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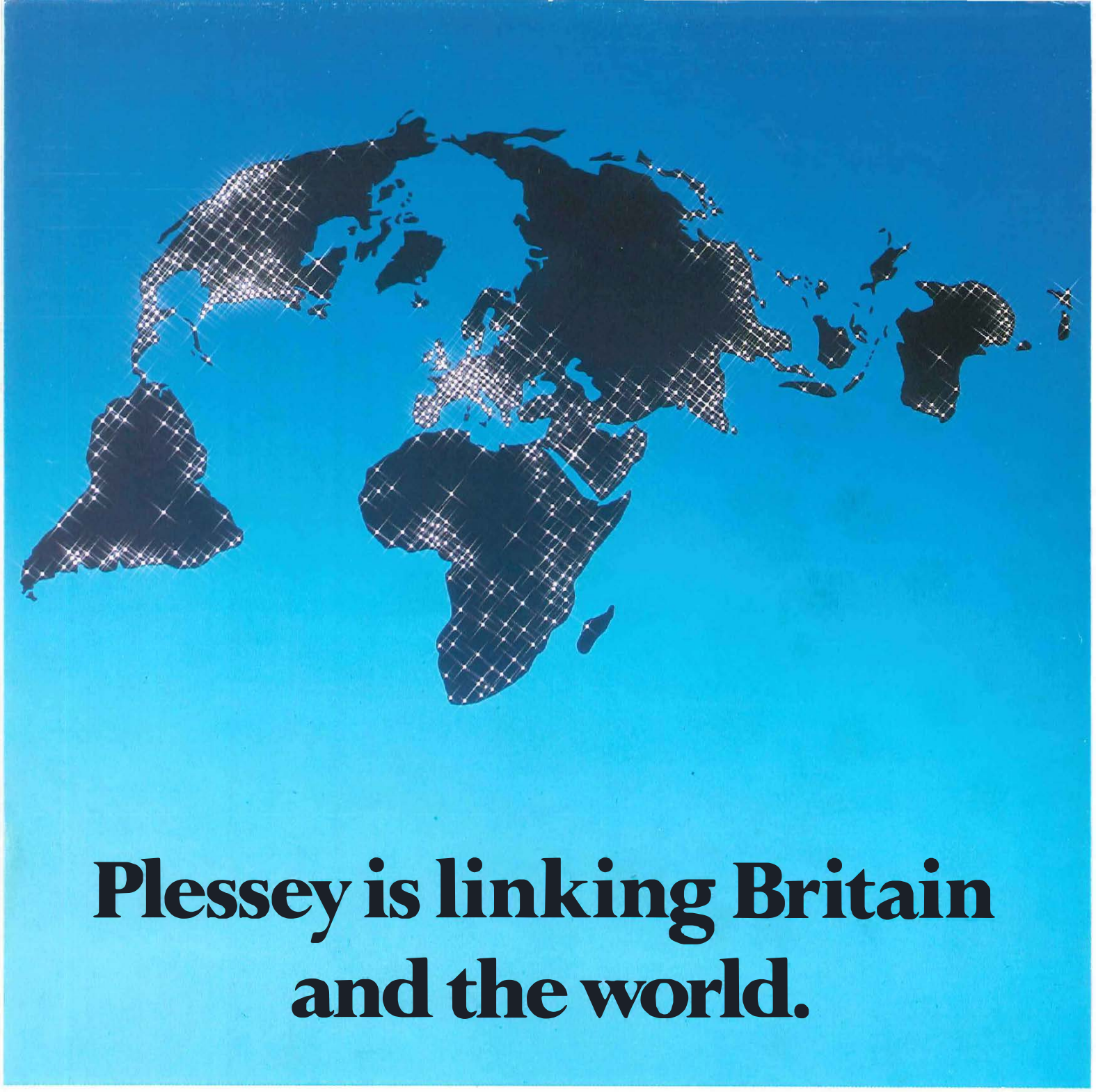

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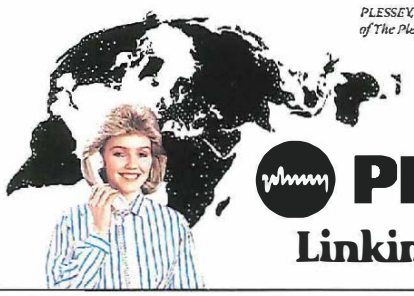

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Everyone knows that modern communications methods shrink distances. They are, without doubt, the most tangible evidence to date of the much-heralded 'global village' concept.

British Telecom has much to be proud of in its achievements in the UK and the company's aspirations to become a world leader in telecommunications have been well publicised. But there is a difference between excelling at home – even though the monopoly days are over – and dominating the world in a field in which progress, and the demands of customers, change at an alarming pace.

True enough, the name of British Telecom is known in the four corners of the world. British Telecom International is the biggest carrier of international traffic, and British Telconsult has notched up important victories in improving the telecommunications infrastructure of overseas countries – particularly in the Third World. Large amounts of BT equipment were refurbished and sold abroad to countries with less sophisticated demands than the home market.

Overseas trade is, therefore, not a new goal for British Telecom. But for BT to become a true 'international player' much more has to be done.

This issue of the *British Telecom Journal* looks at some of the massive strides which BT has made recently on the world map.

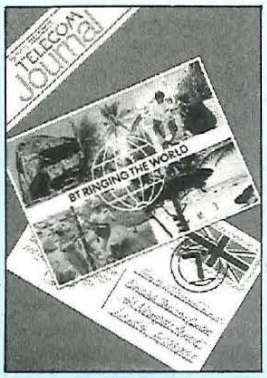
Cynics have looked at the company's aggressive new stance to international competition as a mere extension of the situation in the domestic market. Some have even gone so far as to suggest that BT, not satisfied with fighting Mercury at home is chasing parent company Cable and Wireless around the world for the most lucrative contracts.

This is too simplistic a view. Certainly, BT has been pleased to have succeeded Cable and Wireless as the overseas operating partner to the Government of Gibraltar (see full story on page 16). No doubt the interests of the two companies will clash again. Equally, they may agree that, in some instances, a joint UK bid – utilising BT's huge research and development resources to the full whilst exploiting C & W's overseas presence – could be the best way of securing business in the face of strong competition from abroad.

Whatever the outcome of individual decisions, BT is already committed to a broad international portfolio of products and services.

This issue examines some aspects of that committment such as Overseas Division's biggest ever contract in Saudi Arabia – see page 12 – and the difficult task of improving Kenya's telecommunications services (page 28). Activities such as Dialcom are also discussed (page 64) together with Telconsult's latest achievements.

All in all, BT currently has 175 projects going in 35 countries – an impressive shopping list and one which taunts 'Wish you were here?' to the company's many international competitors.



Cover: British Telecom's global role as one of the world's leading telecommunications companies is often overlooked. But its wealth of experience and expert knowledge is recognised by governments from every continent who call on BT to help overcome their unique communications problems whether they be in the remote African bush, the Arabian desert or a tropical paradise. Cover design and illustration by Raygraphics.

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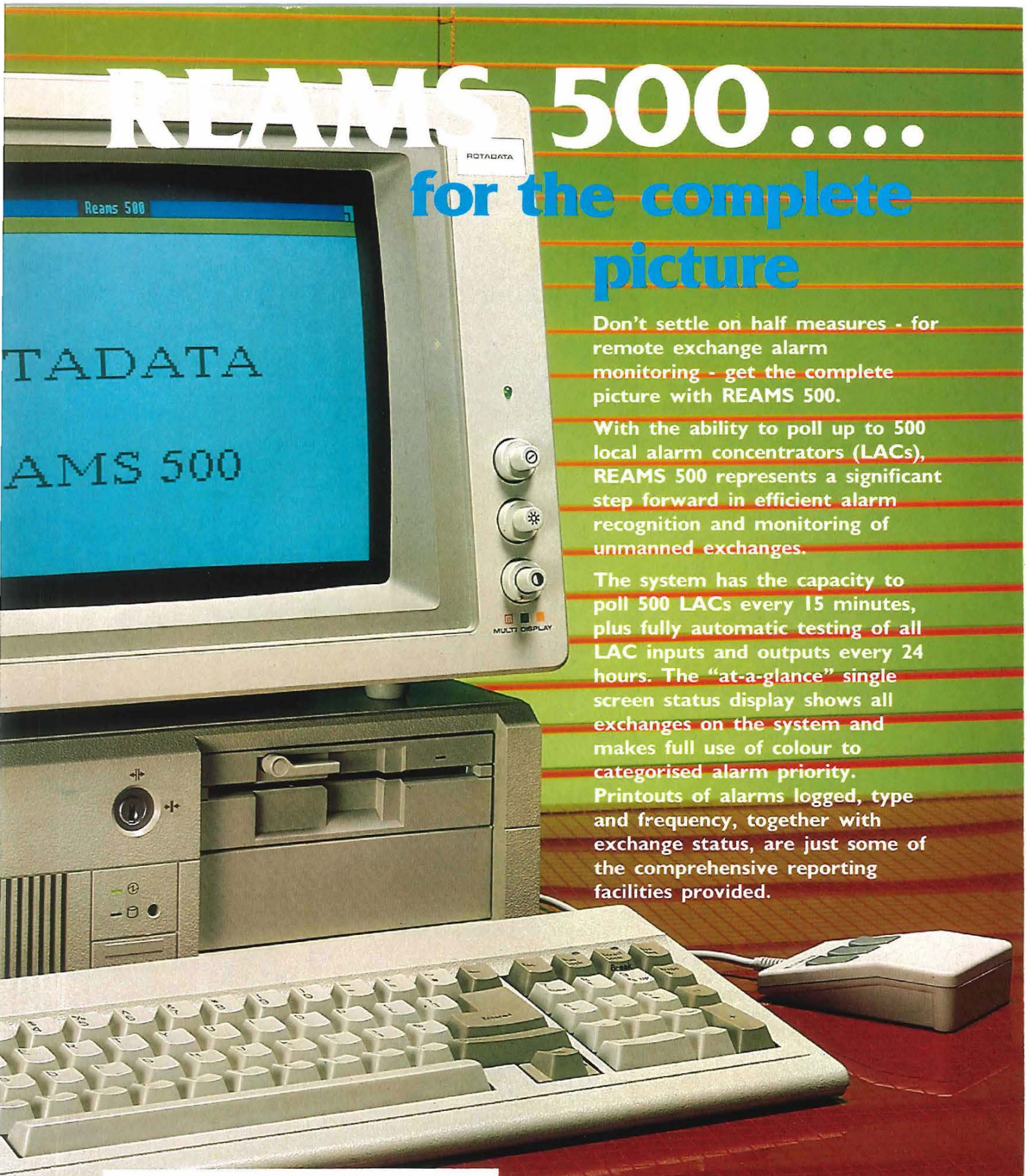

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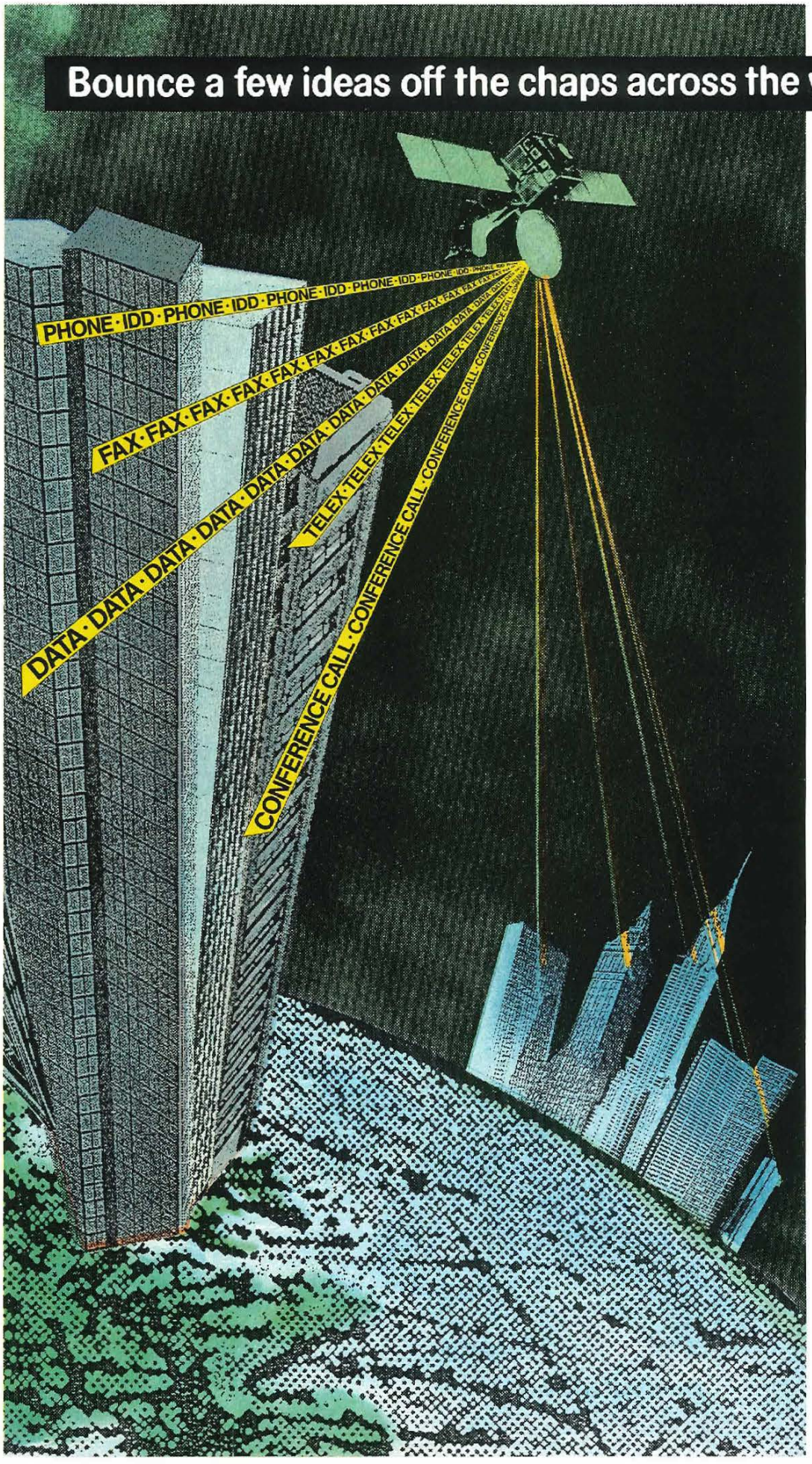

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Lift-off for the 'space page'

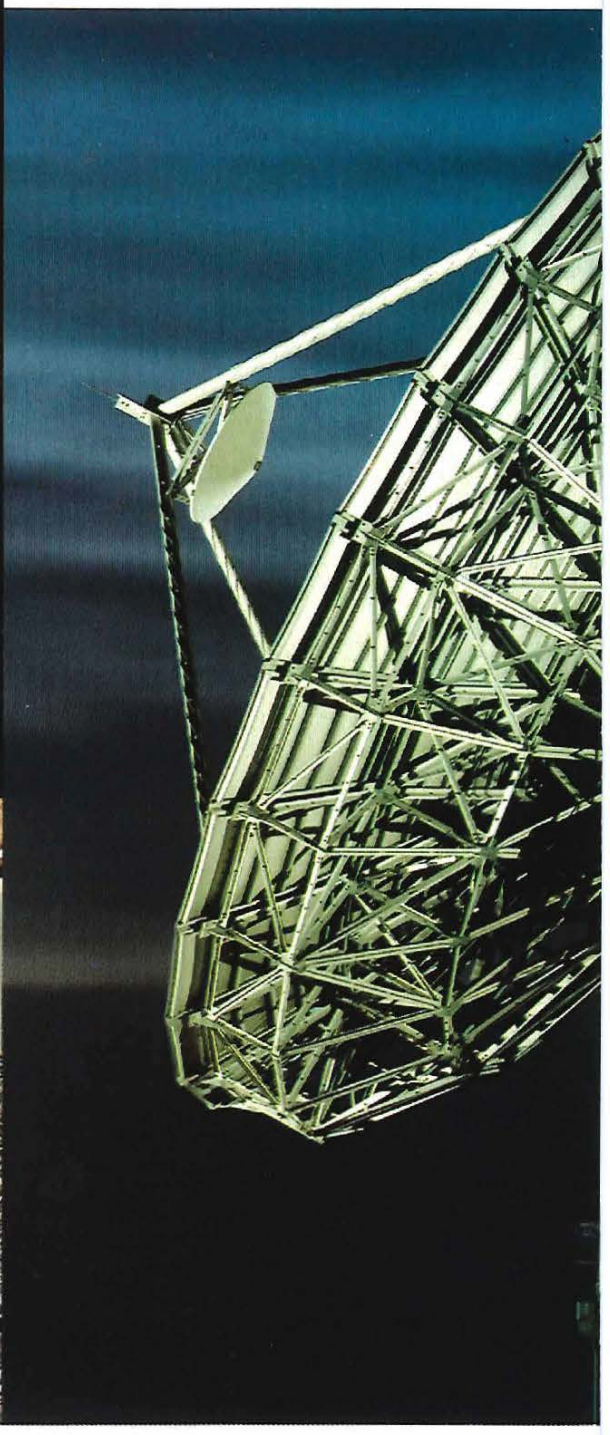
Ivor McClure

The *Virgin Atlantic Flyer* balloon shortly before take-off. An experimental satellite radiopaging receiver was fitted inside the capsule and a message was successfully sent to the crew during the ocean crossing.

Long-distance coach and lorry drivers and international company representatives could soon be contacted immediately anywhere in Europe, Africa the Middle East, even while on the road, due to a breakthrough in satellite radiopaging by British Telecom International development engineers.

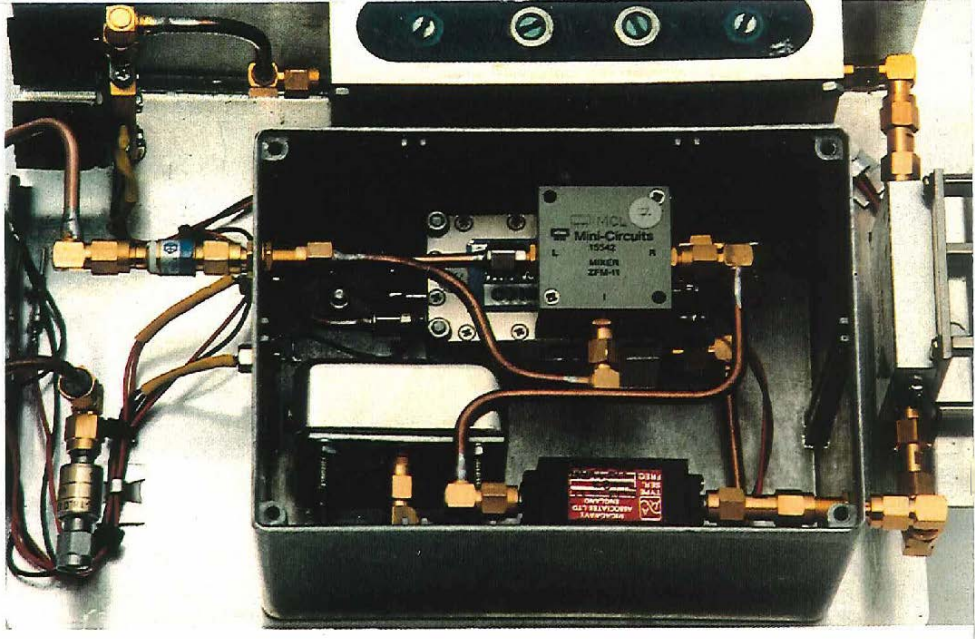
To make international radiopaging by satellite an attractive proposition it was decided that it should be compatible with the national service, and be available as an extra zone on the existing network. The equipment would consist of a satellite receiving antenna fitted to a vehicle's roof and a cab unit into which a standard radiopager could be plugged.

With these criteria in mind, the Development Section of BTI's Main Earth Stations Division began a series of experiments in July 1986 to investigate extending the coverage area of radiopaging by using a satellite. Theoretical studies on these lines were already being conducted at the time by the Technology and Development Division of its Satellite and Lines Directorate.



The logical choice of satellite for the service was INMARSAT's MARECS-B2, operating over the Atlantic Ocean Region and already providing mobile services for maritime, aeronautical, and some land-based systems with a coverage area which included Europe, Africa, the Middle East and the east side of the Americas. As Goonhilly 5 provides coast earth station services on this satellite, this allowed relatively simple access for the transmission of an extra carrier for the satellite radiopaging service.

The Message Master was selected as being the most suitable radiopager in the BT range since, in addition to the tone alerts, it is capable of receiving alphanumeric messages of up to 90 characters and can be plugged into a small printer which provides a hardcopy of the messages received – a useful facility with long messages.



Inside the prototype receiver.

The first stage of the experiment was confined to the laboratory and required the assembly of a simulated satellite link to closely resemble the transmission path which would be encountered by a signal passing through Goonhilly 5 and the MARECS-B2 satellite.

Conventional VHF radiopaging signals were received 'off-air' from the national radiopaging network and passed through the simulated satellite link to a radiopager located inside a metal box. This box screened the radiopager from the national network to ensure that paging was only activated via the simulated link.

As a result of this experiment, there was a high degree of confidence that the paging signals could be transmitted via a satellite link and it allowed operating margins to be established for the radiopagers.

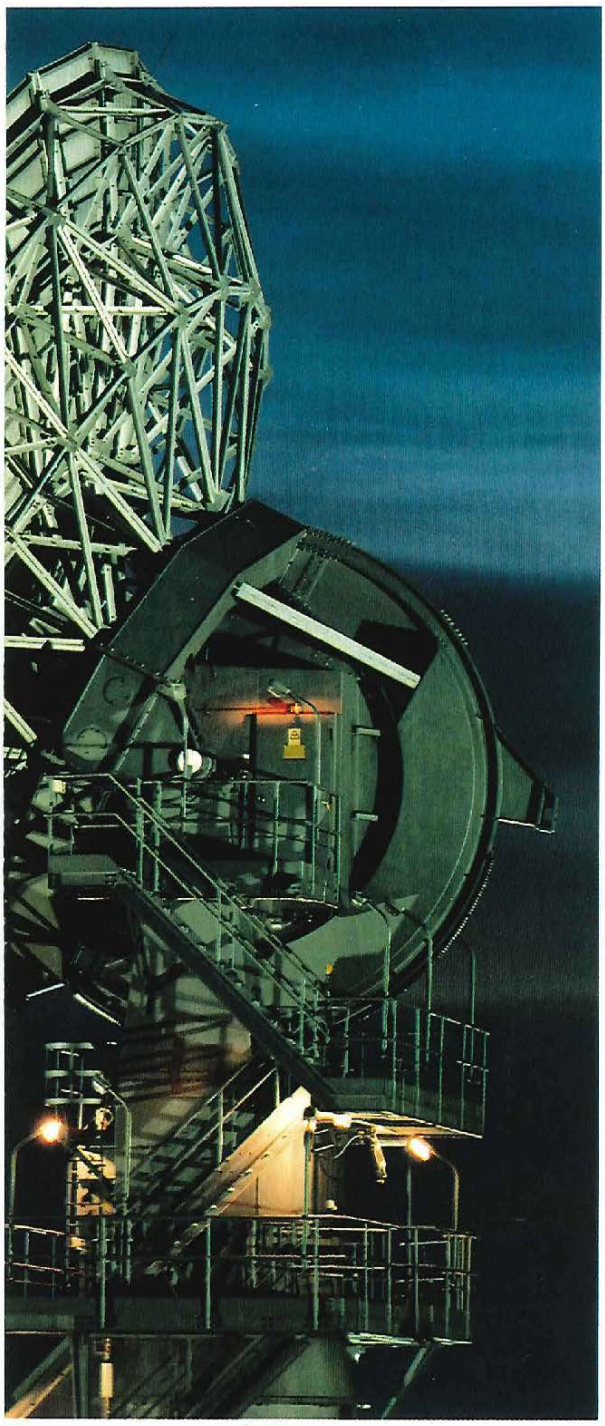
Commercial

The success of these laboratory tests paved the way for the start of a three-phase satellite trial which is being conducted in conjunction with BT Mobile Communications, who will be responsible for running any commercial service which emerges. The objective of Phase One was to demonstrate the principle of receiving a satellite radiopaging signal on a 'breadboard' receiver.

To avoid the unpredictable delays between making a call to the national paging network and obtaining a transmission, a microcomputer with suitable software was used to generate a local paging signal. This signal was used to modulate a carrier which was transmitted via Goonhilly 5 to the satellite. The 'breadboard' receiver was first placed on the laboratory roof in order to provide an unobstructed 'view' of the satellite, and radiopaging via satellite was successfully achieved for the first time in the early hours of 17 February 1987.

A series of tests was carried out to assess the satellite power required to provide such a service. This was very important since the space segment costs are directly related to the satellite power used.

The Phase One satellite tests confirmed all the results obtained from the theoretical and laboratory work and proved that it was ▷



Opposite: during field trials the radiopaging signal was transmitted from Goonhilly 5 to INMARSAT'S MARECS-B2 satellite operating over the Atlantic Ocean. A 'breadboard' receiver was mounted on the roofrack of a van which was driven around to test performance in various locations.

Below: 'Tomorrows World' presenter Maggie Philbin with (left) Eddy Search head of experimental work at BTI's Main Earth Stations Division, and Ivor McClure, systems development engineer. Viewers saw a message sent from the computer terminal via Goonhilly and the satellite to Germany where it was picked up on a self-contained 'briefcase' receiver.

Mr I McClure is a systems development engineer at BTI's Main Earth Stations Division, Goonhilly.

possible to receive satellite radiopaging signals on a static receiver in an unobstructed location. The next step was to establish that a signal could be received on a moving vehicle in a variety of locations. Phase Two of the satellite trial was designed to do just this and to demonstrate a system in operation to interested parties.

Two prototype receivers were constructed, the first mounted on a universal roofrack, allowing it to be fitted to various vehicles. The second was housed in an aluminium box allowing it to be used in the laboratory or for indoor demonstrations. For two nights of a three-night test period the first receiver was mounted on an Escort estate car which was driven around the Goonhilly site, local country lanes, Helston town, and some open stretches of trunk roads.

The receiver was able to operate in all these locations, although there was a noticeable drop in performance where overhanging hedgerows, trees, or tall buildings shielded the antenna. On the final night, the tests were repeated with the car being diven around the Euston and Holborn areas of London. Although some call attempts were unsuccessful, due to shielding by tall buildings, the majority were received successfully.

Towards the end of Phase Two, demonstrations were given to interested organisations. The first was to BT Mobile Communications, which provides the BT Radiopaging service. Messages were received on the vehicle parked in Euston Square and on a second receiver which was pointed out of the window at Mobile House (BTMC headquarters). The second demonstration was to staff at INMARSAT headquarters, London.

Again, two receivers were used, one in the headquarters building, the other on the vehicle parked outside. Subsequently one of the receivers was taken to Bayona in Spain where it was successfully demonstrated to the INMARSAT council meeting, receiving paging messages from Goonhilly.

In addition to these demonstrations, the experimental satellite radiopaging system featured in two high profile events. The first concerned Richard Branson's Virgin Atlantic Flyer balloon. In May the Virgin Atlantic organisation asked BTI to provide radiopaging facilities to the balloon for its crossing of the Atlantic Ocean. A visit was made to the Oswestry factory where the balloon was being manufactured. The second receiver, in its aluminium box, was fitted inside the balloon capsule and the antenna was mounted on the outside.

Robbed

Pre-flight tests indicated that the large amount of balloon equipment located around the antenna such as burners, generator, compressor and liquid oxygen tank, would severely limit its view of the satellite. In spite of this, a paging message was successfully received by the crew during the crossing before the failure of one of the balloon's batteries robbed the receiver of its power supply.

A successful 'live' demonstration of satellite radiopaging was featured on the popular BBC programme 'Tomorrow's World' in October. About 10 million viewers saw Maggie Philbin in the studio type a message on a terminal which was connected by a modem link to BTI's Barbican Computer Centre. The BTI data network carried the message to Goonhilly where the microcomputer formatted it for transmission via Goonhilly 5. The message was then seen being received on the self-contained 'briefcase' receiver on the bonnet of a car outside the ZDF televison studios in Mainz, West Germany. Peter Macann was there to describe the receiver and the experimental system while messages were being received.

This third phase – a field trial – will provide more information regarding the success rate of paging calls to receivers mounted on different types of vehicle in various locations.

In order to receive the international radiopaging service, it will be necessary to equip the vehicle with a special satellite receiver. This consists of a 'patch' antenna measuring about five inches square and mounted flush with the vehicle roof. The 'electronics' are housed in a small box fitted inside the vehicle and connected to the antenna and a radiopager printer. A Message Master radiopager slots into the printer so that a hard copy of messages is produced.

Messages to drivers can be telephoned, keyed in, or telexed in the normal way to the radiopaging system's computers. The service will enable the drivers of long-distance lorries to be contacted even while they are on the road. Coach-tour operators, broadcasting companies, representatives and salesmen of international companies are also expected to be among the first users of this new service. ■

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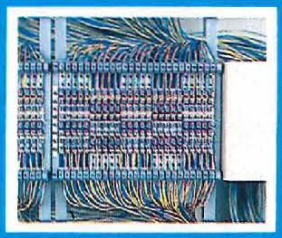

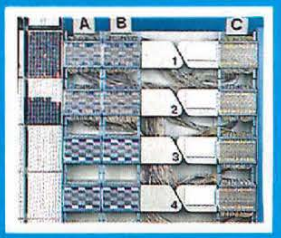

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The training of Saudi nationals to replace foreign workers is a key element in the contract, and over its three-year running period BT and GENTEC will implement a comprehensive plan.

Saudi shake–up

British Telecom's Overseas Division has won a contract to run Saudi Arabia's telex and data networks in a joint venture with a Saudi company. The deal is worth an estimated £25 million and marks BT's biggest ever overseas contract.

The contract covers all aspects of provision and operation of the telex, teletex, data and telegraph services in the Kingdom, including planning, engineering, maintenance and repair, customer services and billing, the production of directories, marketing and sales and, of course, training for Ministry of Post, Telephone and Telegraph (MOPTT) personnel.

Saudisation, the training of Saudi nationals to replace foreign workers, is a key requirement of all contracts of this kind, and evaluation of the tenderers' training proposals was a key element in awarding it. Around 200 Saudis are currently employed on the contract and over its three-year running period BT will be responsible for implementing a comprehensive training plan to ensure the continuing success of the MOPTT's Saudisation programme.

To bid for the contract, British Telecom joined forces with GENTEC, a subsidiary of Haji Abdullah Alireza, the oldest trading company in Saudi Arabia which is justifiably proud of its Commercial Registration – No 1. GENTEC has a long history of success in the telecommunications business in Saudi Arabia and was responsible for the management, operation and maintenance of the Kingdom's telex network during the 1970s. GENTEC's extensive experience and local knowledge proved invaluable during the tendering for this contract. British Telecom has a 49 per cent interest in the partnership with GENTEC holding the remaining 51 per cent. The partnership is administered by a Management Board with an equal number of directors from British Telecom and GENTEC.

This major contract was secured in the face of intense international competition and is the result of nearly two years of careful planning and dedicated marketing effort. British Telecom's Marketing Director for the Middle East, John Baker, explained that the downturn in oil revenues and the demand for oil has had a major impact on the oil-based economies in the region, with international and local companies competing fiercely for fewer government contracts. Indeed, so intense was the competition for this particular contract that it took three rounds of bidding before it was finally awarded. To achieve success in this highly-competitive market means not only submitting a fully compliant technical offer, and a keen price, but also mounting a tenacious marketing campaign to keep one step ahead of the competition.

Having won the contract, the next major task was to mobilise the necessary workforce and achieve a smooth and efficient handover from the previous contractor — Detasad, a joint venture between Detacon, a subsidiary of the Deutsche Bundespost, and a local Saudi company. The management, operation and maintenance organisation involves nearly 600 people from senior managers to technicians. Approximately

fifty British Telecom employees are involved. The majority of these are located in Riyadh with others in Jeddah, Damman and other major cities throughout the Kingdom.

Fortunately, the mobilisation and operation of a large-scale contract such as this is not new to George Dunford, Director of British Telecom Overseas Division's Services Group. George Dunford, formerly Managing Director of International Aeradio (IAL), now a wholly-owned subsidiary of British Telecom, has been managing major contracts in Saudi Arabia since 1962 in the aviation and healthcare fields and feels a strong personal involvement in the development of the Kingdom. He said the marriage of British Telecom and IAL brings to Saudi the telecommunications expertise and management strengths of British Telecom, and the operational experience of IAL. This is a fixed price contract with high penalties for poor performance, and Mr Dunford added that managing a contract like this means you are very visible, not just in Saudi Arabia, but around the world. So British Telecom is committed to Saudi Arabia and will give the same priority to quality of service and performance as it does in the UK and elsewhere. He said his aim will be to ensure the contract is a success — and get it renewed.

The Project Manager is Ian Ridout, a long-serving British Telecom man who has worked previously overseas and at British Telecom's Research and Technology Centre at Martlesham Heath. His background and experience will prove valuable not only on engineering and operational matters but also in providing guidance and advice on new technology and advanced services.

The MOPTT are investing heavily in advanced technology for the expansion and development of their network, particularly in the rapidly growing field of data communications. Ian Ridout said that through its own continuous investment in advanced technology, British Telecom has established an unrivalled position as the European leader in Value Added and Data Services. So it is well-placed to advise and assist the MOPTT in the introduction of new services such as Electronic Mail.

John King, Managing Director of British Telecom's Overseas Division, said they are delighted to have won this major contract and to be working closely with the MOPTT. Mr King added that the opening of their new office in Riyadh is a further example of BT's commitment to this strategically important market. Investment in existing and new overseas telecommunications operations, coupled with greater involvement in a large scale operation and maintenance contracts are, he believes, the two main planks in British Telecom's strategy to build an international business worth hundreds of millions of pounds. This contract fits in perfectly with that strategy and Overseas Division are now actively pursuing other opportunities to consolidate and expand their business in the Kingdom.

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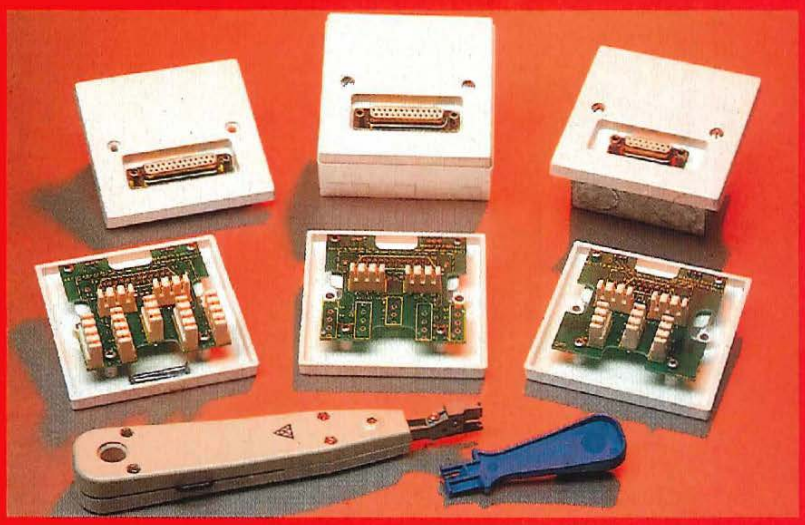

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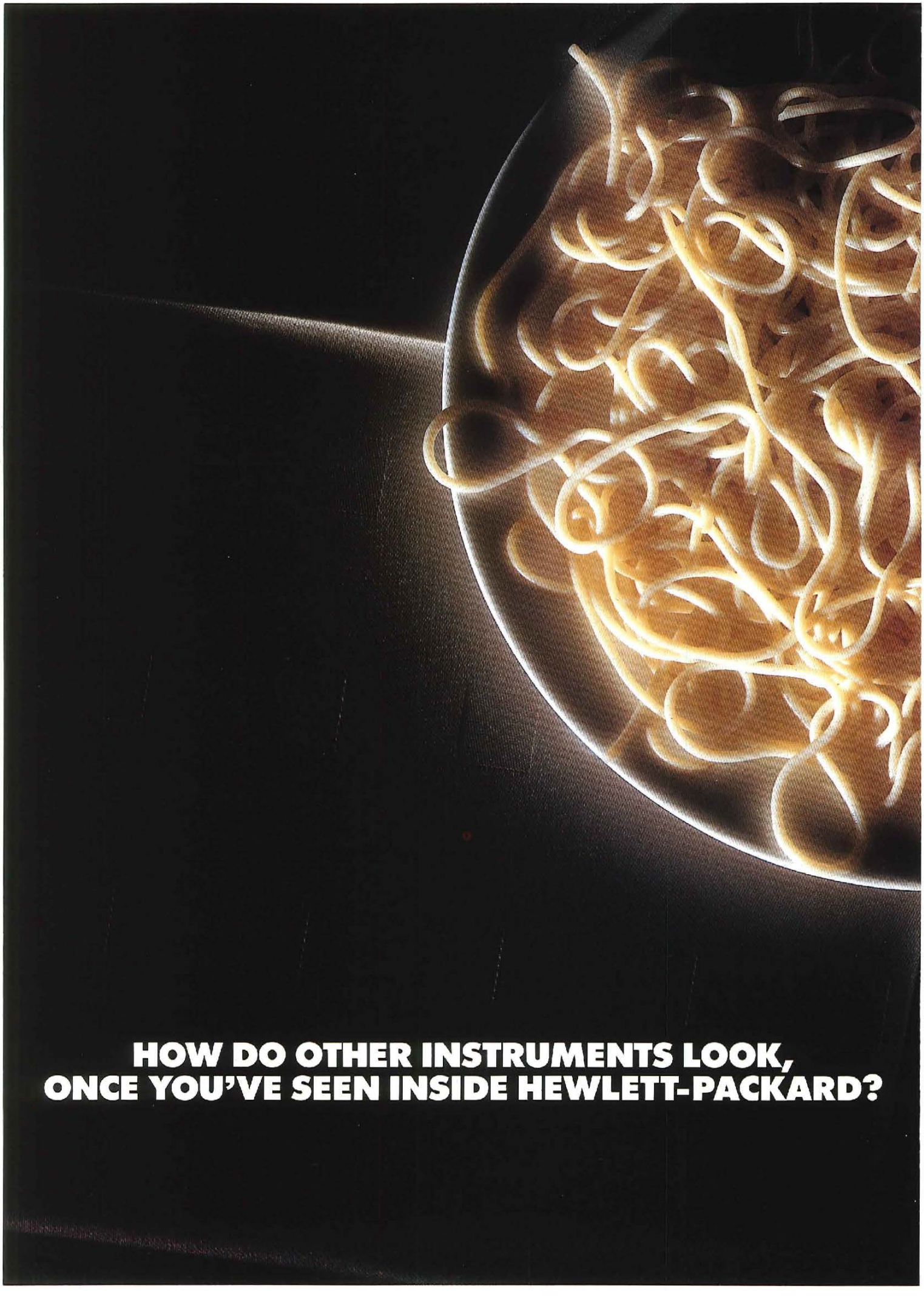
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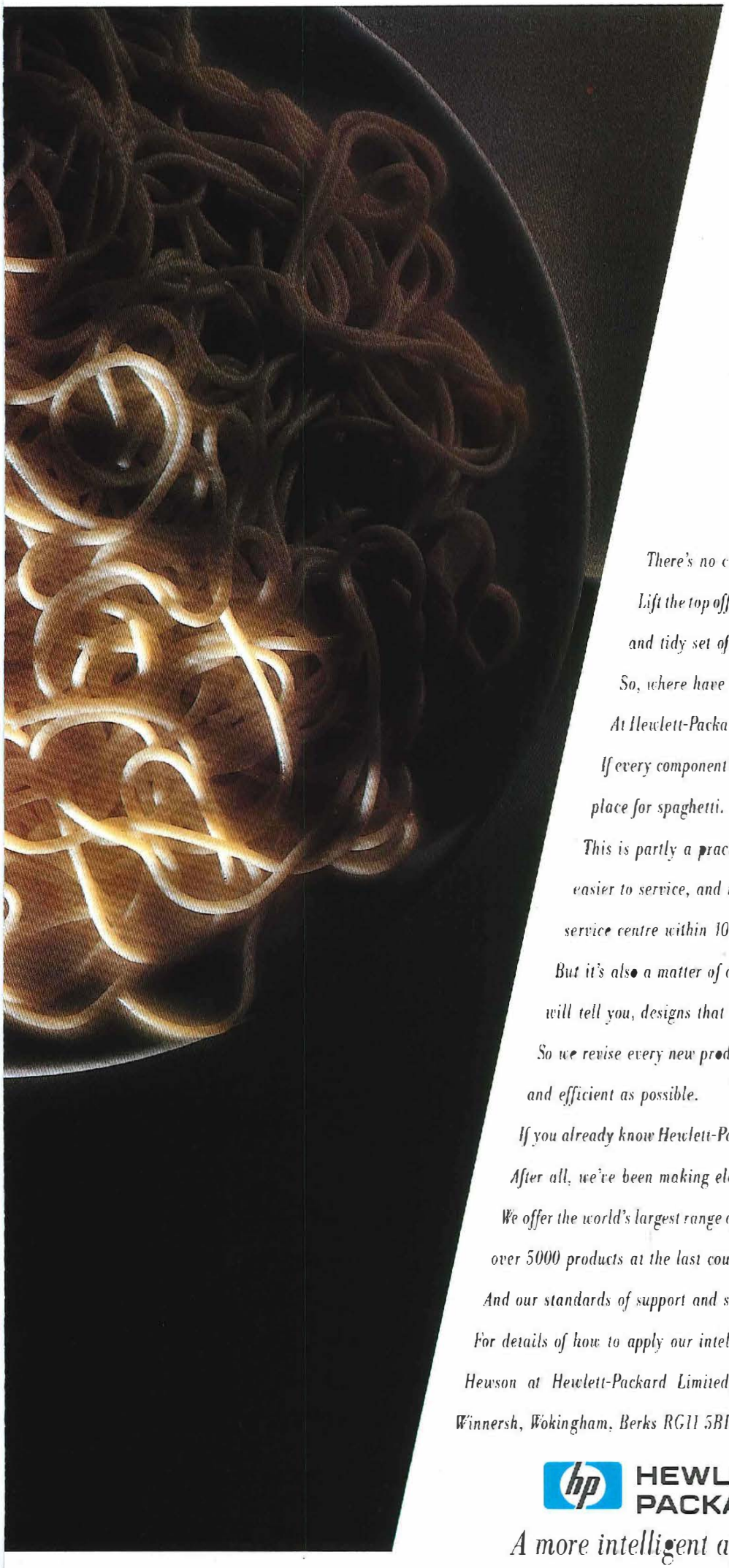

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BT lines up with Gibraltar

A new name came to the Rock of Gibraltar on January 1 when Gibraltar Telecommunications International Ltd (GibTel) took over the running of the Rock's international services from Cable & Wireless — after a stay of over one hundred years.

British Telecom has a 50 per cent holding in the new company, in partnership with the Gibraltar Government. Under the agreement, GibTel has a licence to run the Rock's international services and domestic telex for the next 20 years.

Domestic telecommunications in the colony are still to be run by the Gibraltar Telephone Department (GTD) whose Superintendent, Mrs Charles Fortunato, is also on the Board of GibTel. GTD also looks after the Rock's link with Spain.

BT has provided advice and assistance to Gibraltar for several years, and BT's holding in

Above: the people of Gibralter care about technological progress but this Barbary ape doesn't seem too concerned!

GibTel is seen as a natural development. GibTel staff will have training opportunities in BT's UK training centres. BT will also be involved in assisting with the production of plans for the future development of Telecommunications in Gibraltar.

Another part of the deal is the provision by BT of a new digital switch.

General Manager of GibTel is Mr Ron Thomas on secondment from BT where he was Customer Service Systems Manager in South Wales District. He works to a six man Board of Directors with equal BT and Gibraltarian membership. Its chairman is The Honourable Brian Traynor, Financial and Development Secretary of the Gibraltar Government.

Gibraltar is attractive to BT because of its geographical location and its great potential for growth in existing telecommunications services as well as into new areas. These include mobile communications and specialised services to support Gibraltar's rapidly growing tourism.

Mr John King, Managing Director of BT's Overseas Division, said that the venture underlined BT's strategy to respond positively to opportunities in overseas countries, particularly in network investment and management.

Opposite top: satellites, data transmission, mobile communications . . . the new company aims to expand and improve Gibraltar's present services.

Top left: the basic job of a telephone engineer is much the same anywhere — even on a 1,400 foot high limestone rock.

Top centre: British Telecom's managing director, Overseas Division, Mr John King (left) signed the joint venture company agreement with Mr Brian Traynor (centre) Gibraltar's Financial and Development Secretary. Looking on (right) is Gibraltar's Minister for Municipal Services, the Hon Brian Perdy.

Telephone lines around the world

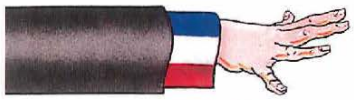
This international comparison of the latest telecommunications statistics shows the 12 countries with the largest number of telephone lines. Most information relates to the situation on 31 December 1985, or as near to that date as possible. For Japan and the UK, the system size information was correct on 31 March 1986. The percentage growth over the preceding year is shown in brackets.

The 12 countries account for about 77 per cent of the world's telephone connections while containing only 23 per cent of the world population. The statistics have been produced from several sources available to British Telecom's International Comparisons and Statistics Group.

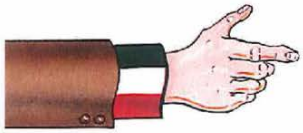
Australia **Telephone lines in millions** 6.5 Percentage growth (4.8)

Brazil **Telephone lines in millions** 6.9 Percentage growth (6.2)

Canada **Telephone lines in millions** 12.5 Percentage growth (11.6)



France **Telephone lines in millions** 23.0 Percentage growth (4.1)



Italy **Telephone lines in millions** 17.4 Percentage growth (5.5)

FR Gennany **Telephone lines in millions** 25.9 Percentage growth (4.0)

Japan **Telephone lines in millions** 46.1 Percentage growth (3.8)

Spain **Telephone lines in millions** 9.3 Percentage growth (6.9)

Netherlands **Telephone lines in millions** 5.8 Percentage growth (3.6)

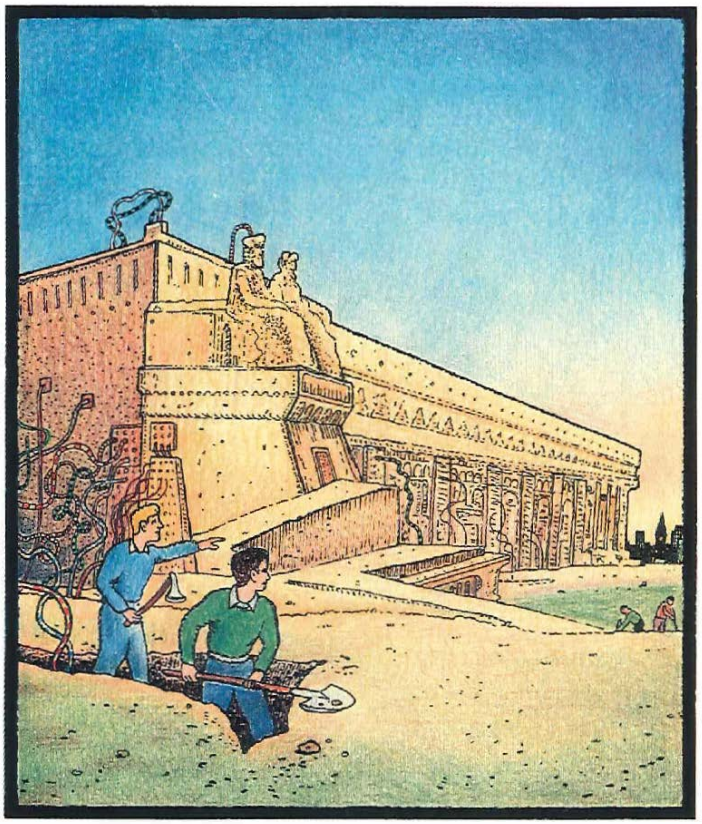
UK **Telephone lines in millions** 21.7 Percentage growth (3.8)

USA **Telephone lines in millions** 118.3
Percentage growth (3.4)

USSR **Telephone lines in millions** 28.0 Percentage growth (6.5)

The Art of Communication

fig. 1



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Below: An army operator uses a Trend 274T electronic teleprinter. Bottom: A mobile exchange under construction. These can be deployed at selected sites in times of emergency.

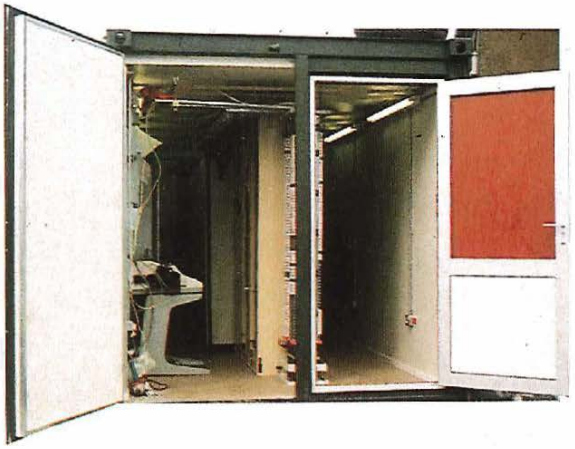
Fighting fit at 50 – BT behind military lines

Stephen Duffy

One of the most important services provided by British Telecom for the Ministry of Defence is the Defence Telegraph Network which celebrates its 50th birthday this year.

Founded at the time of the Munich crisis when a review was made of Britain's communications needs in the event of war, the Defence Telegraph Network (DTN) made a valuable contribution to the war effort and still provides a highly effective and reliable communications link between various government and military locations throughout the United Kingdom.

It is a multi-channel voice frequency (MCVF) network which operates on an impressive scale. More than 300 locations, many remote from the major centres of population, are served by 5,000 telegraph circuits, mostly routed over specially-



provided MCVF bearers of which there are more than 500. In addition, BT rents 3,000 teleprinters and associated pieces of apparatus to the customers who use the system.

At first, in 1938, the RAF and the Navy were the only customers but they were soon joined by the Army and the Foreign and Commonwealth Office and then later GCHQ. These five are known as the Founder Members on behalf of whom BT provides and maintains services on the DTN, but many other government departments such as the Cabinet Office, Procurement Executive and Customs & Excise are now allowed to use the system. Circuits are also provided for NATO, the American armed forces in Britain and some allied foreign embassies.

The day-to-day management of the network is in the hands of eight staff based at Museum House in the City of London. The Services have, therefore, a convenient point of access to the management of the entire system and the group is able to respond quickly to unforeseen requests for circuits or equipment. Every District also has at least one engineer who is designated as responsible for work on the DTN in his particular part of the country. A unique system of centralised billing for the entire network is operated by London Westminster District and an income of well over £5 million is generated each year.

Committee

Administrative control of the DTN is vested in a committee which is attended by representatives of the major users under the chairmanship of BT.

British Telecom supplies and maintains all the circuits and also provides most of the equipment, although customers may supply their own teleprinters and associated apparatus if they wish. Accommodation for the VF terminal equipment is also provided by the customer and the sites to which the circuits are routed can be anywhere in Britain from the Scilly Isles to the Shetlands. Northern Ireland is included and links within the United Kingdom for international circuits are also provided by BT on the DTN.

Within two years of its establishment the importance of the DTN's contribution to the war effort meant that the number of its telegraph circuits grew to equal the total used in the civilian network and by late 1944 the number was two and a half times as great. Since then, although the DTN has not reduced greatly in scale, the massive growth in Telex working has altered the comparison dramatically so that now the DTN is only about 10-15 per cent of the size of the civil network.

The DTN proper is a network of analogue VF bearers linking together MCVF terminals each capable of handling a maximum of 12 telegraph circuits. Initially, for security reasons, direct physical routings were specified for all bearer circuits but this was relaxed in the mid 1960s to allow use of the higher-order FDM network with the proviso that radio routings must not be employed.

The terminal MCVF equipment itself has also been altered in character over the years. The original type utilised valves and gave sterling service for 40 years, but in the last decade it has been totally replaced by transistorised equipment needing smaller accommodation and less electrical power. Although most circuits are routed entirely over the DTN's own bearers, those to more remote sites can be extended beyond the bearers on physical links. The system is also flexible enough to allow circuits to be provided entirely on the civil network, or internally within the customers' own sites, and yet be maintained and charged for as part of the DTN.

Circuits

Most of the circuits are provided on a point-to-point basis but almost from the beginning it was intended that some should be switchable and for these the then Post Office Engineering Department designed suitable telegraph switchboards which were used during the war.

In 1955, the PO began to replace the manually switched exchanges with a fully automated system using Strowger equipment which itself was replaced by six electronic switches in the early 1980s. Now there is even a mobile exchange which can be deployed at selected sites in times of emergency. Although it can be used by any of the Services, the switchable element of the DTN (known as TASS: Telegraph Automatic Switching System) is particularly popular with the Army for use during its training exercises.

As part of a continuing programme to modernise the network, many DTN sites are being converted to low voltage working which will increase the security of the system. There is also a massive programme to replace mechanical with electronic teleprinters, and to deploy complementary equipment within the network.

Over the years the network has been subject to a continuous process of evolution and a working party has now been set up to study the implications for the DTN of the digitalisation of the main BT network. The intention is that the DTN should take full advantage of new developments and continue to play its major rôle in Britain's military communications. It is a rôle which only BT is equipped to provide thanks to its unique access to communications resources anywhere in the UK. ■

Below: Military personnel operate a suite of teleprinter switchboards in 1940.

Mr S Duffy works for British Telecom's Government Services.

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'Monologue' equipment utilizes a tapeless, solid state message system ideal for high quality information service announcements. Both music and speech can be recorded to enhance message impact.

Recording is simple and direct. Unlike other digitally encoded systems, Reid-Monologue requires no pre-processing equipment or outside services to record or re-record announcements. Messages are non-degradable and non-volatile.

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'Monologue' benefits include:

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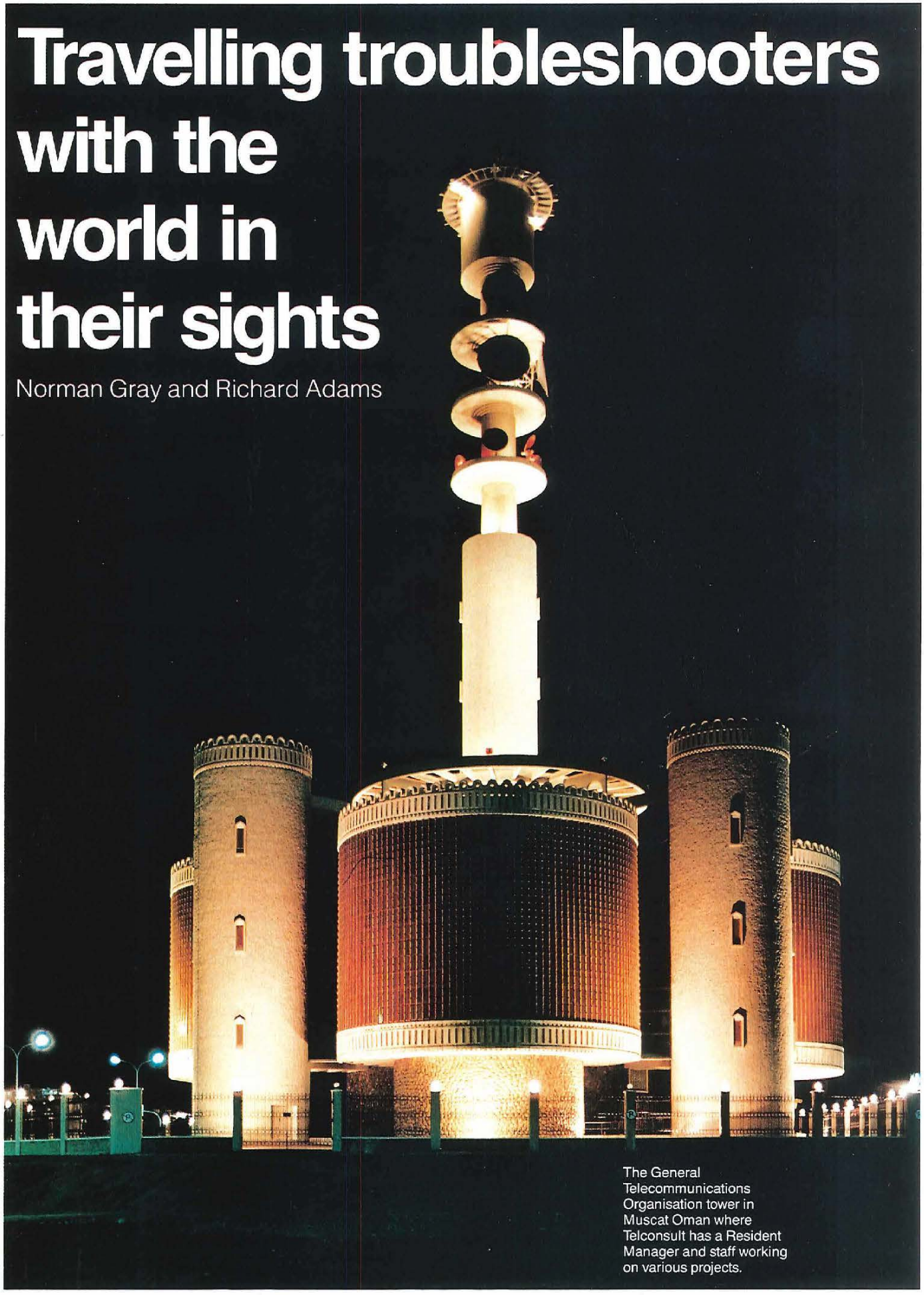
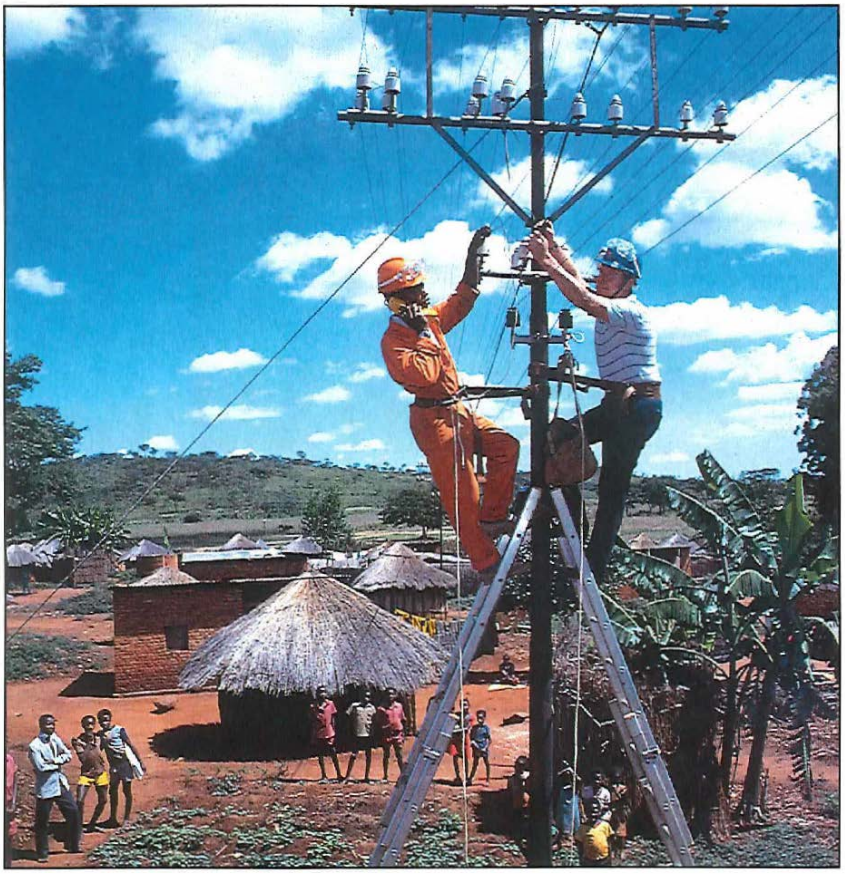
Travelling troubleshooters with the world in their sights

Norman Gray and Richard Adams



The General Telecommunications Organisation tower in Muscat Oman where Telconsult has a Resident Manager and staff working on various projects.



Dealing with cable-eating termites or civil unrest, it's all in a day's work for the troubleshooters of Telconsult, British Telecom's overseas consultancy service. Their technological and organisational skills are called upon to handle problems anywhere from Latin America to the Far East.

Since its foundation ten years ago, Telconsult has been steadily establishing a professional consultancy service all over the world, and in the last year has been active on some 74 contracts in countries ranging from Angola, Sierra Leone, Nigeria, Uganda, Kenya, Nepal, the Middle East and Belize, to Trinidad and Tobago.

Consultancy work covers more than just the engineering disciplines. It embraces the whole range of specialisms in BT's portfolio of expertise – planning, specifying, procuring, installing, commissioning and operating networks, and solving organisational, management and training problems. As part of BT's Overseas Division, Telconsult sells the company's vast accumulation of experience to the world and recruits its consultants on contract from British Telecom's 220,000 staff.

Telconsult's projects can be as short as one week or as long as several years, although BT staff are normally contracted for one or two years.

Clients are naturally conscious of the cost of consultancy, and to ensure the best possible advice they seek world-wide tenders for projects from leading consultancy organisations. They expect to see reliable and loyal staff seconded to their projects. Telconsult has had no difficulty in finding staff who take personal satisfaction in seeing projects through to completion, such as the satellite experts in Saudi Arabia now entering their third year, and five staff in Libya who have just decided to stay on for another year.

Ways of life are different and people working overseas have to adapt. For example, many Middle East states ban alcohol, the employment of women, and have a six-day working week. But consultants come to love the local background, hot climate and high living standard. For the area of the Gulf (Oman, Qatar, Abu Dhabi, Bahrain, Kuwait and Dubai) Telconsult has a Resident Manager based in Oman. Staff there are working on transmission and network planning, project management, training, local network construction, software implementation, and command and control systems for the police and military.

On the other side of the world, Latin America and the Caribbean beckon consultants to help achieve technological modernisation and organisational evolution. Telconsult has assisted with the introduction of digital switching in the Bahamas and direct dialling in Chile, adjudicated tenders in Jamaica, planned networks in Peru, and valued assets in Belize, and its experts may now be required in Columbia, Guyana, Bolivia, Costa Rica, Mexico and Puerto Rico.

Exotic

Exotic locations such as Nepal, Thailand, Sri Lanka, Singapore, Indonesia and Papua New Guinea have all featured in recent tendering for contracts. BT Overseas Division has a manager in Sri Lanka, offices in Bangkok and Hong Kong, and projects running in India. Telconsult will be sending two consultants to Nepal this year, during the warm and dry season in the Kathmandu valley. Prospects are looking good in a number of other countries and the Far East is a developing market for British consultancy services.

The problems Telconsult staff have in coping with different cultures are particularly apparent in Africa which has now become a major contributor to the service's business. One of the most exciting telecommunications projects in Nigeria at the moment is the installation of the continent's first major optical fibre route, between Mosimi in the west of Nigeria, Warri in the south and Kaduna in the north. This prestigious programme is being supervised, at the request of the Nigerian National Petroleum Corporation, by Telconsult which is also supervising the installation of digital microwave routes and digital SPC PABXs. Consultants will be on-site throughout the programme and they have already had to solve some unusual problems.

The local termites liked the optical fibre project so much that they ate it, attacking and damaging the cable sheath. Working with the cable contractors, BT mobilised its resources against the 'enemy' and the cables were all given an extra layer of nylon to foil the miniature vandals.

Among the other major projects being carried out in Africa is the upgrading of international services in Angola. Telconsult has prepared specifications and is handling the tendering procedures for satellite, microwave, switching, telex, packet-switching and data-processing equipment.

This project shows the scope of consultancy work because the services offered are not limited only to the technical aspects. Telconsult is also advising Angola's international organisation

upon its management structure, its staffing and even its accommodation standards.

In Malawi, consultants are supervising the installation of a number of UXD5B rural digital exchanges interconnected by digital radio links. Finance for this important project was part of the UK Government's contribution to World Communications Year 1983. The exchanges are now fully operational and giving modern and efficient communications to four small towns and their rural populations. Thirteen more UXD5Bs are currently planned and Telconsult is looking forward to a long and lasting relationship with the Malawi Post Office.

British Telconsult is winning world-wide credibility through its achievements. It has a reputation for being professional, adept and capable of handling the problems which face telecommunications organisations abroad – problems like carrying out a major prospect using expatriate staff in a country where there is civil unrest and working in areas where there is no public transport and only limited supplies of food and materials. That reputation can only improve as keen, experienced and professional BT staff take the field, accepting the chance to travel and work abroad as consultants.

Clients benefit from the expertise of BT staff, and the fresh experience of carrying out a project abroad is injected back into BT when consultants return to their mainstream careers in Britain. ■

Above left: a Telconsult engineer helps to test subscribers' lines in Old Muscat.

Above right: a satellite dish in Oman.

Mr N Gray and Mr R Adams are British Telconsult's Area Managers for operations in Africa and the Middle and Far East.

Left: in Malaysia Telconsult staff assisted the local telecom company, Binafon, on the installation of a new local line network. Projects undertaken in Oman include transmission and network planning, training, and police and military command and control systems.

Opposite page, top: Telconsult's Jerry Fitzpatrick trains student engineers in a Zimbabwean village setting.

Opposite page, below: in Indonesia, where Telconsult have recently tendered for contracts, bamboo telegraph poles support overhead lines.

TOMORROW'S TECHNOLOGY...

The way some manufacturers talk, you'd think they'd just discovered real ISDN.

The truth is that while they've been announcing their first breakthroughs... we've been quietly completing years of commercial use.

While they debate about what's now possible today... we've been planning what's going to happen years from now.

While other systems are just venturing into ISDN, each and every System X exchange in service provides ISDN facilities today in a network of 1000 nodes interconnected with CCITT 7 – The world's largest.

System X was conceived as an ISDN switch while many other so called ISDN products have simply added it on to an existing analogue or first generation digital switch – a less than satisfactory solution.

System X has been designed from the outset with the future in mind – but NOT at the expense of today's requirements.

Having years of commercial networking experience to its credit it's no wonder System X is out front with ISDN.

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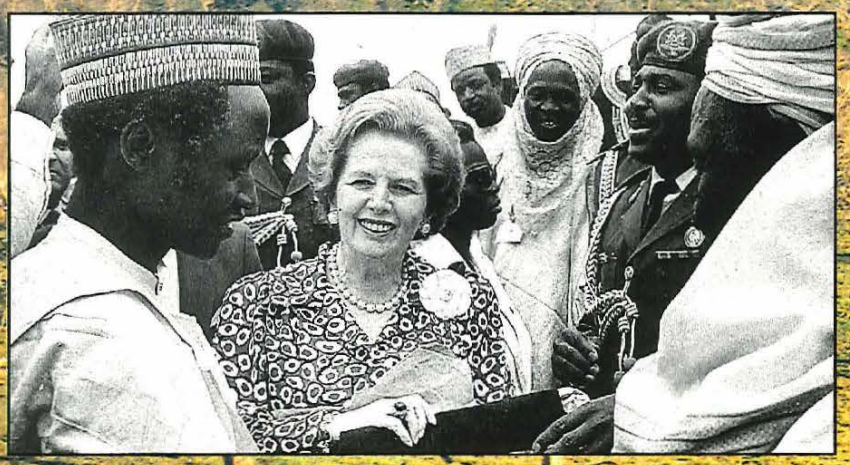
FOR TODAY'S NETWORKS

System X

Below: Mrs Thatcher inaugurated the UXD5 digital exchange at Kapsabet in western Kenya by making a call to the Kenyan High Commissioner's office in London.

BT about the bush

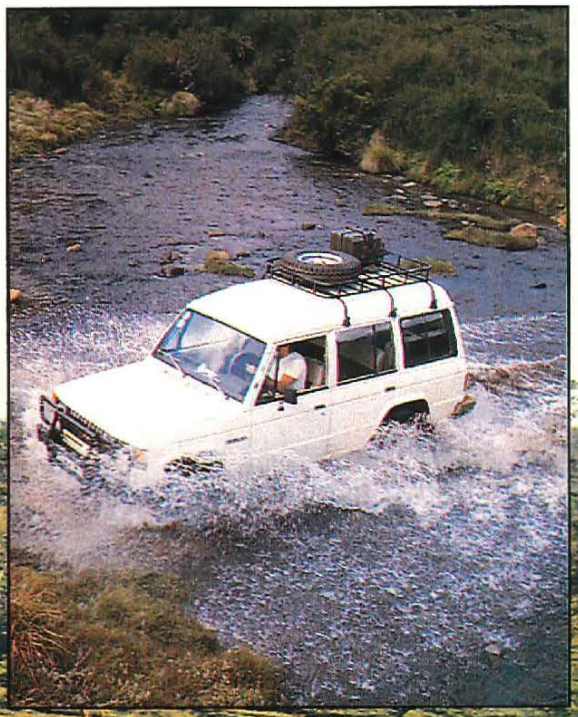
Barrie Gosling



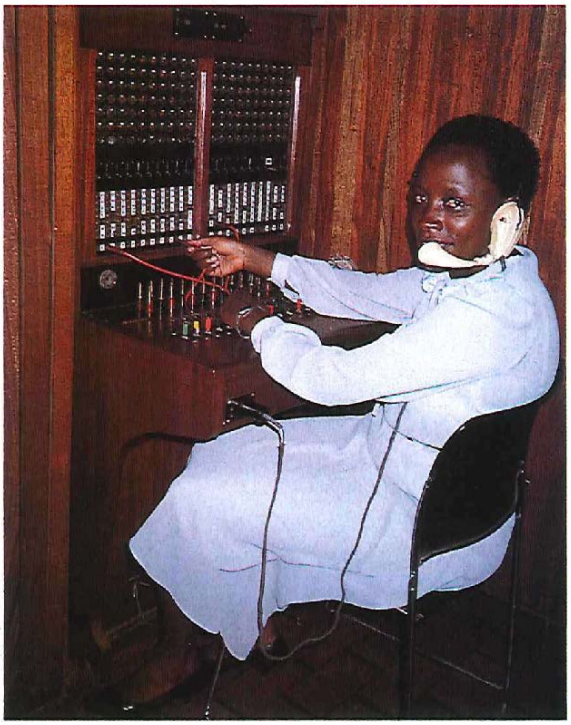
Although one of the more advanced African countries, Kenya has just one telephone per 100 inhabitants – and users are spread over vast and thinly-populated areas. British Telecom Teletrade is now undertaking a £30 million project to supply and install the latest in digital technology to help the country's unique problems.

In 1986, Kenya had about 65 automatic exchanges, the remainder being manually operated, some in very remote areas without mains electric power and trunked by open-wire overhead lines or single-channel radio. These rural magneto-signalling manual exchanges vary in size from about 15 subscribers to 400, with some multi-party lines feeding over 12 subscribers on each pair!

The Kenya Posts & Telecommunications Corporation (KPTC) decided in 1985 to automate the larger manual exchanges, especially in towns of strategic and economic importance such as those containing the Government's Divisional Headquarters. KPTC chose the UXD5 Digital Rural Exchange, as used and operated by BT, to meet the demanding operational requirements made necessary by the Kenyan environment. ▷



In remote areas some sites were difficult to reach, and four-wheel drive vehicles were needed to overcome muddy conditions experienced during the rainy season.



An operator working a manual telephone exchange in Kenya. British Telecom is supplying and installing digital exchanges and transmission equipment in rural areas.

The initial order was for 15 exchanges, situated in places ranging from the exotic Indian Ocean coastline of Lamu Island and Diani Beach near Mombassa, to the remote outback of Garissa, bordering Ethiopia and Somalia in the arid area of the north.

Since the project not only entailed the supply of equipment but also installation supervision, training and maintenance, BT Teletrade staff had to adapt to the rigours of living in the remoter areas, as well as enjoying some of the worlds most scenic coastline.

The logistics of setting up a support team of BT staff in an overseas country are quite daunting. Centralised accommodation and transport problems have to be solved and these are made more difficult due to the remoteness of the majority of sites, some of which require two overnight stops to reach them. Add to this the problems of obtaining suitable places to stay and availability of food which the staff are used to, and some idea is given of the resilience required of the BT pesonnel working in remote areas.

This photograph was taken from a video film of Mrs Thatcher making the inaugural call.

Mr B Gosling is General Operations Manager for British Telecom Teletrade and is responsible for the total Kenya project.

However, just as the UXD5 has interfaced into the Kenya network, the BT Teletrade staff fitted naturally into the African environment.

The conditions in which the UXD5 exchanges have to work overseas can be very different to those at home. Apart from a more rigorous atmosphere in terms of heat, humidity and dust, there are high levels of lightning activity. In one instance the ferocity of the lightning during a tropical storm caused continuous 'arcing' of the carbon line protectors on the main distribution frame at an existing manual exchange. The mains power supply was also interrupted continuously for the duration of the storm.

The network itself may have differing characteristics of signalling tolerances and network congestion. These problems do not always come to light in an electro-mechanical system, but a modern digital network requires high standards of signalling to carry the necessary information expected of it.

The success of the UXD5 in overcoming the problems of interfacing an unfamiliar network, and the numerous and varying methods of connecting the exchange system into that network, have been adequately demonstrated, and contracts have been placed for the UXD5 in Kenya. When these current contracts are completed, a total of 111 exchanges will have been installed.

Some of the links connecting the UXD5 exchanges to the existing network have also been provided under the project. These vary from PCM on transverse-screened cable carried on overhead pole routes to modern digital microwave radio links. Some exchanges have been connected on overhead open-wire routes of up to 50 km long, which give some idea of the problems that were encountered in ensuring that every exchange works in accordance with the rigid requirements of the overseas telecoms administration.

Even during the radio surveys undertaken by BT and KPTC, some remote sites were difficult to reach, and four-wheel drive vehicles were needed to overcome the muddy conditions experienced during the rainy seasons. In fact, one site was not accessible at all, and the survey team faced the prospect of a night stuck in the mud.

The latest orders for UXD5 are for sites covering the whole of Kenya, including the border towns of Moyale and Mandera adjoining Ethiopia and Somalia, Namanga and Taveta adjoining Tanzania, Busia with Uganda. By the end of the current projects, all areas of Kenya will have UXD5 exchanges working for the benefit of the population in the urban as well as the mainly rural areas.

This scheme is the largest of its type undertaken overseas by BT Teletrade and when completed it will represent one of the largest automated rural projects in Africa, bringing Kenya well into the digital age of technology. Many African countries are looking to Kenya and their progressive and far-seeing modernisation programme, and British Telecom looks forward to taking an active role in helping other African administrations into the digital age. ■

'Your new digital exchange has arrived.'

Introducing the five-shelf AXE. The first digital local exchange remote subscriber stage to pass through standard doorways, and into lifts.

The new exchange modules come fully-assembled, cabled-up and pre-tested, ready to be wheeled straight to their permanent homes. Putting them into service is simply a matter of plugging in a few cables.

A job which used to take months, now finished in days.

With the range of switching cabinets and power supplies now available, modules can be combined to provide exchange lines serving from 256 to tens of thousands of subscribers.

And before delivery, every cabinet is quality approved at the factory, using standard British Telecom test procedures.

Already, exchanges based on the five-shelf cabinets have been installed at five British Telecom pilot sites, and more are on order.

AXE is the world's most widely used digital exchange. The five-shelf AXE is a British development, designed and built by Thorn Ericsson in its Scunthorpe factory using standard AXE hardware and software.

Thorn Ericsson employs over 1,000 people to manufacture, program and service AXE exchanges, at six locations in the UK. With that kind of commitment, you can count on Thorn Ericsson for a continuing stream of great ideas.

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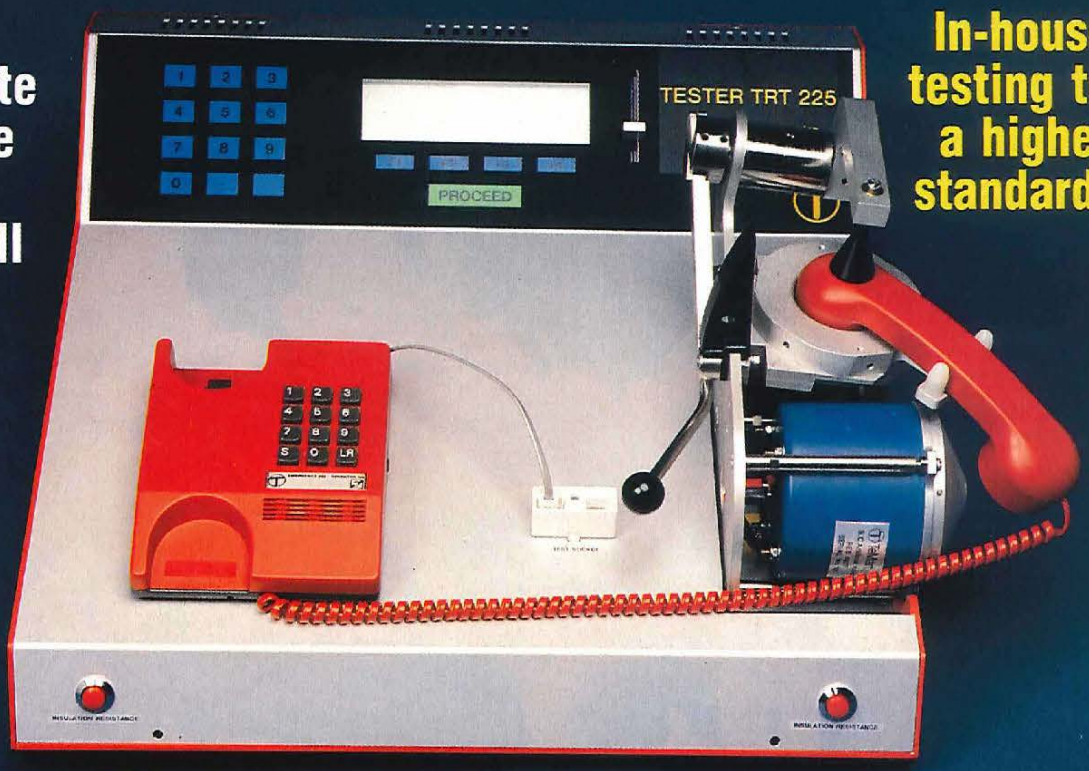

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Use it for a simple pass/fail test or a detailed VDU display or printout of results. Its versatility is a valuable aid in design, development and production situations; warranty work, workshop testing and quality audits.

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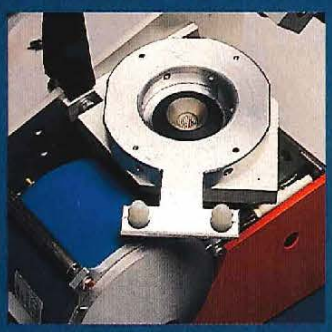
The TRT 225 is the one piece telephone tester with 'User friendly' controls. Anyone can use it with the minimum of training. Just plug in to a 240V supply and it's operational...It's as simple as that!

Light-weight
Remarkably it only weighs 56lbs and is conveniently transportable. Carrying case is supplied.

Tried and tested
BTCE has used TRT for over 2 years for pre-TIGGER testing new telephone designs and manufacture. It's a proven, robust instrument providing a superior telephone testing facility.

Computerised
It's the fully computerised tester with a range of standard testing programmes. Customised software can be written to suit specific production, laboratory and maintenance needs.



*1. **Accuracy** Artificial head designed and patented by BT. Electronically sophisticated and extremely accurate.*

*2. **Development** A pre-approval testing aid.*

*3. **Maintenance** Simple to use by all grades of staff.*

*4. **Production** End of assembly line tester.*

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Telephones come in all shapes these days and offer a wide variety of different features. But every model has to be thoroughly tested and until now the process involved an expensive computer in laboratory conditions. This article looks at the development of a new tester which can be used by field staff.

Depot manager Ken Sole tests a phone on the new equipment designed for use by field staff.

Test match–catching out faulty phones

Ian Niven

Before 1980, the Post Office specification for telephone performance was confined to the functional parameters of each component part and it was assumed that when all parts were correctly assembled, the telephone would work properly. However the specification for the inexpensive telephone (IXT) drawn up in that year only laid down the performance of the complete telephone but left the performance of the component parts to the manufacturers. This was followed by the liberalisation of the BT network, the privatisation of the company and the setting up of a British Standard (BS6317) for the performance of the simple telephone.

The two specifications were similar but the authority required to test and approve new designs of telephones was vested in the British Approvals Board Telecommunications (BABT) – the test house empowered by the Department of Trade and Industry to test and recommend approval for new telephone designs intended for connection to the BT network. Such telephones when manufactured would carry by law a green spot label bearing its approval number as registered with the DTI.

One of the main criteria was the transmission performance of send, receive and sidetone over line lengths up to 7.5Km using an artificial mouth and ear. The test equipment used by BT and BABT is a computer controlled measuring system called TIGGER which costs about £150,000.

The 700 type telephone used by BT for 25 years could pass most of this rigorous transmission test

Opposite: all telephones were formerly tested on TIGGER, a computer-controlled measuring system costing around £150,000.

but the new telephone designs used cheaper transducers and an amplified transmission circuit and this presented a whole new range of customer perceived fault categories:

- a perfectly good telephone whose handset was opened and then resealed could now fail because the transmitter had been unseated in its housing.
- changing a faulty component during maintenance could actually impair its performance.
- high background noise levels could be picked up, amplified and present excessive sidetone problems.
- performance on one type of PBX could vary from another creating variances in the type of telephone to be used in certain situations. For example a 'constant current feed' PBX can fool a telephone into thinking that it is on a long line and that greater amplification should be used. Or impedance mismatch between PBX and the BT network would result in excessive sidetone.

Since the 700 type instrument had been a standard telephone used in a wide variety of operating conditions the new range of electronic telephones were often blamed for faults incorrectly and changed unnecessarily.

Transmission

A telephone tester which could carry out a range of transmission tests outside laboratory conditions and so provide field staff with a measure of confidence in the new telephone technology was introduced by BT Consumer Electronics Ltd last October.

The original development work was commissioned by the Technical Liaison branch of Materials Division. British Telecom Research Laboratories, Martlesham Heath, near Ipswich, was approached to design an 'artificial head' for making speech measurement in accordance with the International Telegraph and Telephone Consultative Committee (CCITT) recommendations.

The company's Factories Division (Telephones), now BT Consumer Electronics, was also in the process of developing a tester using a different type of artificial head and a combination of both developments resulted in a standard tester (TRT 225) which could be used for both the analysis of test results by design engineers and the simple pass/fail requirements of field staff. It could also be used during manufacturing processes, where test time is critical to the final cost of the product.

This first version of the TRT 225 required a large soundproof box, in which the artificial head and telephone under test were housed, away from background noise. The present version, however, filters out the ambient noise and so removes the need for a cumbersome acoustic chamber.

Besides testing for transmission, the TRT 225 measures the telephone outputs for signalling – both loop disconnect and multi-frequency. Other characteristics included are DC (loop resistance) which ensures that the telephone loop will be able to seize and hold exchange equipment as well as control the amount of current taken from the exchange battery during a call, and bleed current which checks that only a limited amount of current can be taken by a telephone to support facilities such as memory, and clocks. A test for incoming ring ensures that the tone caller or bell will work in the most stringent situation of a long line with three extra bells.

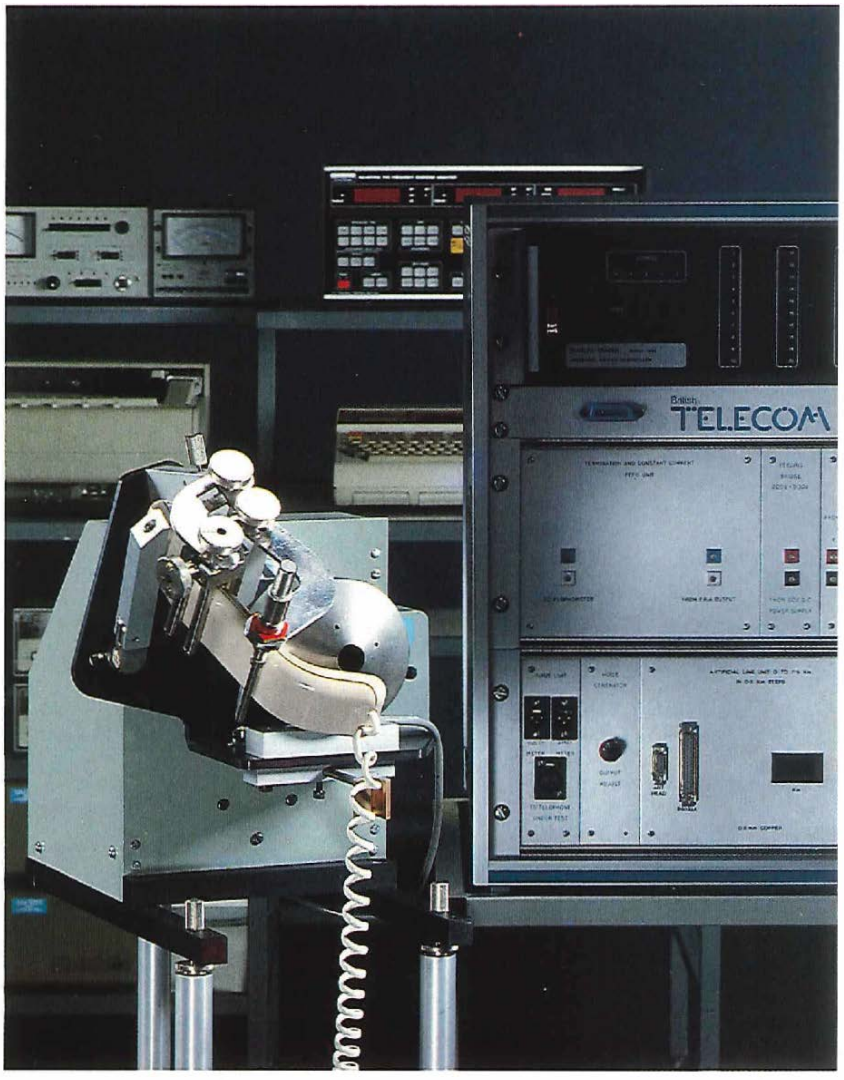
With the increase in facilities now being offered by telephones, the problem of advising staff on how to test each facility is covered by step-by-step instructions on a liquid crystal display.

The flexibility of this universal tester for use by field staff, design engineers or manufacturers is achieved by different software for each situation. The computer control allows for the same tests but with a different level of test data and operator instructions for each user.

An optional printer can provide either a simple pass/fail ticket for each telephone tested or a complete printout of all test measurements made.

Enquiries about the tester are currently being dealt with from a number of UK and overseas telephone manufacturers as well as other Posts and Telegraphs Administrations. ■

Mr I Niven is technical marketing manager for British Telecom's Consumer Electronics.



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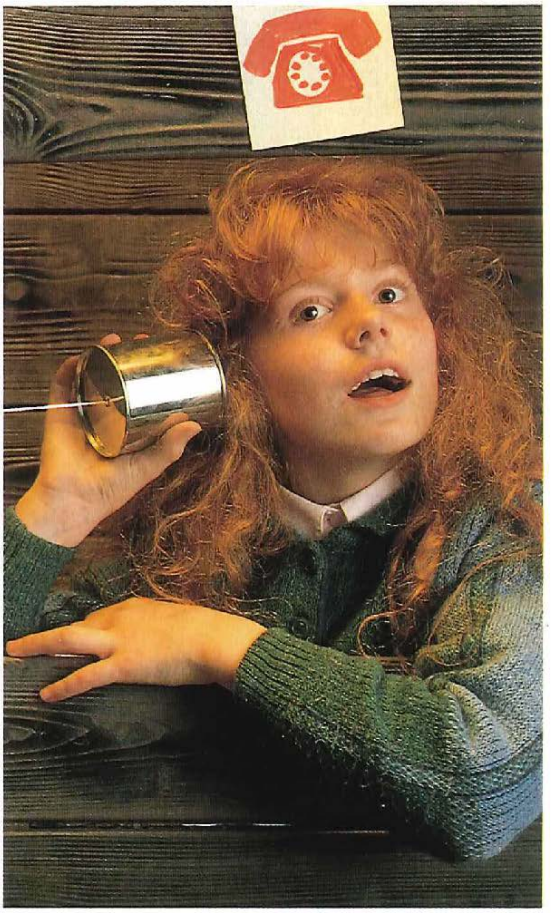

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LANDIS & GYR

Attending a major business meeting abroad used to mean a long journey followed by a night in a hotel. It was expensive, time-consuming and had the inherent drawback of jetlag. But thanks to British Telecom International's videoconferencing services, business executives based in London can make a meeting with colleagues in New York just part of an afternoon's work.

A room with a view

Peter Nash, Sue Fenton & Juanita Thomson

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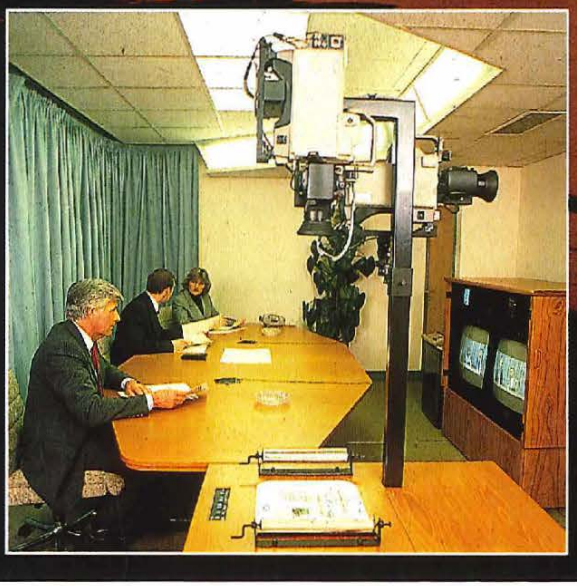


Right: face to face digital video conference.

The concept of international videoconferencing, introduced first to North America in 1984, was simple – to allow groups of people at different locations around the world to hold simultaneous meetings, linked by both-way audio and full-motion video. The meetings could be held on screens in public videoconferencing rooms or on the company's premises.

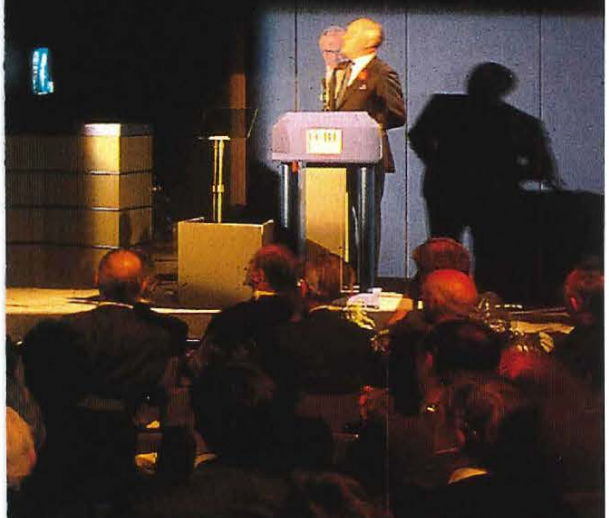
Today, there are three sorts of videoconference – face-to-face, business television and special event videoconferencing. Customers choose which of the three they need depending on their communications requirements.

Face-to-face conferencing allows two-way vision and audio. The service is currently available to the USA, Canada, West Germany, Switzerland, France, Holland and Belgium, with Japan coming on stream in the near future.

Users tend to be large multi-nationals or smaller companies involved in fields like manufacturing, computing or finance, and typical applications include management meetings, project updates and financial reviews.

One of the latest facilities made available through rapid advances in communications technology is a digital multipoint conference service which allows up to five sites in the UK and abroad to be linked simultaneously with both-way vision and both-way sound. Introduced last spring, the system has a voice-activated switching facility which automatically switches the visual element of the conference to whoever is speaking at the time. It operates on a two-second delay basis to prevent the system switching wildly around the world during the exchange of 'good mornings' and other pleasantries.

This sort of enhanced videoconference facility is being matched by increased cost-effectiveness, such as the introduction of 768Kbit/s transmission rate. Significantly lower than the traditional 2Mbit/s rate, it has been made possible by more advanced equipment, and the difference



in quality between transmission at the old and new bit rates is virtually indistinguishable.

As well as the communication links, British Telecom is also able to advise on suitable venues, equipment configurations and provide production and presentation co-ordination together with the audio and video equipment needed at each site.

It is only comparatively recently that developments in picture coding and digital transmission have made it practical and cost effective for customers to install videoconferencing on their premises for regular business meetings. BT's VideoStream service provides on-premises equipment consisting of a number of self-contained units which can be easily installed in a normal meeting room. It allows up to six people at each site to take part in a meeting, and in addition to speaking to colleagues face-to-face, documents, plans, product samples and 35mm slides can be shown to the distant location. Flip charts and whiteboards can also be incorporated as can VCRs and PCs, and the whole system is controlled from a hand-held keypad similar to those used for domestic TVs.

Videoconferencing is available throughout the UK from public videoconferencing rooms in major centres. These can be booked by the hour to meet customers' specific requirements.

Switched Videoconferencing Service (SVS) was launched last summer providing interconnection between public, private and international rooms. Once connected to the network, users are only charged for actual use on an hourly basis. This means that companies can now consider providing videoconferencing to more sites where they cannot justify dedicated MegaStream circuits.

BT provides a full back-up service for VideoStream from initial room surveys and recommendations through installation, user familiarisation days and maintenance. The equipment can be remotely tested so that service engineers have a good idea of the fault before visiting a customer's premises. It is also simple to operate and has been designed to be discreet so users rapidly forget that it is even there and behave as if they were all in one location sitting round a single table.

Around 50 VideoStream installations have been commissioned by major and smaller regional companies. Videoconferencing will not replace all face-to-face meetings but it can complement the traditional business meeting and enable a company to retain the personal touch.

Recently BTI arranged the links for a tricontinental videoconference linking London, Tokyo and San Francisco for a discussion about the development of telecommunications in the participants' respective countries.

Business television can link any number of sites anywhere in the world by conventional TV technology with one-way vision and two-way audio. It is largely used by multi-nationals, retail and franchise groups and computer companies who might need it for product launches, sales briefings, group training or any corporate announcement requiring effective and efficient dissemination of information worldwide.

Special event videoconferencing is generally used for one-off occasions where the international angle adds impact and prestige. Conference organisers and public relations companies are among the potential users of this service which incorporates either face-to-face or business TV technology tailored to customer requirements. Available worldwide, it has been used for press conferences, product launches and for enabling special guests to be present at an event they could not otherwise find time to attend. BT set up its first ever videoconferencing link to Turkey last year to enable government officials to hold a meeting with their Prime Minister who was recovering from an operation in a Houston hospital.

Opposite: this special event video conference linked London and Tokyo.

Mr P Nash is product manager for international videoconferencing, Miss J Thomson is marketing manager for national videoconferencing and Miss S Fenton is editorial services executive for British Telecom International.

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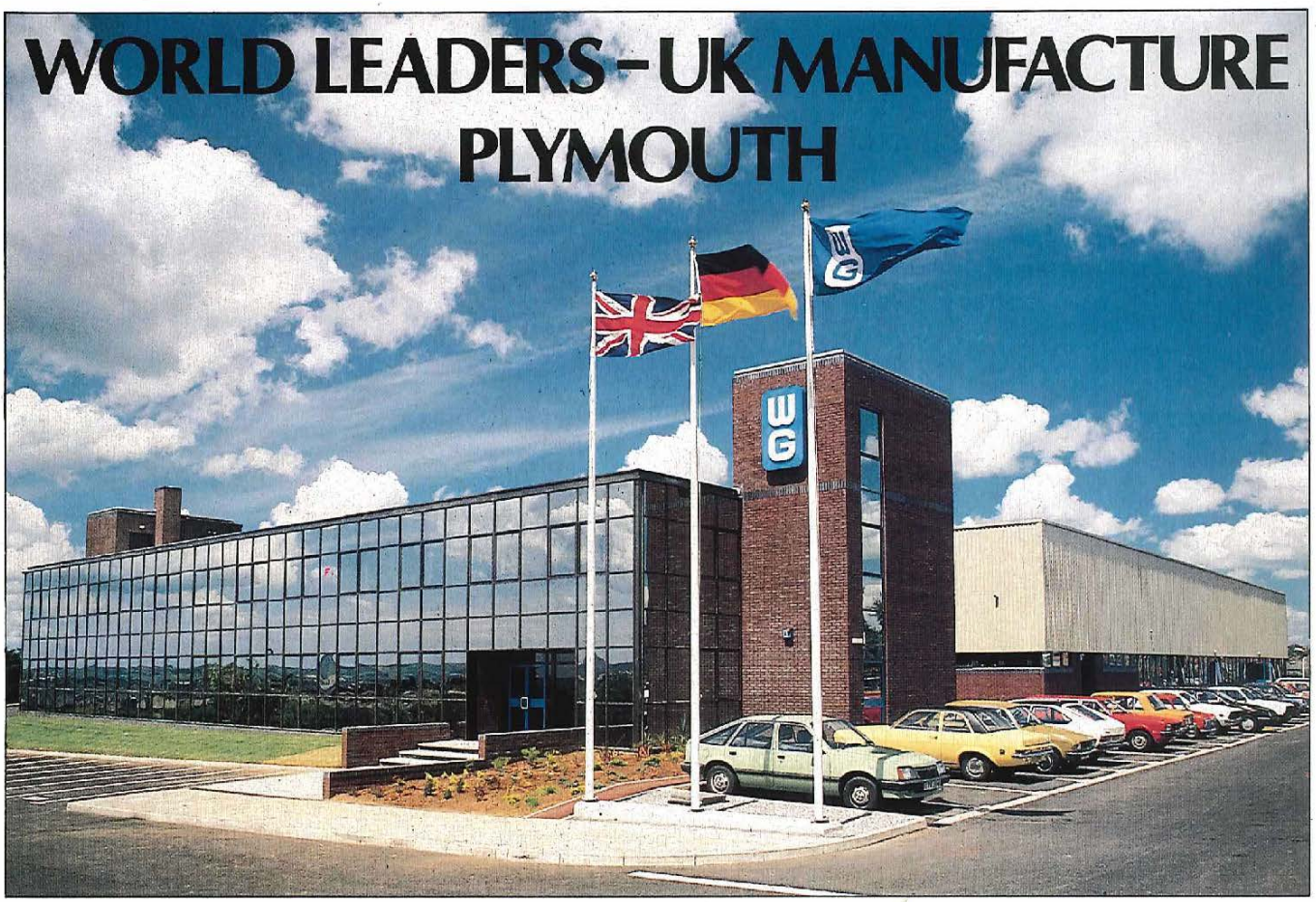

Wandel & Goltermann's new manufacturing centre in Plymouth is exactly what you would expect from such a major force in the world of telecommunications test and measurement.

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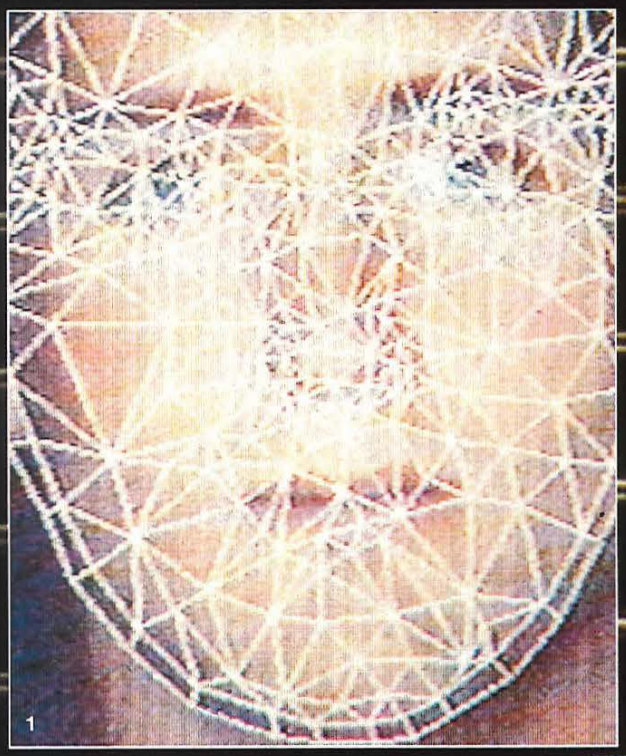
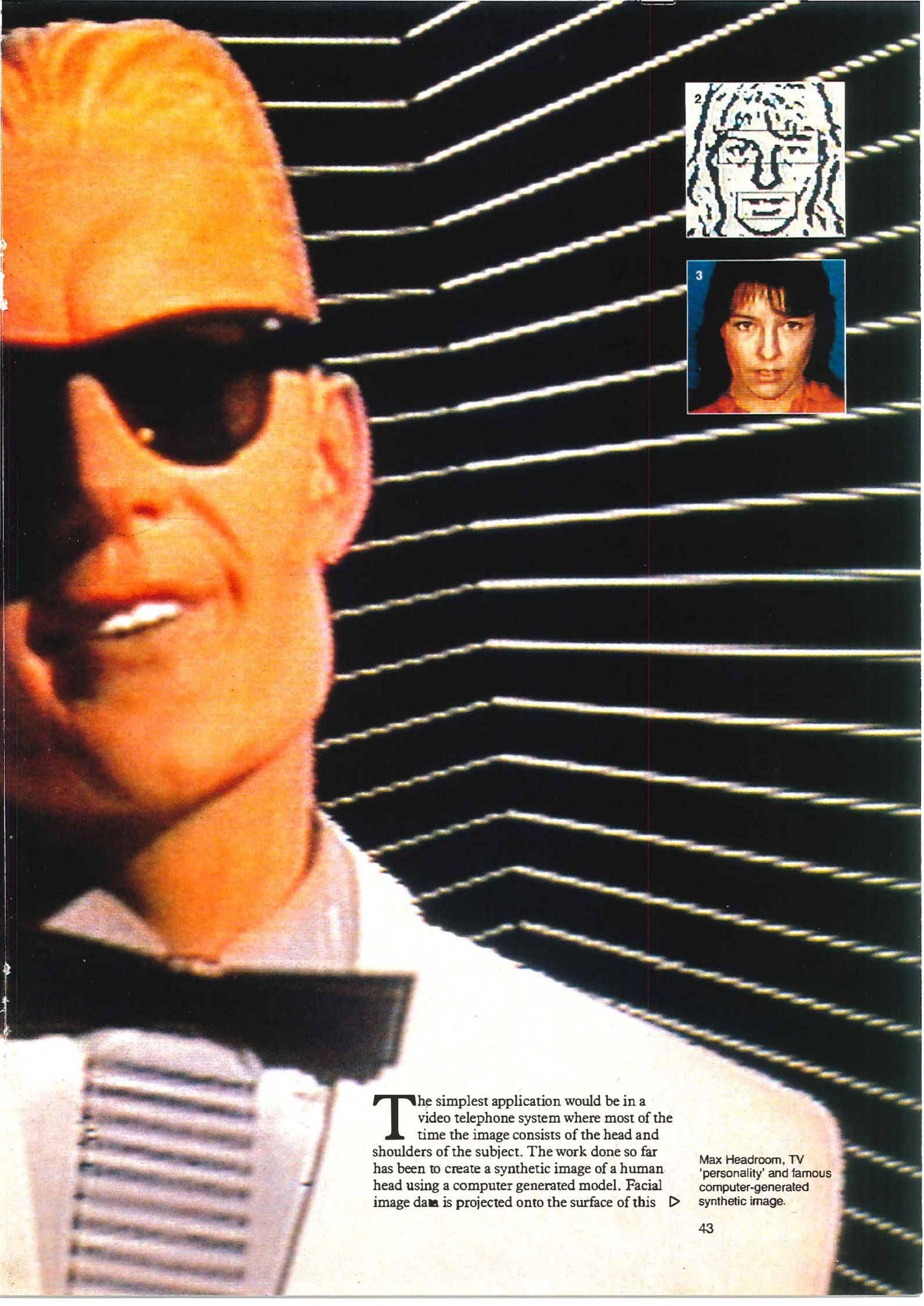


1

Three-dimensional synthetic images of a moving human head can now be generated by computer, Max Headroom-style. The visual telecommunications researchers who have developed the system at British Telecom Research Laboratories, Martlesham Heath, near Ipswich, believe it will make video-telephony over the existing network a marketable possibility in the next decade.

Forging ahead to 'seeing' phones

Bill Welsh



The simplest application would be in a video telephone system where most of the time the image consists of the head and shoulders of the subject. The work done so far has been to create a synthetic image of a human head using a computer generated model. Facial image data is projected onto the surface of this ▷

Max Headroom, TV 'personality' and famous computer-generated synthetic image.

Previous page: **1:** A three-dimensional 'net' is superimposed onto a facial image. The 'net' is stored in the receiver and the features analysis system tailors the image to fit individual callers. **2:** The first stage of the feature extraction process is to locate the edges of the face. Then the computer tracks the eyes and mouth to match them to the nearest equivalent stored in the codebooks. **3:** A computer-generated image nodding.

model, and when rotated it allows the head to be seen from a range of different positions.

To produce changes in facial expression it was decided to concentrate work on the mouth and eyes alone, as they are the areas where the most important information is concentrated. As the eyes and mouth can only assume a limited number of different appearances it seemed feasible to create libraries or codebooks of these features. These codebooks consist of sets of subimages containing different positions of each feature. The image is then synthesised using a single full face image and codebooks of the mouth and eyes. The best matches from the codebooks to the actual image are overlayed onto the face, and this composite image is then projected onto the 3D model.

Analysing the image is the most difficult part of the process. The first attempt consisted of extracting the edges of the image followed by a sequential search from top to bottom for each feature. The scheme is prone to error and does not give very exact positions for the features. A further algorithm is used to track the features as the head moves. It is proposed to replace this method with a more robust one.

In the simulations produced so far a short sequence has been coded using about 20 mouth and 14 eye positions. In practice, one full face and the codebooks would need to be sent, and this would require about 15 seconds over a 1200 bit/s line. After this the only data required per frame would be five bits to index the correct mouth position and four bits for the correct eyes, which amounts to 225 bits/s for 25 frames per second. The remaining 1000 bits per second would be needed for transmitting head movement data as well as extra information to update the codebooks when new mouth and eye positions appear.

The problem of locating and tracking facial features is a difficult one because although all faces conform to the same pattern they are never exactly the same. The situation is further confused by hair, beards and glasses. It would be exceedingly difficult to write a computer program that would be able to accurately locate any facial feature and track it for a particular face. One would have to write in rules which described every possible way in which a feature could appear in any face. Even for one specific face an eye or mouth can appear open or closed or in any intermediate position.

Work is going on to try to discover a better solution to the problem of locating the facial features. Research is being undertaken into the 'neural network' approach to machine vision. Artificial neural systems consist of large nets of rather simple processors which are massively interconnected. In this respect they resemble the brain (hence the term 'neural networks') and it is hoped that they will be able to emulate, to some extent, its impressive visual processing properties.

Predictions

Improvements are being made to the synthesis of the image. In the original simulations it is only the areas around the eyes and mouth which actually move. It is remarkable that the lack of movement in other parts of the face is not readily noticed, even the non-movement of the jaw, but a new structure for the 3D model is being produced which should allow an increased range of expressions. An interesting discovery is that it does not seem to matter too much that the depth data for the model is not derived from the individual whose head is being displayed. A general head model can be used, the shape of which is conformed to match the outline of the head.

The Visual Telecommunications researchers are already involved in developing videoconferencing, video-telephone and still picture transmission systems. These are intended for use over digital transmission lines at rates such as 64 Kbits/s, as provided by the Integrated Service Digital Network (ISDN), and small multiples, particularly 384 Kbits/s. The difficulties involved in transmitting moving television pictures at 384 and 64 Kbits/s can be appreciated when it is considered that to broadcast TV pictures in a studio would need a 216 Mbits/s digital channel for transmission at the standard rate of 140 Mbits/s. Further compressions of about 400 or 2000 times respectively would be needed to reduce the data rate to 384 or 64 Kbits/s.

Fortunately there are two properties of moving pictures which allow reductions of this magnitude to be made. The first is the fact that parts of the picture which are close together have a tendency to look similar. This means that a prediction can be made of the values of nearby points in the image and then only the errors between these predictions and the true values need be transmitted. Transmitting these errors requires less data than if the absolute values were sent.

The second property is the equivalent case for successive frames of a moving sequence of pictures. In this case the same area in adjacent frames usually looks similar and, in fact, if there is no movement in the scene from one frame to the next then it should not be necessary to transmit any additional data.

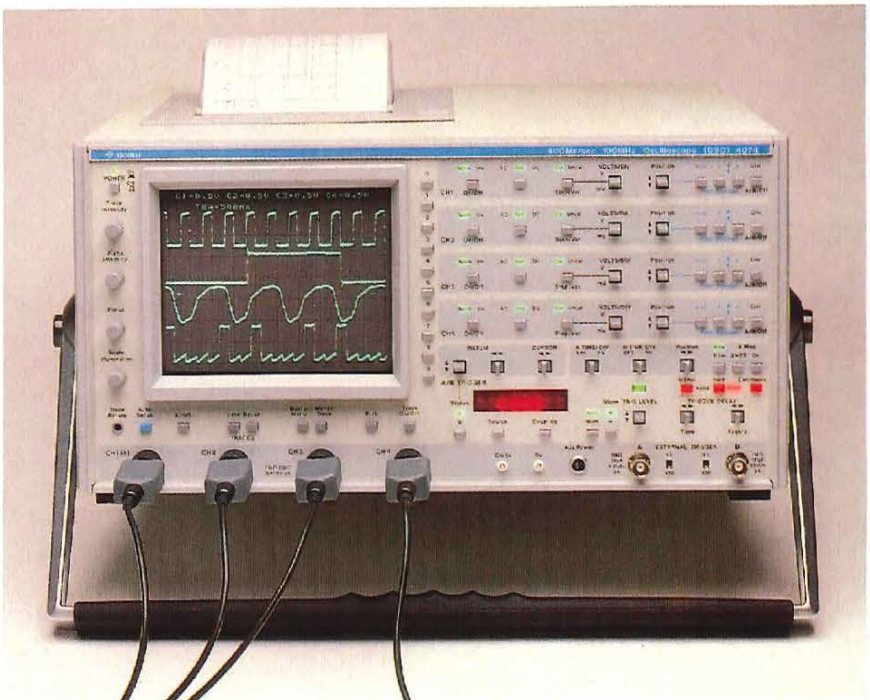
Using these methods, systems have been produced which can operate down to 64 Kbits/s. But although the pictures obtained are of reasonable quality, several types of degradation occur. These become more noticeable as the amount of movement in the scene increases and take the form of jerkiness and blur in the image.

It may be possible to obtain better quality pictures at low bit-rates by introducing some intelligence into the system. If all the objects in the scene could be modelled in the receiver then it would only be necessary to transmit information relating to their motion.

A complete realisation of the system would enable video telephony over the existing telephone network, although it may take around 10 years for a marketable product to be developed. The ultimate application could be to provide videotelephony over cellular radio links which are fundamentally limited in bandwidth.

Mr W J Welsh is an executive engineer at British Telecom's Martlesham Heath Research Laboratories.

The Gould 4074
Digital Storage Oscilloscope



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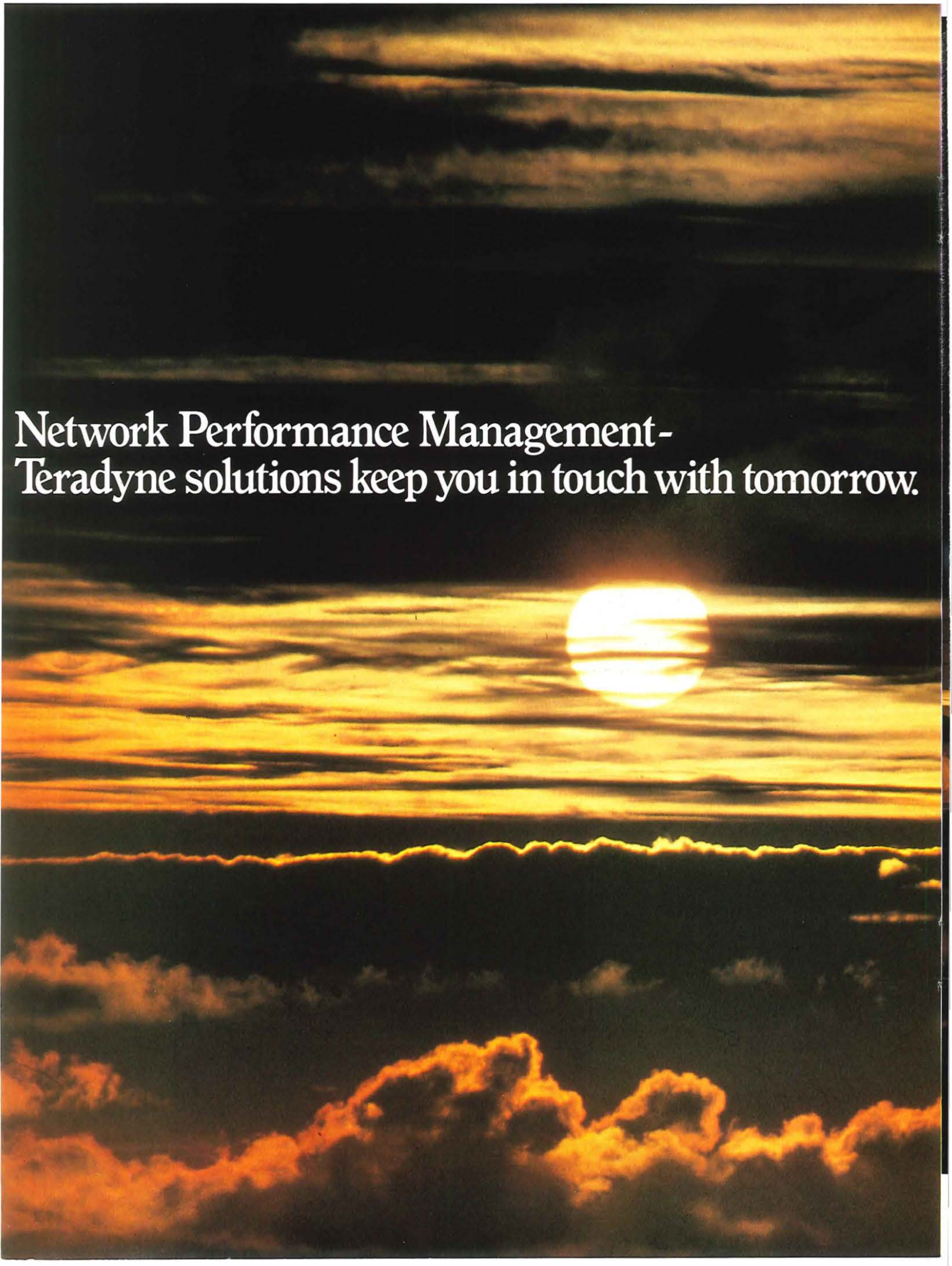
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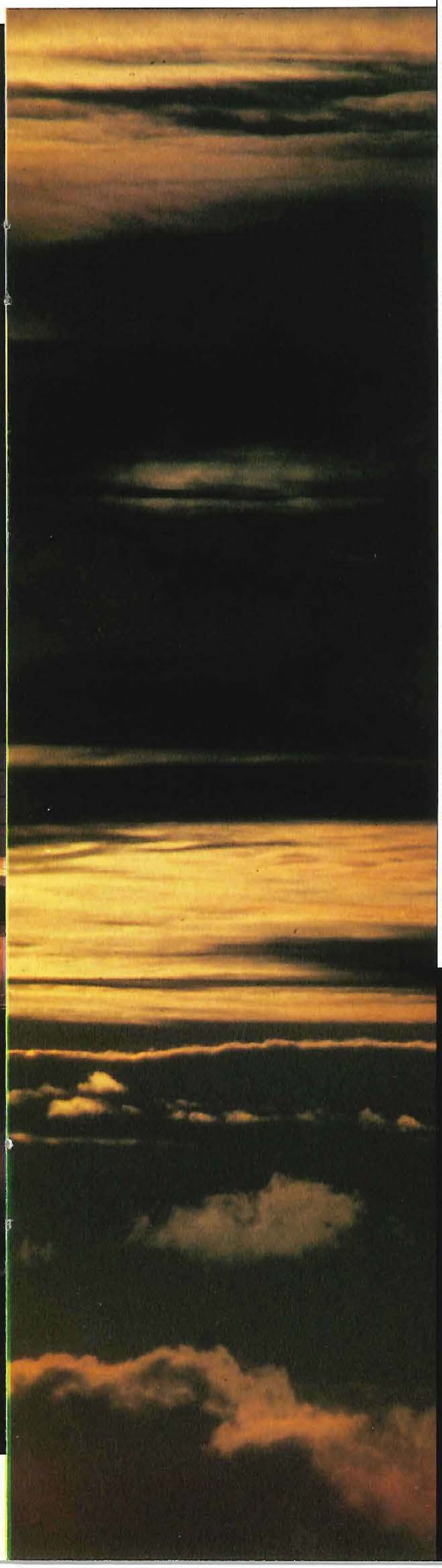

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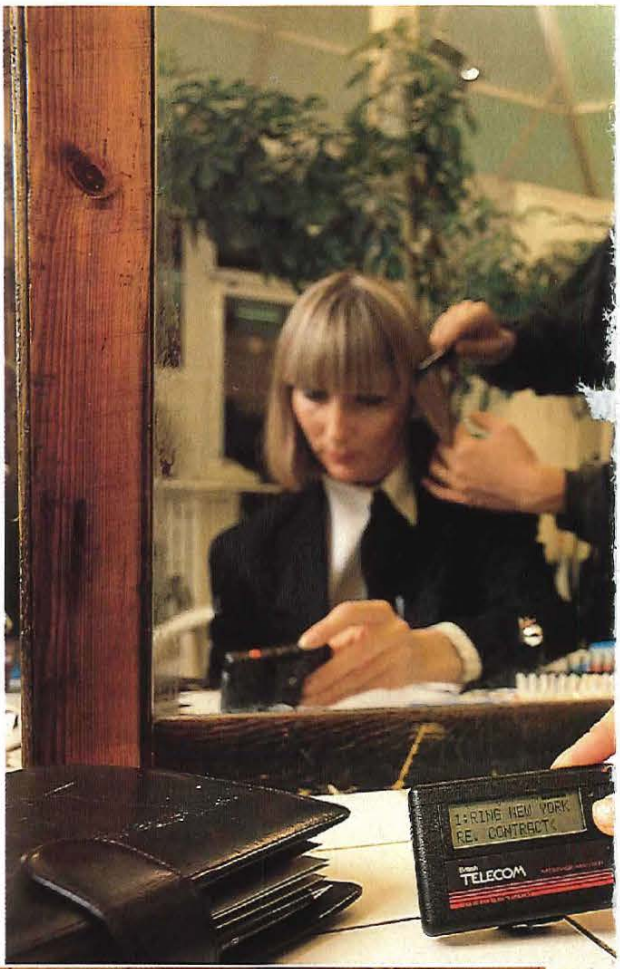
Growing by bleeps and bounds

Roy Dare

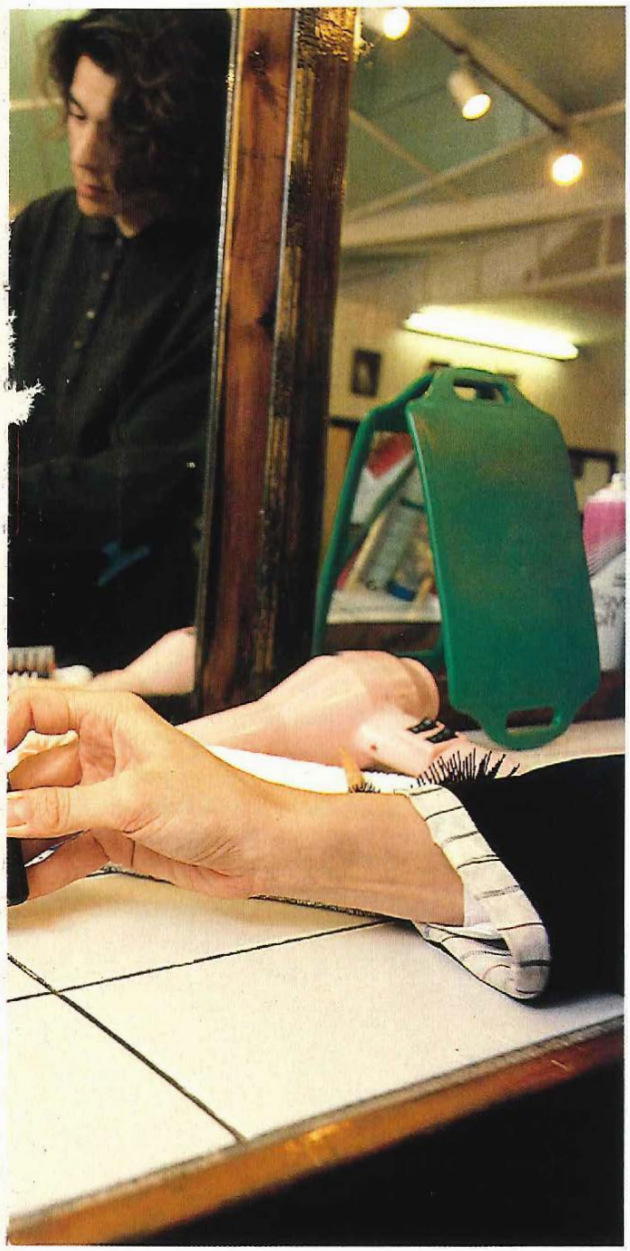


British Telecom's national radiopaging service is the largest in the world, serving almost half a million customers. But behind the 'bleep' which is taken for granted by its users lies a sophisticated back-up network of radio transmitters and control computers.

The system was designed and developed jointly by the London Systems and Software Engineering Centre (LSSEC) and Mobile Communications. The in-house expertise and knowledge has enabled the system to be enhanced to match the commercial demands placed upon the service, for additional facilities, capacity and efficiency.

The country is divided into 40 separate paging zones, each containing a network of radio transmitters which provide a uniform paging coverage for the area. Calls are passed to these paging zones for transmission by Paging Control Computers, known as PACEs. There are five PACEs spread around the country, each controlling eight paging zones. The PACEs are interconnected to provide a nationwide service to

The men behind the bleep, surrounded by PACE 1 which controls the London radiopaging system. There are five such computers spread around the country, each controlling eight paging zones. Pictured (left to right, front) are: Roy Dare, manager of the London Systems and Software Engineering Centre; Terry West and Mike Boorner, heads of group in charge of radiopaging development. Behind them are Richard Fox and Les Barnes, members of the development team.



Left: even at her hairdressers a businesswoman can keep in touch with important developments at the office.

pager call signs, it is possible to change customers pagers without the need to change their PNs by simply amending the service record. So for each PN there needs to be a service record within the system.

The service records, which form the customer database, are distributed between the five PACEs. As incoming paging calls are routed through the public network to the nearest PACE, a call can arrive at a PACE which does not hold the corresponding service record, in which case the PN is passed to the correct PACE, via the inter-pace network, where it is processed.

Included in the service record is the list of paging zones in which the call should be broadcast. The PACE processing the call queues the pager call sign for transmission to each of the appropriate zones. This may require the call sign to be passed to other PACEs which control the specified zones.

To avoid interference between adjacent paging zones, transmissions are timed so they are not transmitting at the same frequency at the same time.

Timeslot

This is achieved using a timeslot arrangement where each zone has a specific period of time when it is transmitting calls. The timeslot cycle has a duration of two minutes in which each zone has at least one transmission slot, ensuring that calls are usually delivered to their destination within the cycle period.

As the PACEs have direct control of the timeslot sequencing it is important that their internal clocks are kept closely in step. This is achieved with the help of radioclocks fitted at each PACE, which receive regular time signals from the National Physical Laboratory transmitted from Rugby. Also, as a backup, synchronisation messages are passed between PACE sites.

Quality of service is recognised as a key factor in maintaining BT's strong position in this ▷

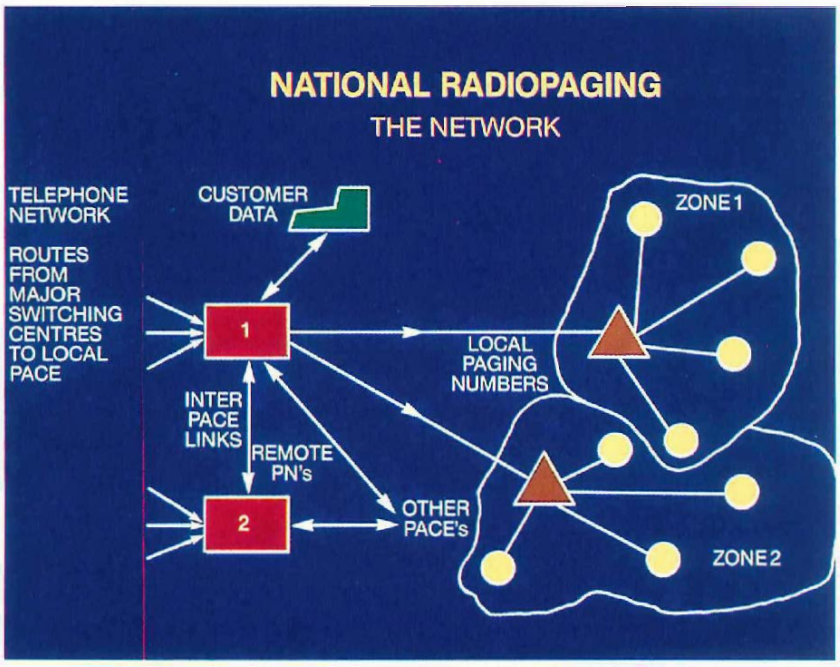
the customers, allowing them to choose which combination of zones they require.

The PACEs also provide the connection to the various input methods such as the Public Service Telephone Network, Telex and Packet Switch Stream. Calls are accepted from these sources, processed and passed out to the paging zones for broadcast.

Customer records are held on the PACE computers and updated, on-line, via terminals in the Mobile Communications Administration Centres sited around the country. On-line access enables centre staff to provide across the counter service to the customer requiring replacement pagers or extended zone facilities.

The Paging Number (PN) issued to a customer is associated with the unique call sign of the pager, known as the Receiver Identity Code (RIC). It is the RIC that is broadcast and recognised by the pager, resulting in the 'bleep'. This association between the PN and the physical pager is held in the customer service record.

By having this relationship between PNs and



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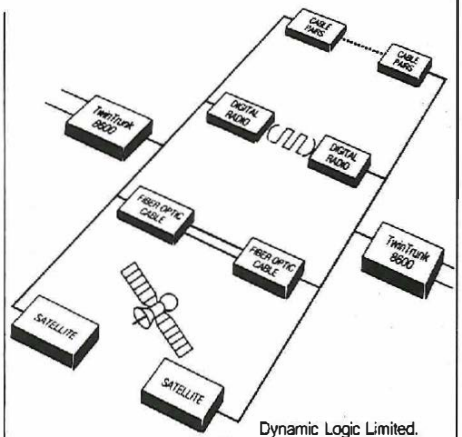

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Airports and docks are being linked by a national computer system to streamline the country's import and export trade. But this collaboration between British Telecom and an independent cargo company is just the first step in creating a nationwide network for agents, shipping firms and airlines to interchange documents electronically. MARTIN BURR reports.

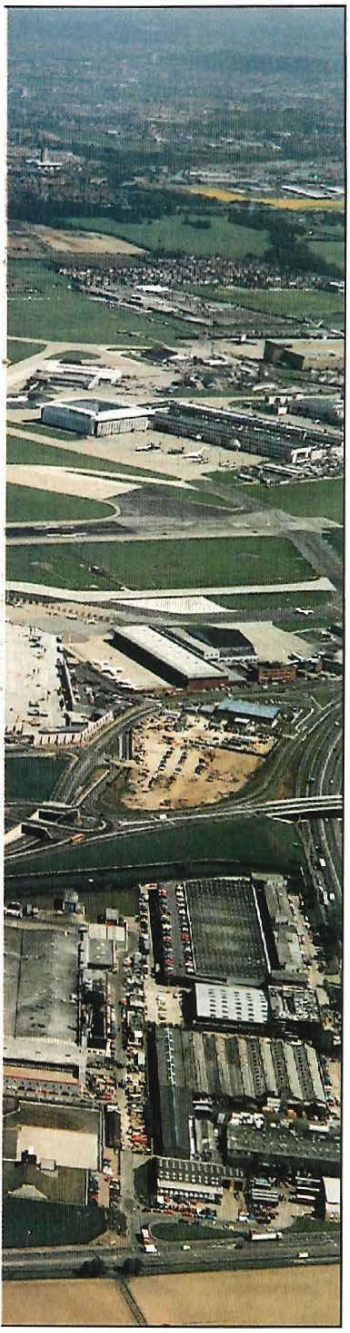
Heathrow Airport. Along with Gatwick and Manchester Airports it is served by ACP90 which provides air cargo processing facilities for imports and exports, and by DEPS which handles customs functions.

Plane sailing for cargo clearance

British Telecom Applied Technology (BTAT) and Maritime Cargo processing (MCP) have launched the system which will allow all organisations engaged in import and export to exchange information about their consignments as well as clear them through customs in a matter of hours. And if plans to expand the scheme go ahead, BTAT will be playing the central role in the whole of the UK freight business by the early 1990s.

BTAT already has an important facilities management contract with HM Customs and Excise which links 80 of their offices and collects more than £18 billion every year for the government. The Departmental Entry Processing System (DEPS) checks import entry declarations, calculates duties and takes and selects goods and documentation for customs examination. DEPS, operated and managed by BTAT, runs 24 hours a day, 365 days a year,

Opposite: goods unloaded from ships used to take up valuable space at ports while waiting in a backlog for customers clearance. Now clearance can be obtained in a matter of hours through computer systems.



handling more than 15 million transactions annually.

The DEPS system evolved from a scheme set up by the Post Office National Data Processing Services in 1970 to deal with increased volumes of air freight at Heathrow Airport. Cargo was only taking a few hours to arrive in England from abroad, but there was such a backlog it took days to clear customs. So the London Airport air cargo system (LACES) was devised whereby freight agents could clear their cargos directly by computer.

A virtual overnight success, LACES operated until 1981 when customs and excise asked for the scheme to be expanded to include sea ports. Reduced government budgets were resulting in staff cuts, and customs had employees tied up all over the country just handling paperwork. If this work could be done by computer, staff would be free to deal with more pressing problems like the increase in drugs traffic.

Cargo

So DEPS was formed to handle the customs functions, and what is now known as ACP90 (Air Cargo Processing for the Nineties) was developed in conjunction with representatives of the air cargo community. ACP90 provides air cargo processing facilities for both imports and exports at Heathrow, Gatwick, and Manchester airports.

It serves airlines shed operators, freight agents, agent consolidaton centres, and airlines' own in-house cargo tracking systems as well as being linked to DEPS for customs clearance. Users have access to the system for inventory control and facilities are provided to allow agents and freight forwarders to log on to airlines' own in-house systems for space reservation.

ACP90 has around 500 users both on and off the airports, with about 1,000 terminals connected directly to the system via public and private BT circuits. Users include 13 airlines via in-house computer systems in Europe, North America and the Far East, and it handles more than 16 million transactions and 1.4 million customs entries annually.

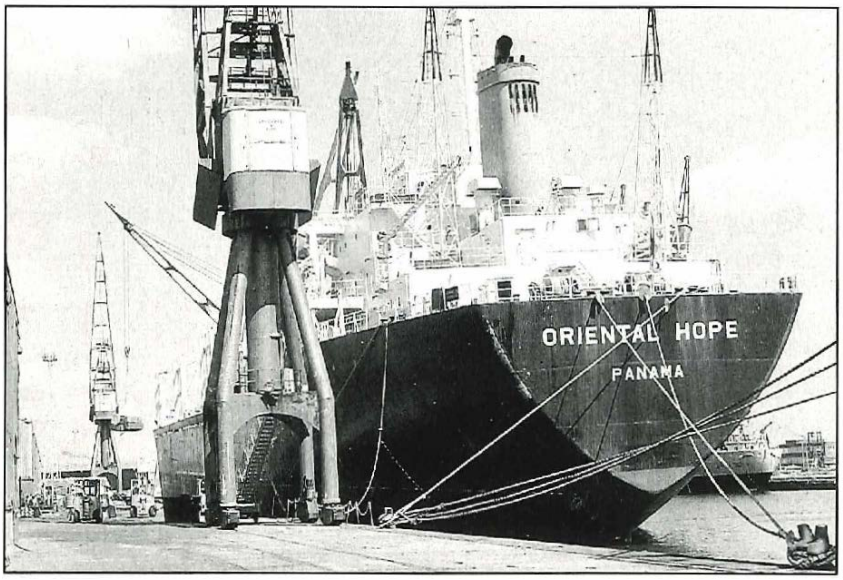
The port of Felixstowe was suffering the same problems of customs backlog, with goods taking up valuable space while waiting for clearance. It was expanding rapidly as a container port (27 per cent increase in two years) because of its proximity to Europe. A computer system was the obvious solution, so FCP80 was set up at a cost of between three and five million pounds. This was a fraction of the cost of building a new container terminal (the one built in 1986 cost £47 million) which would not even then have been a complete solution to the problem.

FCP80 is run by Maritime Cargo Processing and has 400 customers at 10 ports around the country. It now takes just two hours for goods entering the ports to clear customs.

Other ports have followed suit with computer systems. PACE (London Ports Automated Cargo Environment) covers the geographically widespread London port community; SCP85 handles Southampton, Poole, Portsmouth and Hull; NCP85 deals with Northampton; and Dover has its own system to deal with its specific needs.

Customs has limited the number of remote systems accessing DEPS to six in order to maintain an effective service. Each uses different computers and applications software to suit the requirements of the communities sponsoring them, and some larger companies have to provide connections to several different systems. Many users have shown support for the establishment of a national scheme based on existing networks, terminals and trained users/port-rated community management expertise. It would be difficult for individual trade communities to set up a national service as they do not have the expertise or funding.

That is where BTAT comes into the picture. Its agreement with MCP will involve BTAT running both the airport (ACP90) and Felixtowe (FCP80) systems jointly — making them more efficient ▷



Right: the container port at Felixstowe suffered from a customs backlog, but now the computer system allows goods to be cleared in just two hours.

and economical. The systems will be progressively integrated, providing sea and air freight communities with a wider range of facilities.

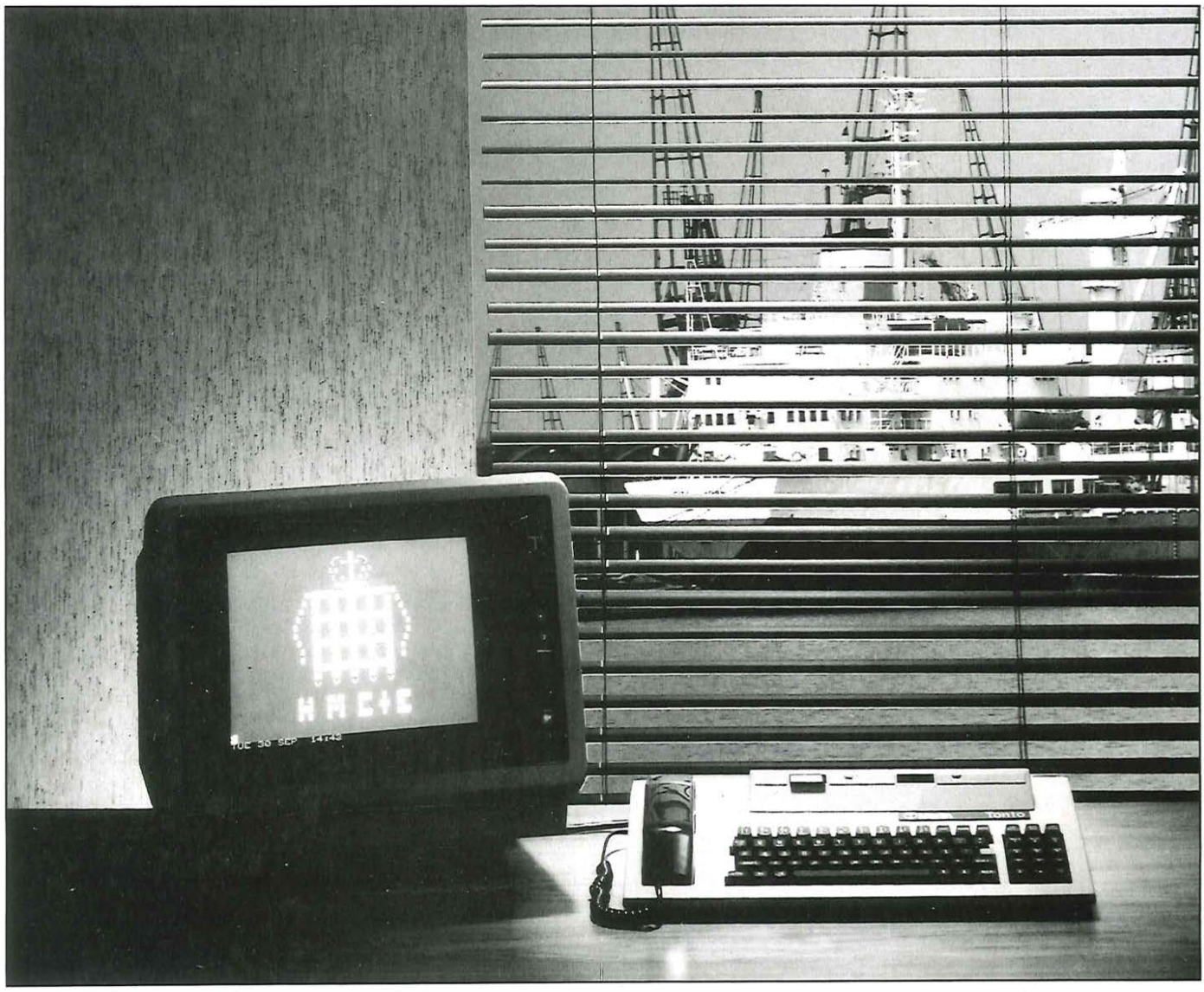
At present the systems are being used for just a fraction of the available time, so BTAT has plans for connection to attendant services such as Telecom Gold or value added network services dealing with freight. These links between users of cargo control systems will pave the way towards open systems for trade, supporting emerging standards for Electronic Data Interchange such as those produced by the EEC, United Nations and the International Air Transport Association.

BTAT is currently the largest provider of cargo and customs management computing systems in the world, and during the past year as well as developing PACE for the Port of London, it has implemented Spacelink for Lufthansa German Airlines. BTAT is also in the final phase of testing Miami International Cargo System, a development based on ACP90, modified and extended for the US environment. MICS is a joint project with the Computer Sciences Corporation of the USA, and when fully implemented 75 airlines, 300 brokers, forwarders and consolidation centres and 100 customs and other federal inspectors will be interfaced to it.

BTAT has played a significant technical role in helping to set down the standards for such interfaces, and the project is important as not only is it the first of its kind in the US, but Miami is currently ranked second in the country for international cargo volume, and seventh in the world for total cargo volume.

HM Customs and Excise are leading the world in their automated entry of data by computer, clearing more than 80 per cent of UK consignments in this way — by far the highest proportion of any major trading nation. ■

Below: H M Customs and Excise are leading the world in their automated entry of data by computer. More than 80 per cent of UK consignments are cleared in this way — by far the highest proportion of any major trading nation.



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Clearing the air for cordless calls

Richard Mendelsohn

Radio interference caused by the rapid growth in the use of cordless telephones could sour a potentially enormous market. But British Telecom research has formed the basis of specifications for second generation equipment designed to overcome the problem. The specifications are now being considered for adoption throughout Europe.

Present cordless telephones tend to interfere with one another but the next generation of instruments could be used by colleagues in the same building, or even in the same office.

Existing cordless telephones (CTs) provide a fairly basic service. They substitute a radio link in place of the cord between handset and base of a normal telephone to allow increased mobility within a range of up to 200m.

British Telecom's Research Laboratories at Martlesham Heath, near Ipswich provided the initial specification for first generation products which have been available in the UK since 1983. As a result of liberalisation, the final BT Technical Guide Number 47 was agreed in a public forum and this specification has since been revised to allow CT connection to PBXs, and a few other improvements have also been made.

'Freeway', from British Telecom, is the major cordless telephone on the market in the UK today, retailing at under £80. It uses analogue radio frequency modulation at 1.7 MHz from base to handset and 47.5 MHz in the reverse direction. There are eight channel pairs available, one of which is set in each CT at manufacture.

It is the very success of these first generation CT products, selling over 250,000 last year, that sets the urgency for the next generation, higher capacity, products. If the present rate of growth continues, by 1990 the incidences of mutual radio interference between users could prove unacceptable.

There is another even more pressing need for the next generation of cordless telephones. This is to address the business marketplace which is unpenetrated by CTs at present. Here performance – particularly in terms of radio coverage – is far more important than in homes, and density of use will be far higher. A survey in London showed that if only seven per cent of existing telephones were replaced by CTs then average densities of 5,000 per sq km would be reached.

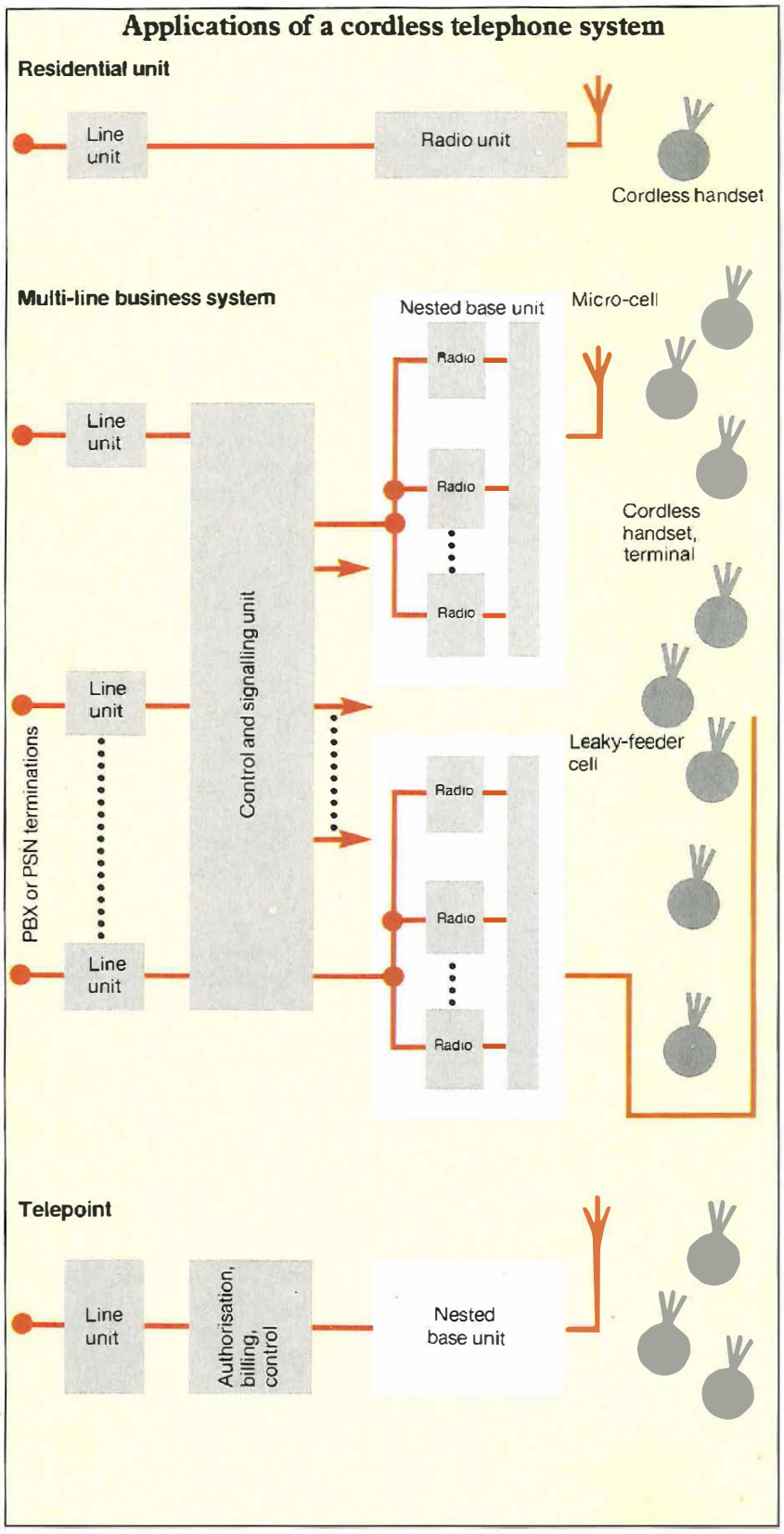
In contrast, the cordless telephone market in Europe has not yet taken off in any significant manner, largely due to the higher product price which exceeds £400. This is caused by the complexity of the Conference of European Postal and Telecommunications Administration (CEPT) generation 1 specification, which is different to the current UK specification.

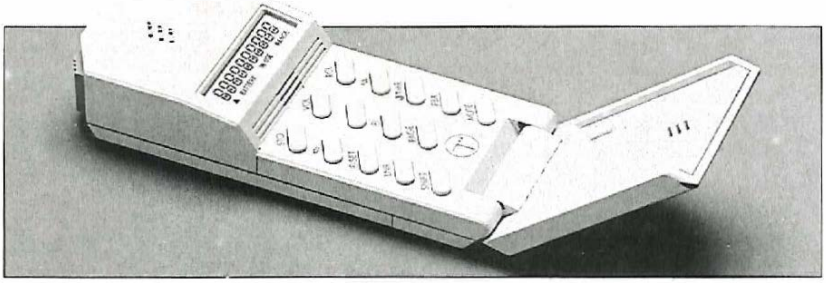
The North American cordless market will soon reach saturation with current generation products, just as it will in the UK. However, the Federal Communications Commission (FCC) has not yet put forward a specification for the next generation to solve this incipient problem.

There is an opportunity therefore for the UK to lead the way for the rest of the world and promote the adoption of its new publicly agreed specification for second generation cordless telephones.

The types of products required in the office range from a basic CT to a cordless boss-secretary telephone, and from cordless key systems, through to the cordless (or wireless) PBX; all likely to require full building coverage. This spread of potential applications and the need to cater for both speech and data transmission, with speech privacy being very important, shows that the next generation must use digital transmission throughout and the core digital transmission link must be easily adaptable to new product applications.

Recognising, therefore, the importance of having a flexible system for this next generation, known as CT2, British Telecom research gave detailed consideration to system requirements and performance. This work on the CT2 concept since the early eighties has formed the basis of ▷





A lightweight portable handset similar to those which will be developed for use on the CT2 system.

both radio (MPT1334) and Telephony (BS6833) aspects of a newly published specification.

The advantage of these standards is that they only specify the barest of requirements to ensure both minimum radio interference between equipment and acceptable telephony performance. This enables manufacturers to choose the features their products need and an innovative implementation that meets this in a cost-effective manner. These specifications are now being considered for adoption within Europe, both by CEPT and ECTEL (European Industry Associations).

Communications Terminal Products (CTP), part of British Telecom's International Products Division, manages the design, development and marketing of cordless telephones. CT2 plays a major role in CTP's activities, and includes the promotion of the CT2 specification in world markets.

In 1986 an extensive market research study was carried out which highlighted a significant market opportunity for cordless telephony in the business market. At the same time, a feasibility study showed that CT2 could be made cost-effectively with a truly pocket-sized handset and within a reasonable timescale.

The CT2 programme is initially targetted on specific products to be launched from 1990 onwards, but the key development will be a universal chip-set that can be used in a series of cordless information technology products to be launched throughout the 1990s and in spin-off developments beyond.

The initial CT2 product range will include multi-line and single-line units. The multi-line unit will 'nest' a number of transceivers in one unit, each transceiver dedicated to one line. This will provide site mobility with full, enhanced system features and coverage tailored to customers' requirements.

The single-line units will be variants of a multi-extension unit (which will offer enhanced boss-secretary facilities) and a basic 'one-to-one' unit, similar to current cordless telephones. The first products will be targetted initially at the business sector, moving later into the residential sector as larger volumes bring the price closer to £150, a level more affordable to the consumer.

Subsequent products will include wireless PBX, which will provide large businesses with high density usage, using picocellular radio coverage around customers' premises. Products will also enable the transmission of data.

In parallel with the work required to support the development, British Telecom researchers are also looking at various applications for specific requirements. A major concern with cordless communications is how to achieve good radio coverage within buildings in a relatively simple, inexpensive and easily installed manner. Another problem is the ability to evolve the coverage system to cope with higher density of usage. To achieve these challenging goals, two approaches are being considered:

- directing coverage to where it is required using leaky feeders (poorly screened co-axial cables that leak signal where required) strategically positioned around a building;
- a honeycomb of aerials could be used to give cellular radio type coverage but on a much smaller, picocellular, scale.

The development of the universal CT2 handset which will be both pocket-sized and lightweight means it could be transported to and from work and used in between. 'Phonepoint' is a proposal to provide base units sited in public places such as railway stations, shopping centres or laybys.

Within about 50m of a Phonepoint, a CT2 user would be able to gain access to the Public Switched Telephone Network to make outgoing calls. Using a handset in conjunction with a display pager, the user would have a limited incoming call facility.

Phonepoint is receiving increasing interest from governments and industry both in the UK and around Europe. BT's Mobile Communicaitons Division is taking the lead on evaluation of the Phonepoint service.

CT2 is a major development in the telecommunications field which will have a huge impact across the breadth of British Telecom's interests.

Mr R Mendelsohn is marketing and sales manager with British Telecom communications terminal products.

Using the new standard

A typical implementation of the CT2 standard would be as follows:

- speech encoded at 32Kbit/s using the adaptive differential pulse code modulation algorithm (CCITT Recommendation G721);
- speech data is framed into one millisecond bursts and sent at 72Kbit/s over a 100 KHz wide radio channel;
- both-way transmission bursts are interleaved to give time division duplex operation over each radio channel;
- digitised speech or data is modulated at RF using simple frequency shift keying;
- transmitter powers are 10mw;
- forty channels are available, between 864 MHz to 868 MHz, from which the handset or base, as appropriate, can choose a free radio channel over which to set up calls and terminate them when completed.

The procedure to find a free channel is termed dynamic channel allocation and the method adopted plays an important part in the CT2 performance. This is another part of the standard in which British Telecom Research Laboratories have made a significant contribution to ensure acceptable performance limits are achieved.

BIX*

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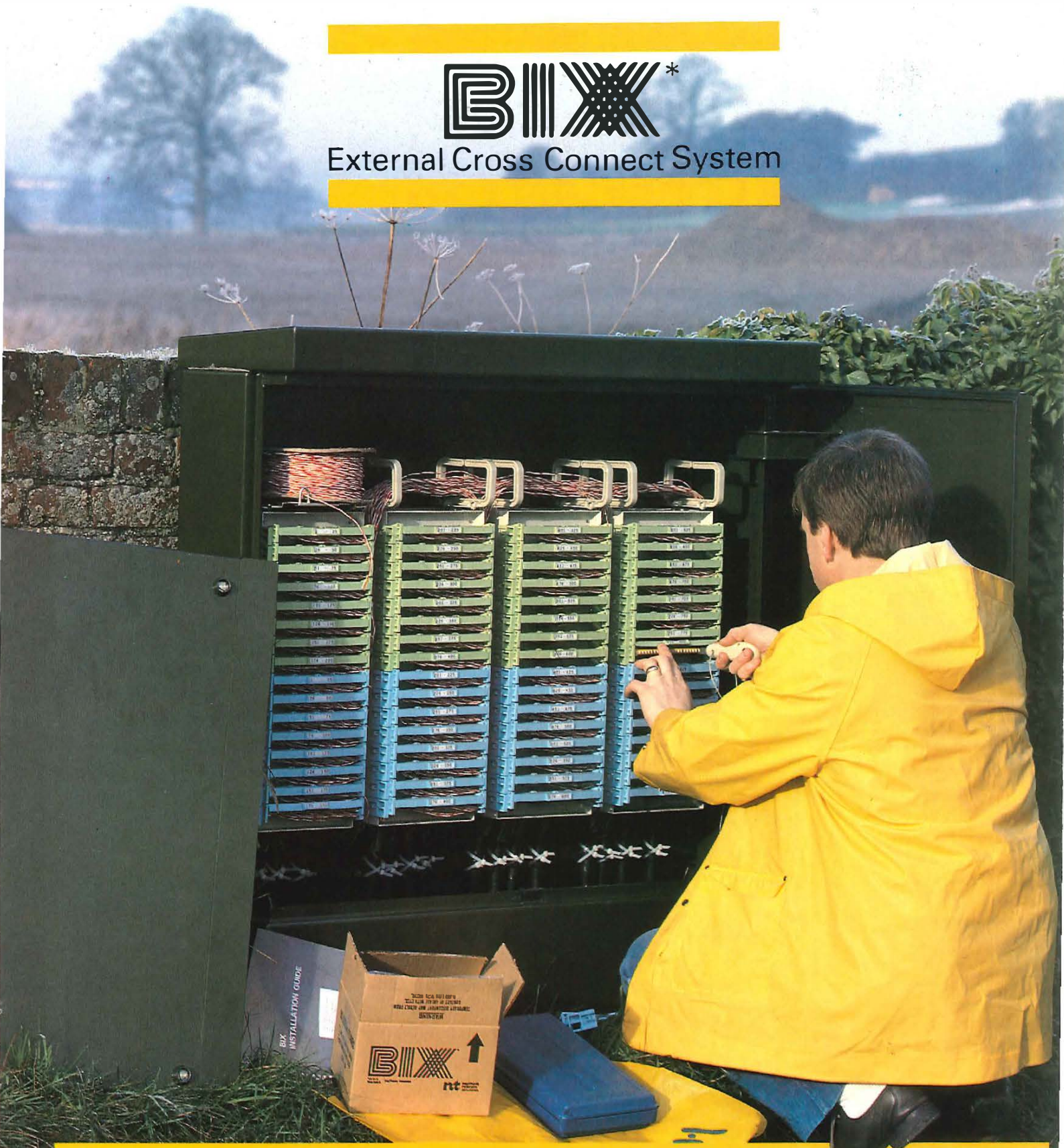

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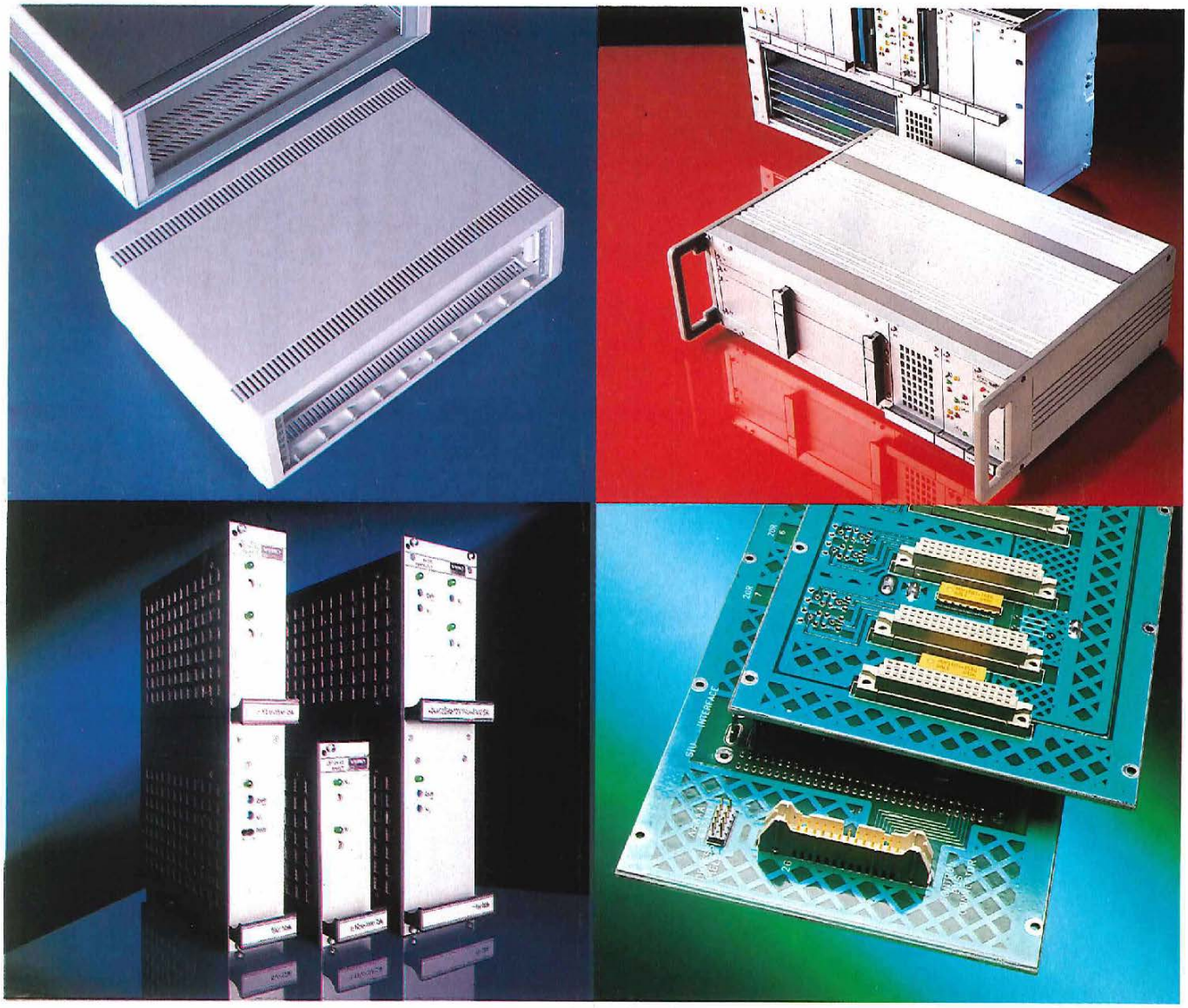

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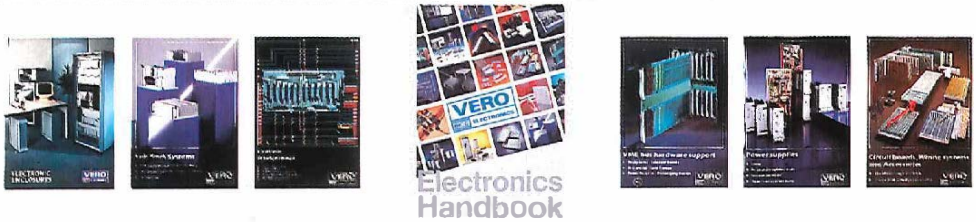
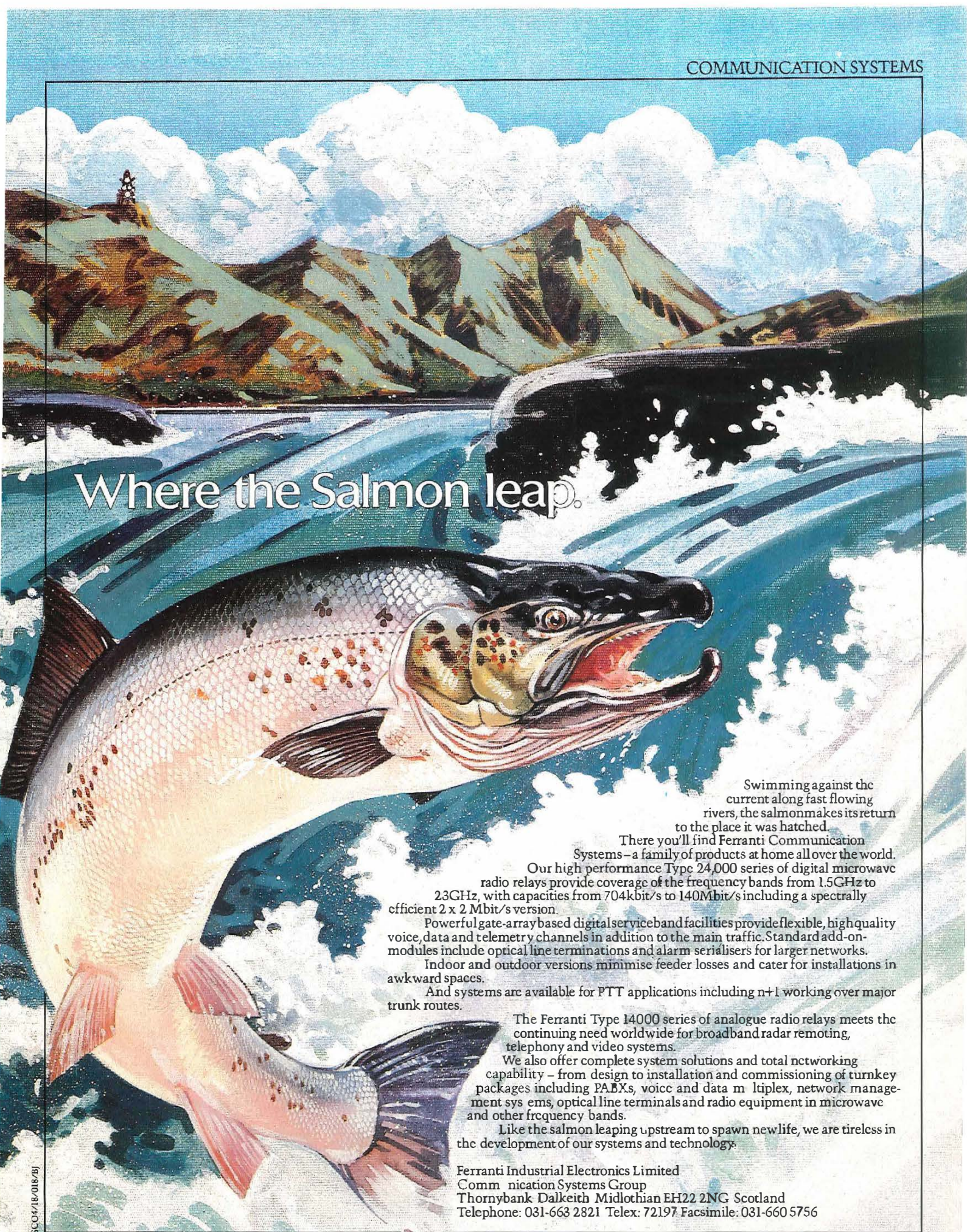


LEADERS IN ELECTRONIC PACKAGING TECHNOLOGY



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FERRANTI INTERNATIONAL

Dialcom's Gold wedding

British Telecom's Value Added Services Division has set up a new international business group in a strategic move to be number one in electronic mail and related value added data services worldwide. The move involves restructuring and enlarging Dialcom, BT's wholly-owned US subsidiary.

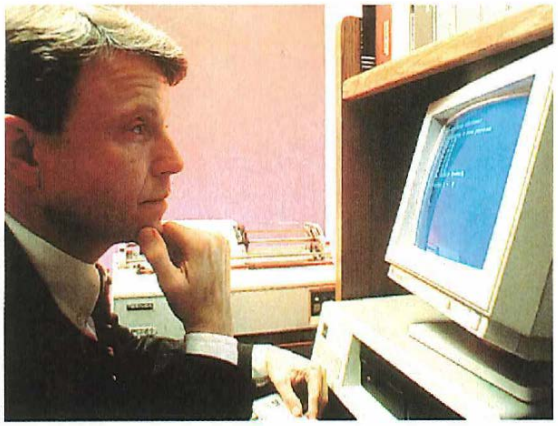
The enlarged Dialcom Group will have four marketing areas serving the UK, USA, Europe and other countries worldwide and as a combined unit will have more than 900 employees, with initial annual revenues of about £60 million.

Expected to be fully operational this spring, the group will combine Dialcom Inc, Telecom Gold (the UK's prime public messaging service), the company's Value Added Business Services, which include Prestel and the British videotex service, and the Computer Network Services Division which provides the technical support for the UK operation.

Mr John Morris, currently president of Dialcom Inc, has been appointed chairman of the new group.

The group's range of products and services will include Dialcom's electronic mail, messaging and information services, now with messaging systems in 17 countries, together with its X400 software (Dialcom 400) which connects dissimilar public and private messaging systems — already licensed in eight countries. Telecom Gold, BT's Dialcom-based market leading mail service in the UK and its X400 message handling service (Gold 400) will also come under the wing of the Dialcom Group as will Value Added Business Services, BT's portfolio of electronic business data services based on the Prestel videotex system, publishing information on subjects ranging from tourism and trade to agriculture and financial data.

Mr Morris said that with the consolidation of these operations already successful in their respective markets, the group now has the 'critical mass' to be a formidable supplier in the worldwide arena of value added communication services. He believes that by centralising their computer and network 'engine power' they can realise economies of scale and fully exploit their development expertise. As part of this



Above: a new Dialcom service, Political Election News (PEN), provides news of election issues and information about candidates. The information includes poll results, in-depth analyses and campaign backgrounds, all at the press of a button.

development the Dialcom Group will be setting up 'intelligent' network links as the backbone of its worldwide infrastructure for messaging, information and value added application services.

Mr Morris also believes that international messaging is on the brink of an unprecedented growth surge and that controlling inter-connectivity is a key to maintaining Dialcom's leadership position.

Contract

Dialcom was bought by BT two years ago for several reasons including Dialcom's relationship with a number of international suppliers and its leadership role in the development of X400 software. Founded in 1970, the company already offered electronic messaging to 10 countries when purchased by BT in 1986, and participants in its international network now number close to 20, with 250,000 user mailboxes, 130,000 around the world and 120,000 in the US.

Dialcom markets complete systems and services to corporations, government agencies, PTTs, telco administrations and other distribution agencies. In this market both Dialcom's and BT's connections and reputations are key assets in expanding the international messaging infrastructure. Dialcom also finds and negotiates contracts with resellers who have information and products which are valuable to specific industries, and its services include the development of business applications and databases such as stock reports, government and agency news, travel information and reservations.

The X400 software, based on the international standard recommended by CCITT, enables communications between dissimilar message systems. The importance of this technology was recognised by BT in its decision to acquire Dialcom from ITT. The acquisition was also considered essential to BT's global expansion and Mr Morris believes that to be a world player in information and communications systems and services a company has to be successful in North America.

Dialcom has been working with hardware vendors to develop and test X400 systems. Last year compatibility tests with in-house electronic mail systems developed by Digital Equipment Corporation and Data General Corporation were conducted, and this year Dialcom's active promotion of the X400 standard will continue with message interchange for IBM and Wang E-mail systems. IBM was involved in a demonstration of X400 interoperability at Telecom '87 in Geneva where the show highlighted that the CCITT X400 electronic mail standard was becoming commercially viable. The X400 demonstration which involved electronic mail transfers among 21 computer, software and mail service vendors was conducted by Dialcom, Telenet, ATT, IBM and others.

Growing European demand for X400 products has left IBM and other US vendors with little choice about supporting the standard if they want to compete abroad, according to Audrey Mandella who recently became director of European research for the Yankee Group in Boston, Massachusetts. She said X400 is extremely important to Europeans because it represents the first real implementation of Open Systems Interconnect standards.

Apart from international message handling, the Dialcom 400 System can offer facsimile capabilities and access to telex. As well as already being linked to Telecom Gold and CNCP Telecommunications in Canada, licences for Dialcom 400 have been purchased by the PTT of Finland and Deutsche Bundespost of West Germany.

Dialcom 400 is capable of interconnecting different public and private electronic mail systems, permitting message to be sent between these systems, telex and facsimile services.

Summing up the importance of X400 implementation, Mr Morris said if the user is simply looking for the transfer of information between two similar systems, a common packet switching network will suffice. But when one wants to interface dissimilar systems that talk different languages and have different protocols, then the implementation of the X400 standard permits communications to take place.

The X400 software unlocks a world of co-operative development and marketing opportunities, according to Mr Morris. He believes that electronic mail is one of the most promising of the value-added services telecommunications companies have to offer.

And BT Chairman Mr Iain Vallance said the move to concentrate electronic mail and value-added data business in a single group is an essential part of BT's strategy to become the major player in the international information technology marketplace. ■

Above: for personal computer users who want to use Dialcom's electronic mail more quickly and effectively there is UpFront, a multi-function program which, with one keystroke, will send all messages that have been prepared and receive all messages waiting. UpFront also includes a file folder system to allow users to keep track of all incoming, outgoing and previously sent messages.

Dialcom inc

Left: FORMS, a popular business facility, is a full forms creation, execution and library system. Users design their own full-screen forms processed via E-mail for such applications as purchase orders, medical and health insurance claims, travel expense reports, stock order and inventory forms and sales forecasts.

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- LICENSEE AND TECHNOLOGY TRANSFER
- CABLE INSTALLATION · CONNECTORISATION · OUTSIDE LINE PLANT PRODUCTS · ACCESSORIES · CUTTING AND TERMINATIONS

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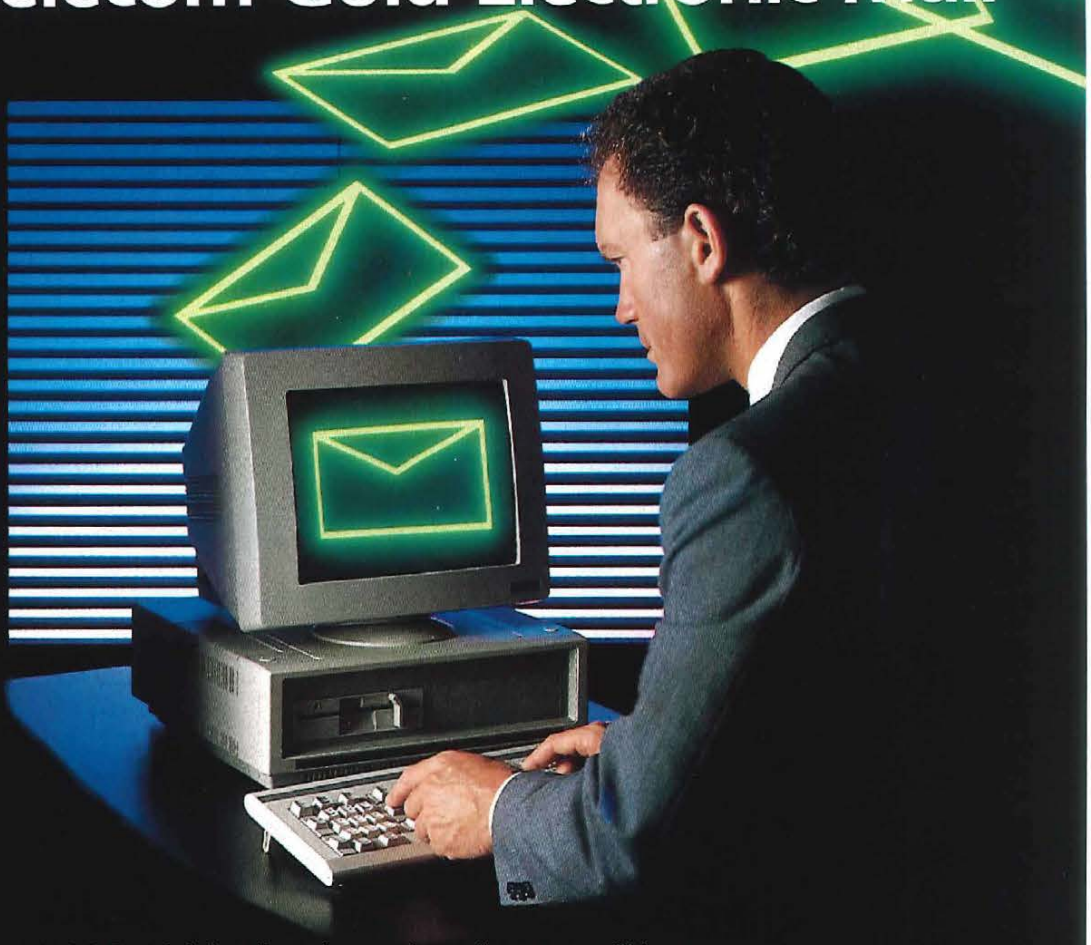
Unlock the power of your Computer with Telecom Gold Electronic Mail



Telecom Gold, Britain's leading electronic mail system, will improve communications and information flow into, and out from, your business unit. Electronic mail makes communications with key staff, customers and suppliers more reliable, accurate and efficient.
On-line access to a range of databases provides competitor analysis, marketing data, financial information and more.
And Telecom Gold is a truly international facility. As part of the Dialcom community it provides a network in nineteen major countries worldwide. In addition there's the recently introduced interconnect capability for electronic messaging through the Gold 400, message handling service.
So go for Gold – call our Direct Response Unit (Free) on 0800 200 700 or use the coupon provided.

Please complete and send to: Telecom Gold Direct Response Unit
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Address _____

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Tick appropriate box.

☐ I would like to sign on for Telecom Gold Electronic Mail, please send me an application form.

☐ I would like more details about Telecom Gold Electronic Mail – what it is and what it does.

TELECOM GOLD

Only 3M supply the connection from the under ground up.

The newly introduced MS² underground jointing system from 3M means that British Telecom engineers can now obtain the complete solution to cable management from a single source.

The entire MS² cross connect system requires only one set of tooling – and its exclusive modular design gives easy access to cable pairs without connectors being opened or circuits interrupted.

The system is highly reliable, is BT approved, and is backed by the 3M UK technical resource.

No other supplier can offer this comprehensive and fully integrated cable management system.

For more details, talk to John Holtham, Telcomm Products Group, on Bracknell (0344) 58742. 3M United Kingdom PLC, Bracknell, Berkshire, RG12 1JU.

MS² Cable Management System

Now – even more System Flexibility with MS² Pluggable Jointing Modules.

- Plugs and unplugs into existing circuits.
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- 25 pairs at one time.
- Time and cost savings.

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Price cuts

Massive price cuts have been announced by British Telecom which will help business customers.

British Telecom International has reduced rental charges on international private circuits by up to 40 per cent and abolished connection charges for most leases taken for a year or more.

The new prices are part of a package of measures aimed at meeting the changing needs of customers.

BTI offers private analogue circuits to anywhere in the world currently served by the international telephone system, and digital services to most major countries and cities. For the digital services, SatStream and International KiloStream, significant reductions in annual rentals are being made for many circuits. Reductions of up to 40 per cent are being made for circuits using the world's first international fibre optic cable to Europe, UK-Belgium 5, which was laid by BTI in 1986.

On the transatlantic routes SatStream prices are being reduced by up to 15 per cent. Prices on the new fibre optic cable, TAT 8, in which BTI is a leading partner, will be reduced by up to seven per cent for the higher speed circuits. Charges for the digital services to Japan, Hong Kong, South Korea, Singapore, Australia and New Zealand will be reduced by 28 per cent, with an 11 per cent drop for analogue services.

Scrambling success

A desk-top phone scrambler has been launched (below) by BT's International Products Division.

The SC2000 plugs into a standard BT line socket and will connect to any approved phone. It is easy to install and operate, requiring no expert knowledge or special tools.

It works by converting analogue speech into digital form which is scrambled and reconverted to analogue format for transmission over the public telephone network. The reverse of the process then occurs at the receiving end of the call using a second SC2000 voice privacy system. The speech transmission is of high quality.

The unit is designed to fit under any standard phone and its microprocessor technology means that it is reliable, compact and unobtrusive.

The SC2000 was designed and developed by IPD's Government and Advanced Projects Unit.

Hello, science calling

Female telephone operators and clerical workers could become electronic research engineers through a pioneering British Telecom scheme to encourage more women into science and engineering careers.

BT is sponsoring a group of female employees – none of whom have technical backgrounds – in courses which could lead to university degrees.

Sixteen women have successfully completed their first term of the year's bridging course at the Essex Institute of Higher Education in Chelmsford.

The all-women pilot course includes clerical assistants, junior technicians and a telephonist supervisor aged between 19 and 41. They were chosen from 400 candidates and attended a two-week induction course before going to college on full company pay.

Pictured above is 23-year-old Tracy Jeffs with senior technician Ken Horsman in the college laboratory. Tracy is a former clerk at a BT training college.

Vandals vanquished

A trial scheme for placing payphones in police stations has proved so successful in combating vandalism that it is to be extended.

The scheme was started in Merseyside, but other areas of the country are picking up on the idea as British Telecom pushes towards its goal of having 90 per cent of payphones working at any one time.

The first payphones in police stations were in Liverpool, and communities which had effectively lost that service because of the frequency and extent of vandalism and theft now have reliable payphones. Other payphones in the area have been moved closer to police stations where they too have found protection.

Mr John Forrest, General Manager of BT's Liverpool District, said at its height payphone vandalism was costing £1 million a year in the city. And Deputy Chief Constable of Merseyside, Mr John Burrow, said the community inspired fitting of payphones in police stations has highlighted how the police can work with the business world to fight crime and improve the quality of life on Merseyside. He added that the installation of payphones in police stations had encouraged large numbers of people to go into police stations which is good for the development of police community relations.

Help for calls

New services and equipment to help disabled customers use the phone are featured in a revised guide which has been published by British Telecom Action for Disabled Customers.

The 37-page guide, which is available free from all BT sales offices, is designed to assist disabled customers in choosing the most suitable product for their needs.

More than 150,000 copies of the booklet, known as the Blue Guide, were printed last year and distributed to customer support staff, social service departments, charities and disability clinics as well as individuals.

New services detailed in the latest edition include the Protected Service Scheme to safeguard against the disconnection of services when a disabled or elderly customer is in hospital or too ill to deal with the phone bill; a talking telephone bill service for visually handicapped customers;

▷

NEWS SCENE NEWS SCENE NEWS SCENE NEWS SCENE NEWS SCENE

Raychem the world leader in heat-shrinkable accessories introduce the new improved XAGA 1000 which makes installing closures on pressurised cable joints easier than ever.

For a start, we've done away with the V seal. Then there's a detachable, protective canister. Also there's a choice of air fittings: valves air, connectors air or a low profile blanking plug which reduces the chance of accidental damage.

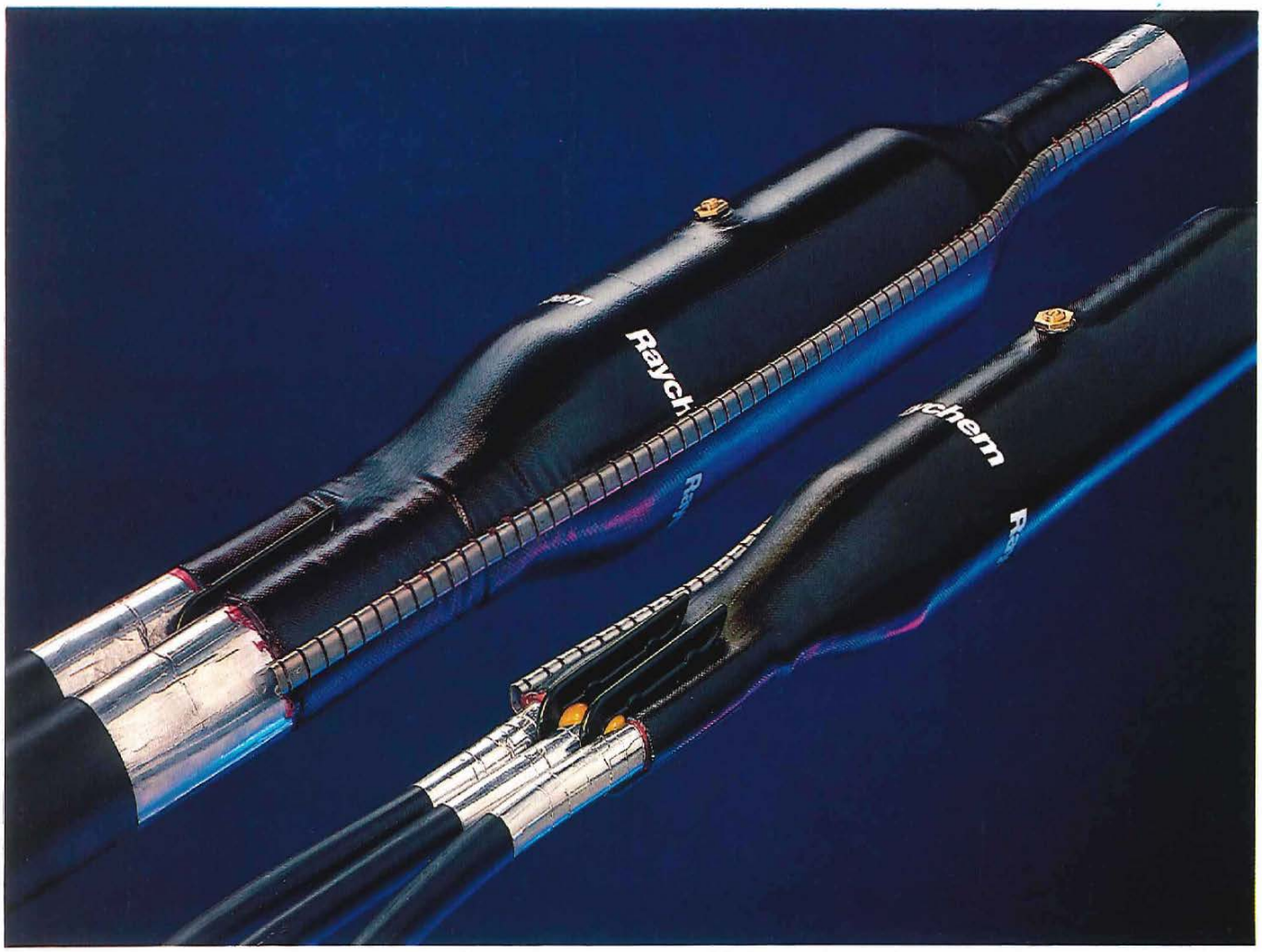
You can even check that the correct sealing temperature is achieved by means of a 'white line' indicator.

What's more, the XAGA 1000 is the only product that gives you 3 cables in and out lead or polyethylene sheathed. It comes with full BT approval for pressurised networks in underground installations.

So, it's even easier to feel you've got the best closure for the network.

Raychem
The difference is material.

Announcing the new improved XAGA 1000. Even more reliable and quicker to use.



Raychem Limited, Telecommunications Division, Faraday Road, Dorcan, Swindon, Wiltshire, SN3 5HH. Telephone: 0793 482350/482172. Telex: 44940

phonecards with a notched edge to help blind customers; and inductive coupling for hearing-aid users on the Tribune phone with amplification and lamp signalling facilities.

Details are also included of where to go for help with the cost of installing and running a phone and of arrangements for chronically sick and disabled people to receive free priority fault repair service.

Appointments

Mr Brian Rigby, Director of the London and South East Territory of British Telecom's UK Communications division, has been appointed Deputy Managing Director of British Telecom Enterprises (BTE).

Mr Rigby, 43, was previously Deputy Director London and before that held senior posts in BT concerned with organisation, marketing and finance. Before joining BT in 1977 he held various senior posts in the Department of Transport and Department of the Environment in connection with transport planning and investment, the channel tunnel project and local government finance.

Mr Mike Armitage has been appointed Assistant Managing Director (Operations) of the UK Communications Division. In this capacity he will assume direct responsibility for UK Communications' London and South East Territory.

Mr Armitage, 48, is currently Director of the Scotland, Northern England and the Northern Ireland territory of British Telecom's UK Communications Division.

Mr Kenwyn Brown, FRICS, has been appointed Director of British Telecom Property. He was formerly the County Valuer of Cheshire County Council.

Mr Brown, 49, now heads the department which is responsible for formulating corporate policies on the management of the company's property portfolio and for providing advice on property matters throughout the group as a whole, including the acquisition, development and disposal of property.

British Telecom currently owns or leases more than 9,500 properties, most of which are specialised telecommunications buildings.

Mr Dennis Marley has been appointed the first sales and development manager of Yellow Pages Business Database. The move marks the start of the company's second year of operation and its continued growth.

Mr Marley, formerly account development manager, will now head the sales team of 16 fronting the 32-strong Yellow Pages Business Database organisation.

Before joining Yellow Pages Business Database Mr Marley worked for 10 years in sales and account development at Central Television.

Boxing clever

Traditional red telephone kiosks are to be listed as being of special architectural and historic interest.

British Telecom has agreed with the Department of the Environment that a total of around 1,000 of the red kiosks will be listed in heritage and conservation areas. About 700 have already been listed, 380 of them in London. BT and the DoE are working with English Heritage to identify a representative sample of kiosks worthy of preservation.

BT's public payphone modernisation programme, providing improved, cleaner housings which give easier access for the elderly and disabled, has always allowed for the retention of the most worthy red telephone boxes in special locations. In the £160 million modernisation scheme all public payphones have been equipped with new electronic mechanisms. More than 20,000 modern booths are in place, and the programme is due for completion in 1991.

Spotlight on BTI

British Telecom International is spending around £1 million on an advertising campaign to raise public awareness of its services. The series of full-page advertisements in the quality daily and Sunday newspapers aims to stop people thinking of BT as just a telephone company and of BTI as just a fringe activity.

BTI wants to stress its role as an all-round sophisticated carrier using a mixture of international communications, and put over the message that when businesses or management have a problem to solve, it is ready to help with the necessary expertise.

One of the advertisements appears on page 5.

A yen to talk

Cellnet, acknowledged leaders in the world mobile communications market, are to act as consultants in the introduction of a cellular network for Japan.

They have been awarded a consultancy contract by Japanese Cellular Network Licence Holders Daini Denden Inc (DDI). DDI will design and operate the new system which will function on the TACS specification perfected for use on Cellnet's UK cellular network.

On the map

A £19 million digital mapping project to transfer records and maps of its inland cable network from paper to computers will result in significant savings for British Telecom.

The digital mapping system will be supplied under contract by Intergraph (GB) Ltd and when ultimately completed is expected to be the largest of its kind in the world. It will bring many benefits, including: ensuring that BT's records of its cable network are accurate and up to date; helping the creation of records and their updating when sites are developed, road layouts changed or new cables laid; speed up network surveys needed to meet customers' requests; and simplify the exchange of records with gas, electricity, water and other authorities to minimise the risk of damage to underground services during road excavation.

At present records of BT's underground plant are held on 150,000 paper maps stored in local offices as well as on 300,000 cable and duct diagrams.

In digital mapping both the map and the additional information on it are converted into digital data and stored on a computer. Any part of a map may then be displayed, instantly, in colour, on a visual display unit screen or printed out on a graphics plotter.

Once stored, the data may be manipulated with greater ease, enabling almost instant changes to be made either to the maps or to the cable records.

In the first phase of the project BT will supplement existing processor capacity with four Digital Equipment Co VAX computers supplied by Intergraph. These will serve approximately 110 workstations to be provided in BT operating districts. The computers will initially store maps and records of BT's cable networks in the principal towns and cities in each district. This first ▷

Otterly successful

For animal lover Karen Talbot, 13, winning an Otter Trophy as senior British Telecom Young Environmentalist of the Year is a big thrill. But perhaps just as exciting was to meet a real life otter in the shape of Bee in her natural habitat in Gloucestershire.

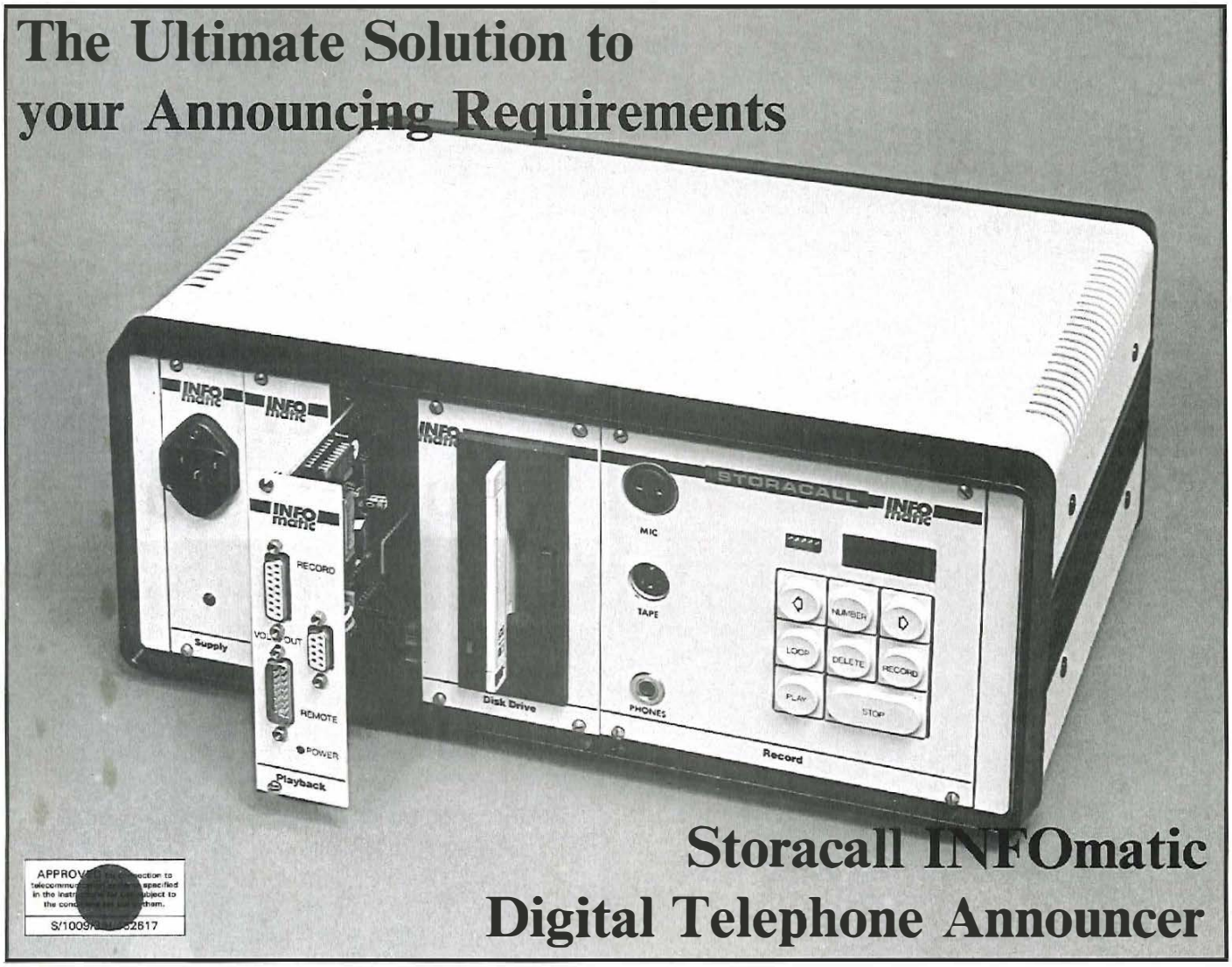
Pictured here with Bee and Karen (left) is Tanya Russell, 19, who sculpted the 10 inch high model in resin bronze.

The Young Environmentalist competition is sponsored by BT and six other companies. Each company will be awarding Otter Trophies.

Karen, from Thorrington near Colchester, and a junior winner in last year's competition, made her winning presentation on 300 years of changes in her local countryside.

For Tanya, this is her first major commission. Both of her parents are sculptors and she works with them in their Hindhead studio. She took two months modelling her otter after spending many weeks studying the live animals.

The Ultimate Solution to your Announcing Requirements



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Whatever your application, the new INFOmatic telephone announcer offers the ultimate range of standard and optional features:

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phase is expected to take about two years, and in the three-year second phase the system will be extended to include all urban areas. The final stage will enlarge it to include rural areas.

Contracts

Atlas Bolt is to supply British Telecom with 1.8 million coach screws to support the steps fixed to telegraph poles. The steps allow BT engineers to climb easily and safely to the top of the poles when attending to line faults and making routine checks.

Base Ten Systems Limited of Camberley, Surrey, has been awarded a British Telecom contract worth £1.2 million for additional exchange and central computer equipment leading to expansion of the CARE (Communicating Alarm Response Equipment) System in the UK.

ICL Ltd has received an order from British Telecom for a further four Series 39 Level 80 mainframe systems for use in the introduction of itemised billing, starting in the London area.

Margaux Controls Ltd of Egham, Surrey, and Margaux Inc of California have signed a unique deal with British Telecom to transfer Silicon Valley high technology from America to the UK. The licensing agreement covers both high technology and market development.

BT has bought for an initial payment of £250,000 a two-year, non-exclusive manufacturing agreement to build the Margaux 4000 and 8000 series of energy saving Building Management Systems, together with the MX 1000 controller.

John Noad (Ceilings) Ltd has been commissioned to supply an £85,000 ventilated ceiling and integral lighting project for British Telecom's latest information computer centre in Scotland.

Plessey has won a £30 million order from British Telecom as prime contractor for the latest Flexible Access System (FAS) which is to be installed in London's expanding Docklands business area.

Plessey Telecoms Products Ltd has received orders worth more than £23 million from British Telecom for intelligent payphones and cashless systems.

Thorn Ericsson is to supply BT with AXE 10 digital exchanges worth more than £20 million for its local exchange replacement programme. The orders represent a total of 226,000 exchange lines.

Thanks a million

A new digital exchange has been opened by British Telecom in Birmingham as part of a £1 million communications network designed to take the city's Business Park into the 21st century.

Enterprise Exchange at Chelmsley Wood was officially opened by Professor Eric Ash, CBE, President of the Institution of Electrical Engineers and a non-executive corporate director of BT.

Installed in a record six months, Enterprise Exchange has been designed to meet the specific needs of its business customers and to grow as the Business Park – developed by Arlington Securities – expands. Optical fibres linking companies to the exchange will also offer the full range of telecommunications services from a flexible voice network to high-speed data transmission facilities.

Both national and international companies using the exchange will be easily identified by the common 021-717 code which will be exclusive to Business Park customers.

BT's Major Project Manager, Ron Duers, said the opening of Enterprise Exchange represents a major investment for the company and it is proud to have been involved with Arlington Securities, the developers, from the early stages of the project.

Cut to camera

Open surgery in the widest sense of the word was made possible by British Telecom's Broadcast Services when an estimated 10,000 doctors watched a live operation carried out at a London hospital.

The doctors were spread over 105 venues throughout the UK and Ireland in an educational symposium involving the latest in medical and broadcasting technology. The endoscopic operation was also relayed to eminent doctors in New York.

Throughout the operation, which also demonstrated post-operative care for stomach ulcers, doctors in the widespread audience were able to talk directly to the consultant physician, Dr Roy Pounder, while he worked.

Named GASTROLINK, this unprecedented interactive conference was organised with the combined expertise and equipment of Broadcast Services and Satellite Management International (SMI).

The endoscopy was carried out at the Royal Free Hospital and described by the surgeon's Senior Registrar, Dr Owen Epstein, a consultant gastroenterologist, via video and audio link from the Portman International Hotel several miles away.

The exercise involved using the facilities of Telecom Tower, three satellite links, two microwave links, seven direct audio links, 163 telephone lines and 105 satellite receiver units.

GASTROLINK also featured 12 consultants in gastroenterology being interviewed at the Portman Hotel, and presenting their papers to a symposium which was transmitted live to the 105 satellite conference locations. All sites were in two-way audio communication enabling a fully-interactive question and answer session to take place with the Portman panel. A transatlantic link enabled the panel of experts in New York to also participate live.

Checking the bill

Showing how the money's been spent, computer operations supervisor Sandra Holbrook (below) displays a new-look itemised telephone bill which many BT customers will now be receiving.

BT is investing £87 million to provide these itemised bills, and more than 30,000 customers in London are among the first to receive them, to be followed by parts of Birmingham, Edinburgh, Glasgow and Bristol in the spring.

By 1990 almost 90 per cent of London telephone customers and about half the customers in the rest of the UK will be offered itemised bills.

The new bill will itemise all dialled calls of 10 units and more, showing the date and time that a call is made, the number called, and the call's cost and duration.

Sandra works at BT's St Albans Computer Centre which processes bills for five areas. She is surrounded by magnetic computer tapes containing details of more than one million customers' bills.

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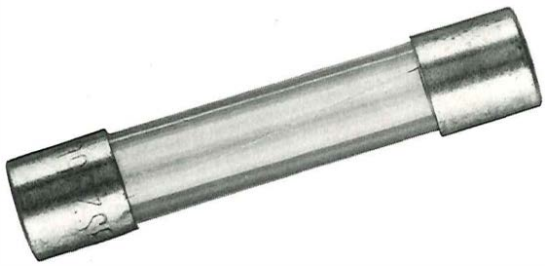
We think it's about time all designers knew how to replace them.



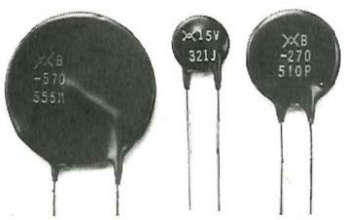
PolySwitch™ PTC devices are a new range of circuit protectors designed to last as long as the products they safeguard.

Unlike fuses, they don't have to be replaced after a fault. And unlike circuit breakers they don't have to be re-set manually.

Easily mounted on PCBs, they give the ultimate in design safety – interrupting power when overloaded and automatically re-setting on power removal.

Small, inexpensive and operational over a wide temperature range they offer virtually unlimited design possibilities. Currently it is being used by one of the world's largest telephone companies on their digital switch, but they have a wide range of applications including:

- *Hi-fi Loud Speakers*
- *Transformers*
- *Small motors including automotive*
- *PBX*
- *Telecom SLIC Protectors*
- *Batteries*
- *UL Approved*



So it's about time you sent off the coupon for details and a sample product.

Then you can see for yourself how PolySwitch™ blows out fuses for good.

To Ann Smith, Raychem Limited, Faraday Road, South Dorcan, Swindon, Wilts. SN3 5HH. Tel: (0793) 482245.
Please send me details of Raychem's PolySwitch.

Name:_____

Address:_____

BTJ/3 Postcode:_____ Tel:_____

Raychem

The difference is material.

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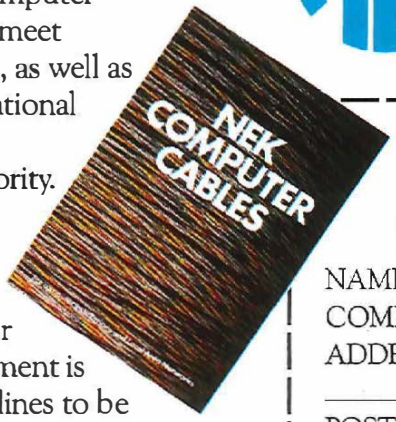

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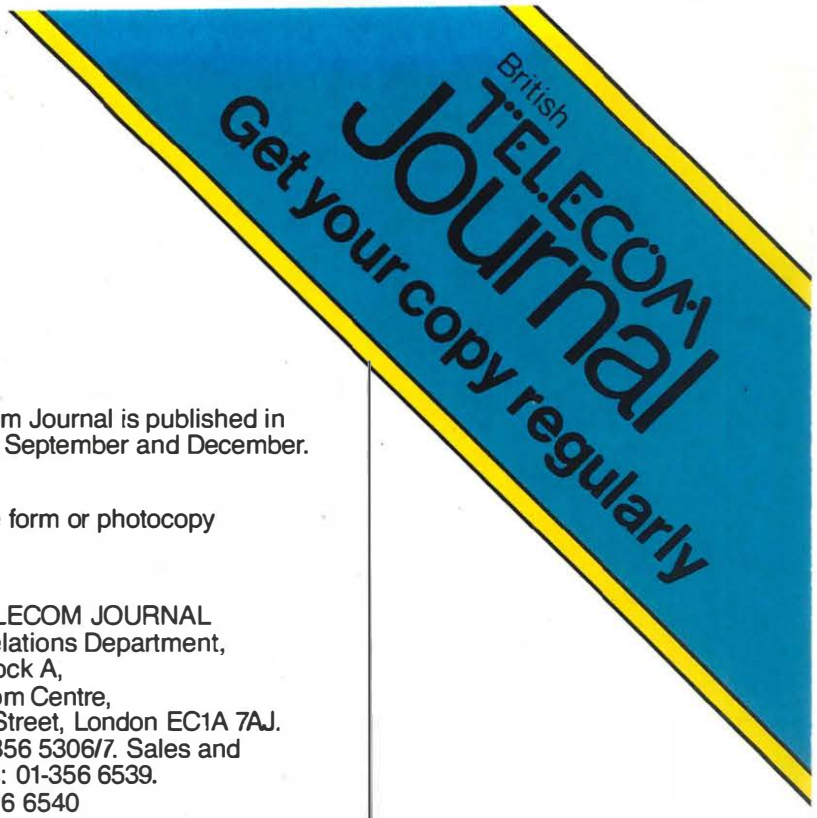

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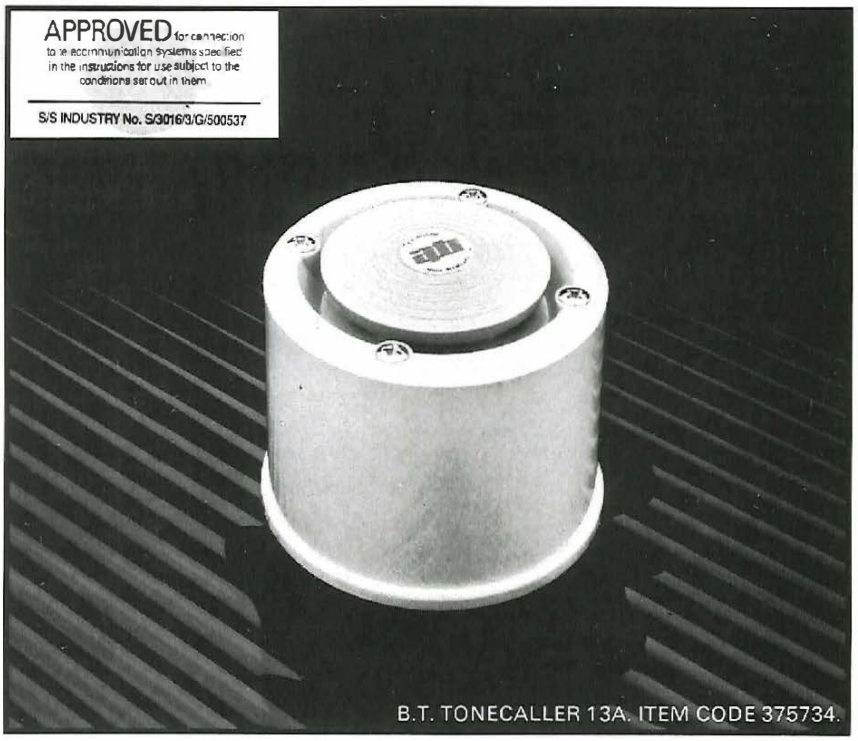

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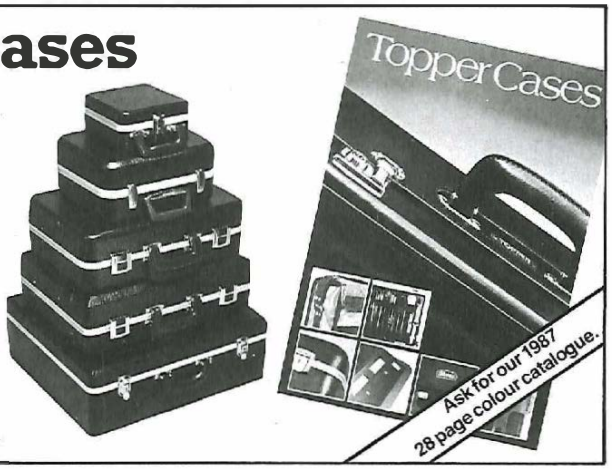

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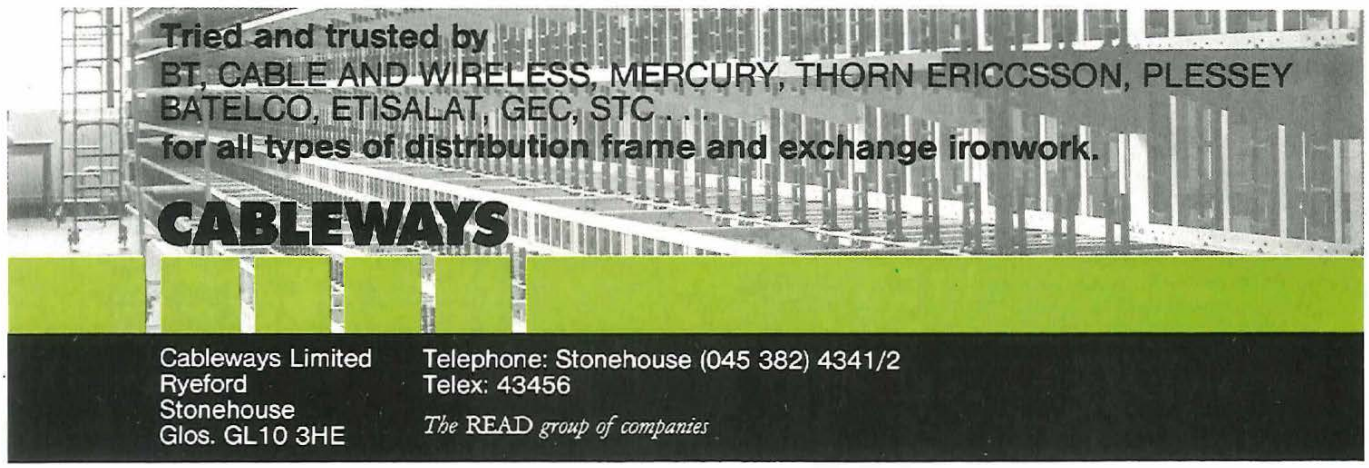

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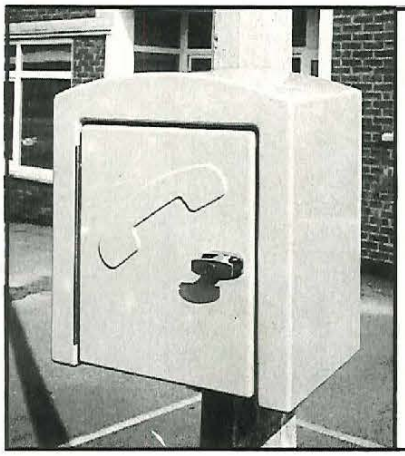

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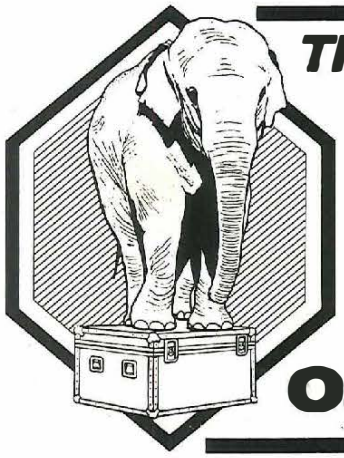

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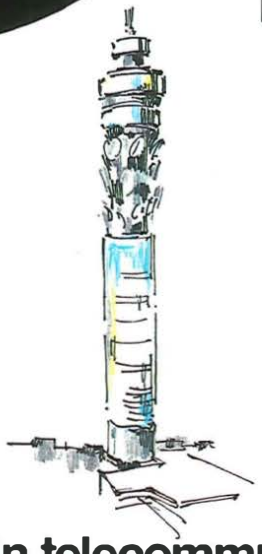

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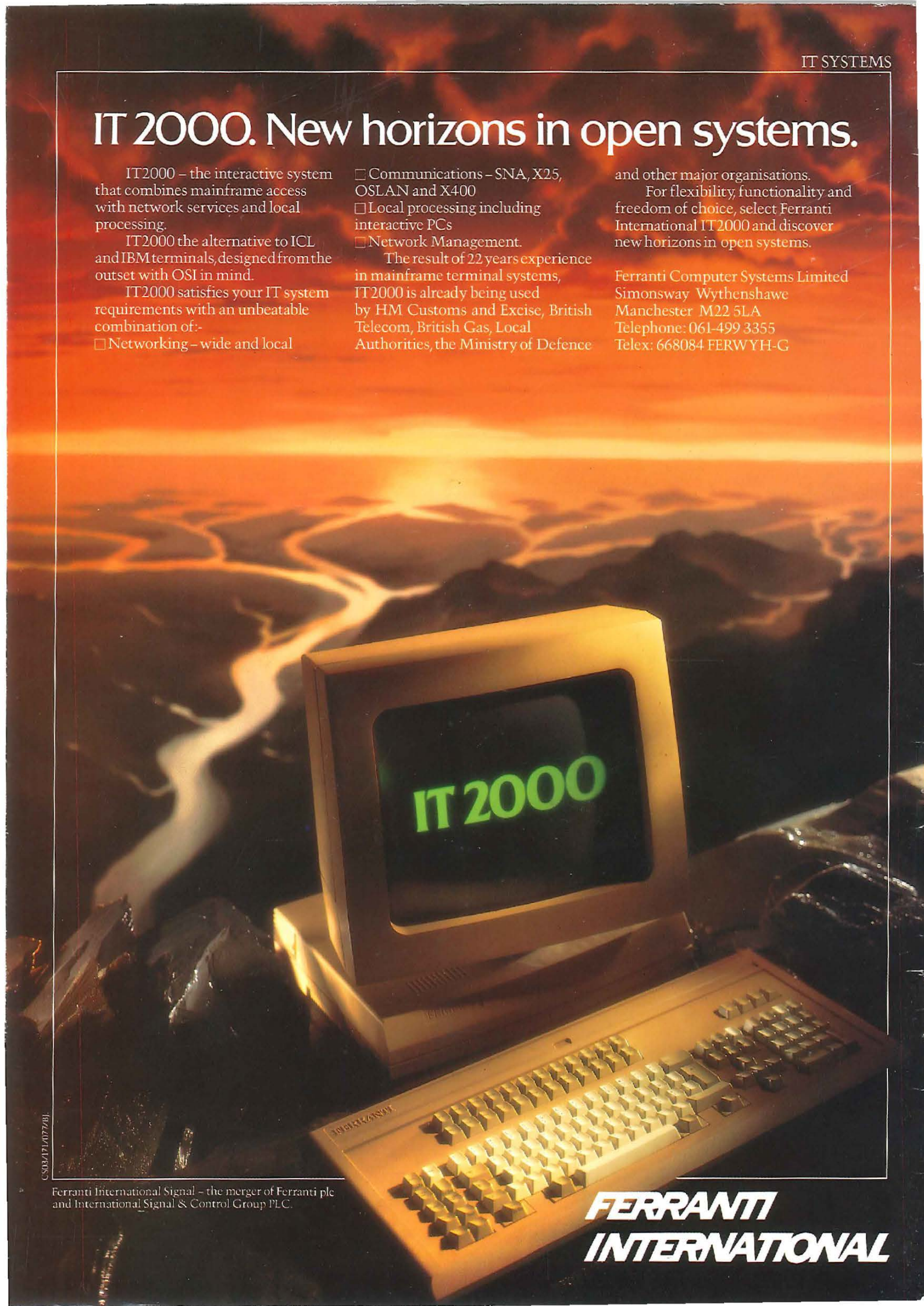

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