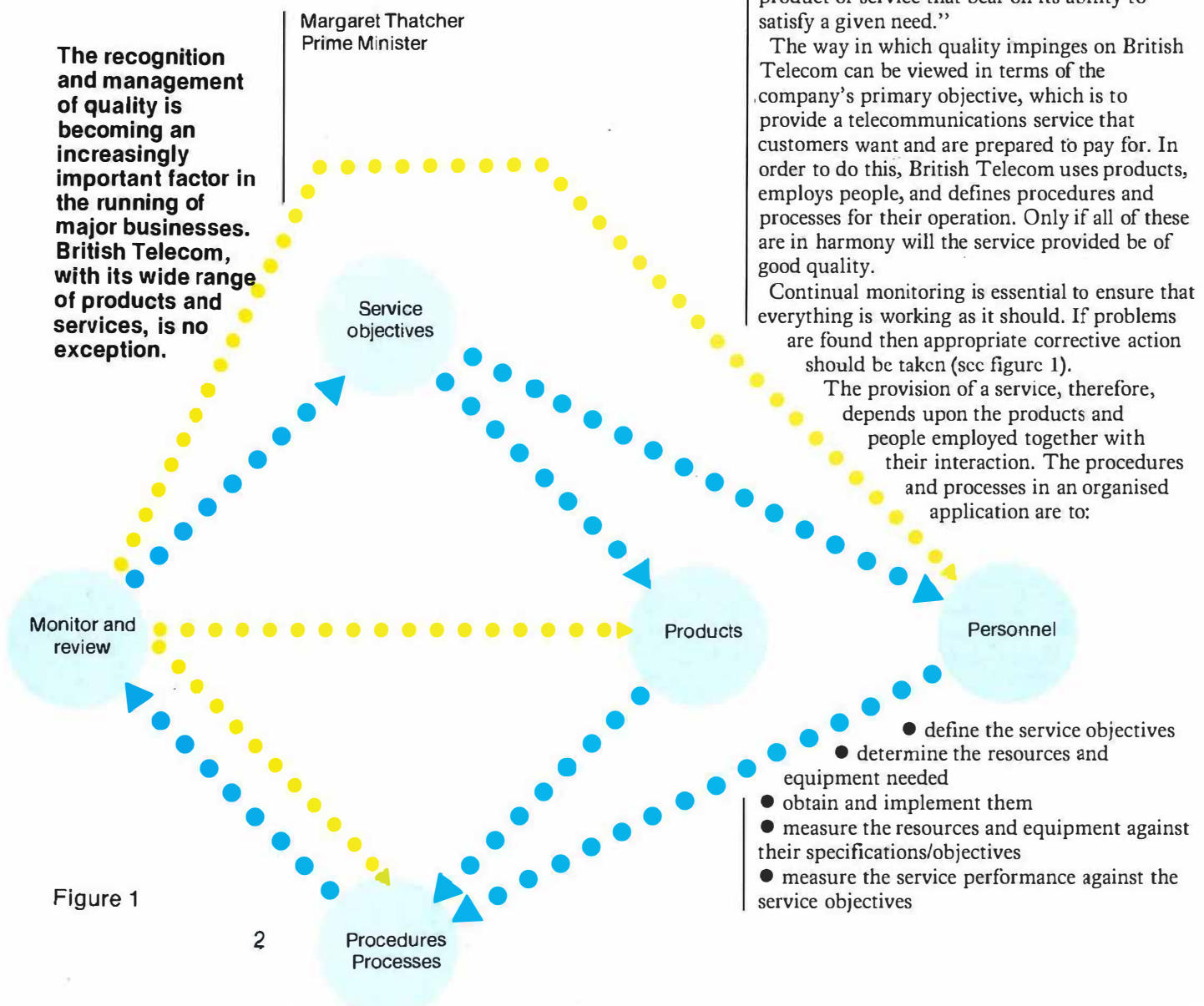


Figure 1

The major stages in a product life-cycle are:

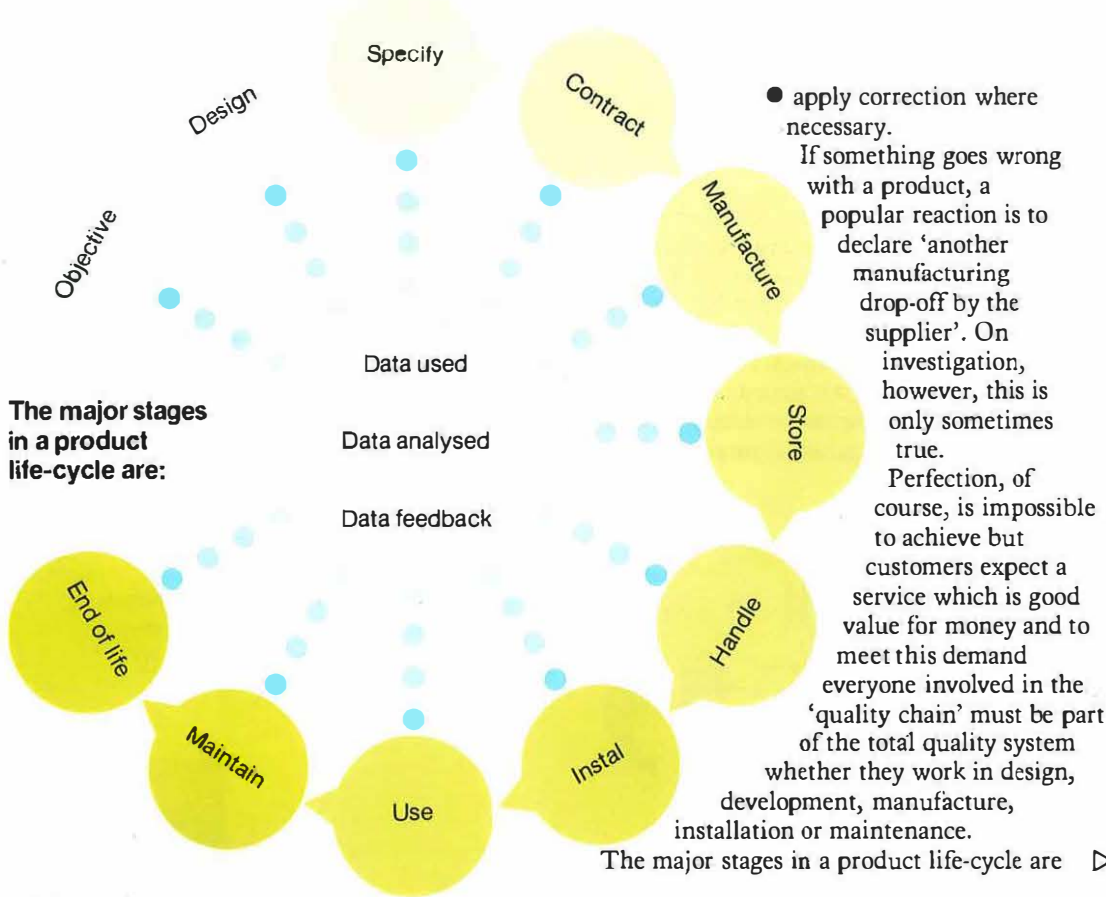


Figure 2

At a quality conference for LCS senior managers some 18 months ago, British Telecom chairman, Sir George Jefferson stressed the need for a system of quality management throughout the business. There was, he said, a formal requirement for such a system on particular activities which were subject to specific licence constraints.

One such activity is the maintenance of call routing apparatus. The licence constraint is that a management system meeting the requirements of BS 5750 (Part II) will be employed and, furthermore, will be subject to an assessment by BSI whose interests will include handling, storage and transport.

Since October 1983 LCS staff have worked hard producing appropriate documentation and reviewing procedures and processes with British Telecom Quality Assurance support, advice and training. Tunbridge Wells and Birmingham Telephone Areas have now both been assessed by BSI and given qualified approval.



“Quality management should be just as much a feature of the service industries as of manufacture”

Sir George Jefferson
 Chairman, British Telecom



As part of the LCS quality drive, the LCS Quality Task Force has set up an information database on Prestel with British Telecom Quality Assurance help. The database is called Quality Digest and is the who, what, where and when on quality.

Mr P E Gillam is controller of Quality Assurance services provided for Local Communications Services and National Networks. His work includes the procurement of major switching and transmission systems together with automatic test equipment and software quality assurance.

shown in figure 2. Any one of these stages could be responsible for faults occurring at either the same or a later stage. Design faults which are only discovered when a product is put into use can cause the greatest problems resulting in a large amount of product to be reworked or scrapped. A number of intermediate stages may also need changing – a time-consuming process which can also introduce new compromises.

To minimise the consequences, it is important that information is fed back immediately and analysed so that the cause can be determined and corrected. Centralised analysis is preferable

because it enables potential widespread hazards to be identified more quickly. It is essential, therefore, that the activities at each stage are carried out properly and that information is fed back, analysed and used.

A system for the management of quality is essential to ensure that the various products used by British Telecom, and the staff employed, work together to provide a quality service. This requires commitment from top management and the workforce and also the provision of resources and clear, concise work procedures.

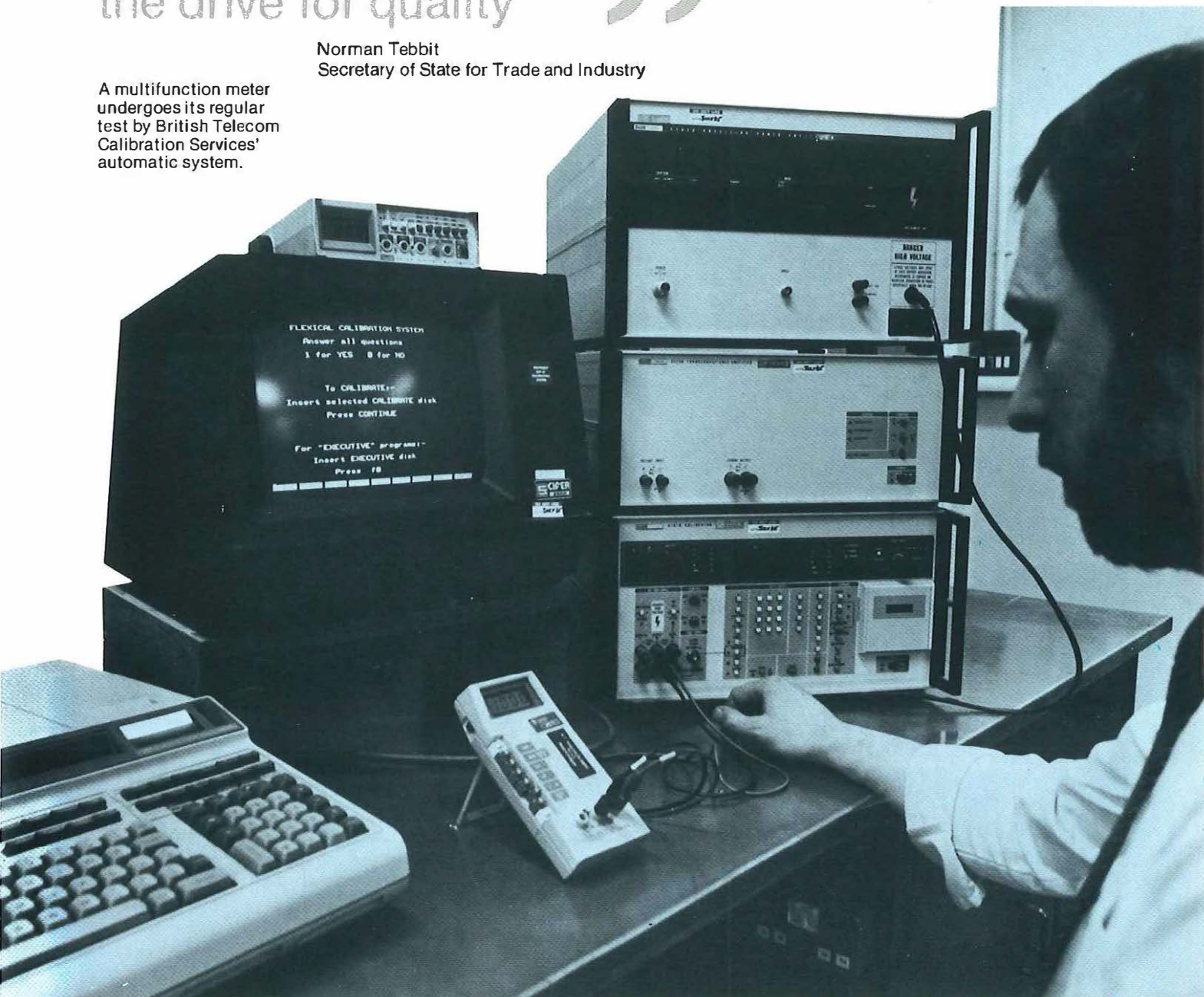
To work effectively, staff need clear objectives, adequate training and confidence in their management in addition to the more basic requirements of suitable accommodation, tools, office machinery and handbooks.

Only if staff are given the right environment and the proper 'tools for the job' can they be expected to provide a quality service. ⊕

“The Government therefore asks all chief executives to lead the drive for quality”

Norman Tebbit
Secretary of State for Trade and Industry

A multifunction meter undergoes its regular test by British Telecom Calibration Services' automatic system.



A commanding voice

Iain Bruce

Computers which can respond to spoken commands will play a crucial role in the future and important developments towards the 'intelligent' machine are now underway at British Telecom's Research Laboratories (BTRL) at Martlesham Heath, near Ipswich.

But the exploitation of speech, man's natural medium for communication and enquiry, has a long history in British Telecom and a number of services involving the storage and replay of speech have been developed since the early glass-disc Speaking Clock.

Techniques for digitally encoding speech have stimulated the development of variable message announcement machines such as the System X Automatic Announcement Subsystem which stores a vocabulary of digitised words and assembles them into pre-defined messages for a range of customer services. Speech recognisers and synthesisers are available to enable a computer to receive and generate speech sounds, but, in themselves, they do not provide a functional interface and special software has to be written to co-ordinate the man-machine interaction.

To date, speech recognition has only been successful for highly constrained tasks such as the handling of goods by warehouse storemen who speak isolated commands or short sequences of numerical data.

Ordinary

The prime goal of current research is to make machines easier to use by ordinary people and this requires a more intelligent interface than those found in today's systems. The work, by Martlesham's Advanced Voice Operated Systems group, is also expected to have applications in the electronic office to supplement existing methods of communication with computer systems.

Part of the research programme includes the Vodis project which is being carried out in collaboration with Logica and Cambridge University Engineering Department with funding from the Department of Industry's Alvey Directorate for a three year period. The object is to build a prototype train timetable enquiry system connected to the telephone network, to demonstrate the level of performance that can be achieved by combining the latest speech recognition and synthesis technology and by exploiting Intelligent Knowledge Based System (IKBS) techniques.

Users will be invited to specify details of their proposed journeys giving the essential details in

a short sentence supplemented by one or two word answers to simple questions. The system will attempt to maintain a simple dialogue and will then interrogate a database of train times and present the relevant information verbally.

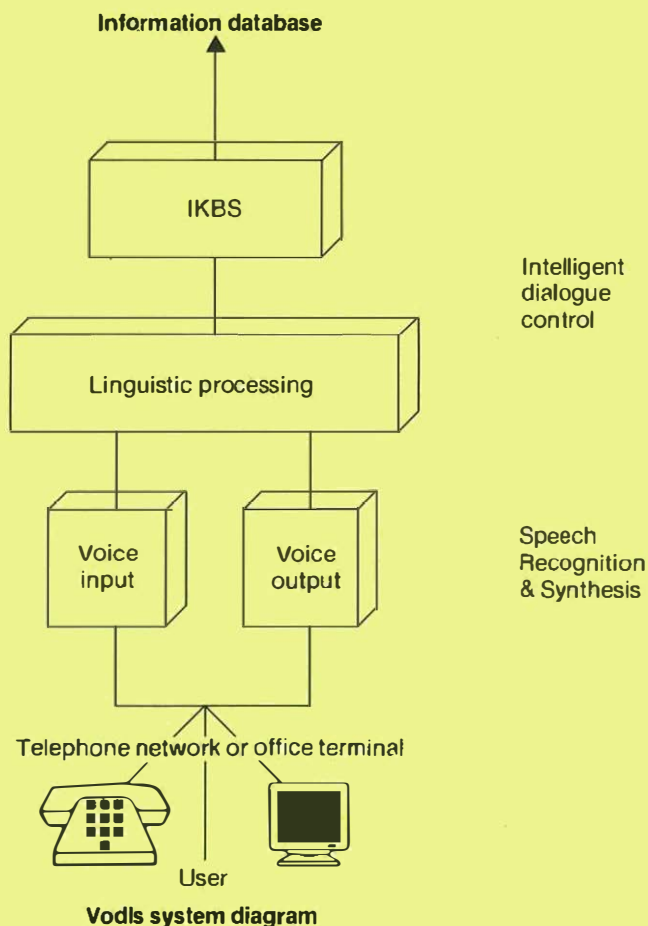
Speech recognisers are designed to identify words in their vocabulary store which most accurately match the spoken utterance and the process of pattern matching is often performed without any consideration of the meaning or logical sequence of words.

Vodis, however, uses a Logica-built recogniser which can be controlled by a host computer to consider only reasonable word sequences. The system interprets a restricted set of spoken words and it is important that the user is not deceived into thinking that the system can understand natural conversation.

Part of the Vodis software, known as Linguistic Processing, controls the recognition procedure and aims to identify the most likely word ▷

British Telecom Journal
Summer 1985

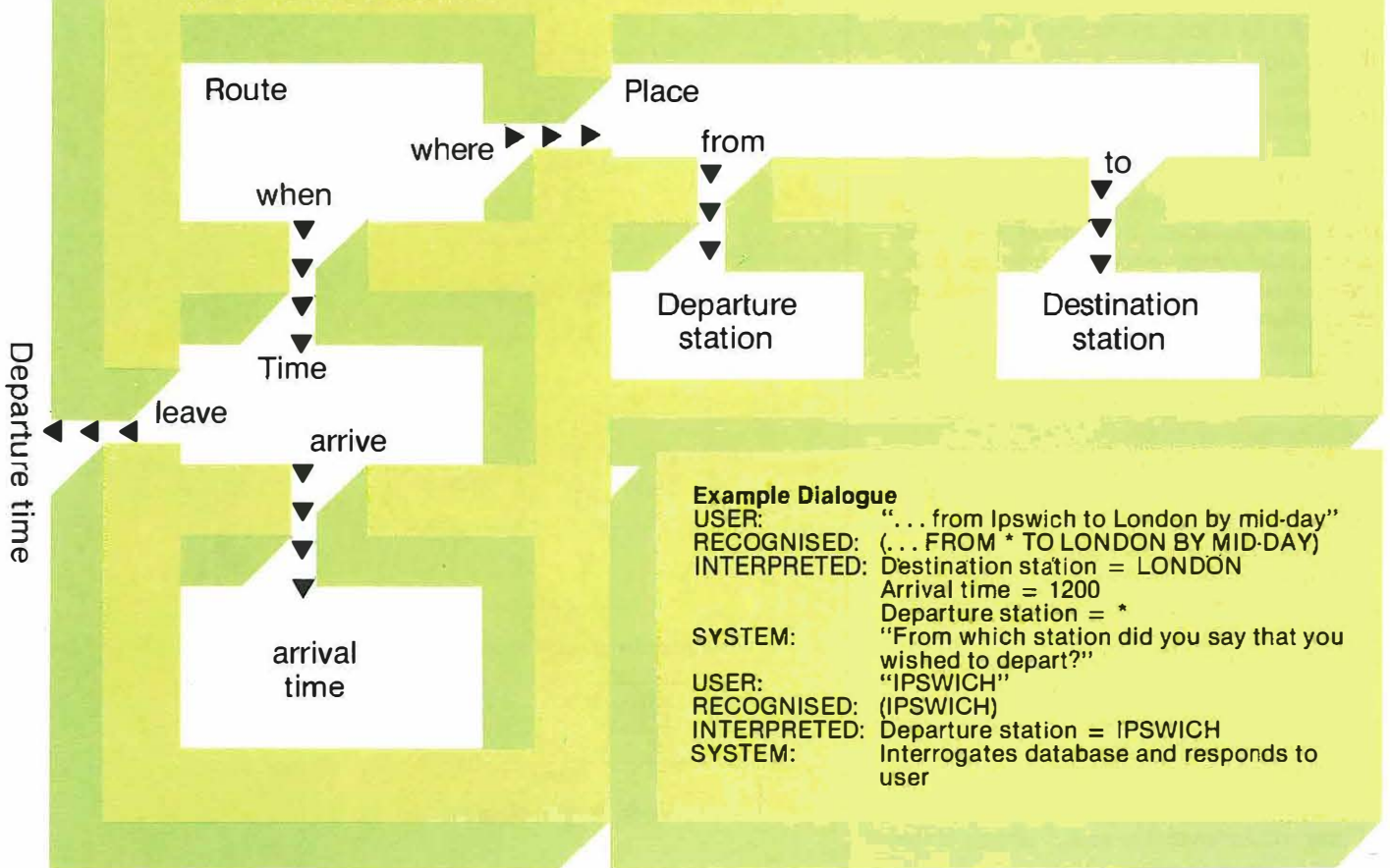
British Telecom is spearheading a £2 million research programme to develop an intelligent, voice-based man-machine interface (MMI) with computer systems. One of its main objectives is the construction of a prototype voice operated database inquiry system (Vodis) to open up valuable new opportunities in the information processing market.





Expert in phonetics, Louise Helliker, checks that the equipment can recognise connected speech over a telephone line.

IKBS frame structure



Example Dialogue

USER: "... from Ipswich to London by mid-day"
 RECOGNISED: (... FROM * TO LONDON BY MID-DAY)
 INTERPRETED: Destination station = LONDON
 Arrival time = 1200
 Departure station = *
 SYSTEM: "From which station did you say that you wished to depart?"
 USER: "IPSWICH"
 RECOGNISED: (IPSWICH)
 INTERPRETED: Departure station = IPSWICH
 SYSTEM: Interrogates database and responds to user

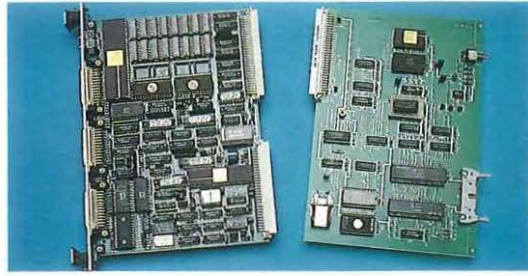
sequence and present this information to the IKBS which then interprets the speech input and controls the next phase of the dialogue. The IKBS will next instruct Linguistic Processing to generate a suitable message and to control the delivery of it to the user.

A BTRL synthesiser converts computer generated text into voice announcements using synthesis-by-rule programs and the Filter-And-Detect (FAD) chip, developed at Martlesham. The ability to convert unrestricted text into speech means that the system is not limited to speaking pre-defined messages and the synthesiser is likely to have many uses in a wide variety of computer applications.

A key element of the Vodis system is the IKBS which controls the dialogue with the user. Because of its software structure, it is possible for the system to attempt to interpret partially mis-recognised speech and then respond in a sensible way. This capability is vital for voice input systems because human speech varies so much that it is unreasonable to expect any speech recognition system to be able to discriminate all spoken utterances.

The system might repeat the question, or ask a different one to get further details about the rail journey before the dialogue controller is able to interrogate the database.

The IKBS uses a Frame Representation Language to define an enquiry. Frame systems are now an established technique in artificial intelligence research and they allow facts to be related to each other so that acquired knowledge



can be assembled into a hierarchical data structure. Each frame has slots for information and when sufficient slots are filled the IKBS interrogates the database.

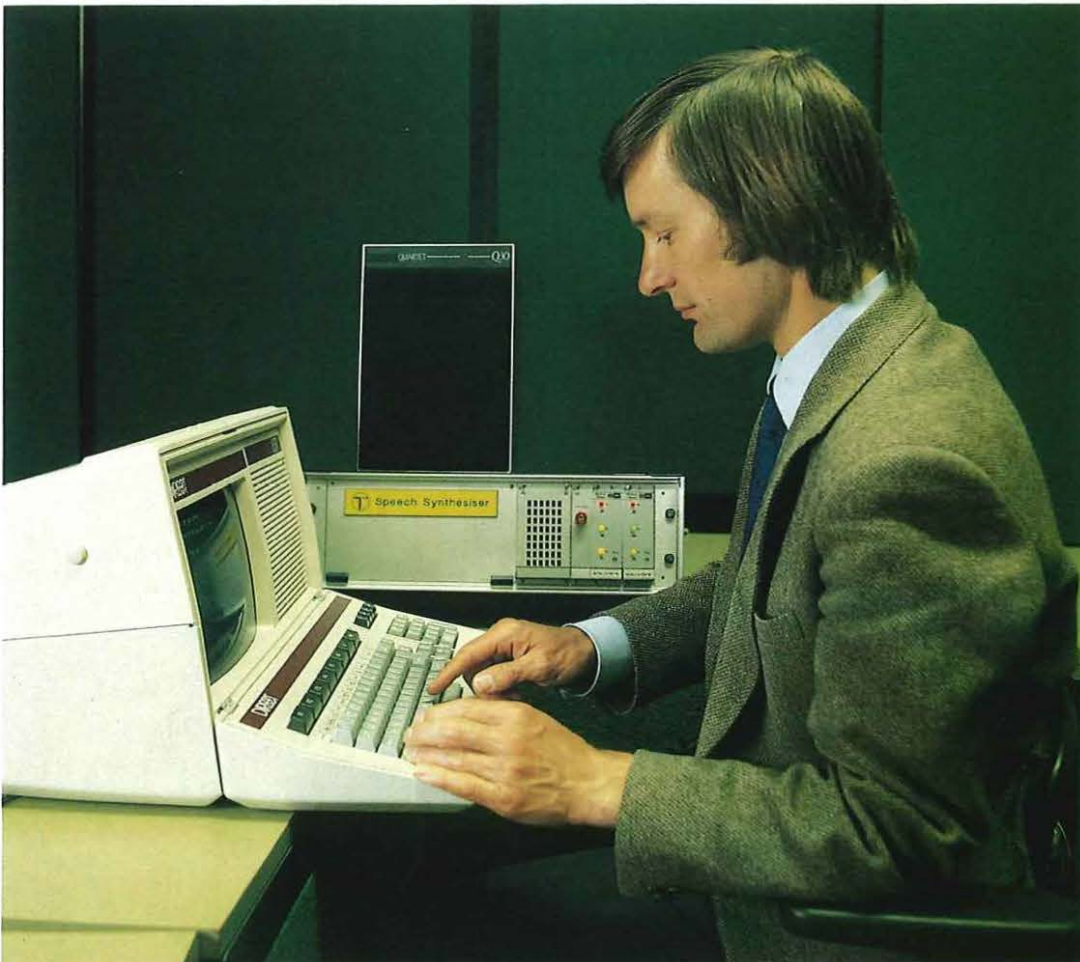
In the train timetable application, there could be a 'route' frame which has slots for 'where' and 'when' the user wishes to travel. Each of these slots points to frames that relate to concepts of 'place' and 'time', such as to/from and arrive/leave. Further frames have slots for station names or actual values. The structure automatically generates questions to obtain information needed to fill empty slots, but can fill its slots in any order so it is able to cope with incomplete responses.

Most speakers can successfully interact with voice input systems, but there will always be particular individuals who will have to use other forms of communication. The use of multi-frequency telephones will undoubtedly increase but the research into voice operated systems will ensure that British Telecom can offer a range of the most advanced telecommunications services over the established telephone network. ①

*British Telecom Journal
Summer 1985
A commanding voice*

Above: The prototype synthesiser's electronics are based on two cards, one for microprocessor control (left) and the other a synthesiser card including the Martlesham-developed FAD chip. Work is in hand to produce a single card version.

Author Iain Bruce types in an example message and listens to the synthesised speech over a loudspeaker.



Mr I P C Bruce is head of the advanced voice operated systems group at BTRL, Martlesham.

Chairman launches BT Fulcrum

New era of 'high tech' supply

BT Fulcrum, a new-look subsidiary company which succeeds the former BT Factories (General) has been launched to give British Telecom manufacturing a new commercial profile.

Computer controlled machines at Birmingham can insert 4,500 components an hour on to printed circuit boards – ten times the rate of previous methods.

Dave Proctor and
Terry Scown-Geary

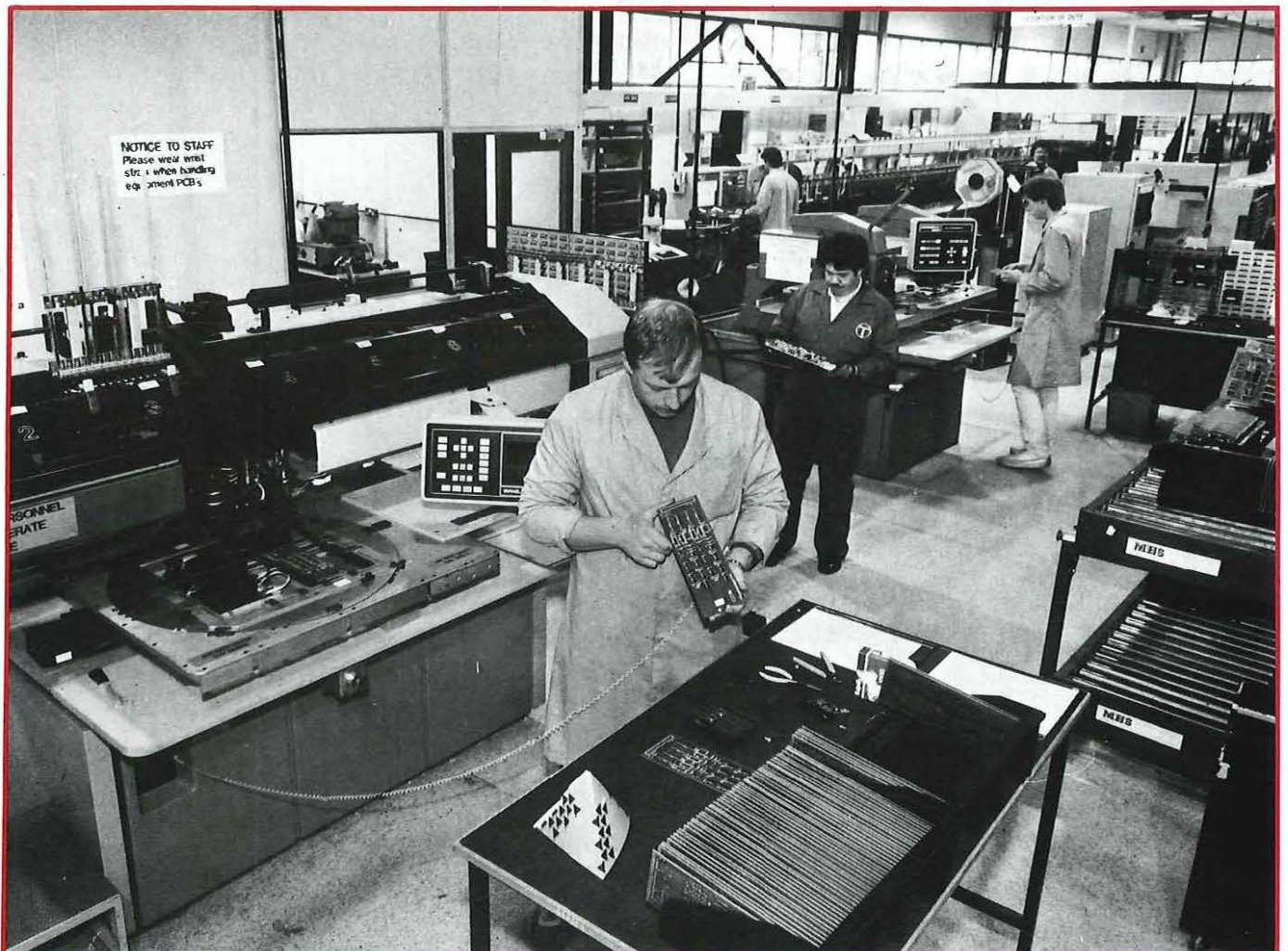


The creation of BT Fulcrum as a wholly-owned subsidiary of British Telecom is the culmination of two years' work which has transformed the old Factories Division into a high-tech commercial supply 'company' able to compete in its own right in the new environment in which British Telecom now operates.

Major investment was made to enable Factories to be transformed from what was essentially a 'jobbing workshop' into the sophisticated and streamlined high technology 'total supplier' that BT Fulcrum has now become.

But two years ago it was a very different story. Factories Division had no real identity of its own and most of its effort was spent operating a large workshop and refurbishment unit at a time when demand for refurbished products was rapidly diminishing. In short there was no future unless something drastic was done.

- The obvious needs were to:
- ★ develop a brand new business by completely restructuring the factories
 - ★ establish a new manufacturing capability
 - ★ build a new sales and marketing operation
 - ★ provide a comprehensive customer services function.





This has now been accomplished and BT Fulcrum has the total capability of taking a product through all stages from concept and manufacture to sales and servicing. In addition a highly successful electronic PWB repair unit is in operation which last year saw business grow by more than 40 per cent.

Shaking off the old image and making customers fully aware of its new capability has obviously been a top priority for BT Fulcrum and it is now involved in many activities which customers may not associate it with. Gone are the days when it was seen primarily as a refurbishment house as is shown by the fact that this year less than ten per cent of its work load was in this sphere.

The British Telecom operating licence presented BT Fulcrum with a unique opportunity. Under the legislation any part of British Telecom involved in the production of apparatus equipment had to set up as a subsidiary by the summer of next year. Plans for the 'new-look' Factories operation fell into that category and it was essential that the new image was very much to the fore in time for the official launch earlier this year attended by British Telecom Chairman, Sir George Jefferson.

BT Fulcrum, which employs about 2,300 staff, has sites at Birmingham, Edinburgh and Enfield in North London. Product development and manufacture are concentrated at Birmingham while after sales service is primarily centred on London. Both plants have been equipped with the latest high-technology production systems making them among the most advanced units of their kind. A satellite unit operates from

Edinburgh while company headquarters is in central London.

BT Fulcrum emphasis initially has been to concentrate operations into key markets within British Telecom and capitalise on its intimate knowledge of British Telecom's operations. It is also working to strengthen commercial links and exploit fully complementary skills.

BT Fulcrum's own products are already extensive and range from simple hand-held testers to highly sophisticated microprocessor-controlled telecommunications systems. A number of products are manufactured under licence from companies outside British Telecom.

Many visitors from within British Telecom have already had a close look at BT Fulcrum's new operations and few have failed to be impressed by the transformation.

But although it is vital to secure the future, BT Fulcrum is equally concerned not to ignore the present. A continuing role will be to provide Strowger support to British Telecom as well as finding profitable overseas outlets for British Telecom's surplus electromechanical products. Ⓣ



Above, left: Test engineer Mark Dawson commissions a Miracle 2 call logging unit.

Above, right: Systems test engineer Kevin Biddle probes a processor board in an ADEKS cabinet. Completed consoles are shown in the foreground.

Below, left: British Telecom chairman Sir George Jefferson (centre) at the launch with BT Fulcrum's chairman Mr Clive Foxell (left) and managing director Mr Ken Govier.

Mr D Proctor is director, sales and marketing, BT Fulcrum.
Mr T J Scown-Geary is marketing manager, BT Fulcrum.



The wide range of British Telecom Guideline services is well illustrated in this composite picture.

Information on the line

Roger Farrow

Recorded information via the telephone began in 1936 when London telephonist Ethel Cain became the voice of the Speaking Clock. Today British Telecom operates 15 national services ranging from horoscopes and recipes to the latest City financial information.

The time, the weather forecast, the latest test match score or a choice of music to suit most tastes – all these plus many more are just a phone call away and form part of the growing range of British Telecom Guideline Services which began before the war and now generate nearly 500 million calls and almost £30 million revenue a year.

And in addition to the national services there have been several local initiatives from individual telephone areas and more recently the new Districts.

It is the Speaking Clock, however, which remains the most dialled service. It began when Croydon telephonist Ethel Cain fought off competition from 15,000 colleagues to become the first girl with the Golden Voice. She received a prize of ten guineas (£10.50) and the tribute from Poet Laureate John Masefield, one of the judges, that she had 'one of the most beautiful voices I have ever heard'.

Ethel remained 'in post' until 1963 when the familiar tones of Pat Simmons took over. Pat, an assistant supervisor at Acton was picked from 9,000 telephonists and she remained 'on duty' until earlier this year when Brighton's Brian Cobby, also an assistant supervisor, was chosen to take the service into the digital era.

'Timeline', as the service is now known, is accurate to one twentieth of a second and is available at almost 300 centres and generates over 250 million calls a year. The speech itself consists of 86 individual words from which 8,640 separate phrases are composed.



No further services were introduced before the war but in the mid 1950s came 'Weatherline'. This now provides separate forecasts for all areas of the country, apart from south west and north west Scotland where service will shortly be introduced. In addition a separate in-shore Marineline forecast has now started for yachtsmen and seafarers. This covers the whole coastline in the two daily forecasts provided at

0600 and 1900 hrs. In winter, British Telecom provides a Skiline forecast for skiers.

The almost legendary Cricketline service was introduced during the Lords Test Match of 1956 and now covers all the major competitions generating considerable interest and making a major contribution to the summer cricket scene. Sportsline caters for other sports news including the classified football results between 5 pm and 6 pm on Saturdays together with a pools check. Overseas cricket in the winter and all other major sports are covered.



Raceline, with information provided by the William Hill organisation, caters for punters and the racing fraternity with prospects and conditions in the morning, results during the afternoon and a summary at the end of the day. Evening meetings are also covered. Motoring enthusiasts can obtain results of major Grand Prix meetings and progress of major car rallies on 'Eventsline' currently available in Manchester and London.

One of the most successful recent introductions has been 'Starline' a daily horoscope provided in conjunction with *Woman* magazine. For those interested in a daily brain-teaser there is Challengeline with a problem set by MENSA who help promote the service. 'Recipeline', a daily recipe for four people from British Gas, is probably a prime candidate for some form of interactive service which would enable customers to dial through and select their own recipe from a list. A new bedtime story for children between three and 12, available after 6 pm, will also start soon, sponsored by Pallitoy.



The amateur investor is catered for by FT Cityline which provides hourly updates of stock market information with a summary after the Stock Market has closed. There is a separate number in London only for international information. 'Spaceline', provided by Dr David Whitehouse, provides a weekly record of events in space, and there is a separate Halleyhotline service available in eight locations giving details of the history and current progress of Halley's Comet. The ability to sight the comet later this year and early next is expected to generate significant public interest.

Different types of recorded music are available on Discline, Albumline and Goldenline. Discline, available at almost 200 centres, provides four records a day and five at the weekends from the pop charts top 30 while Albumline provides a separate top single each day, and Goldenhitline enables those with longer memories to listen to two hit records daily (changed at 0600 and 1400 hours) from the 1960s and 1970s.

Local services include Radioline – tuning in to the local radio direct on the telephone – under

which more than 30 stations are now available. Local 'Whats on' services are provided in several places in conjunction with the local council and tourist boards. In other places, fishing information is provided and in Bradford and Colchester separate forms of information to home computer owners are available.

Market research has shown that public awareness of the newer services is relatively low, and a promotional strategy to overcome this is being devised. It will include improved presentation of the range of Guidelines services in British Telecom customer information.



One of the hardest tasks is keeping the Guidelines numbers, which can vary from area to area, in the public mind. A booklet is now being compiled for ready reference for distribution to subscribers throughout the country. Over the next five years, it is also proposed to put the ten most popular services on level one – three digit dialling. The research did show, however, a high degree of satisfaction with Guidelines amongst users, particularly in services such as Raceline and Sportsline.

Competition to Guidelines from other sources has been growing, particularly from Prestel and Teletext and from BTE Supercall who are

*British Telecom Journal
Summer 1985
Information on the line*

A major event for the Guideline services was the launch earlier this year of Brian Cobby as the voice behind the Speaking Clock. Brian is pictured with the new digital equipment.



providing a series of premium information services in London such as Citycall and Chartcall, to which callers pay trunk rates for improved information. This will certainly mean that Guidelines will have to maintain high quality to retain a market share.



Gaps in the information market are constantly being sought which could be profitability exploited by Guidelines services. A number of new entertainment-based services have recently been introduced including *The Mirror* Telefun Show – a weekly compilation of jokes and comedy – and Eastendersline, a twice weekly update of the popular BBC soap opera. This

form of service is popular in USA and is proving to be profitable here.

Guidelines services have also been used to raise money for charity. The proceeds for one day before Christmas were donated to Band Aid, and a one week service of messages from pop stars raised more than £10,000. This was also donated to Band Aid and the promotion succeeded not only in improving awareness of telephone recorded information but also of British Telecom – an important role for Guidelines with such a high public profile.

The future of the services will depend to some extent on the evolution of premium call services, but the intention is to continue to increase the range and to play a leading role in British Telecom's call stimulation activities and its efforts to promote wider telephone usage. ①

Keeping in time

Beating off the challenge of a dozen or so female competitors ensured that Brian Cobby should still be the voice of time into the next century.

Brian, who used to work with the British Forces network in Hamburg and has done several 'voice-overs' for television commercials, received a £5,000 prize on breakfast television from British Telecom Chairman, Sir George Jefferson. A bachelor from Brighton, Brian made his recording in just 26 minutes - compared with the three weeks it took Pat Simmons. The new digital clock has no moving parts.

From the anonymity of Croydon telephone exchange to one of the country's most easily recognised voices... that was the fairytale step made by Ethel Cain in 1936 when she was selected as the first lady of the Speaking Clock. Judges for the competition were Poet Laureate, John Masefield, Dame Sybil Thorndike and Mrs E D Atkinson, representing 'the perfect telephone subscriber'.

Ethel's voice was described as 'no more personal than a bird in the bush' and her success led to her becoming announcer for band leader Henry Hall and an offer of a part in a Columbia film under the name Jane Cain.



Pat Simmons was selected from more than 9,000 hopefuls when the time came for change in 1963. Her voice was described as having clarity, naturalness and friendliness without fuss.

Pat's voice became familiar to millions of telephone subscribers and during her career she received many proposals of marriage. Men also tried to strike up conversations with her.

Recording the Speaking Clock voice in 1963 involved Pat in making only 79 different announcements as the equipment enabled the different phrases to be used in the right sequences to make up a succession of complete announcements.

Mr R T Farrow is call stimulation manager in Local Communications Services Networks Marketing Department.

Whistle stop tour for Telecom train

Businessmen the length and breadth of Britain are now on the right lines when it comes to telecommunications – thanks to British Telecom's exhibition train which made a 33-stop tour of the country during June and July.

The eight-coach train was waved away from London by actress Joanna Lumley at the start of its 3,165 mile journey and visited stations from Truro to Inverness and Swansea to Lowestoft.

During the tour businessmen were invited on board to be shown the practical benefits of the way technology is being harnessed to meet the needs of modern businesses, large and small. The emphasis was on how the latest communications equipment helps businesses in practical, easy-to-understand ways.

On arrival at the reception coach, guests were given a personalised message of welcome flashed onto screens at the entrance through Tonto, British Telecom's new versatile desk-top communications package which combines telephone, computer and data terminals.

The exhibition was divided into three areas – speech, mobility and text. Among the wide range of equipment featured were small phone

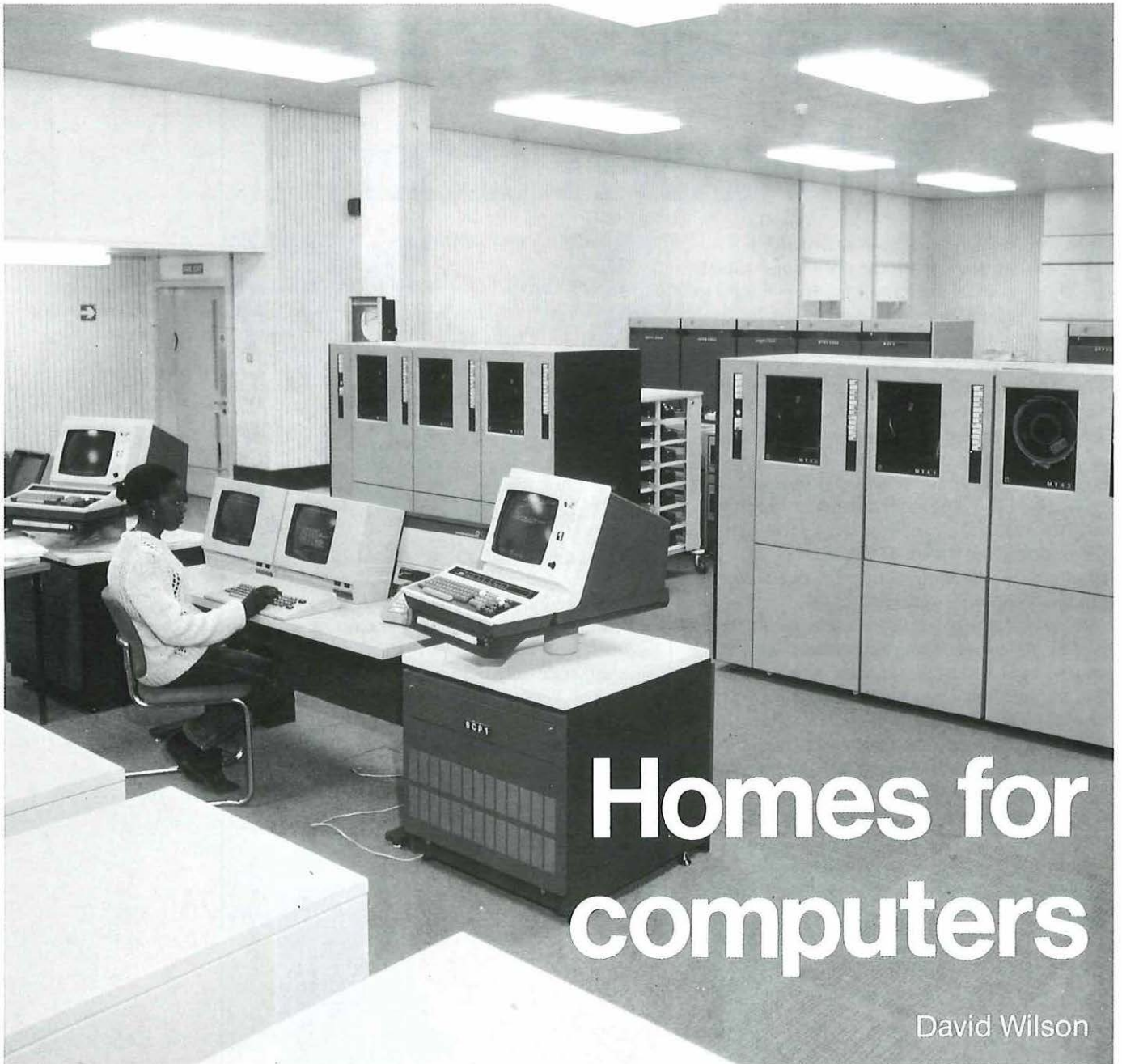


Joanna Lumley waves the exhibition train away from Blackfriars, London.

systems like Pentara and Kinsman; telex service and equipment, Radiopaging, answering and recording machines and payphones. British Telecom staff were on hand at all times to give advice and demonstrations.

At each stop the train's cargo of electronic communications was linked into the national and international networks by 30 direct telephone lines and telex connections through local exchanges. ①





Homes for computers

David Wilson

Jeanette Ross working at the operator's console in Finsbury Fyeld computer centre, London.

A growing myth is that today's computers are not as 'neurotic' about their environment as yesterday's. But the opposite is true and a specialist British Telecom team – Combuild – offers a unique service to overcome the problems involved.

As computer equipment gets more sophisticated, the conditions laid down by the manufacturers get tougher. The manufacturers, quite reasonably, will not take responsibility afterwards for anything going wrong if their computers have not been given the right environment at the start.

Giving proper housing to computers takes specialist knowledge and Combuild – an expert British Telecom team with no rival either inside or outside the organisation – can help in all the stages involved from initial planning and designing, to completion and in the maintenance of the computer environment afterwards.

The Combuild experts have more than 20 years' experience in handling the accommodation of computers and in advising and planning as well as knowing the professional architects, surveyors, engineers, contractors who need to get involved.

Of paramount importance is the chosen professionals' ability to create an economical and

completely reliable system . . . on time. Meeting deadlines – sometimes against all the odds – is a Combuild success story in the battle to cut computer costs.

One recent example is Ivor Place Computer Centre in Cardiff which took just under six months from start to finish. The contractor worked 12 hours a day, seven days a week to beat the deadline in a project which involved converting a warehouse including creating a new mezzanine floor to house essential air-conditioning plant. The operation increased floor space by 40 per cent and made more space for the computer hall itself. It was far from straightforward, involving an area of some 1,800 square metres but was completed on time within the original budget of £1.4 million.

Despite the mess and rubble that building works always generate, the Combuild team kept an eye on the public relations side of things and managed to remain on good terms with neighbours, the Welsh Tourist Board.

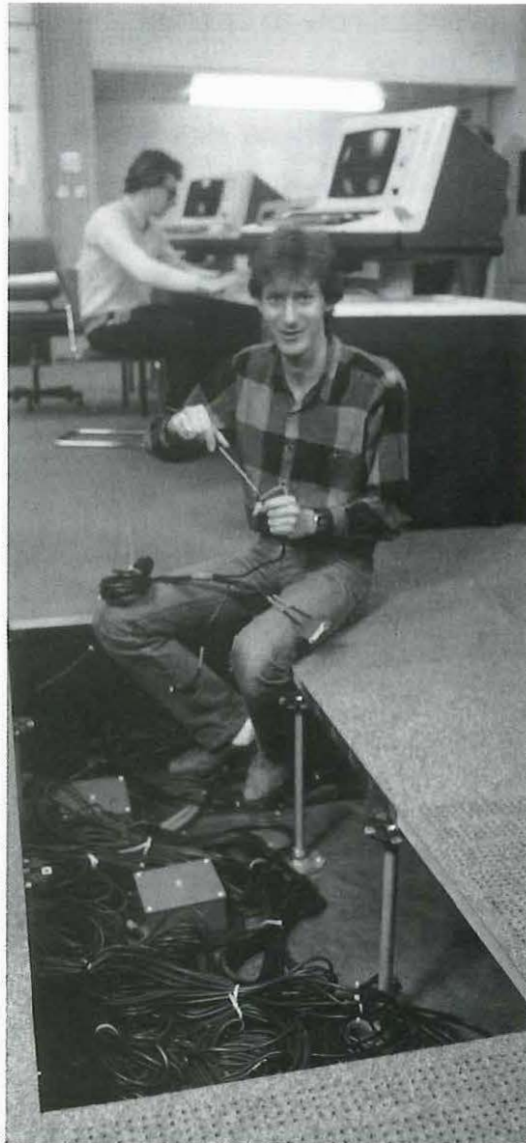
The construction of a complete computer centre for Thamesway District in Reading was completed last December. It involved a computer hall and all essential auxiliary services and support areas covering a total of 2,000 square metres. The entire building had to be gutted before construction work could start and, despite having to fit a completely new roof, the timescale, including planning and installation, was cut by a month to five months. Once again the budget – £1.6 million – was met.

Other projects have included computer centres at Finsbury Fyeld, London, which was completed in eight months with a budget of £1.3 million; Liverpool, which took seven months and £0.9 million; Rochdale, six months and £1.7 million and Red Lion Square, London costing £0.6 million was completed in nine weeks from start of contract. In addition, there have been 32 mini-installations of different kinds at locations throughout the country over the last 12 months.

Sometimes, the team starts from nothing and has to search out the right site before carrying out planning and design work from the ground up. In other cases, a building exists for conversion but in either case it takes specialist knowledge to offer such services as:

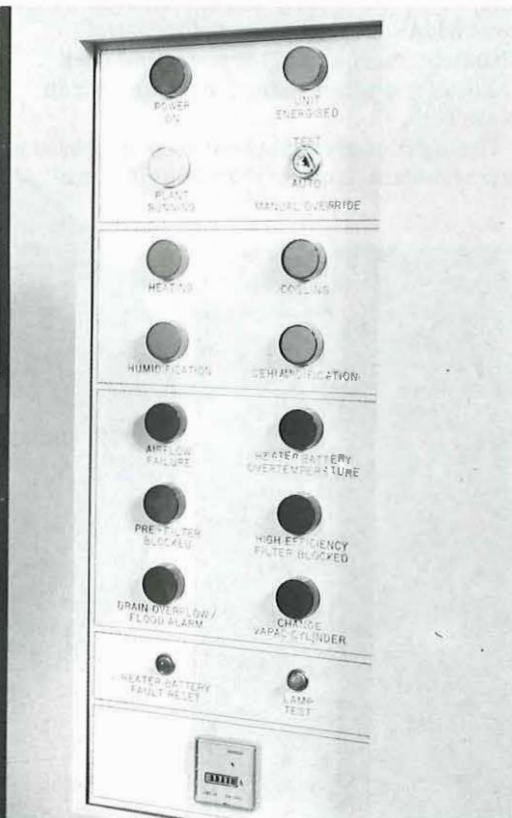
- initial advice and planning
- site-evaluation
- organising planning permission
- arranging financial authority
- choosing the right professionals
- making sense of contracts
- handling liaison throughout
- guidance after completion.

With two decades of experience behind it and an impressive record of achievement, the team has every reason to be proud of its comprehensive and cost-cutting services. ☎



*British Telecom Journal
Summer 1985
Homes for computers*

Cabling under the computer hall floor at Finsbury Fyeld is housed in a specially designed 16-inch deep void under the flooring which consists of steel-framed chipboard panels to allow easy access.



Every aspect of the computer hall environment has to be carefully controlled and monitored. Here, one of Combuild's project managers Mike Darbyshire, inspects the air handling unit indicator panel.

Mr D J Wilson is deputy manager of Combuild.

BTI's vital role in special
TV link up

Vietnam in view

Ron Calfe and
Ian Shane



Live television coverage from Vietnam of the celebrations marking the tenth anniversary of the withdrawal of American forces was made possible in the United States through a unique communications package involving British Telecom International (BTI).

Below: Street parades were a spectacular feature of the tenth anniversary celebrations in Ho Chi Minh City.

Below right: An NBC cameraman prepares his equipment.

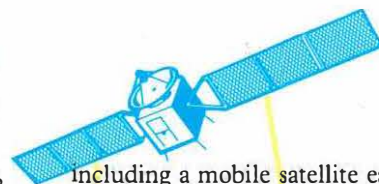
America's National Broadcasting Company anticipated keen interest in the celebrations marking the end of the Vietnam war and had ambitious plans for two weeks of early morning live programmes including screening of the Unification Day celebrations, a number of human interest features and a series of programmes on the development of the country since the takeover by the communist regime from the North in April 1975.

The problem was, however, that apart from some international telex facilities, other forms of worldwide communications were non-existent. And it was at this point that NBC approached BTI's Broadcast Services Unit for help since the facilities required were only available on the Indian Ocean satellite which cannot be seen in the USA.

For the coverage required, it was obvious that one TV channel would not be sufficient. There were additional requirements for control channels, international telephone and telex facilities and access to the NBC computer in New York.

The logistics of carrying out such an operation were immense. It meant that about 15 tons of

Atlantic
Ocean
Satellite



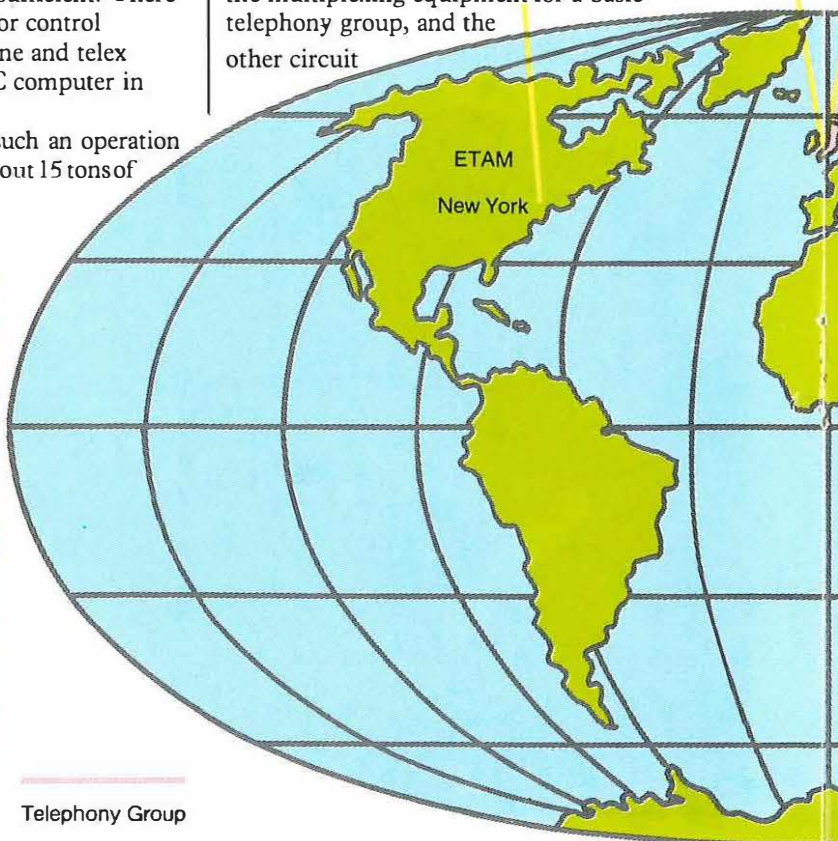
equipment, including a mobile satellite earth station, had to be packaged and shipped half way round the world and then set up in a hostile environment. In addition, only a limited amount of visas were granted by the Vietnamese. The team comprised 30 NBC staff including cameramen, editors, technicians and producers together with the authors of this article and two members from GEC McMichael who supplied the dish aerial.

Permission was obtained from the Vietnamese government to operate from a small transportable earth station in Ho Chi Minh City and BTI were authorised by the Vietnamese to act as their Intelsat operations representative for the project.

Double satellite hops were necessary for TV destinations beyond the UK – an overall distance of 90,000 miles. BTI also arranged for one of the Indian Ocean Region 14/1 1GHz spot beams to be temporarily repointed over Vietnam and two satellite carriers were agreed with INTELSAT – one outgoing TV channel and one bothway 24 channel telephony carrier.

BTI International Lines Division had only three weeks to put the project together so telephony facilities were kept simple with ring down manual board circuits terminating on dedicated operator positions in the Wren House International switchroom in London where full international connection facilities were made available.

Two racks of equipment were assembled at the International Telephone Services Centre (ITSC) workshop in Stag Lane, London. One rack held the multiplexing equipment for a basic telephony group, and the other circuit

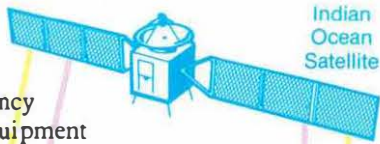


terminating equipment, carrier frequency generating equipment and various power and signalling supplies. Telephones were modified for four wire working to negate the need for echo suppressors and a vast assembly of spare parts and cables was gathered together.

Meanwhile, circuit provision duties were ordering a high frequency (HF) group from Madley earth station to Wood Street ITSC, nine telephone lines to the international manual board in Wren House, two TV control channels terminating at the International Sound Programme Centre in Mondial House, an out of area telex circuit, a computer line to New York, an earth station omnibus speaker circuit and two engineering speaker lines. All these requirements and associated equipment were provided within the deadline and final tests were carried out at Stag Lane with the GEC transportable dish to ensure that the equipment worked before shipment to Vietnam.

On arrival in Ho Chi Minh City there were problems in negotiating with the Vietnamese a suitable site for the earth station, transmission equipment and NBC control room. Permission was finally granted to use the grounds and guard room of the Presidential Palace, renamed Unification Palace. The next three days were spent in setting up the communication facilities and earth station and finally lining up the TV channel and telephony group with the UK.

The facilities provided at the palace were made available by NBC to other news media companies and to quote an Australian Broadcasting Company correspondent "gave a radio, television and communications coverage from Vietnam far beyond expectations".



During the following two weeks more than 25 television transmissions were relayed from Vietnam via Madley earth station to New York, Sydney, London and Tokyo. The Wren House International operators connected about 1,000 telephone calls and the live 'Today Show' broadcasts to New York resulted in rave reviews from the American TV columnists.

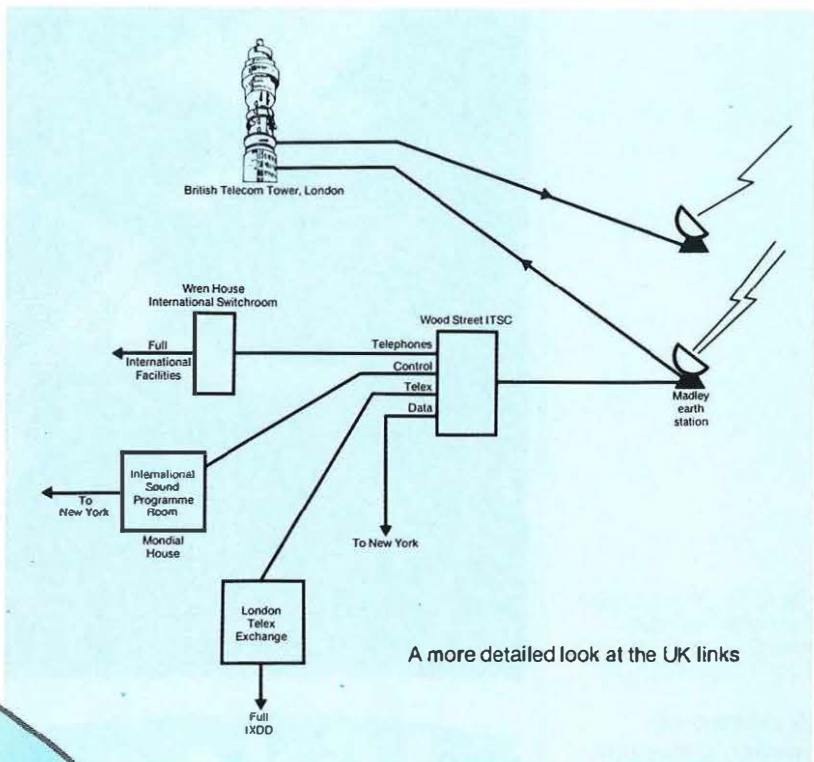
BTI, GEC and NBC worked well as a team despite domestic power supply problems and monsoon storms which occurred most days for about one hour around midday making transmission to Madley impossible. Only one TV transmission was delayed by bad weather.

The experience gained on the first project of this kind has been invaluable and demonstrates the ability of BTI to react swiftly to customer requirements. As a result, it is conceivable that there will be a market for further projects in the future. Ⓟ

*British Telecom Journal
Summer 1985
Vietnam in view*

Mr R W Calfe is a member of a project group in BTI's International Lines Division responsible for the development of new switching centres.

Mr I M Shane is involved in transmission network and equipment planning in the same Division.



Television Channel



Co-author Iain Langdon operates the video mapping 'workstation' at BTRL, Martlesham.

A video disc mapping system has been developed at British Telecom Research Laboratories (BTRL), Martlesham to overcome problems associated with 'digital' mapping. It can be used in the process of transferring paper records to computer databases without losing vital geographical detail.

Video discs on the map

Iain Langdon
and
Mike Gray

Many British Telecom projects require the transfer of existing paper records, including some drawn on Ordnance Survey maps, on to computer databases. One method of providing a map background for computer records is the use of digital mapping, in which every line on a map is entered into the database by storing the co-ordinates of its end points and a computer graphics system is then able to redraw the map, line by line.

Such a system is flexible, allowing individual lines to be classified as parts of houses or roads and displays only those features of the map which are required. The map can also be updated as road alterations and housing developments occur.

There are, however, several disadvantages to digital mapping systems:

- A large database is necessary to cover a sizeable tract of land such as a telephone area or District which means that the computer system needed to process the maps can become expensive – typically, hundreds of

thousands of pounds.

- When a user is remote from the main computer and communicates with it over a data link, it can take three or four minutes to draw a map.
- Ordnance Survey, the prime source of digital mapping in Britain, have not yet produced digital maps to cover the whole of the country. The task of producing digital maps is so labour-intensive that it will be many years before full coverage can be achieved.

Stored images

A solution to these problems has been developed at BTRL using video discs to store images of maps. Images taken from Ordnance Survey maps varying in scale from 1:625,000 to 1:1250 are stored as still pictures on the video disc. Any one of these can then be displayed in colour on a TV monitor and, by using a microcomputer to control the video disc player, it is possible to 'move around' the maps on the disc.

The various scales of map allow the user to 'zoom in' on the area of interest showing progressively more detail at each step and the range of zoom can be from a view of the whole of Britain down to a single 100m square from a 1:1250 scale map. The user can also pan around the map in discrete steps.

As it is impractical to turn over video discs when in use, they are treated as single-sided and the area of the country available on one side depends on the requirements of the application. For example, where the most detailed view required is a 4 km x 3 km area (equivalent to looking at a small part of one of the well-known 1:50,000 scale maps), then the whole of Britain can be fitted on to a single-sided disc. For most applications within British Telecom, a detailed 100 m square will be required, giving a coverage of 200 to 300 km² per side. Larger areas are available by using more than one videodisc player at the workstation.

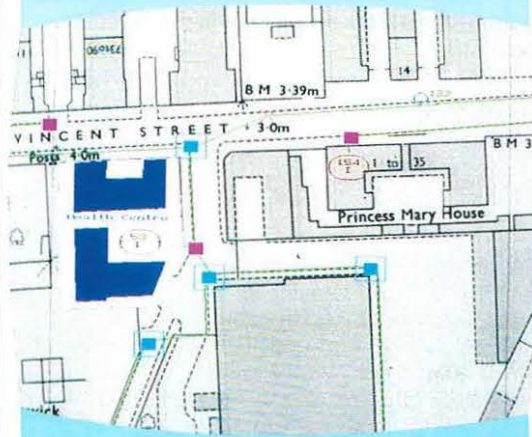
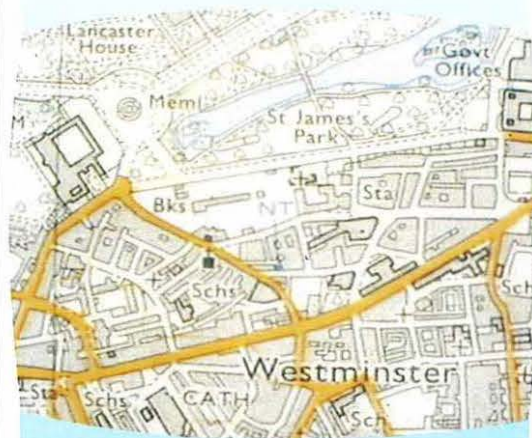
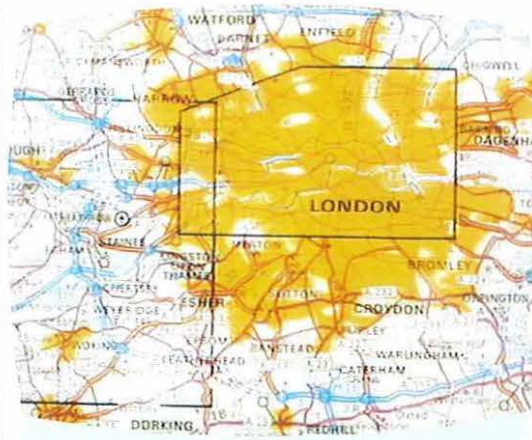
By careful design of the system it is possible to get the microcomputer to overlay the video map with computer graphics representing, for example, local line plant. The Martlesham system can position items on the video map with a scale resolution of about 0.2 m, and an accuracy of better than 0.5 m.

Too costly

System costs are a fraction of those of a digital mapping system because it is based around a microcomputer, and uses cheap video discs to store the map data.

Industrial video disc players can locate any track on the disc within five seconds but in practice most changes of view take place in a fraction of a second. One disadvantage is that the TV picture cannot be altered once the disc has been pressed. But a special video mixer designed at Martlesham enables the map information to be updated with new developments.

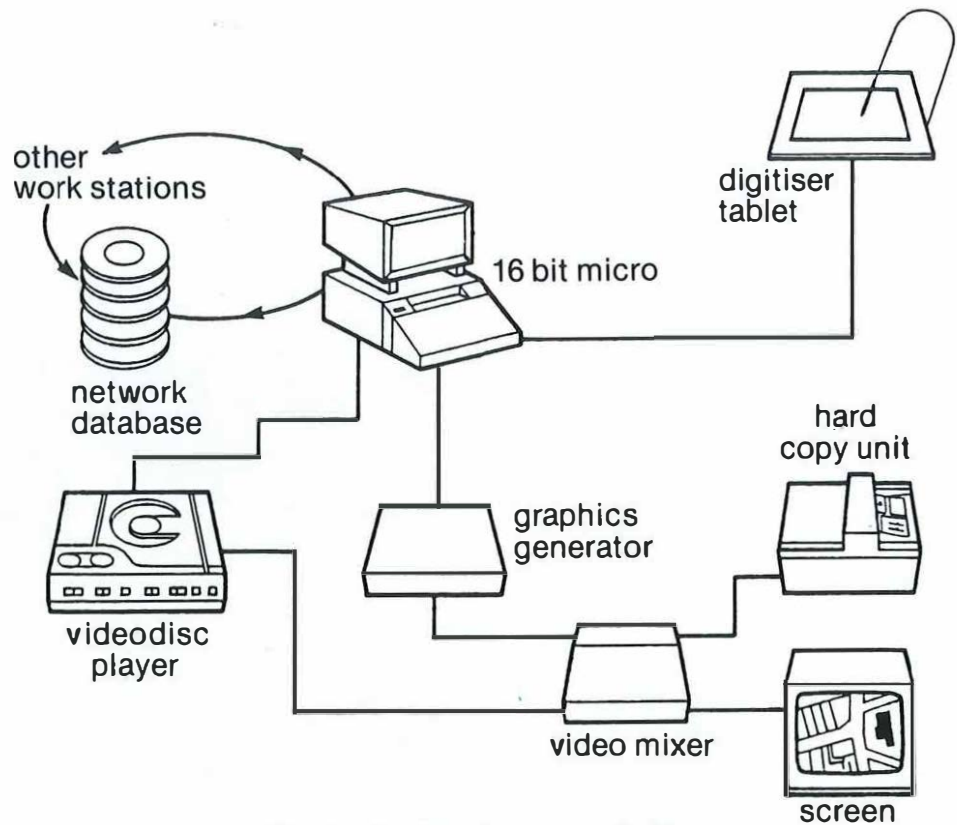
By allowing computer graphics to over-write the map background, the user can cover an out-



Friday, May 31, 1985
Video Map Demonstration Program.

ATTRIBUTES	
ON	Item type DUCT
5	Last amended 30-May-85
3m	Identifier 1789
	Type 54D
	Instal d./Prop'd Installed.
011	Instal'n date 25-Jun-81

The various scales of map allow the user to 'zoom in' on a particular area of interest giving him progressively more detail. Additional data and systems information is shown on a separate text screen.



Cable TV planning workstation

Video disc mapping is being used as a network planning aid for switched star cable television networks.

Mr I Langdon and Mr M Gray, of the telematics and office automation division at BTRL, Martlesham, have jointly lodged a patent for the British Telecom video mapping system.

of-date portion of map with a white patch, and draw in new details over the top. The details are stored as computer graphics in the database until a new, up-to-date, video map is produced at a later stage.

Video maps were first developed in British Telecom as an aid for the planners of switched-

star cable TV networks. All the workstations on the system are connected via a local area network to a central Winchester disc system which contains the main database. This allows all users instant access to the latest information.

The workstations have two screens – a graphics screen displays the maps and overlaid computer graphics, while a text screen shows other relevant information.

A video copier can provide monochrome copies of anything displayed on the graphics screen while a pen plotter can provide higher quality colour drawings of the overlaid graphics.

Facilities for the cable TV planner include:

- ★ the ability to enter data from existing paper maps by a process of 'digitisation'
- ★ the addition and editing of further data by freehand drawing directly at the graphics screen
- ★ measurements of lengths, either of selected cables or duct routes, or between any number of points indicated by the user on the graphics screen
- ★ checks on transmission limits for planned cable routes, together with manpower and cost estimates for proposed schemes
- ★ access to additional data relating to each item displayed on the graphics screen such as spare capacity, number of ways, type of duct or cable.

A market survey is currently being compiled by BT Fulcrum with a view to launching the product as a planning aid for use both within the company and by other utilities, such as gas and electricity boards. (1)

Optical video discs offer a method of storing colour TV images and stereo sound which is superior in most aspects to using video tape. About 55,000 frames or individual pictures can be stored on each side of the disc and when played back at normal TV rates each side lasts 37 minutes. Alternatively, the images can be played back more slowly or faster than normal, in reverse, or even individually to create a vast still picture store.

Information is recorded in a continuous spiral track of variable length pits. With a pitch of 1.6 microns, the track is 60 times denser than that of a standard audio LP and for 55,000 frames it is about 19 km long. The video signals are encoded to produce a pulse-width modulated waveform which is used to form the pits on the disc.

Unlike a conventional audio record, the information on a video disc is not on the surface but is sandwiched between protective coatings. This, coupled with the contactless optical readout system using a laser beam, results in the disc being virtually wear free.

Breaking down the barrier

Geoff Knight

Every day in the UK millions of people reach for the telephone to make or receive business, social or occasionally emergency calls. Most don't have to think twice about it, but for the elderly, infirm and disabled, for whom the phone is often their only means of regular and rapid contact, the physical difficulties in conducting a call can be immense.

British Telecom has long been aware of these problems and is currently co-operating with the Royal National Institute for the Deaf (RNID) in providing a special 'exchange' which enables profoundly deaf people (with or without good speech) and hearing people with speech impairment to communicate much more easily.

Over the years British Telecom has built up a wide range of equipment and services enabling many disabled people to use the telephone effectively. The very nature of the telephone, however, presents particular problems to the deaf or those who suffer from speech problems. Some may be helped by amplifying devices

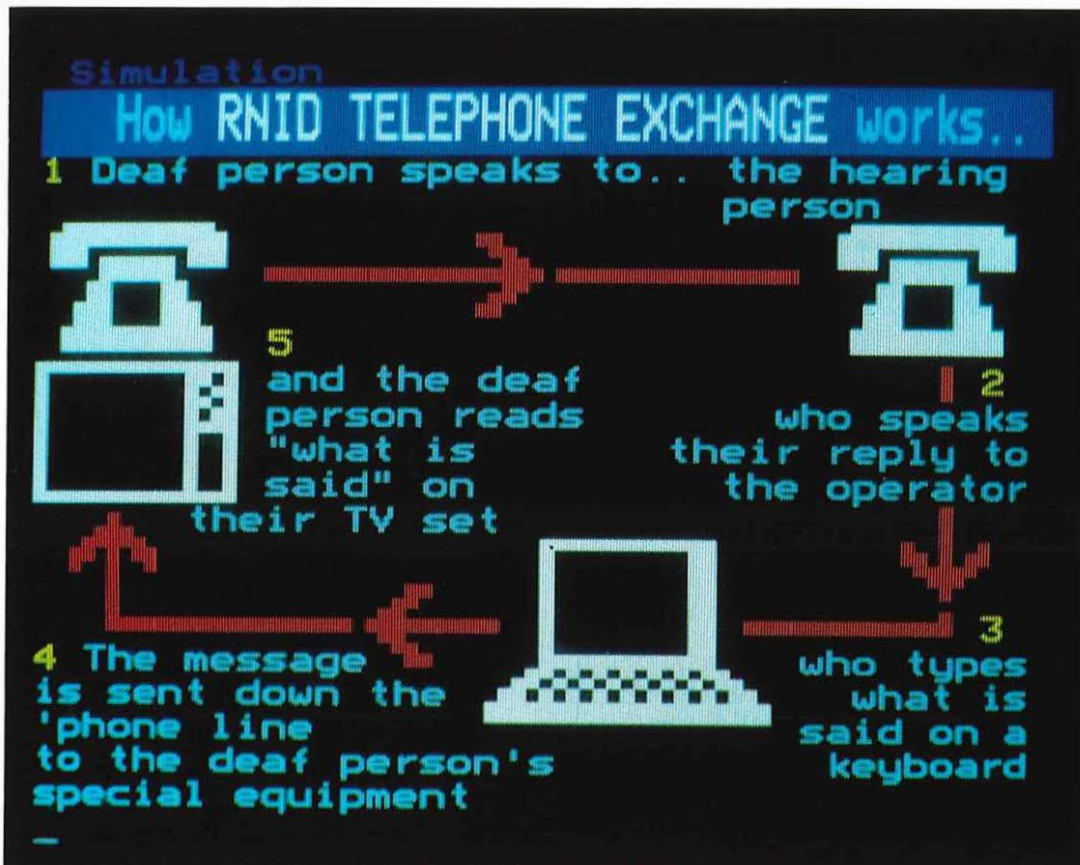
which increase the level of incoming or outgoing speech, but their disability may be so severe as to prevent their direct use of the telephone even with this additional equipment.

With text communication terminals or electronic keyboards and visual displays, it is now possible to 'converse' directly over the public switched telephone network. Use of these text systems requires both parties to have specialist equipment but still leaves the deaf or speech-impaired person unable to talk to a hearing person who only has an ordinary phone. The tasks involved in making and receiving a telephone call are shown below.

In 1981 British Telecom, the Royal National Institute for the Deaf (RNID) and the National Research Development Corporation carried out the first trial of a bureau-based telephone service enabling deaf people to converse with hearing people by using a Prestel set and an intermediate operator.

In the trial a deaf person wishing to make a call to a hearing person would ring the bureau at RNID Headquarters in London and give the number required. The bureau operator would then contact the third party and act as an intermediary during the conversation by typing and hearing person's speech on the keyboard of a telephone-linked microcomputer which

A special telephone 'exchange' provided by British Telecom is the focal point of a new service launched by the Royal National Institute for the Deaf (RNID) to help people with hearing and speech difficulties communicate by telephone.



simultaneously appeared on the deaf person's television screen.

The deaf person with good speech would speak directly to the hearing person as in a normal telephone conversation but a caller with speech difficulties was able to type a message back to the bureau and the operator would pass on the message verbally to the hearing person.

Conversely a hearing caller was able to ring the bureau and be connected to the deaf person whose attention was drawn to the ringing telephone by flashing lights.

Successful

The experiment proved successful although a number of technical improvements were recommended to minimise the tasks required of the operator and simplify the call procedure for the deaf user. Certain frequently-used typed messages for instance could be stored in the system so that they could be recalled and transmitted at the touch of a button. These might include:

- ★ a page announcing the bureau and asking callers to identify themselves.
- ★ a page asking for the name and telephone

number of the person that the caller wants to speak to.

- ★ a 'please repeat' message.
- ★ a 'please speak now' message.
- ★ a 'goodbye and thank you for calling' message.

Experience of the trial using 25 participants showed that the system was overstretched at times and led to the conclusion that two operators would be necessary to reduce queuing problems. A facility to book calls in advance was also recommended.

It was clear that an extended trial with more taking part would enable a fuller evaluation to be made and that it would be necessary to seek funds for the service which was expensive to operate.

By January last year, working with telephone equipment provided by British Telecom and with a grant from the Manpower Services Commission under its community programme, the RNID was able to introduce a pilot scheme now involving more than 70 profoundly deaf people throughout the UK. The current British Telecom contribution to this two-year project involves the free provision of six exchange lines,

Elderly widow Mrs Gabrielle Partington from south London is profoundly deaf and has poor sight. Connection to the RNID exchange has made a great difference to her quality of life.



bureau equipment, rental and regular maintenance.

Much work was also put in by staff from British Telecom London London North Central Area in the setting up and continued maintenance of the bureau. Approval was sought and gained for the connection of the special apparatus at the bureau to the British Telecom network.

Public launch

After only 12 months the service was working so well that it was decided to make it more widely available. In February this year and RNID publicly launched the service as 'The RNID Telephone Exchange for the Deaf.'

At present the exchange operates between 10 am and 9 pm, Monday to Friday and 10 am to 5 pm on Saturdays, but the RNID hopes to offer a seven day service when subscribers reach sufficient numbers. The exchange has capacity for about 150 more deaf subscribers.

Subscribers to the exchange can make and receive calls from hearing people anywhere in the world. During the first part of the trial, users were not charged for their calls, but from

October last year calls through the exchange have been charged at the standard rate. The RNID is currently compiling statistics on the volume and duration of calls which will form part of a general review of the aspects of the services.

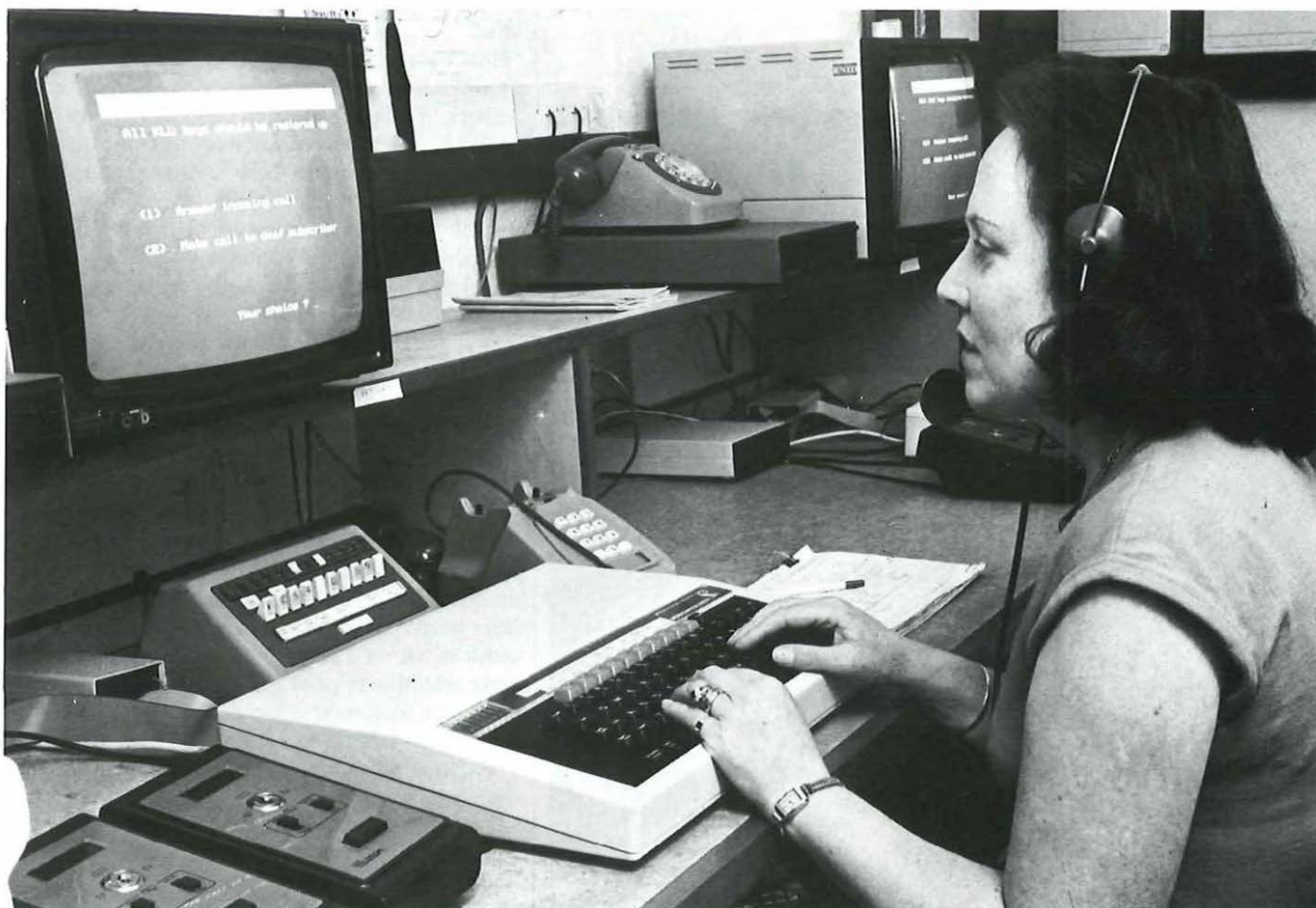
It costs between £300 and £400 to buy the necessary equipment to use the service. Subscribers to British Telecom's public viewdata service (Prestel) or electronic mail service (Telecom Gold) now have access to the exchange. Many of the popular models of home microcomputers can be made compatible with the bureau and an information sheet giving details is available from the exchange supervisor at the RNID, 105 Gower Street, LONDON, WC1E 6AH, Telephone: 01-387 6829.

Both British Telecom and the RNID believe that the opening of the exchange is an historic event for both hearing and deaf people as it opens a new line of communication with their hearing friends, relatives and the community at large. There is confidence that the system will soon become a permanent feature, undoubtedly leading the way for similar exchanges around the country. ①

*British Telecom Journal
Summer 1985
Breaking down the
barrier*

Mr G J Knight is a member of British Telecom's Action for Disabled Customers (BTADC) team.

Operator Joan Warren at work at the RNID's special exchange in central London.



Since it opened three years ago in the City of London, British Telecom's Technology Showcase has played host to more than 70,000 visitors. Here manager Neil Johannessen looks at the philosophy behind Showcase and argues that its role is far wider than that normally associated with a traditional museum.

Showcase easily demonstrates how directories, switchboards and telephonists themselves have changed over the years.



Museum of the future?

Is Showcase a museum or is it not? Certainly it houses a unique collection of long redundant telecommunications equipment but the somewhat wordy dictionary definition of 'museum' makes no mention of 'history' or, indeed, 'the past'. Perhaps it all depends on a particular point of view – a bit like a hologram where what one sees depends on the standpoint.

What is beyond doubt is that visitors to Showcase, who have ranged from parties of excited schoolchildren to Peers of the Realm have all learned from their tour. Whether their particular interest centred around dials, payphones and exchanges or high speed fax or slow scan TV, they have gone away considerably wiser.

But there is more to Showcase than meets the eye. What is on show is merely the tip of the iceberg. Years of dedicated collecting by many individuals have given Showcase a collection that is second to none, both in range and in quantity. This, together with the enthusiasm of a small team of staff, and support from other British Telecom groups and suppliers, enables Showcase to serve many needs far removed from the displays themselves.

Take the directory collection for example. More than 3,000 different directories, dating back to 1880 and the earliest telephone users, offer a unique picture of the country over the years. The most obvious use is for family history study but there have also been many uses by businesses as part of their marketing planning.

Then there are the historic vehicles. Ranging from a 1933 BSA engineer's motorcycle combination to the last Morris Minor van, these have been regularly used at fetes and fairs – often as part of a larger British Telecom stand. A huge selection of photographs helps enthusiasts to restore their own vehicles and helps in the illustration of a whole range of articles including one that appeared in the last issue of *British Telecom Journal*.

It was Showcase which provided the 1936 Speaking Clock for the recent publicity for the 'Golden Voice' competition and last year's IBTE Christmas family lecture made use of many exhibits. Many of the recent activities of the British Telecom Education Service have also involved input by Showcase in one form or another.



Right: Technical officer George Williams monitors the remote switching panel for aerial 2 transmitters at Goonhilly's operational control console.

Goonhilly's 20 years of commercial operation

Space age spectacular

Bob Bowden

Twenty years ago this summer British Telecom's first earth station at Goonhilly Downs in Cornwall began commercial operations – and triggered the explosive growth in satellite communications which now span the world.

Any popular history would soon reveal that the 'swinging sixties' were remarkable for a number of momentous 'firsts' ranging from men walking on the moon to mini-skirts. An event which perhaps lacks the same popular appeal but which, almost certainly, has proved of most benefit to mankind took place on a bleak Cornish moor 20 years ago this summer and helped revolutionise international

communications. The occasion was Goonhilly's first commercial operation in beaming telephone calls across the Atlantic via the Early Bird satellite perched 22,300 miles out in space above the Earth. And that was just the beginning . . .

Since Early Bird, the development of satellites by the International Telecommunications Satellite Organisation (Intelsat) has kept pace with the almost frantic growth in traffic which

THE INTELSAT SYSTEM

Britain is a founder-member of INTELSAT which was set up in 1964 to form a single global commercial communications satellite system. INTELSAT was originally formed by 11 countries and there are now 108 member-nations.

INTELSAT I (Early Bird) (1965)

Size: 28.4in (721mm) diameter
23.25in (590mm) length
Weight: 150lb (68kg) at launch
85lb (38kg) after apogee motor firing
Characteristics: Capacity 240 telephone circuits or one television channel. Provided point to point communications only.
Design Life: 18 months although Early Bird operated satisfactorily in continuous full-time service for more than three and a half years.

INTELSAT II (1967)

Size: 56in (1421mm) diameter
26.5in (672mm) length
Weight: 357lb (162kg) at launch
190lb (86kg) after apogee motor firing
Characteristics: Capacity 240 telephone circuits, or one television channel. Earth coverage (northern and southern hemispheres). Introduced multipoint communications capability between earth stations in area of coverage.
Design Life: three years.



THE INMARSAT SYSTEM

The principal satellite facilities leased by INMARSAT for satellite service to ships will be Maritime Communications Service (MCS) packages on INTELSAT V satellites and MARECS satellites (maritime derivative of ECS).

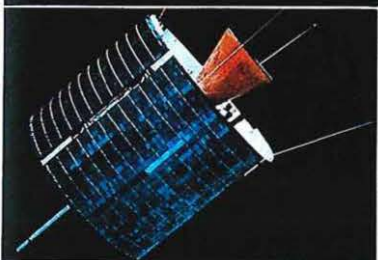
MARECS: Launched Atlantic, December 1981
Launched Pacific, October 1984

Size: 45ft 3in (13.8m) wide with solar panels fully deployed

7ft 3in (2.2m) in height

Weight: 2216.9lb (1005.6kg) at launch
1209lb (548.4kg) on-station after apogee motor firing

Characteristics: Capacity average of 35 telephone circuits for communications to ship earth stations in the INMARSAT system. Employs 6/4 GHz frequency bands for shore/satellite links, and 1.6/1.5 GHz for ship/satellite links. There are two global coverage antennas, comprising one 6/4 GHz horn and a two metre diameter, shaped-beam 1.5/1.6 GHz reflector.
Design Life: seven years.





has developed. But the enormous cost of launching large objects into orbit led to considerable refinement of onboard system design and as the launcher load capability rose with the application of the Atlas Centaur rocket, the satellites became even more sophisticated.

By 1976 the Intelsat IV and IVA satellites were in use on the main Atlantic and Indian Ocean routes. Their 'spot' beams allowed the same radio frequencies to be used both ways across the ocean region while retaining 'global' beams to give the smaller countries access to the system.

It was also about this time that it was realised that the predicted traffic growth through the 1980s would not be contained by the 'IV' and 'IVA' designs unless large numbers of satellites were maintained in orbit working to equally large numbers of ground stations. ▶



THE ECS SYSTEM

Britain is a partner in the European Communications Satellite (ECS) and INMARSAT (International Maritime Satellite Organisation) systems. ECS is managed by EUTELSTAT

ECS (first launch 1982)

Size: 45ft 3in (13.8m) wide with solar panels fully deployed, 7ft 3in (2.2m) in height

Weight: 2220lb at launch

1280lb (580kg) after apogee motor firing

Characteristics: Capacity average of 12,000 circuits plus two television channels. Capacity achieved by the use of the 14/11 GHz frequency bands and dual polarization with the TDMA/DS1 transmission technique. Each frequency can be used twice. There are six communications antennas, including three 'Eurobeams' covering Europe and North Africa and three spot-beams giving narrower coverage of particular parts of Europe. The antennas are front-fed reflectors. Later spacecraft will carry additional transponders operating in the 14 and 12 GHz bands for use with small earth terminals typically located in city centres.
Design Life: seven years.



INTELSAT (Continued)

INTELSAT III (1968)

Size: 56in (1421mm) diameter

41in (1041mm) length

Weight: 647lb (293kg) at launch

334lb (151kg) after apogee motor firing

Characteristics: Capacity 1500 telephone circuits or four television channels, or combinations. Capability for expanded multipoint communications and for transmitting all forms of communications simultaneously - telephone, telegraph, television, high speed data and facsimile. Television service without interruption of telephone or message service.

Design Life: five years.

INTELSAT IV (1971)

Size: 93.7in (2378mm) diameter

111in (2817mm) solar panel height

208in (5279mm) overall height

Weight: 3120lb (1415kg) at launch

1610lb (730kg) after apogee motor firing

Characteristics: Capacity average of 4,000 telephone circuits or 12 television channels. Twelve transponders each with a 36 MHz bandwidth. Two global transmit antennas, two global receive antennas, and two steerable spot-beam transmit antennas. Multiple access and simultaneous transmission capabilities.

Design Life: seven years.

INTELSAT IVA (1976)

Size: 93.75in (2379mm) diameter

111in (2817mm) solar drum height

267in (6776mm) overall height

Weight: 3256lb (1481kg) at launch

Characteristics: Capacity 6,000 telephone circuits plus television and SPADE (demand assignment system which permits greater flexibility and more efficient use of satellite capacity). If used only for television, satellite has a capacity of 20 channels. The IVA has 20 transponders, allowing 20 channels, each 36MHz wide, to operate through the satellite's twin 53in (1345mm) transmit dish-type antennas, each illuminated by feed horn array. Multiple access and simultaneous transmission capabilities.

Design Life: seven years.

INTELSAT V (1980)

Size: 52ft (15.8m) wide with solar panels fully deployed

21ft (6.4m) in height

Weight: 4110lb (1864kg) at launch

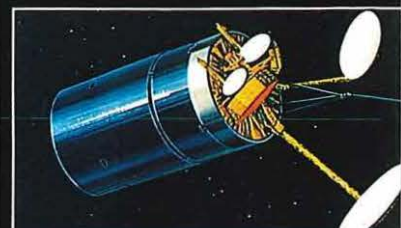
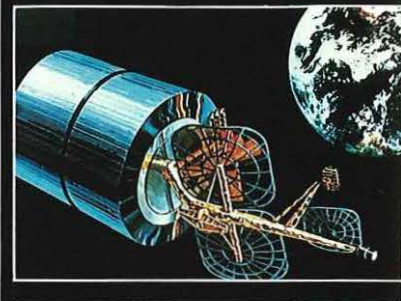
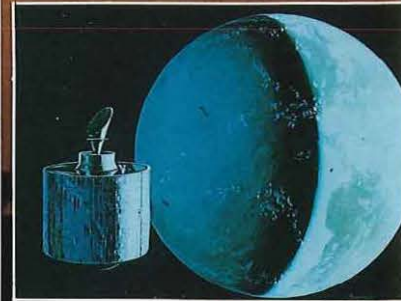
2231lb (1012kg) after apogee motor firing

Characteristics: Capacity average of 12,000 telephone circuits plus two television channels. Capacity achieved by the use of the 14/11 GHz frequency bands, in addition to dual polarization in the 6/4 GHz frequency bands. The 6/4 GHz frequencies are used four times, and the 14/11 GHz frequencies are used twice. There are six communication antennas, including two global coverage horns, two hemispherical/zone offset-fed reflectors and two offset-fed spot beam reflectors. Additional facilities on later flight spacecraft provide 30 telephone channels at 1.5 and 1.6 GHz for communication with ships.

Design Life: seven years.

INTELSAT VI

Due for launch next year is half as big again as INTELSAT V and will be capable of carrying an average of 35,000 telephone circuits plus three television channels.



To meet these needs, the larger Intelsat V satellite was developed and the first one was launched in 1980. Unlike the earlier Intelsat satellites which were spin-stabilised – requiring the body of the satellites to rotate to provide gyroscopic stability to the aerial pointing – the ‘V’ is three-axis stabilised by a combination of small gas jets and internally located momentum wheels. This gives greater solar cell array efficiency and allows a large cluster of antennas to be pointed at the earth.

The ‘V’ enables dual-polarised (left and right circular) transmission to be exploited and gives a substantial increase in spectrum capacity, as well as having transponders and aeriels operating in the new frequency bands of 11 and 14 GHz. This gives an average capacity of 12,000 telephone circuits plus two television channels and for the first time the planned use of digital ‘time divisional multiple access’ (TDMA) traffic streams passing through the satellite. The ‘VA’ launched in March this year has a slightly larger capacity with 15,000 circuits and two television channels.

During the early seventies, it had been realised that one earth station at Goonhilly represented too many eggs in one basket and a new site search was undertaken, resulting in the establishment of Madley earth station in Herefordshire where the first aerial came into service in 1978. Currently Goonhilly operates

seven antennas while Madley uses five main system antennas.

With three Intelsat main operational satellites in use in the Atlantic and two in the Indian ocean regions, as well as two European (BCS) and a maritime (Marecs) satellite to cater for, British Telecom International (BTI) satellite operations has become an area of unprecedented activity with staff at each earth station maintaining the day-to-day integrity of the space network under the guidance and control of the main operations centre in London.

Regular activity includes satellite-to-satellite transitions, new carrier line-ups, antenna substitution, special event and scheduled television, satellite failure restoration protocols, and submarine cable restoration or support.

World excellence

There is also a great deal more essential effort needed to keep BTI satellite activities in the forefront of world excellence. Systems development, planning and procurement are now, with operations, located within a single Executive and this ensures a sensible and co-ordinated approach to meeting future needs.

One current growth area is the SatStream small dish field, in which BTI responds to customer demand by providing small antenna systems at or near the customer’s premises. These provide specially tailored services – usually digital – to meet particular needs and use transponders on both Intelsat (mainly for transatlantic) and Eutelsat (intra-European) satellites.

Future plans include provision of a ground station to serve small dish terminals located on off-shore oil installations and already, to meet the needs of the new cable-satellite television service, a station (London Teleport) has been built in the docklands near North Woolwich.

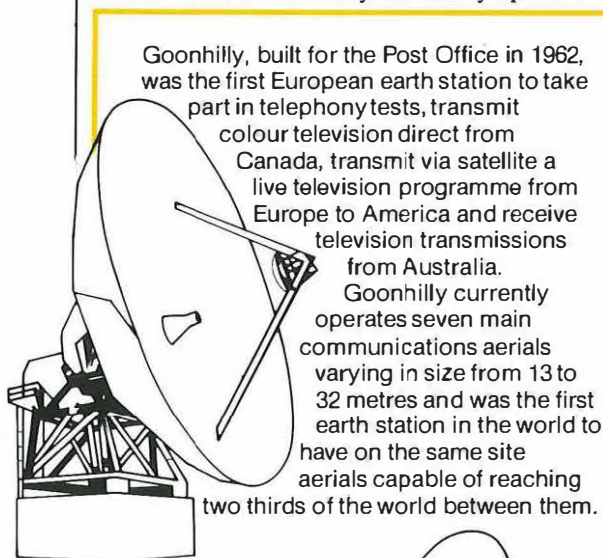
At Madley this year, and Goonhilly next, TDMA operation will begin over both ocean regions and between countries within Europe. This will offer greater capacity and a real promise of internetwork flexibility through the use of high-speed digital transmission.

Already, under construction and planned for launch next year is the first Intelsat VI – a huge spin stabilised satellite half as big again as Intelsat V and capable of carrying 35,000 telephone circuits plus three television channels.

In a similar timescale an aeronautical satellite service will join the already highly successful maritime service working from Goonhilly and BTI is poised ready if required to enter the field of telemetry, tracking and command of future satellites which will mean responsibility for ‘station keeping’ and onboard system integrity from launch onwards.

In short, the years up to the 21st century are likely to be even more exciting than before. Even the world recession has failed to stem the growth of international communications and the application of the global satellite network to meet that growth will continue to give BTI’s satellite executive an important and challenging commitment in the years ahead. Ⓣ

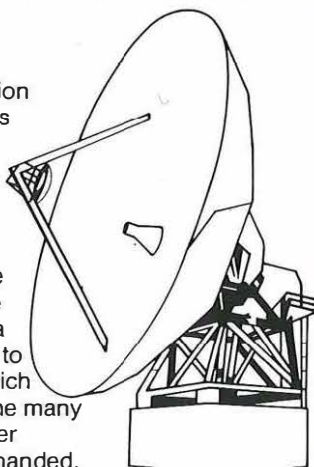
Mr RT Bowden is earth stations operations manager for BTI.



Goonhilly, built for the Post Office in 1962, was the first European earth station to take part in telephony tests, transmit colour television direct from Canada, transmit via satellite a live television programme from Europe to America and receive television transmissions from Australia.

Goonhilly currently operates seven main communications aeriels varying in size from 13 to 32 metres and was the first earth station in the world to have on the same site aeriels capable of reaching two thirds of the world between them.

Madley earth station near Hereford was brought into service in 1978 and currently operates five aeriels. The 140-acre farmland site was bought in the early 1970s after a three year search to find a location which measured up to the many technical and other requirements demanded. Madley is 133 miles from London and 224 miles from Goonhilly.



Playing host to Faraday

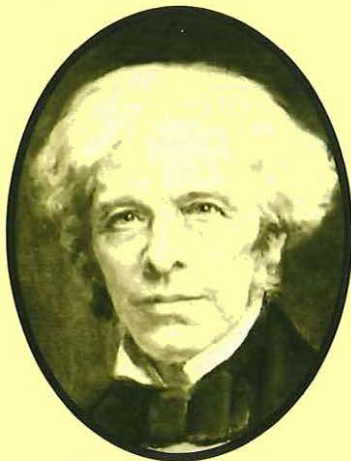
MICHAEL FARADAY was born in 1791 in London. In 1804 he started work as a messenger boy for a book-seller and binder and was apprenticed a year later. He read the books he bound – and it was from them that his interest in science developed.

In 1810, after seeing an advertisement, he joined the City Philosophical Society, a group of 'natural philosophers,' and took detailed notes at their meetings.

His enthusiasm was matched by his initiative. He was given a ticket to hear Sir Humphry Davy at the Royal Institution. Not only did he take notes of the great man's lecture, but bound them into a book, sent it to Sir Humphry and asked if there was any scientific work of any kind on offer at the Royal Institution. In 1813 he was given a post as a laboratory assistant.

In his early work Michael Faraday obtained liquefied chlorine, enabling the refrigeration industry to develop, and began research into steel. In 1824 he was elected a Fellow of the Royal Society. In 1831 he discovered and formulated the laws of electromagnetic induction and, in 1833, he was appointed Fullerian Professor in Chemistry. Three years later, when London University was established, he was appointed to the Senate.

By the 1840s Faraday was in poor health but he remained active for many more years, principally as a consultant to the government. In 1864 he declined the presidency of the Royal Institution. Three years later, he died.



British Telecom is to present the 1985/6 Faraday Lecture – the prestigious annual event aimed at explaining the role of the engineer in society to schoolchildren, members of the Institution of Electrical Engineers and the public at large.

The lecture – named after Michael Faraday, the 19th Century 'father' of electromagnetism and an early electronics pioneer – will tour 16 locations throughout the UK from October to March. Six British Telecom lecturers led by Mr William Jones, British Telecom's senior director for Development and Technology, will make the presentations.

The lectures were instituted in 1924 and although an Institution of Electrical Engineers event, they have in recent years been presented by major organisations which have included British Petroleum, Standard Telephones and Cables, and the Central Electricity Generating Board.

This year's lecture – the 57th – will be entitled 'Beyond the Telephone: The intelligent Network'. The informed hour-long presentation gives an introduction to the telecommunications network, looks at the role of the engineer, explains digital and value added services and shows how the intelligent network will affect the future. It also explains to young people the challenge that electrical engineering presents in terms of career prospects. Ⓣ

British Telecom Journal
Summer 1985

The British Telecom Lecturing Team



Mr William Jones, senior director for Development and Technology.



Dr John Grierson, head of integrated circuit design and applications section at Martlesham.



Mr Phil Holmes, in charge of development and production of high reliability, high speed integrated circuits.



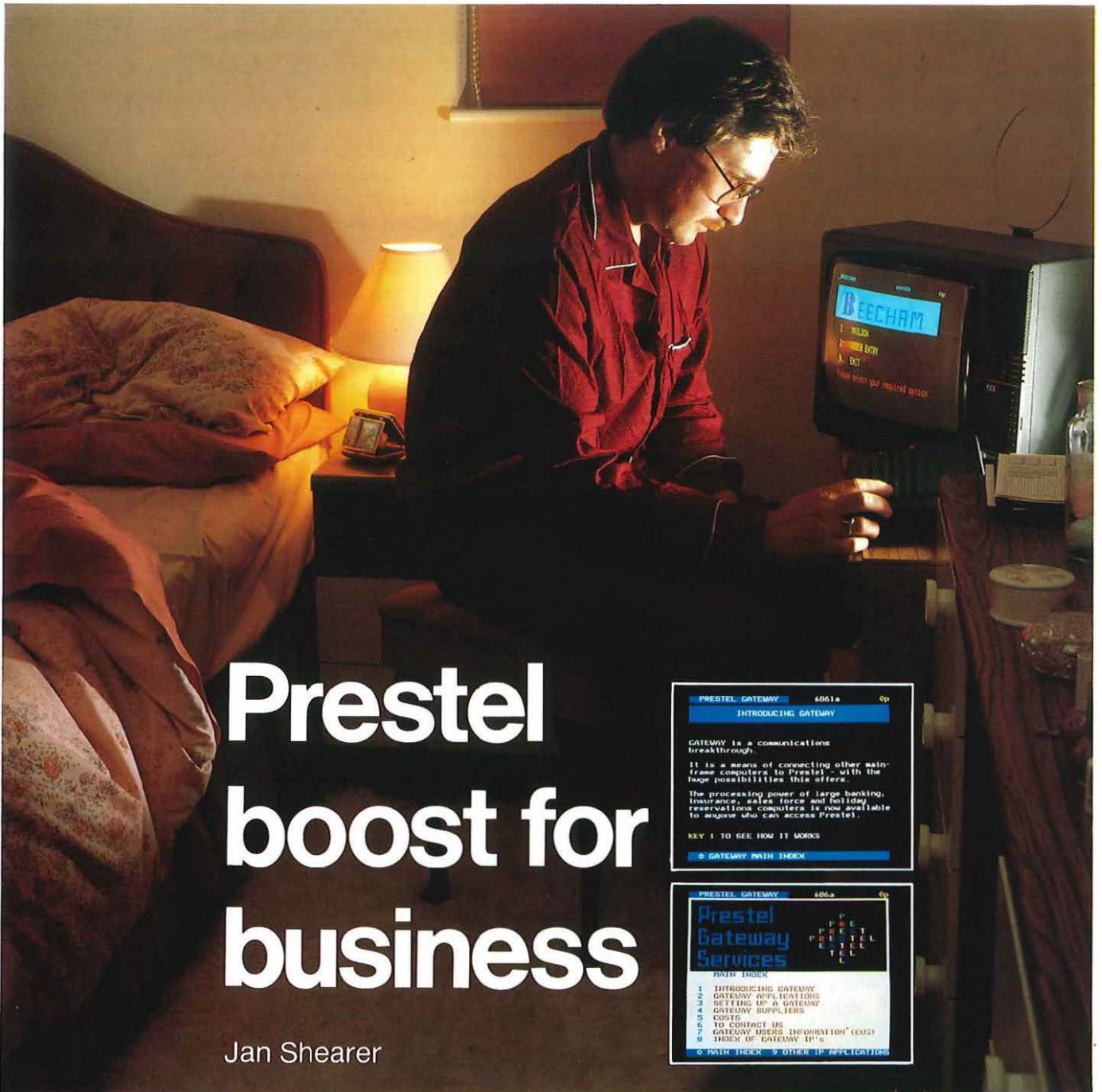
Mr Ian Park, head of digital switching group at Martlesham.



Mr David Coward, installation engineering manager for British Telecom London City Area.



Mr Michael Purser working in software engineering development of microprocessor projects in non-voice message switching.



Prestel boost for business

Jan Shearer

Prestel recently hit the international headlines with news that the Singapore authorities have chosen the British Telecom system as a starting point for their own viewdata service. But there have also been important developments in the home business market with the launch of two new services – Private Prestel and Gateway.

Prestel's current policy of aiming at well-defined market sectors as opposed to a general audience of potential users has led to the growth of two new value-added services which are already proving to be of broad appeal to business customers.

Private Prestel, an in-house communications system, and Gateway, a method of using external computers over the Prestel network, can both be readily adapted to suit the needs of those using more familiar services such as Prestel Travel and Prestel CitiService.

Private Prestel enables a company to publish information purely in an in-house capacity, restricting access to company employees or even to workers in specific company divisions. Prestel's extensive local call access network, which is available to over 96 per cent of the UK telephone population, makes Private Prestel a low-cost communication system for use between

departments. Headquarters staff and the sales field force, for example, can keep in touch through Mailbox, Prestel's electronic mail service.

The Prestel Business Services team works with the customer to provide a tailor-made high-security package to meet the individual company's needs. The package includes technical consultancy on designing and running each database, training in editing for company staff and advice on the hardware to use, together with skilled back-up should any problems arise in the day-to-day running of the database.

One of the main selling points of Private Prestel is its flexibility. Customers differ widely not only in the type of industry they are concerned with but also in their geographical location and the number of staff involved. Shaping a mini private viewdata system to answer all these requirements is a challenge

which can only be met with a flexible basic service adapted to meet individual requirements for such facilities as a sales force package, stock list indicator or marketing enhancement programme.

The team also markets the service within British Telecom and packages have been designed for BT Liverpool, BT City Area and Local Communications Services.

Seminars will run throughout late summer and autumn to offer interested sections of British Telecom the chance to see the sort of benefits Private Prestel can offer as an inter-departmental communications network, with instant update facilities, 24 hours a day availability, and 'user-friendly' presentation.

Competitive

Private Prestel is competitively priced – a company can set up its own viewdata system for around £3,000 – but for companies which already hold a large amount of information on computer, Gateway could be more suitable. Gateway allows an external computer to be accessed through the Prestel network and many companies are attracted to the facility by the availability of the extensive local call access area.

In the fiercely competitive consumer products business, it is essential that a sales team, often scattered nationwide, has up-to-date knowledge of stock availability and any special marketing drives.

Beecham – the name behind such well-known brands as Lucozade, Horlicks, Bovril, Corona, Macleans, Night Nurse and Yardley – started using viewdata in 1982. Now, a salesforce of 350 can process orders and be kept in the picture about stock levels, production rates and delivery dates.

Beecham salesmen use Gateway to process orders and receive immediate confirmation on a

terminal linked directly into the company's own mainframe. Orders can be processed from 6.30 am to 11 pm Monday to Friday with every salesman able to receive instant confirmation, whether he operates in the Home Counties or in the North of Scotland.

The salesforce, however, was faced with using a completely new technology and great care was taken in devising an initial training programme.

Salesmen started their training by assembling the equipment straight from its packaging and were given a full day's 'hands on' instruction, with one experienced instructor for every two novices. At night, each salesman took the equipment home reassured by the fact that a manned 'help desk' was easily contacted. To lessen any feeling of intrusion into domestic life, the equipment could also be used as an ordinary TV set and each salesman was able to choose where to site the set – the majority picked bedrooms but other sites ranged from the loft to a converted under-stairs cupboard.

Beecham estimated that each salesman spent an average half an hour a day accessing the Gateway service with a total of some 2,000 orders a day being processed through the system. It has led to a 24-hour reduction in the processing time of each order – an important factor in a fast-moving environment – and the added bonus of greater consistency.

As a result of this initial success, Beecham now plans to expand and develop its viewdata services to include other salesforces in the future.

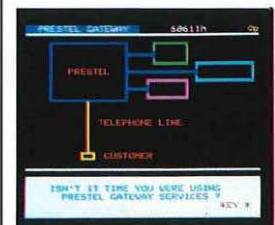
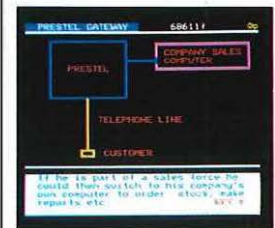
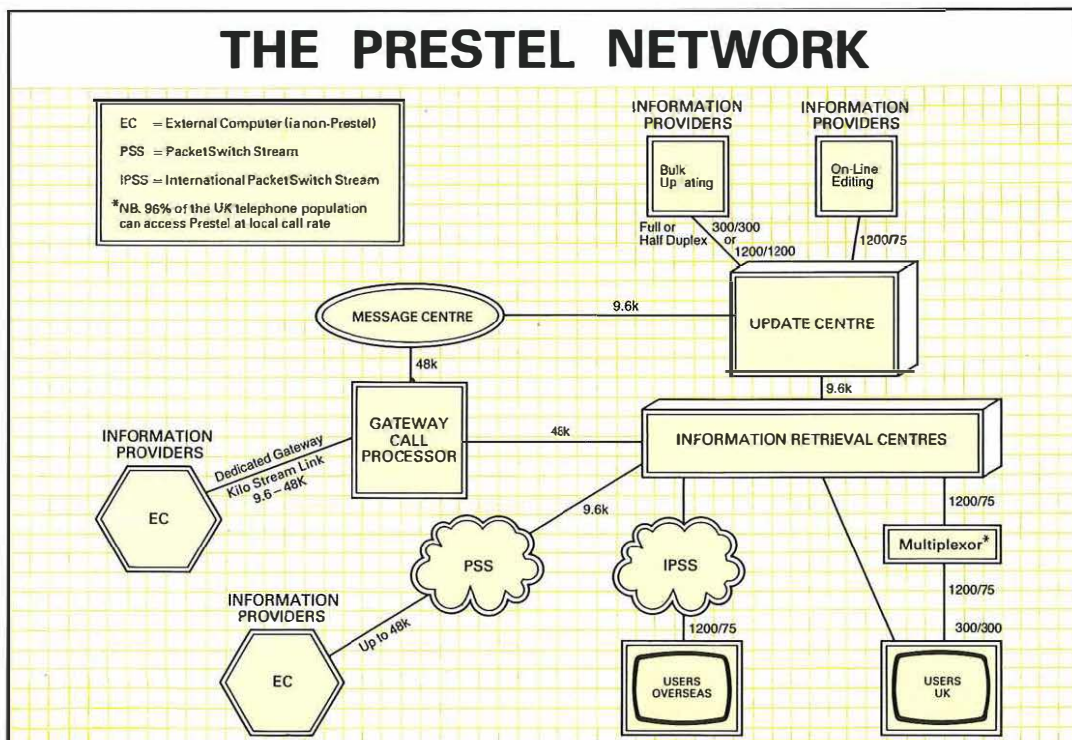
The growth rate of such services generally has been phenomenal over the past five years and Beecham, together with many other companies both large and small, regards Gateway as an invaluable tool for its salesforce which is having to work in increasingly competitive environment. ●

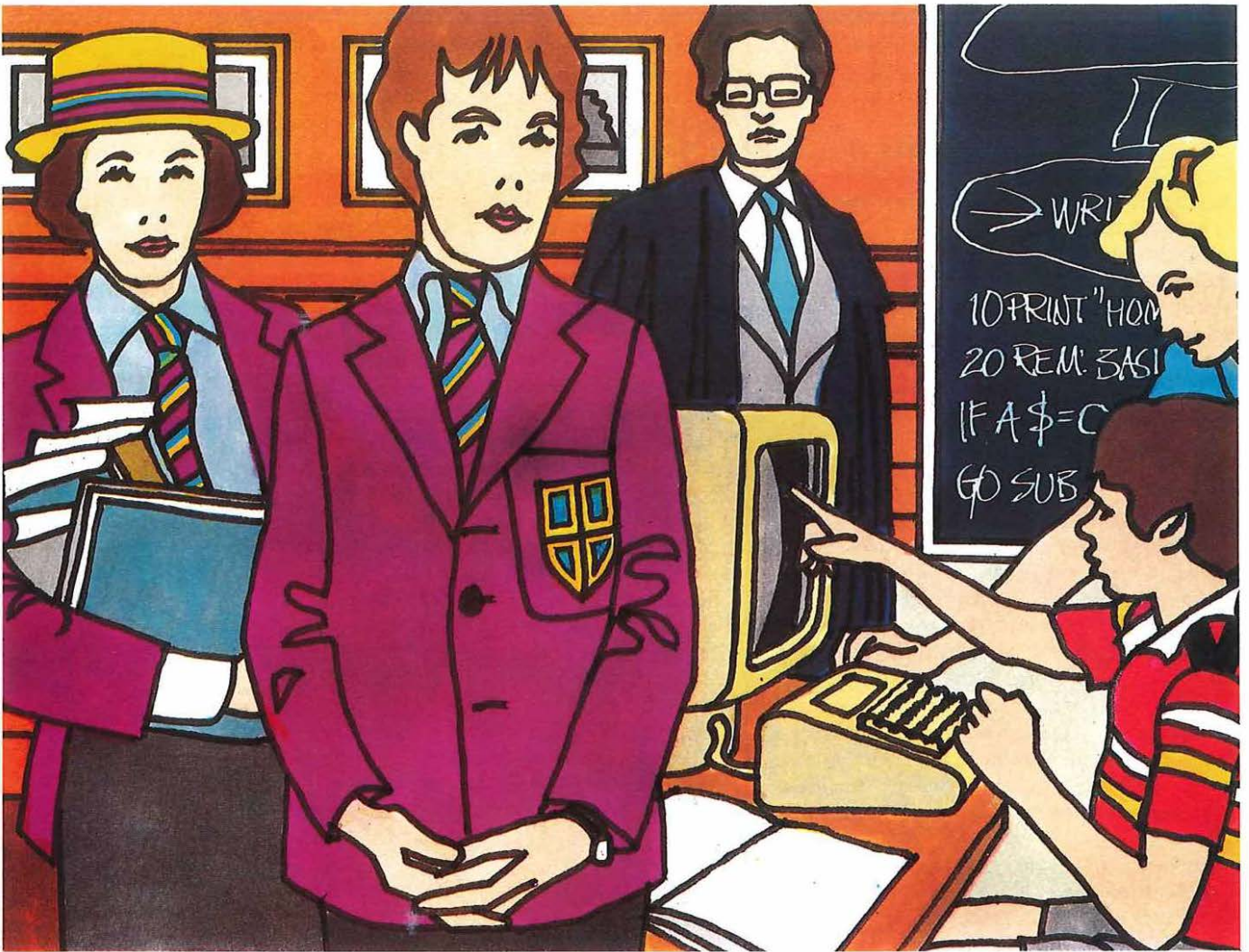
*British Telecom Journal
Summer 1985
Prestel boost
for business*

Opposite page:
Beecham salesman Alf Webb, of Lower Earley, near Reading, can use Prestel's Gateway service to keep in touch with head office at any time of the day... or night.

Ms J Shearer is Prestel publicity officer.

Below: how the Gateway service works for sales forces and a wide variety of other users.





With computer sciences and information technology playing an increasingly important role in the school curriculum, British Telecom's Education Service is producing a comprehensive range of 'learning packages' for use in the classroom.

Schools get the message

Peter Thompson

Although telecommunications has long proved a fascinating subject for schoolchildren, the last three years have seen an unprecedented, and ever increasing interest in British Telecom and its operations both from teachers and pupils of all ages.

Post Office Telecommunications did have an information service for schools for many years and wallcharts were produced together with booklets and films. It became clear in the early

1980s, however, that there should be a tailor-made education unit for the new British Telecom and this was created in 1982 in what is now the Corporate Personnel Department.

There were three main reasons for this move. Firstly, British Telecom has consistently been front-page news following its separation from the Post Office, there was the lengthy run-up to British Telecommunications plc and most recently, the share flotation. All this has led to many schools undertaking detailed projects on British Telecom.

Secondly, there is also a great deal of change happening within education and British Telecom needs to be in a position to influence the debate on how these changes should take place. GCE 'O' levels and CSEs are due to disappear in 1987 to be replaced by the General Certificate of Secondary Education and wide ranging discussions are taking place between industry and education to ensure that all examinations in science subjects will in future contain a selection of questions that relate science closely to its application within industry.

Finally, schools syllabi and teachers themselves cannot keep pace with the rapid changes in information technology and teachers are increasingly approaching British Telecom for information about new developments to keep the curriculum up to date.

One way in which British Telecom has responded is publication of 'Getting the Message', a package produced last year which came about as a direct result of requests from teachers of subjects such as commerce, office practice and business studies. Before this, many text books – published only a few years earlier – contained sections on telecommunications but frequently referred to little more than the telephone and telex! Teachers were simply lost for information on what for them were new developments and requests for information on such developments as facsimile, electronic mail, teletex and videoconferencing became a familiar plea.

A teacher, on secondment with British Telecom at the time, suggested a package of information which could be used in the classroom. He wrote the first draft of teachers' and students' notes on communications and preparation began of ten leaflets and booklets which explained in straightforward terms how different telecommunications services can help modern businesses, together with instructions on how to use the telephone and take messages.

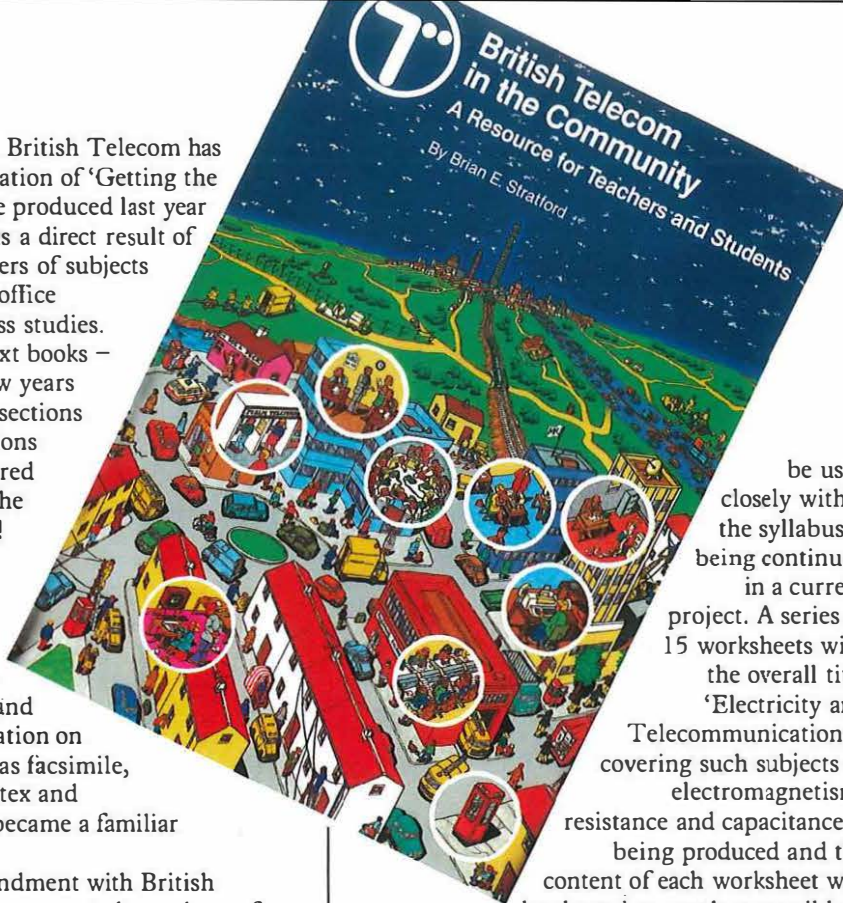
A series of question-sheets was produced on each booklet and a glossary made up the package which is shown on page 34. This package, which sells at £5, has been snapped up by many schools and colleges as well as receiving good reviews in the educational press. Particularly pleasing, however, is the 'feedback' from teachers who have claimed that it covers 30 per cent of examination syllabi.

Close contact

Another publication, Telecommunications in Practice (TIP) published earlier this year, shows the benefit of close contact with teachers. Produced jointly with the Association for Science Education, TIP was written by 20 science teachers who each contributed a chapter on a different aspect of telecommunications. The material resulted from four-day secondments of the teachers to various British Telecom science and engineering establishments, including the Research Laboratories at Martlesham, Rugby radio station, Madley earth station and the British Telecom Tower.

The main point of the secondments was that they gave the teachers the opportunity to see the application, within industry, of the science they teach in the classroom – an increasingly important aspect. TIP is a 250 page document of industry-related teaching material likely to play an important role in the process of educational change now taking place.

The philosophy of publishing material that can

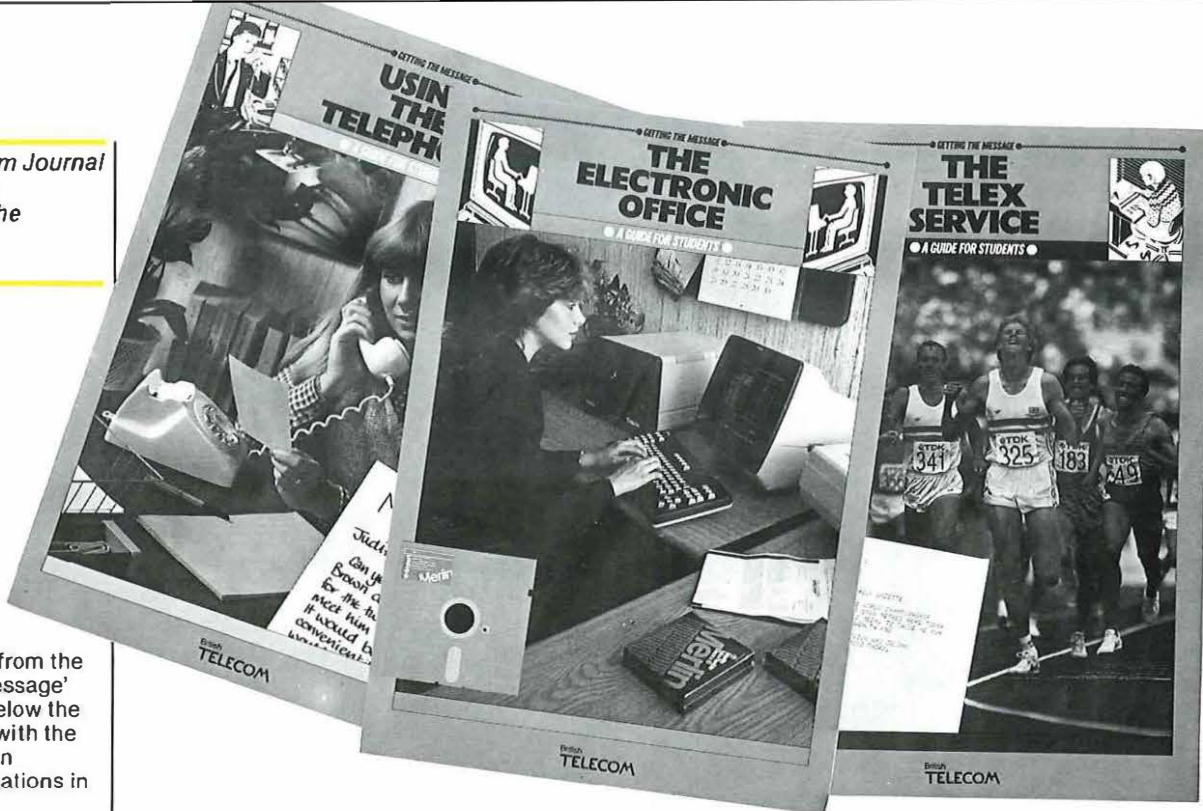


be used closely within the syllabus is being continued in a current project. A series of 15 worksheets with the overall title 'Electricity and Telecommunications', covering such subjects as electromagnetism, resistance and capacitance is being produced and the content of each worksheet will be slanted as much as possible ▷

British Telecom Journal
Summer 1985
Schools get the message

Below: A typical spread from 'Names and Dates for Students', a booklet recently published by the British Telecom Education Service and the bottom illustration is taken from 'Tiger by the Tail' another Education Service publication.

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 Summer 1985
 Schools get the
 message



Leaflets taken from the 'Getting the Message' package and below the package itself with the specially written 'Telecommunications in Practice'.

towards the physics 'O' Level/CSE syllabus. The writer of the package is in fact an ex-teacher who is also an 'O' Level examiner.

Videos also form part of the range of material, and a 17-minute programme on the physics of optical communication has recently been produced with accompanying teachers' notes. The programme concentrates on scientific theory and should be used by the teacher as an integral part of a lesson.

But computer software will not be overlooked. A joint project with a team at London University has just begun which, over the next 18 months, will produce a variety of programs for junior and secondary pupils with a strong telecommunications bias. Teacher groups throughout the country will initially identify subjects of interest, and it is hoped that after programming later this year, and school trial, the first complete program will be available by next Easter.

All this effort is a genuine attempt by industry

to explain itself and how it operates, in a way which British Telecom has never done before. But there is a valuable public relations spin-off because the school children of today will soon be potential customers of British Telecom.

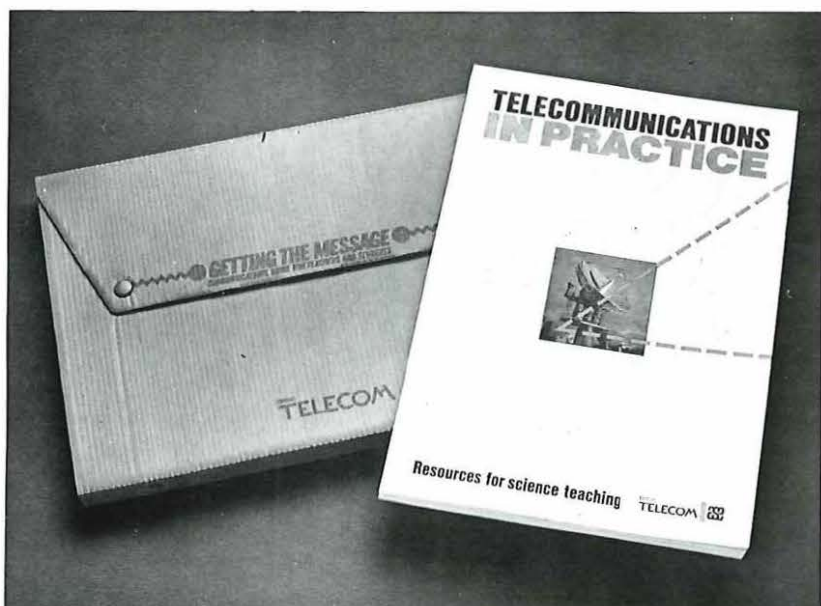
The fact that there is a charge for material has not deterred teachers from buying it, and indeed is a discouragement to over-ordering. Those now buying British Telecom's packages, even if some are for a little more than nominal sum, have to go through a thought process of why they want them and how they will use them in school.

All material produced by British Telecom's Education Service is available free of charge to local British Telecom offices throughout the country who are prepared to sell it to schools and the packages can be a useful way of developing new contacts with schools and the local community, as well as maintaining existing ones.

Much of the planning of a package depends on the target audience. Children in primary schools generally remain in one classroom for lessons which are usually given by just one teacher. Project work is often a particular feature of such schooling, with major topics being selected as the main class activity for the term. These are treated to a multi-disciplinary approach. A class of eight year-olds doing a project on communications will, with the ingenuity of the teacher, cover history, geography, biology, arithmetic, social studies and many other subjects and give them all a communications theme!

In secondary schools there is a more subject-oriented approach and the need for more specific material. That is why it is so important to liaise closely with teachers and to discuss how the information about British Telecom can be related to their curriculum and the syllabus they teach. It is a question of stimulating what is a captive audience into an early awareness of British Telecom's increasingly important role in a changing society. ①

Mr P A Thompson
 manages the British
 Telecom Education
 Service.



Answercall

The shape of phones to come!



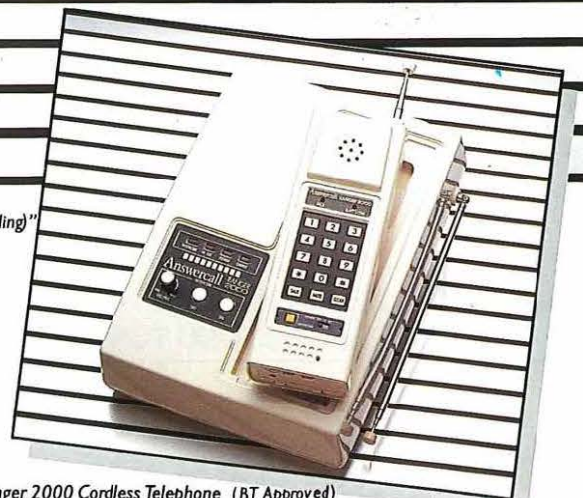
The telecommunications market is advancing in leaps and bounds. So naturally you need to stay one jump ahead. That's where Answercall can help. Because quite simply, we're the shape of phones to come.

Answercall

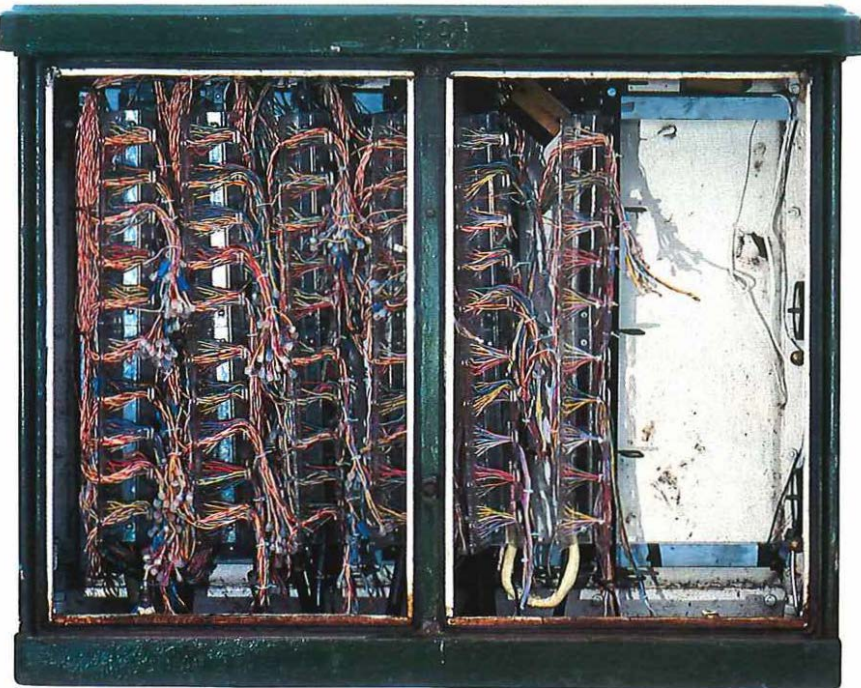
TELECOMMUNICATIONS FOR TODAY

Contact Trisha Silvester now!
 at Answercall Limited, Kangley Bridge Road, London SE26 5AH.
 Telephone: 01-659 1133. Telex: 892943.

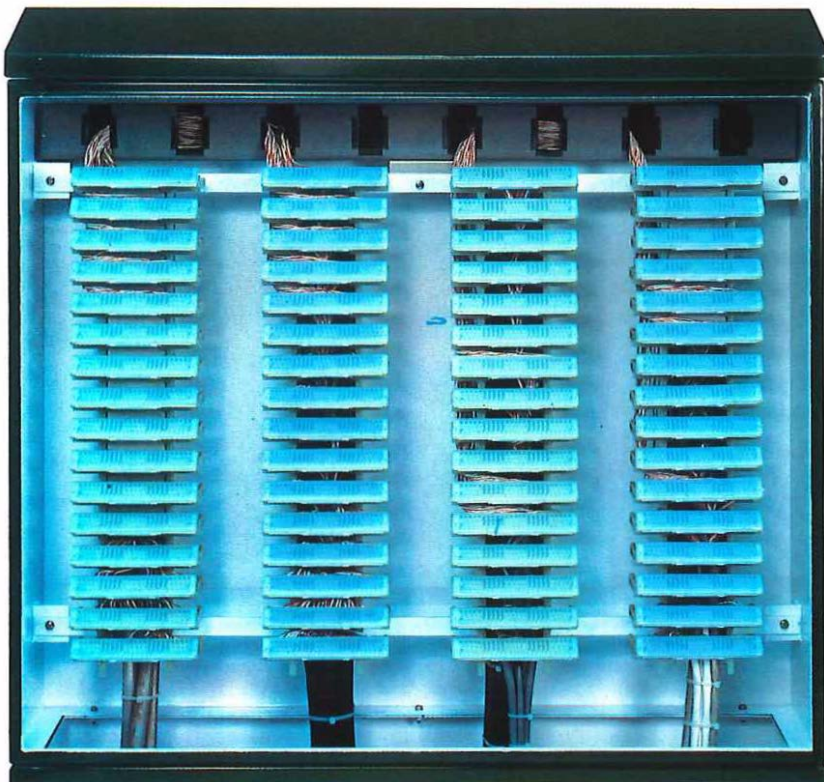
▲ "BABT Approval (pending)"



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Spaghetti Junction.



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A tangle of wires in a cabinet cross connection is a thing of the past.

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Not only good housekeeping, but also an exclusive modular design that gives easy test access to cable pairs without opening connectors or interrupting circuits.

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For more details, talk to Scott Heycock, Telcomm Products Group on Bracknell (0344) 58306. 3M United Kingdom PLC, Bracknell, Berkshire RG12 1JU

MS² Cross Connect System.

The new cabinet cross connection illustrated has been designed and engineered by Austin Taylor.

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SCENE NEWS SCENE
SCENE NEWS SCENE
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World record!

A new world record has been established with the help of the Telecom Tower in a stunt which raised £10,000 for charity.

A daredevil commando team led by Cambridgeshire Police Constable Gil Boyd abseiled 484 feet from the 620ft Telecom Tower. They set a new record for abseiling from a man-made structure by beating their own previous best of a 418ft descent.

The stunt raised £10,000 for sick children, £2,000 of which was donated by British Telecom to Great Ormond Street Hospital in London.

The descent was organised by PC Boyd whose five-year-old son has been treated at Great Ormond Street for several years. It was also a personal tribute to his partner on previous fund raising



stunts — PC Bob Reynolds — who died of a heart attack last year while on duty.

PC Boyd took just under four minutes to descend from the former observation platform on the 31st floor.

Scheme offers staff the opportunity to link a regular savings plan — with the Halifax Building Society — to an option to buy shares in the future at a price fixed at the same time of application to join the scheme. After saving for five years the employees will be able to exercise their option to buy the shares at the option price of 168 pence per share.

Last Strowger rack

British Telecom has received its last rack of Strowger step-by-step public telephone exchange equipment from Plessey Major Systems Limited. Manufactured in Liverpool, the equipment is the last of a product line which started with the supply and installation of a Strowger automatic telephone exchange at Epsom for the Post Office in 1912.

During a 73-year period, more than 300,000 racks of Strowger exchange equipment have been shipped from the Edge Lane factory to British Telecom and to 80 overseas telecommunications administrations.

Henstridge dropped

British Telecom International has decided not to develop a main satellite earth station on the airfield at Henstridge in Somerset.

The change in plan has been made because BTI is now confident it can meet customers' needs and fulfill its business forecasts without developing Henstridge.

Cable 'first'

Aberdeen Cable Services (ACS), which uses cable provided by British Telecom, has launched its multi-channel television operation — the first new franchise to go 'live' since the Government closed 11 pilot operators in 1983.

British Telecom, a major shareholder in the new company, has completed the initial cabling which will allow 2,000 Aberdeen homes to be connected to the network. Eventually ACS hope to serve more than 90,000 homes in the area.

In addition to BBC and ITV channels, Aberdeen customers will be able to view Sky, the entertainments channel; Premier, a films channel; Screen Sport; Music Box; The Children's Channel; Arts Channel; a local Aberdeen Channel, a programme of current affairs and features; and a community channel.

MultiStream launch

A new service has been launched by British Telecom to bring information technology services

within local-call reach of 90 per cent of the nation's businesses.

Called MultiStream, the service provides widespread local access to Packet SwitchStream (PSS), British Telecom's public data network.

MultiStream, which cost £8 million to develop, aims to bring information technology to a multiplicity of small businesses, such as high-street traders, grocers, newsagents, chemists, garages and car accessories firms. Two MultiStream services are available:

EPAD provides error-correction on the dial-up data link between the customer's terminal and the connection into the PSS network.

VPAD provides users with data presentation in videotex format to enable operators of private viewdata systems to offer their services nationwide through PSS.

Network landmark

The world's first commercial integrated digital communications network has been launched by British Telecom. Its ability to handle data and other information technology services as easily as speech will accelerate the race to the 'electronic office'.

The new service called IDA (integrated digital access) is a key landmark of British Telecom's £1 billion-a-year modernisation programme which includes the building of a new advanced integrated services digital network (ISDN).

When complete, the fully switched network will be available to all and IDA will provide the customer link to give just one connection point for

speech, data, text, fast facsimile, pictures, graphics and slow-scan tv terminals. Customers will no longer need a separate network connection for each service.

Single-line IDA can be used with a special telephone called NTE1 (network terminating equipment 1) which has one data connection (or port) to accept a variety of desk-top terminals, such as the slow-scan tv unit shown in the photograph.

A feature on IDA will appear in the Autumn issue of the *British Telecom Journal*.

Room at the top

A new £3¼ million building at British Telecom's Research Laboratories at Martlesham Heath, near Ipswich, was formerly 'topped out' by Mr Bill Jones the company's chief executive for technology. He laid an engraved slab on the building's roof.

When completed at the end of the year, the three-storey block will house about 300 engineers and scientists with their support staff.

The new building is needed to meet growing demands for additional facilities created by the impact of the microchip revolution on telecommunications technology.

Move for Mitel

British Telecom is poised to enter the lucrative North America telecommunications market following the bid to acquire control of Canada's Mitel Corporation. Agreement in principle has been reached for British Telecom to acquire a 51 per cent controlling interest in the company but the

Queen's award

British Telecom Research Laboratories' work on optical fibres has won the Queen's Award for Technological Achievement and is in recognition of the development of singlemode optical fibres used in telecommunications. The fibres are more efficient, require fewer amplifiers along the route and reduce the cost of modernising the UK long distance network.

Singlemode optical fibre was first proposed in the mid 1960s but the technology did not then exist to make it. By largely eliminating reflections inside the fibre, singlemode transmission achieves significant improvements in bandwidth (capacity) and in loss (length of cable before signal repeaters are required). The fibre differs from the more widely used multimode cable by its smaller core diameter (6 to 9 microns against 50 microns).

Most of the modernisation of the UK national (long distance) network will use singlemode optical fibres. By the end of the 1980s, 50 per cent of this network will be made of optical fibres. In addition, the world's first commercial undersea optical fibre system (UK-Belgium 8) and the first transatlantic fibre system (TAT-8) use singlemode cable, as a result of British Telecom's early development in this field.

Sharesave success

British Telecom employees have responded enthusiastically to the offer to participate in the company's Sharesave Scheme. More than a third of the 229,000 staff eligible have contracted to save an average of £33 a month, ranging from £10 to £100, over a period of five years. They will hold options to buy nearly 121 million shares.

British Telecom's Sharesave

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matter is first to be referred to the Monopolies and Mergers Commission.

British Telecom's shareholding will be by purchase of new ("treasury") shares at Canadian \$8.00 per share which will inject cash of over Canadian \$300 million (£180 million) into Mitel. This will enable Mitel to take full advantage of growth opportunities. Both companies confirmed that British Telecom would exercise full management control as soon as the agreement became effective.

The agreement is conditional on a full purchase investigation and board approval by British Telecom, approval by Mitel shareholders and appropriate legal and regulatory clearances. Pending completion of documentation, British Telecom has secured an unconditional option on treasury shares amounting to 18.5 per cent of the issued stock.

Mitel Corporation, founded in 1971 and based at Kanata, Ontario, near Ottawa, designs, develops, manufactures and markets a family of microprocessor controlled switching equipment (private automatic branch exchanges) and items such as telephone sets and work stations.

● British Telecommunications plc has bought CTG Inc, a leader in the telephone interconnect business in Canada, in a deal worth £11.8 million.

New phone launched

A compact electronic push button Inphone designed for wide customer appeal is being launched by British Telecom.

Called Tremolo the instrument is being manufactured in Eire solely for British Telecom Enterprises Consumer Products Division and it features last number redial, mute button and tone caller with high/low volume control.

Licence to sell

British Telecom is actively seeking licensing agreements with companies wishing to manufacture and sell its products and services. An information pack entitled "Technology for Licensing" is being distributed to existing licensees,

commercial agencies and embassies and to visitors to trade fairs and exhibitions.

A section has been set up within the Licensing Division of British Telecom's Intellectual Property Unit to handle the business.

Contracts

Plessey Office Systems Limited has received a £10 million order from British Telecom for digital key telephone systems which will be sold exclusively in the United Kingdom by British Telecom Business Systems as the Merlin Octara 32.

Plessey Public Networks Limited, Transmission Division, has been awarded a contract by British Telecom to supply Low Cost Junction (LCJ) optical fibre equipment. An order, worth about £2.5 million, represents a large part of the contract and follows a £1 million order placed six months ago. Deliveries are scheduled to begin in October.

Saville Tractors Limited is to supply British Telecom with a further nine International Harvester tractors following a recent order for 13 machines which are now being used throughout the country for cable laying and other duties.

TMC Limited has been awarded contracts worth about £18 million by British Telecom for three types of keysystem.

The biggest contract, for over £13 million, is for the Pentara 100 hybrid system – the latest and enhanced version of the well-known Herald system. Also ordered are £2.2m worth of the Ensign hybrid keysystem and £2.3m worth of the popular, low capacity Escort.

Telonic Instruments Limited has been awarded a contract by British Telecom for 150 Kikusui 60 MHz oscilloscopes which will be used for maintenance and general purpose applications at switching and other centres throughout the country. The standard list price of each unit is £795 ex VAT.

Faster Prestel

Users of Prestel – Britain's world-leading videotex system – are to get

even more reliable dial-up to its computers this year over a new access network.

The new network will provide users with high-speed access to Prestel, Telecom Gold, British Telecom's national data network Packet SwitchStream (PSS) and other computers operated by the Value Added Systems and Services division of British Telecom Enterprises (BTE).

Supercall expands

Supercall, British Telecom's premium voice service business, has extended the Citycall phone-in financial information service by adding a Tourist Rate Bulletin to the existing range of recorded financial information bulletins.

Updated twice daily, using exchange rates supplied by the Midland Bank, the new bulletin gives the rates at which callers can change pounds into foreign currency banknotes and travellers' cheques. Rates are also given for changing US dollar travellers' cheques and cash into sterling.

Exchange rates are given for all the popular holiday and business destinations – 19 in all – to aid both traveller and visitor.

SatStream Europe

A new business communications service to the continent, using small-dish aerials located on or near customers' premises – has been launched by British Telecom International (BTI).

SatStream Europe is being provided through Eutelsat 1, the European communications satellite, owned and operated by Eutelsat, a consortium of more than 20 telecommunications authorities in which British Telecom plays a major part.

The service will operate from a satellite dish on London's south bank via Flight Two, Eutelsat's second spacecraft which has been equipped with satellite multi-service systems (SMS) transponders. From November, BTI will also be able to access France's Telecom 1 satellite under the Eutelsat 'umbrella'.

SatStream Europe will cover most Western European countries and

will provide high-speed digital voice and data transmissions to single or multi-point destinations. High transmission speeds will also allow complex transmissions such as live video-conferencing.

Telecom on track

Touchdown, British Telecom's unique touch-screen computer and phone system, has been chosen to help run BR's Southern Region.

An installation at Waterloo Station in London is part of a £350,000 contract to speed up communications and ensure information to passengers is fully up-to-date.

The first stage, is a suite of Touchdown terminals enabling train operations controllers to direct train movements via touch sensitive screens which give immediate access to telephone lines and computer data.

The complete installation will comprise 28 terminals and will include telex facilities. The system will help keep track of some 6,000 train movements a day.

BTI world beater

British Telecom International's latest satellite dish antenna, at Goonhilly Downs earth station in Cornwall, will become one of the first four frequency band antennas in the world when it begins full-scale operations in the autumn.

The £9 million dish, Goonhilly 6, is 32 metres in diameter and operates with British-designed radio transmission and reception equipment.

Designed to work with a new transmission technology known as time division multiple access (TDMA) and digital speech interpolation (DSI), the new dish will be able to quadruple the number of calls handled and improve the quality of service.

Goonhilly 6 will enable BTI to meet expanding demand for international services and it can also handle ordinary telephone calls, telex, computer data, document facsimile transmissions, television signals and videoconferencing. It will work to an Intelsat satellite over the Atlantic.

Topper Instrument Cases

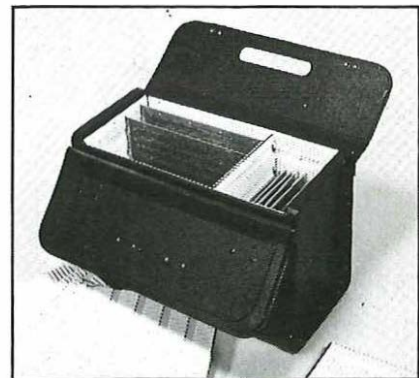
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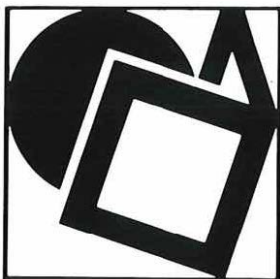
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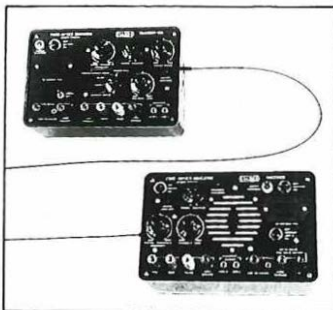


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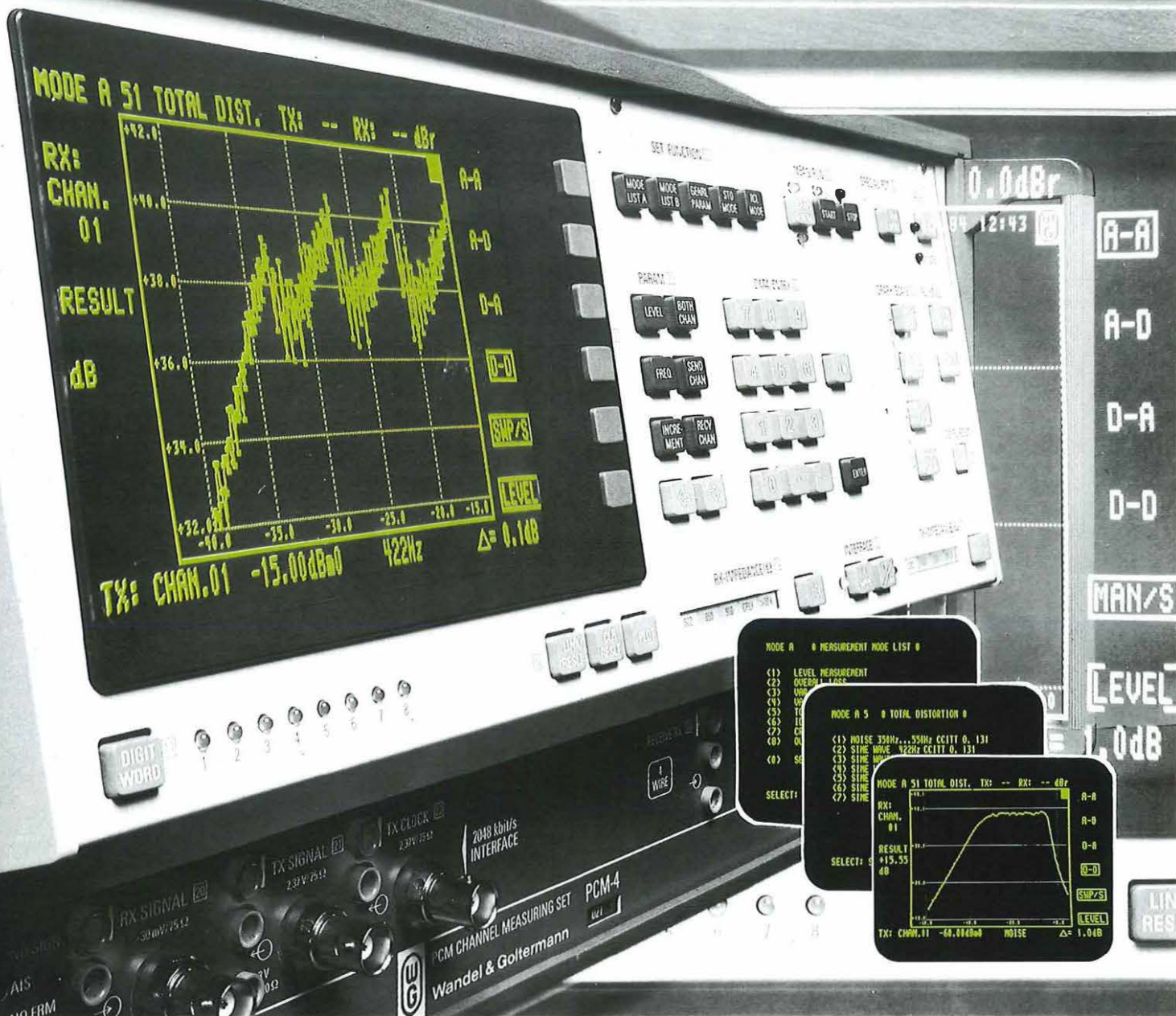
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frequency, gain vs. input level, or distortion. Classic PCM measurement routines can be called from memory, or the user may devise and store those that are particular or frequently used.

- PCM-4 deals with all interfaces in one unit.
- A and μ law measurements.
- Precision with speed achieved by digital signal processing.
- 2 Mbit/s and 64 Kbit/s (option) interfaces.

Without question the PCM-4 sets new standards for PCM measuring instruments.

PCM-4 MEASUREMENTS MODES

Level Measurements, sine/noise
 Insertion loss.
 Overload Capacity (peak word).
 Peak Code Detection.
 Attenuation/frequency response.
 Gain linearity.
 Total distortion/sine noise.
 Idle channel noise.
 Psoph./C-filter.
 Crosstalk.
 Signalling Interference.
 Out of band measurements.
 Return loss.
 2 pole and 4 pole symmetry (balance).
 Group Delay.
 Signalling Distortion.
 Frame and Multiframe word errors.

For comprehensive information on the PCM-4 call or write to:

W & G Instruments Limited
 Progress House,
 412 Greenford Road,
 Greenford, MIDDX.
 UB6 9AH.
 Telephone 01-575-3020
 Telex 934489





4TEL EARLY WARNING SYSTEM

In the battle for improving service and reducing costs you need to deploy your repair forces to maximum effect. 4TEL is unique, acting like a radar surveillance system, locating real and potential trouble spots at night and giving the RSC or EPMC the necessary advance warning first thing in the morning.

4TEL scans every customer's line, every night and will detect and report every type of fault, enabling black spots in cable to be identified and eliminated.

Apart from its overnight strategic duties, 4TEL acts as a tactical system in the day. It performs, on demand, an unequalled series of line tests and diagnostics, enabling faults to be distributed immediately and pinpointed quickly by your repair forces.

4TEL is the total line testing solution, field proven in the BT network, working with every major exchange type, interfacing to ARSCC and compatible with System X and CSS.

Contact us and find out how 4TEL can help you with your maintenance strategy. Telecommunications Division, Teradyne Limited, The Western Centre, Western Road, Bracknell, Berks RG12 1RW.
Telephone: Bracknell (0344) 426899. Telex: 849713.

The logo for Teradyne, featuring the word "TERADYNE" in a bold, blue, sans-serif font. The letters are stylized with a slight shadow or 3D effect, giving it a modern, industrial appearance.

ANIXTER COMMUNICATIONS

The CATV Supply Specialists

Service is our technology

We are leading suppliers of CATV and Local Area Network equipment in North America and have been operating in the UK for over 10 years. Now we have expanded our existing national network of wire and cable facilities to include a range of CATV, local area and telephone network equipment.

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ANIXTER

Improving Customer Services

As designers and manufacturers of a range of advanced communications products incorporating the latest microprocessor technology, AGI are major suppliers of electronic payphones to British Telecom and other telecommunications authorities worldwide.

PAYPHONE 100

Table Top Payphone

Extremely convenient to use either as a normal telephone or as a payphone for calls made in clubs, restaurants, bars, hotels, guest houses, etc.

The renter has access to the cash box and all calls are charged at the subscriber rate.

● DUAL MODE OPERATION

Coin or no coin operation — payphone or subscriber mode as determined by renter.

● MULTI-COIN ELECTRONIC VALIDATION

● COIN STORAGE AND REFUND FACILITY

● SIZE: 230 x 200 x 152mm

PAYPHONE 200

Indoor, Wall Mounting Payphone

A worthy successor to the current electro-mechanical payphones, the Payphone 200 capitalises on the reliability and many other inherent advantages of today's microprocessor technology.

● MULTI-COIN ELECTRONIC VALIDATION

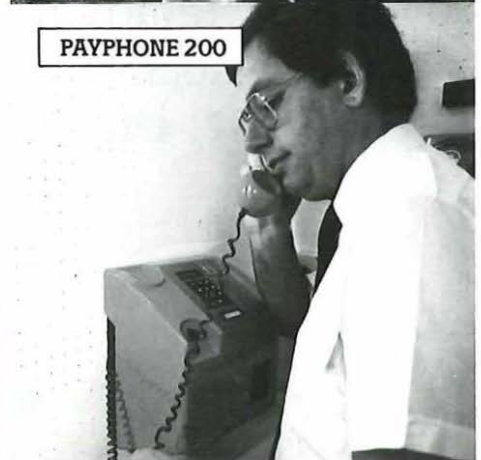
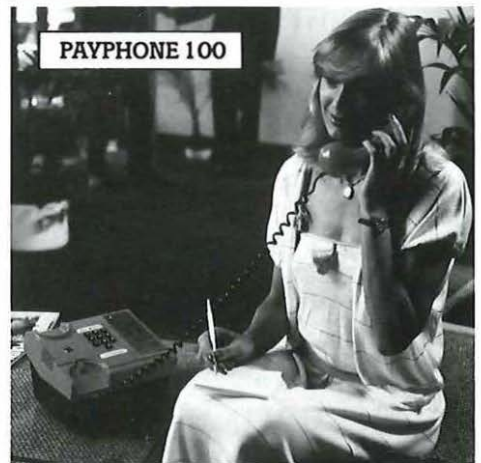
● LARGE CASH DRAWER

● STEEL WALL MOUNTING

FRAME

● SIZE: 310 x 260 x 190mm

ALL PAYPHONE ENQUIRIES SHOULD
BE DIRECTED TO YOUR LOCAL
BRITISH TELECOM AREA SALES OFFICE



A member of the LANDIS & GYR group

Aeronautical & General Instruments PLC,
Company Headquarters and Central Marketing,
Wickham House, 12 St. Thomas Street,
Winchester, Hants.
Tel: (0962) 67035 Telex: 47610

The phantom office* comes sharply into focus with Divert-a-Call. The first in a range of automatic call forwarding equipment which forms the basis of a whole new family of British Telecom Services.

Divert-a-Call has been designed and manufactured by Dynamic Logic, a British company using experience gained from more than a decade at the forefront of PSTN telemetry.

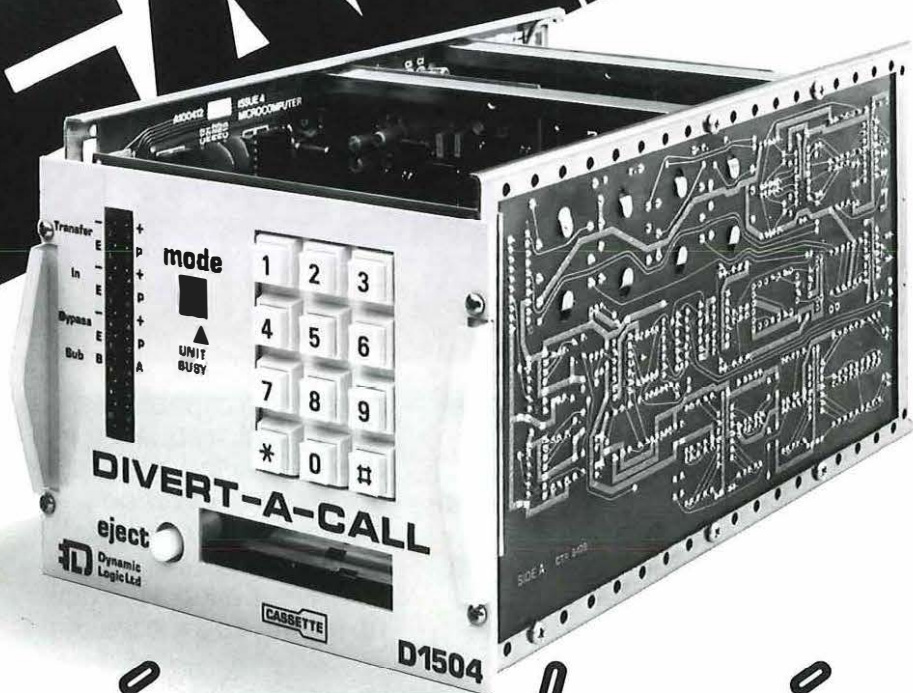
Based on advanced microprocessor technology, the Divert-a-Call range is fully software driven, enabling calls to be remotely diverted to 10 different destinations from a single exchange based unit.

The subscriber can select or change destinations from any location within the telephone network using a synthesised speech facility which is protected by a security code.

Divert-a-Call incorporates a hybrid amplifier to compensate for the variable transmission losses encountered within any telephone network.

Diversions can be transparent or the caller can be informed using the personalised announcement facility.

Dynamic Logic's Divert-a-Call heralds many new and exciting approaches to marketing and business administration.



dynamiclogic

Dynamic Logic Limited
The Western Centre Western Road Bracknell Berkshire RG12 1RW England
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Analogue Transmission Testing. Well In Hand.

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

Easy to operate, the test set provides full signal measurement and signal

generation capabilities: signal level, frequency, idle channel noise and signal-to-noise ratio. Level and frequency are displayed simultaneously.

There is even a full dial-up facility, and the speaker/

microphone enables one tester to communicate with another over the line under test or act as an independent telephone.

Another testing first from GADC.



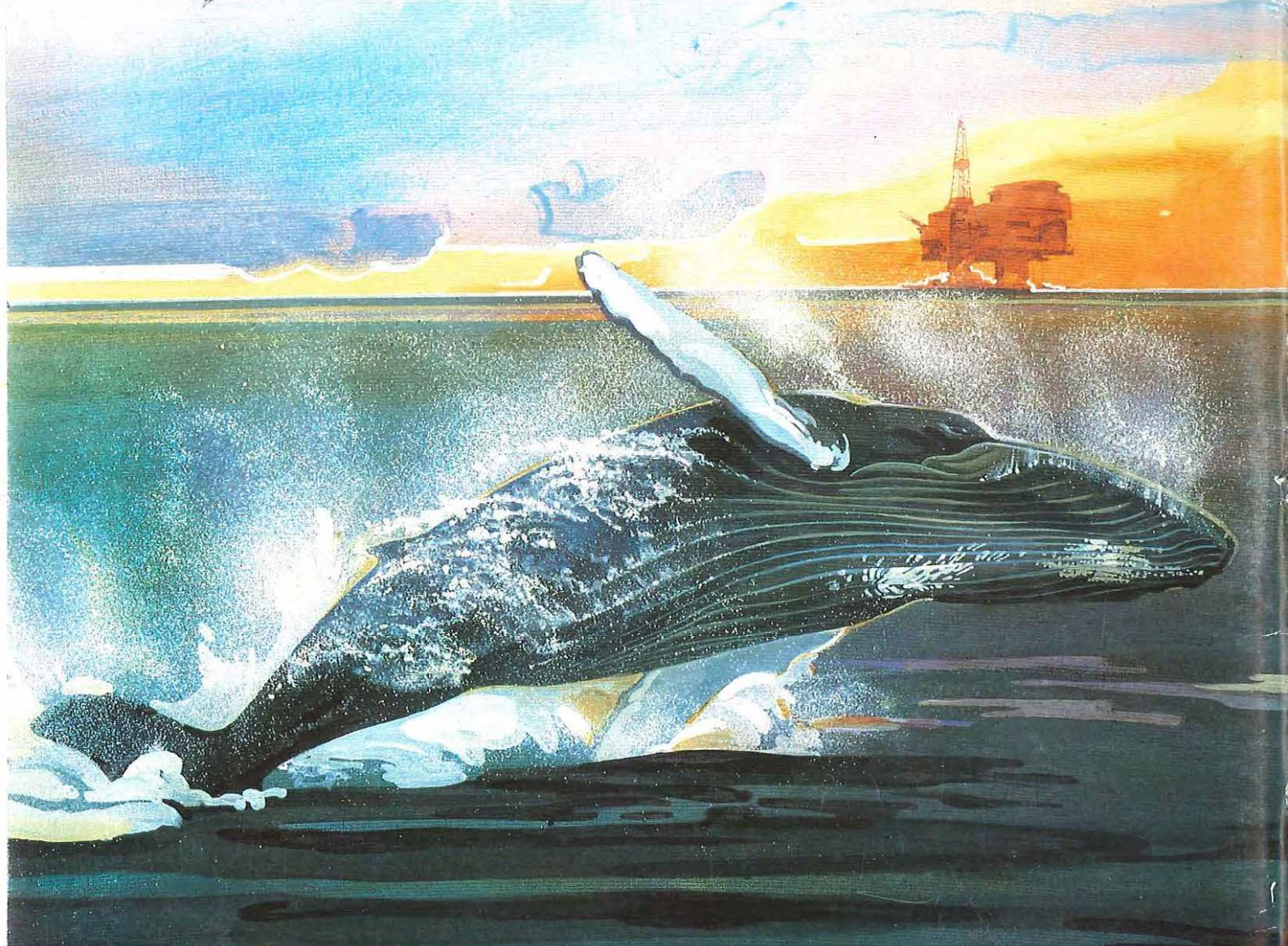
General Audio and Data Communications Ltd.

64-82 Akeman Street, Tring, Herts. HP23 6AJ. Telephone: Tring (0442 82) 4011/5551 (Enquiries quote No. 7BT)
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