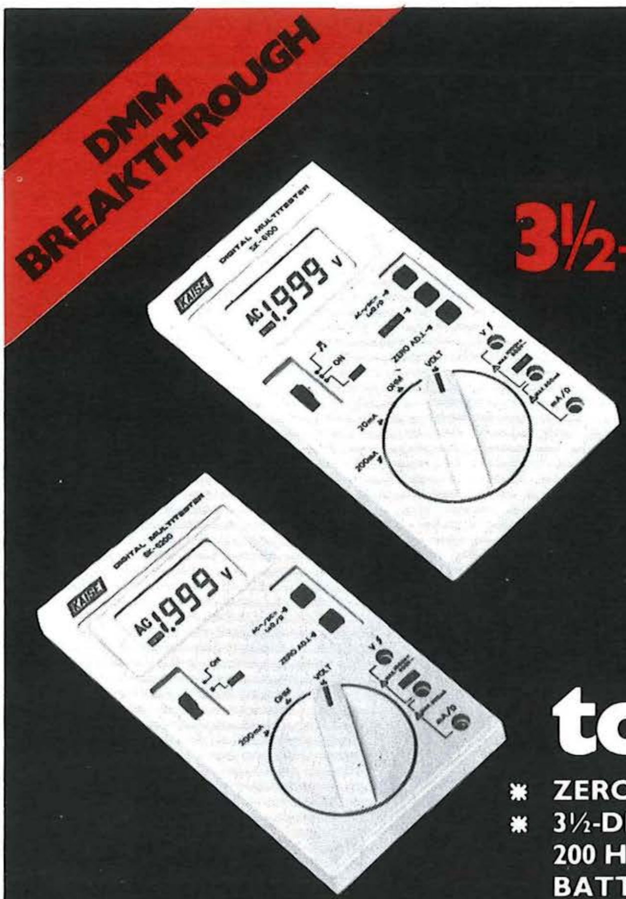
British TELECOM Journal

Summer 1980 Volume 1 Number 2 Price 24p



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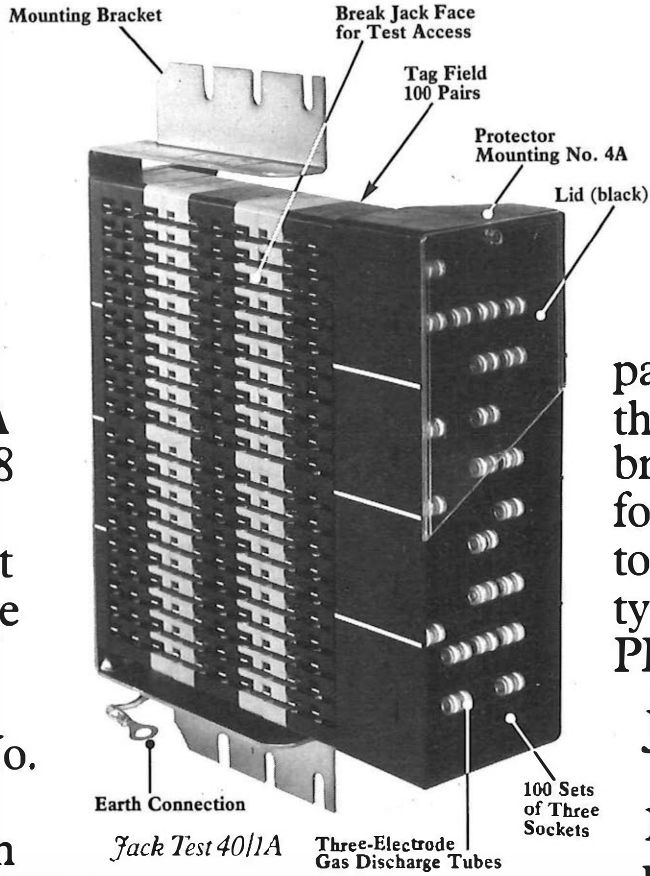

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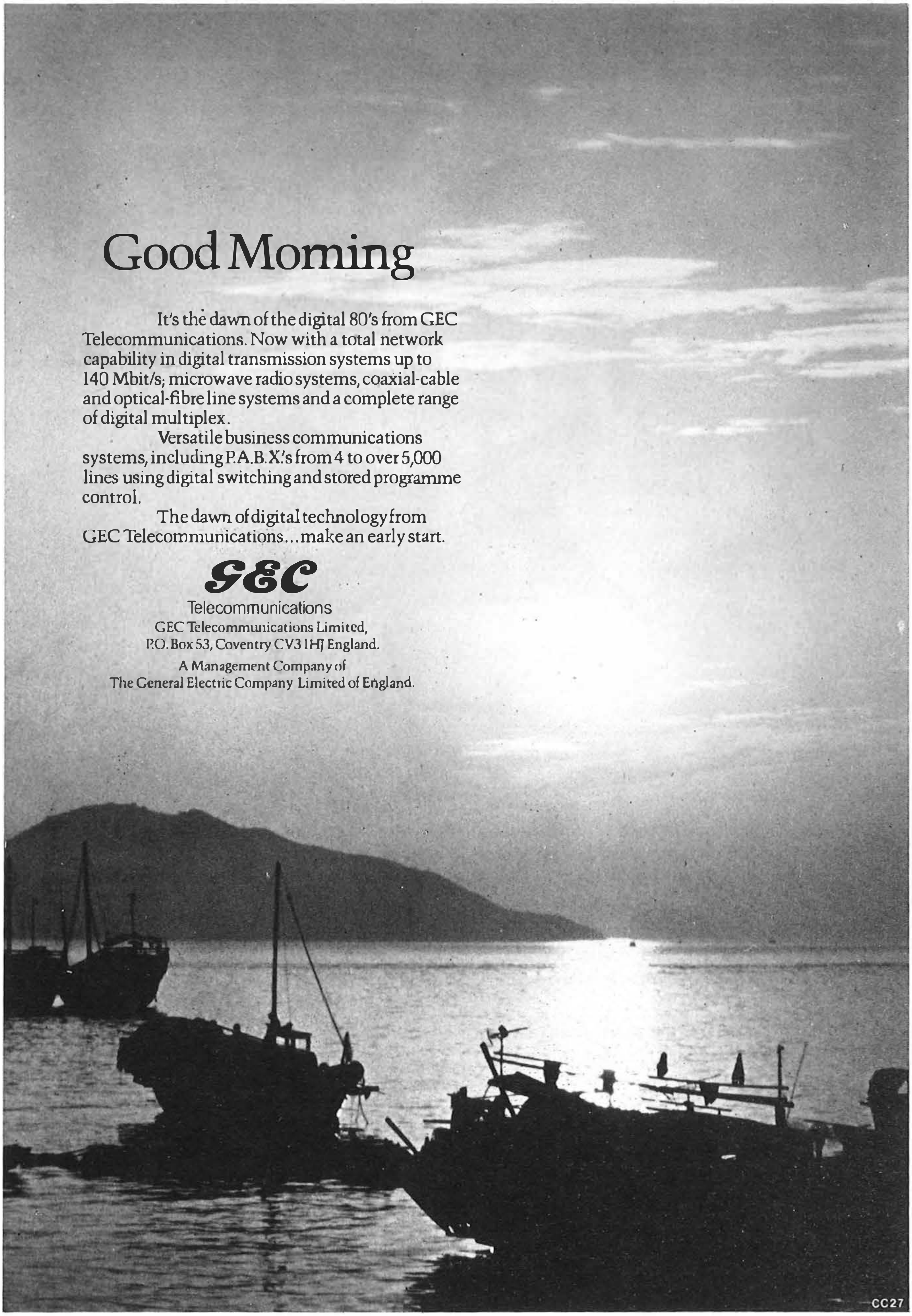
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British Telecom Journal

Summer 1980 Volume 1 Number 2

Published by British Telecom, part of the Post Office, to promote and extend knowledge of the operation and management of telecommunications.

Cover: Technician Roger Lorenz, one of two British Telecom engineers responsible for installation and repair of equipment in the Scilly Isles, makes his way along the beach on Trescoe Island with a recently-repaired coinbox.

Playing to win

"The present rapid growth in telecommunications and information technology provides immense opportunities for industries connected with telecommunications. Over the coming years, the majority of British households will be affected. Whole new industries, sub industries and many jobs will be created.

"These developments have been under way for a longer time in the United States and have gathered more momentum there than here. I am sure that one of the reasons for America's greater success has been the freedom available there to entrepreneurs to develop new services and a wide range of equipment associated with telecommunications. The opportunities and the market are too great to be encompassed by a single organisation, however skilled and however great its resources."

These words from Industry Secretary Sir Keith Joseph preceded the announcement of the relaxation in British Telecom's long-standing monopoly. But the decision to allow the private sector to participate in new areas was not unexpected.

If the proposals become law, two major changes will occur. Firstly, private-sector companies will be able to provide and install a wide range of terminal equipment, including private branch exchanges. Secondly, people will have greater freedom in using British Telecom circuits to provide services not currently available through the corporation. In the longer term, the private sector may be allowed by the Government to provide other national services and perhaps even separate networks using satellite business systems.

Although the Government did not entirely accept British Telecom's view that the monopoly should be retained by the corporation in the interests of the customer, they agreed that the supply, installation and maintenance of the first telephone connected to the network, and the maintenance of PBXs, would remain the responsibility of British Telecom.

Whether the Government's decision – to relax the monopoly while at the same time standing firm on borrowing for investment – will benefit the customer in the long run remains to be seen. British Telecom is committed to turning the situation to advantage, and to meeting the unprecedented challenges now facing it. Stronger marketing, System X, the new identity – these are the keys to success.

But that success will depend on British Telecom's ability to give the customer the service he wants at the price he is prepared to pay. And despite carrying some extra weight at the starting gate, everyone within the organisation has a vital role which can only be played one way – to win.

The future for Strowger

R W Felgate

Although digital switching technology, spearheaded by System X, is planned to revolutionise Britain's telephone network over the next few years, Strowger equipment will continue to play a vital role until the turn of the century.

Deep into the countryside, buildings similar to this rural non-director exchange at Runfold in Surrey will continue to house working Strowger equipment until the end of the century.

When in 1891, Kansas City undertaker Almon B Strowger invented the selector for switching telephone calls automatically, little could he have realised that he was bequeathing to the world a system that would celebrate its centenary.

Developed originally by Strowger to counter the loss of customers caused by operators diverting calls to his rivals, the system has been at the heart of most administrations' networks for many decades and even today – despite the advance of the electronic exchange – earns about 90 per cent of British Telecom's income.

Since the start of automatic telephony, Strowger equipment has been the main switching system in the UK and still connects about 80 per cent of customers. And at present as much as 80 per cent of the main network trunk equipment, is Strowger. Interesting, too, is the fact that despite some exchanges operating with equipment more than 40 years old, the average age of Strowger is about 15 years. This gives a measure of the growth in the switching system in recent years, which has almost trebled in size since 1965.

The basic building bricks of a Strowger exchange are a two-motion selector (switch) and a uniselector. The two-motion selector is so named because it can step first vertically under control of pulses from the dial to one of 10 levels of contacts and secondly can move horizontally either in a hunting mode searching for disengaged outlets, or in other situations, stepping under control of pulses. Most modern two-motion selectors can switch to one of 20 outlets in the horizontal train, arranged by having one bank connected to even outlets and the other to odd outlets. The uniselector hunts in one direction only.

The first Strowger-type public automatic exchange in Britain opened at Epsom in 1912. The first Strowger exchanges installed on a wider basis in the early 1920s were of a system known as Siemens No 16, the selectors of which were different in detail from any that followed. All exchanges of this type have now been recovered.

From 1926 to 1931 various manufacturers were installing Strowger exchanges which differed in detail but employed a common double-side rack method of installation in which subscribers' calling equipment (uniselectors) and final selectors were mounted on opposite sides of the same rack with inter-connection facilities (jumper wire) at the top of the rack. Other equipment was mounted in 'houses' with each 'house' consisting of two racks of selectors back-to-back with a wiring gangway, the end of which was blocked off by a grading frame and a mounting for miscellaneous circuits.

Pre-2000 equipment installed between 1931 and 1939, consisted of single-sided racks with complete gangways front and back, while standard Post Office 2000-type equipment installed from 1939 was, as its name suggests, designed to be capable of gaining access to 2000 contacts by way of 10 banks of 200 contacts. In fact, no selectors with such availability were ever introduced. 4000-type equipment installed between 1961 and 1967 is so numbered as the next number up, avoiding confusion with the Post Office 3000-type relays. It is estimated that currently there are 7,000,000 two-motion selectors in service in British Telecom made up of 500,000 pre-2000, one million 4000 and the rest in 2000-type equipment.

The British Telecom Strowger switching system is capable of being extended simply by the provision of additional equipment to give a subscriber a number (final selector) and calling equipment, or by supplementing the common switching equipment to enable improved grade of service to be given.

The days of Strowger equipment are, however, numbered. Although maintenance philosophy and techniques have changed in recent years, and many maintenance aids have been adopted, Strowger equipment is costly to maintain. It is expensive to provide a reasonable quality of service and the new facilities that customers now demand requires much additional equipment and extra work.

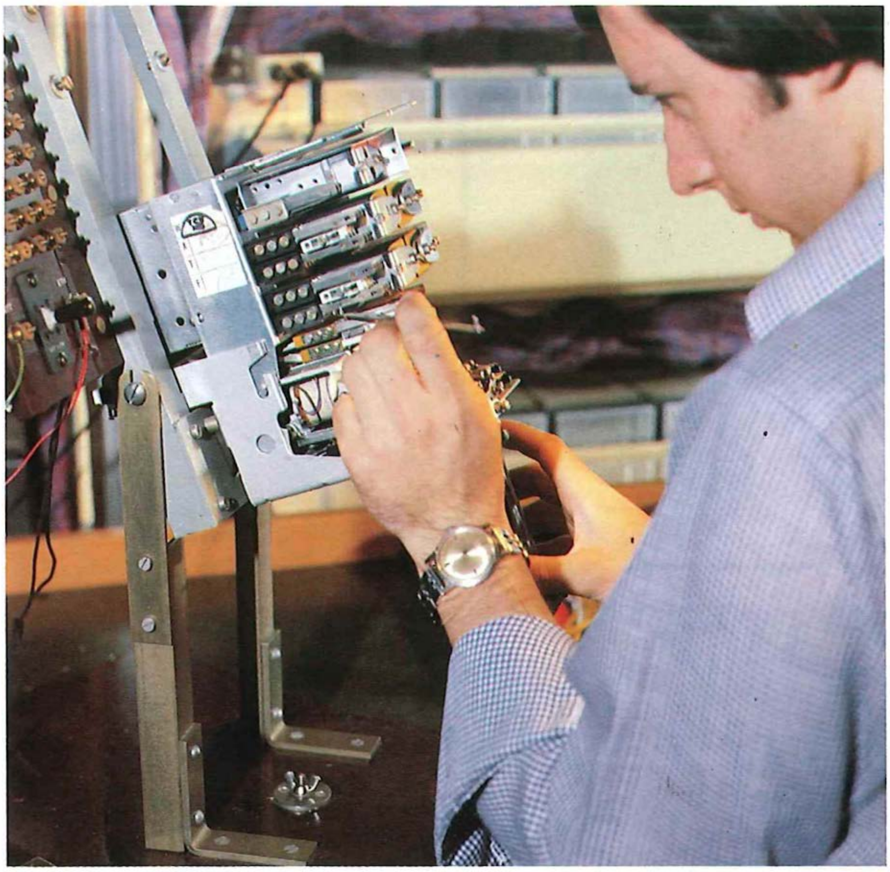
At present, full implications of the modernisation plan have not affected switching systems but increasingly this will now occur. The plan is for all large local Strowger exchanges to be replaced by 1992. This covers most of the Strowger director and non-director exchanges including the local multiple of the Group Switching Centres (GSCs) but excluding UAX13s. To achieve this goal, the last order for Strowger local and main network equipment has been placed although it could be some three years before delivery is completed.

It is, of course, not possible to modernise every exchange overnight due to the size of the task and the manpower and capital expenditure involved. A strategy for the next few years has therefore been developed. As local exchanges are converted to other systems, spare Strowger equipment of 1960 or later vintage, meeting certain criteria of condition, will be recovered for re-use. Most of this will be re-used for extension to existing Strowger exchanges in the same telephone area or region. Only about 25 per cent will be transferred to other regions.

It may be necessary during the early years of the programme to re-use equipment manufactured before 1960 provided it is suitable. Equipment identified for scrapping will be clearly marked with a blue spot by area staff. In the interest of customers' service, it is important that all equipment, including that marked for scrapping, is maintained in good order while the exchange remains in use. 4000-type selectors will only be used to extend existing 4000-type or mixed 2000/4000-type exchanges and the intention is to end up with only one type of switch, the 2000-type selector.

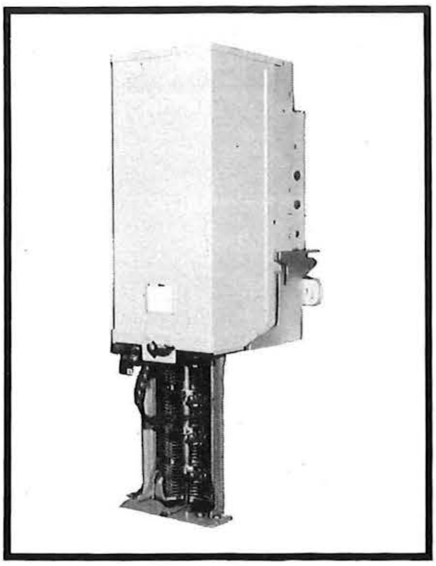
To reduce damage to equipment destined for re-use, methods of recovery, packing, transportation and storage are set out in planning instructions. Each rack of equipment will be recovered with three metre cable lengths for joining to new cable at the receiving ing exchange. This will reduce considerably re-installation costs.

At the receiving exchange the old cable lengths will be joined to the new lengths by means of '3M connectors' – a solderless method of jointing. This equipment should then be trouble-free



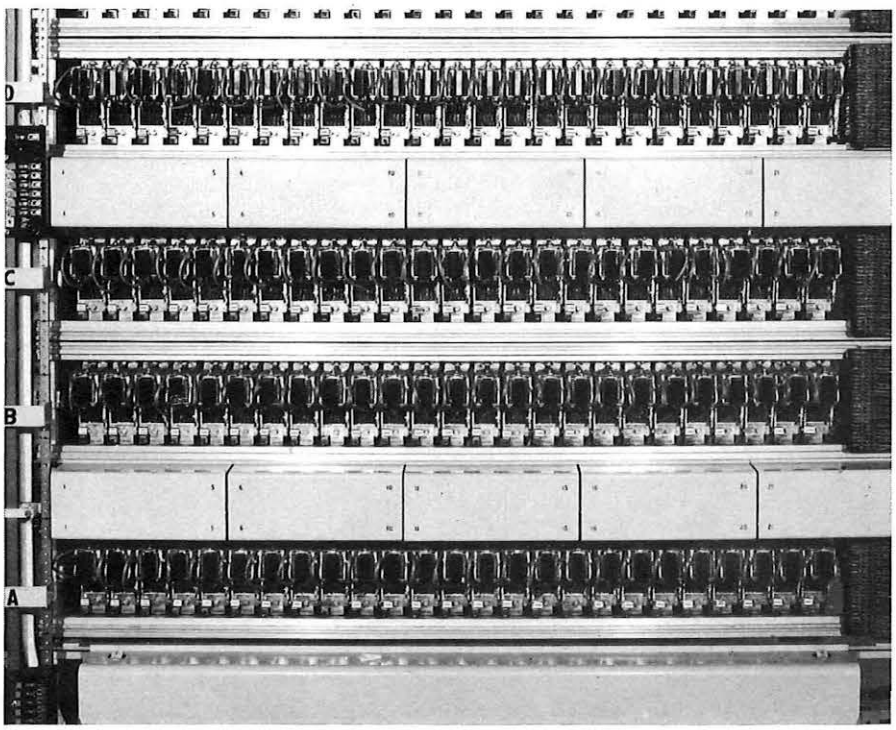
Trainee technician Alastair Carruthers adjusts a relay spring on a 2000-type two-motion selector at an exchange test bench.

At City Telephone Area's piece part depot, a senior technician replaces a bearing pin in a 2000-typeselector.



Left: A final selector – the last stage in the dialling sequence.

Below: New and used Strowger equipment is already being stored by areas ready for immediate dispatch to exchanges in need. Here, storeman Vic Springett checks the last item in a batch of returned selectors on an otherwise unused floor at Woking exchange.



Bottom: Type 3 uniselectors – the customer's gateway to the Strowger exchange.

for its remaining life. To indicate these joints cables will be marked with a 12 mm green plastic tape near the butt ends. At the joint itself either the sealing tape or special tape will be labelled to indicate the racks that have been joined together.

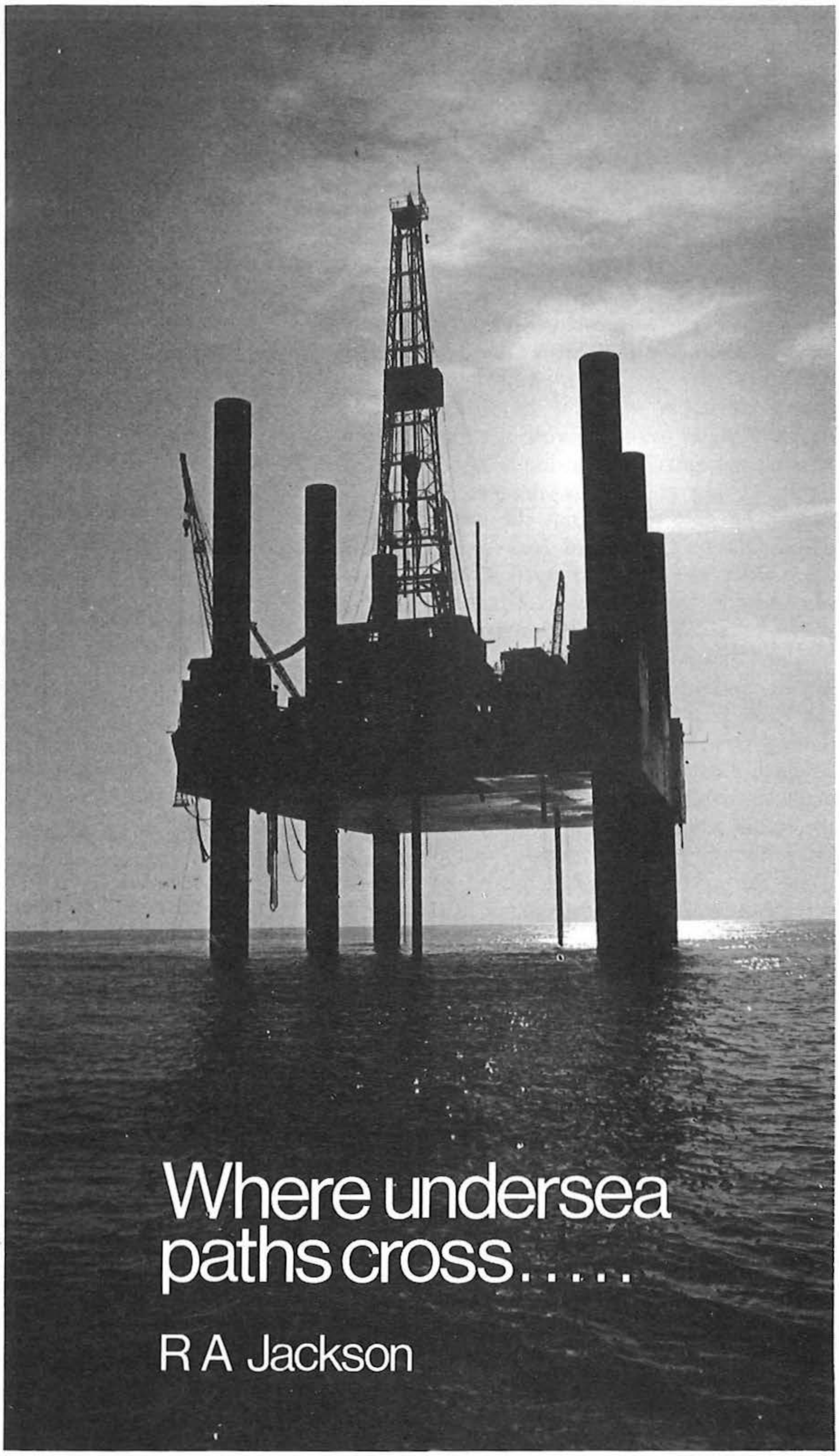
It has been the practice with Strowger equipment to design a standard circuit which by the use of wire straps enables the circuit to work in a number of modes such as forward or backward holding, and it is essential that when the equipment is reinstalled, a check is made that the various straps are wired correctly for that exchange.

As re-used equipment was previously working, it is not necessary to give full acceptance testing as is usual for new equipment. The equipment once installed will be given a full block routine overhaul which involves checking items that wear, cleaning the selector bank outlets and lubrication. It will then have to pass three full routine cycles of an automatic routiner, if available. If not, a manual box tester may be used. Items such as cables will however, require complete testing for continuity as normal.

Sufficient piece parts and spares have been ordered to last the lifetime of Strowger, although at present no complete strategy has been prepared for the main network switching centre modernisation. To reduce the possibility of shortages in the early years of the programme therefore, such spares and piece parts must only be used for the provision and maintenance of Strowger equipment.

All these developments, of course, mark the beginning of the end of Strowger in the British Telecom system. Equipment which has been well tried and proven in service for more than half a century, and which has brought automatic telephone service to businesses and homes throughout the land will gradually give way to more modern systems. But until the last Strowger exchange is recovered the equipment will continue to be given the attention necessary to ensure its reliability in service.

Mr R. W. Felgate is a head of group in the Network Executive's Maintenance Methods and Support Division, and is responsible for national day-to-day maintenance of Strowger equipment.



Where undersea paths cross.....

R A Jackson

Ask the average Briton about the North Sea and he will probably talk about oil and natural gas. What he probably won't consider is the intricate network of undersea telephone and power cables which play an equally vital role in the country's economy. And just like the concrete-coated metal pipelines which bring the oil and gas ashore from the wells, these cables need to be protected from damage by other users of the sea – and by the installation of new pipelines.

Pipelines vary in size but 36-inch diameter pipes coated with six inches of concrete are often used. Some pipes carry a smaller pipe 'piggy back'. Protection for them, now enforced by law in many of the continental shelf areas, involves burial, as far as practicable, to a depth of one metre between the top of the pipe and the bed of the sea. Power cables are also buried beneath the sea bed but they may present other problems because of the very high DC voltages and currents which can affect telecommunications cables.

Because the North Sea is bordered by countries all with highly-developed, interconnected telephone systems providing customers with a high degree of direct dialling, there is, of course, a large and highly developed network of cables in the sea. Even before the advent of the modern 'repeatered' telephone cable, there were a very large number of telegraph cables which, though now out of use, still criss-cross with newer cables to form an intricate communications web on the floor of the sea. It is inevitable, therefore, that any pipeline between a well and the shore may cross one or more of these cables.

At the start of a new well project, an exploration platform is installed, followed later, if the well is successful, by the production platform. When the position of the platform or the track of a new pipeline has been established, it is customary for the pipeline owners to approach the cable owners to find out which out-of-service and working cables are in the area so that, if necessary, the position of the platform or the track of the pipeline can be altered before work begins. This avoids interfering with or damaging the cables.

If neither of these courses is possible, then the telephone cable may have to be interrupted or moved to a new route. Out of service cables – usually old telegraph cables – are, with the agreement of the co-owners, sometimes recovered by cable ship, but this practice is expensive and time-consuming and more recently it has become customary to lay the pipe over the old cable which is subsequently cut by the pipe burying operation.

For 'live' cable, a very different procedure is required. Modern systems may carry as many as 4,000 circuits and it is essential that they should be protected at all times from damage by other sea users and from electrical damage (perhaps due to corrosion) by contact with other objects under the water. Both the construction of platforms and the laying of pipelines – or power cables – present a possible hazard to telephone cables.

The construction of a platform inevitably results in much shipping activity near the platform, and ships of course have anchors. In some cases the platforms themselves may even be kept in place by anchors. For this reason cable owners require the platform to be at least one nautical mile from any cable although in sea areas controlled by the Netherlands, this clearance has been reduced where the cable track has been marked.

The problem is much more complicated where a pipeline will cross an existing cable route and it is necessary to devise means of protecting the cables from damage during the laying and the subsequent burial operation. One method is to cut the cable and peel it back in the area of the pipe-laying operation. When the pipe-laying barge has passed the cable is rejoined and cut and peeled back again when the pipeline is subsequently buried.

Another method is to re-route the cable entirely, either on a temporary basis or permanently, inserting larger diameter cable or even additional repeaters to make up for the increased cable attenuation caused by lengthening the system. Because of the cost of marine operations, it may even be economical to cut the cable before the start of pipe laying and leave it out of service until after the burial operation, the circuits it normally carries being re-routed on another cable.

It is also necessary to ensure that the cable crosses the pipeline as nearly as possible at right angles to minimise the possibility of inducing currents in the cable or the pipeline and to ensure that repeaters in the cable are at least one mile away from the nearest pipeline. This latter requirement was easy enough to achieve with older cable systems where repeaters were between 10 and 15 miles apart but, in modern systems, with repeaters about 2.7 miles apart, it is much more difficult.

This reduction in distance between repeaters does, in fact, lead to considerable complications when a new system is being laid in the North Sea. The new UK-Denmark cable, for instance, will cross four pipelines. Fixing the route of cable so that the repeaters in it are equidistant from one of the pipelines, fixes the position of the repeaters for the whole of the cable. It is then necessary to adjust the route so that clearance between the repeaters and other pipelines is correct. Careful survey and route planning are, therefore, vital to ensure that one-mile separation and 'right angle' crossings are achieved.

To safeguard the mutual interests of all parties, British Telecom negotiates formal Agreements with the pipeline and power cable owners for each of the crossings. Agreements deal not only with the work to be carried out on the cable but with the future for as long as it remains in service.

This concern for the future arises largely because great care is taken when laying a cable to ensure that it conforms as closely as possible to the contours of the sea bed involving close control over the tension in the cable as it is paid out from the ship. In consequence, the cable presents very little obstruction to other users of the sea and is therefore less likely to be 'snagged' by other equipment such as fishing gear. And in time, the cable tends to 'bed-down' or becomes sanded-in, so giving added protection.

When the cable is cut and lifted to the surface any natural protection is lost. To rejoin the cable, it is normally necessary to insert an additional length of cable – about twice the depth of water – and because it is not possible to control the tension as effectively during the laying process, it cannot be guaranteed that the cable will lay flat on the sea bed. Indeed, the final splice has to be dropped to the sea bed and the chances are that this part of the cable, at least for a time, will remain above the sea bed. Following a removal operation of this type the cable is at its most vulnerable to damage by other users of the sea.

British Telecom requires the pipeline or power cable owners to pay both for the initial work on the cable including costs incurred in re-routing traffic while the cable is temporarily out of service, and also the costs of any subsequent repairs which can reasonably be regarded as having resulted from the initial disturbance of the cable.

Over the years, the Business has established a good relationship with other offshore operators and maintains a close liaison to monitor further developments and obtains advance warning of new projects which might affect telephone cables. The proposed construction of a generating station in the southern North Sea for instance, which would use gas collected from a number of small wells and transfer the electricity so generated to the shore by high-tension cable where both the collecting pipes and the high-tension cable will cross telephone cables.

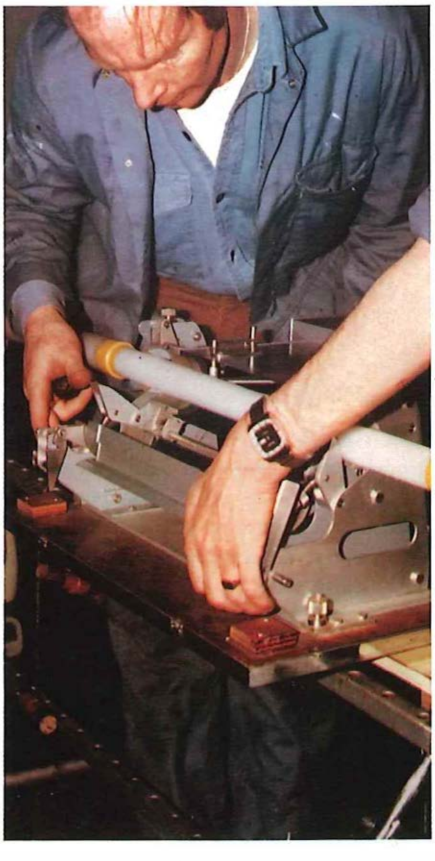
Obviously, the UK needs all the gas and oil it can find in the North Sea, but their discovery means that British Telecom must ensure constant vigilance to maintain vital international communications.

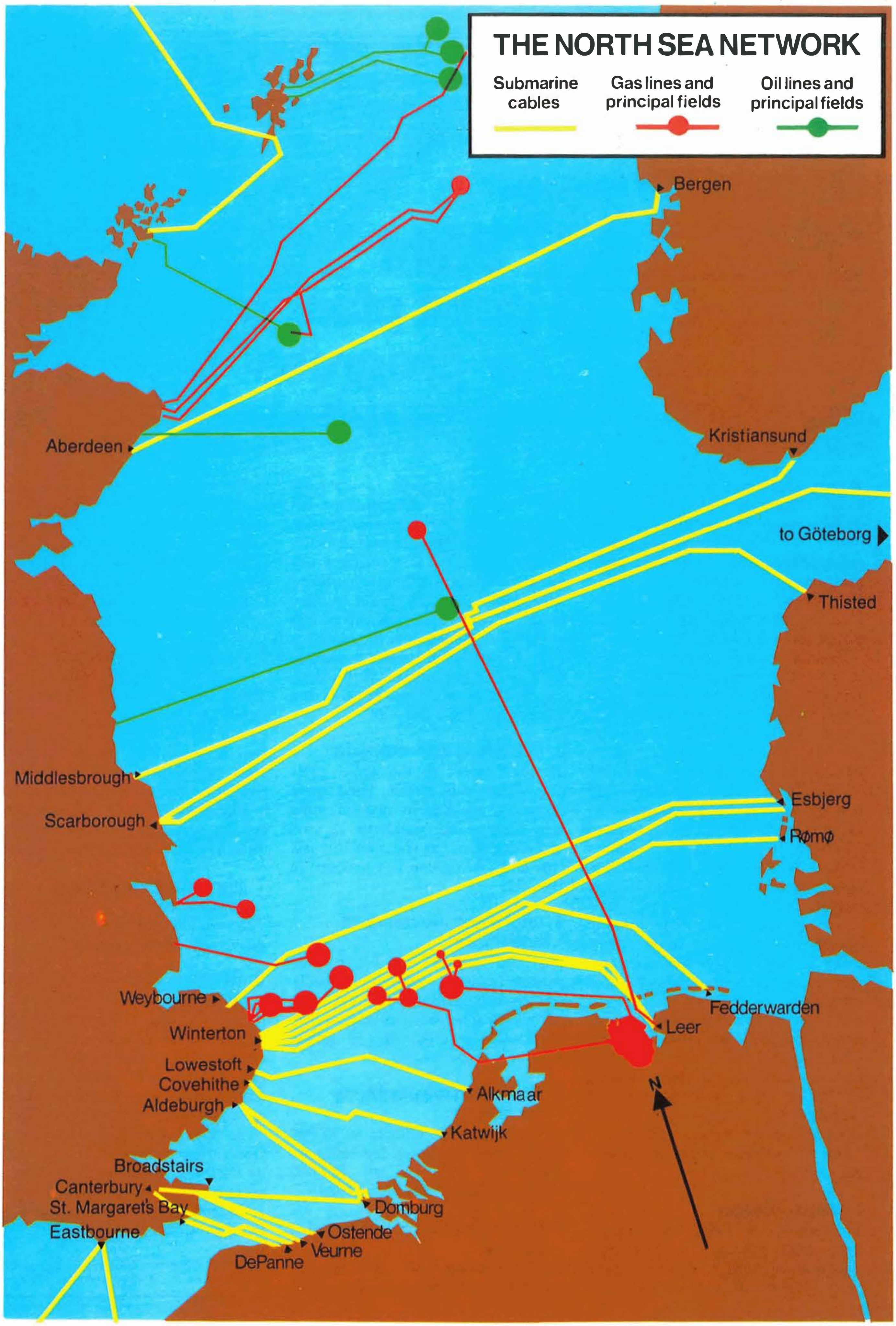
Mr R. A. Jackson is a head of section in the International Executive's International Network Division, and is responsible for administrative arrangements and agreement negotiations for cable and microwave projects.

British Telecom Journal, Summer 1980

Above: Following the splice in an undersea international cable, the injection moulding, which provides the right electrical conditions for the conductor, is X-rayed to check that it is satisfactory.

Below: After the final splice has been made, armouring around the joint is replaced before the cable is lowered back into the sea.





THE NORTH SEA NETWORK
Submarine cables
Gas lines and principal fields
Oil lines and principal fields
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Middlesbrough
Scarborough
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Aldeburgh
Alkmaar
N
Katwijk
Broadstairs
Canterbury
St. Margaret's Bay
Domburg
Eastbourne
Ostende
Veurne
DePanne

Eight point plan for progress

British Telecom will not be content until Britain has the finest telecommunications service in the world . . . That was the unequivocal message from Mr Peter Benton, managing director, Post Office Telecommunications, when he introduced the Business's eight point improvement plan in May.

Pledging a better service to customers, Mr Benton confirmed that British Telecom would be making an "unprecedented" effort to improve the quality of the telephone service over the next five years by attacking the problem from the roots. He said that within 10 years there would be a 50 per cent increase in the size of the telephone network which already boasted 17 million customers using 27 million telephones. This made the British telephone system one of the world's largest.

Last year, the Business had financed its development programmes from earnings, but this year needed to borrow money externally to maintain the investment programme. In the last financial year it had installed two million telephone lines, provided direct inland dialling to every customer, brought international direct dialling to 96 per cent of customers and launched major extensions in Prestel, the world-beating viewdata service.

The key elements of the eight-point plan are:

1 Modernisation

The aim is to replace old electromechanical exchanges with reliable electronic exchanges of which more than 1,150 are already in service. Top priority is to be given to replacing those which are unsatisfactory because of old age or equipment fatigue. Computerised measurement and analysis centres (MACs) are being introduced to monitor exchange performance and to identify faults as they occur. Business customers will benefit from the introduction of the Monarch and Herald digital private automatic exchanges being introduced this year. New facilities would also be offered to all customers from this year.

2 Replacing external plant

Trouble spots in the local cable network are to be identified and where necessary, replaced by plant meeting high performance standards. A total of £35 million was spent on this last year and £42 million will be spent in 1980/81.

3 Improving the standard telephone

Improved models and better components such as electronic transmitters are being introduced. More than 25 million standard telephones are to be replaced at a cost of £50 million over the next four years.

4 Improving the payphone service

Costing over £250 million, all 77,000 public kiosk coinboxes are being replaced by 1985 and all 400,000 renters coinbox telephones by 1988.

5 Improving the international service

The international service is already one of the most advanced in the world, and massive investment is keeping it ahead of the 20 per cent growth in traffic. New services such as the International Packet Switched Service (IPSS) and Euronet are helping to maintain this lead and already a drive to improve the international operator service is paying dividends.

6 Improving reactions to customer complaints

This will be achieved by delegating responsibility and authority for action to individuals. Mr Benton said the old civil service management style has been swept away and the business reorganised on commercial lines. This is already producing improvements because managers now have control of the resources needed for faster service.

7 Improving purchasing methods

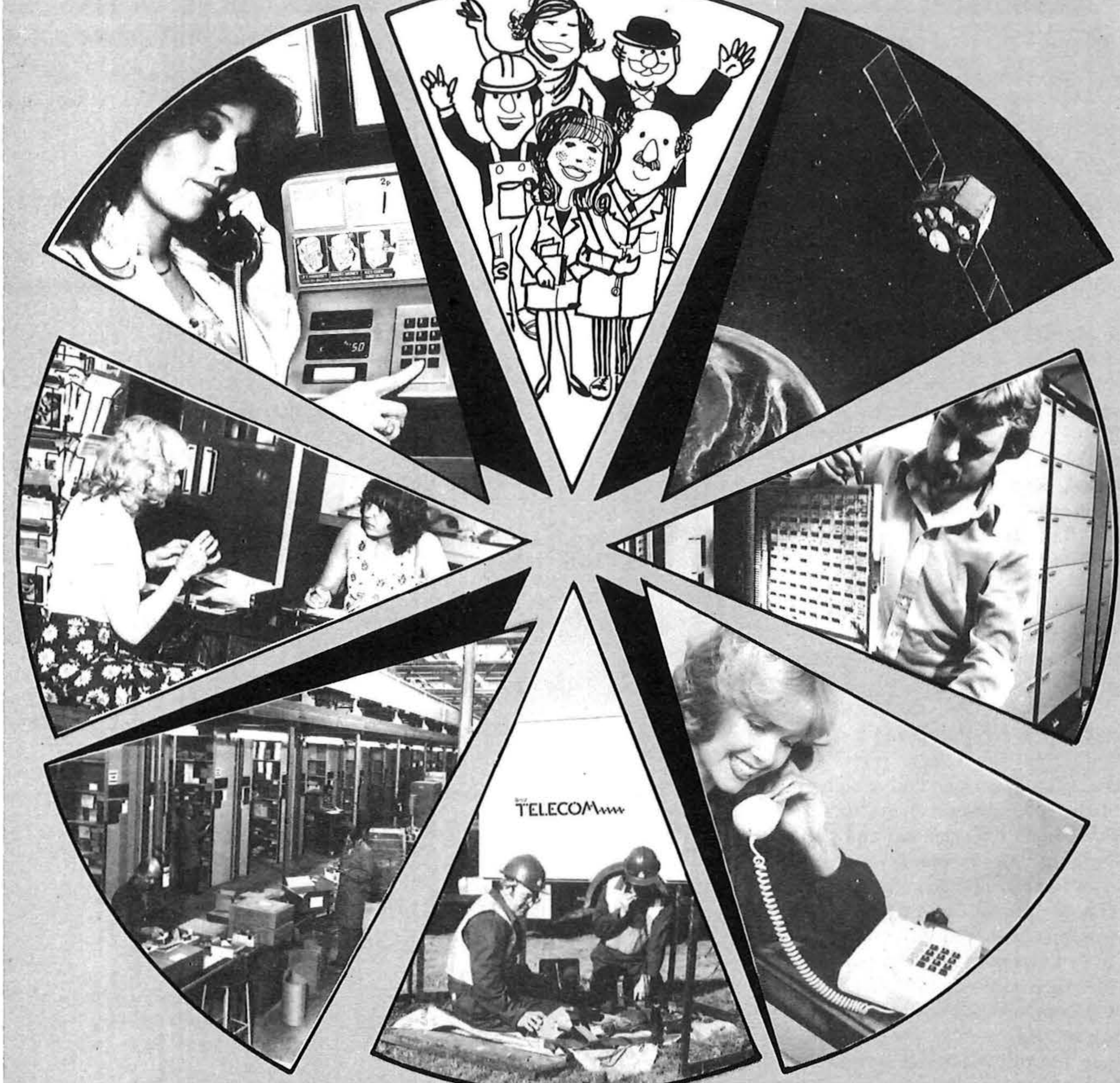
This would enable British Telecom to deliver what it had promised.

8 Removing the causes of staff dissension

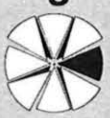
British Telecom aimed to restructure its staffing grades so that pay relativities were established by job evaluation rather than confrontation. In this way, British Telecom hopes to encourage a dedication to customer service.

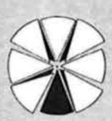
The Post Office had promised the Government to reduce the real cost of its telecommunications services by an average of five per cent a year between 1978 and 1982. "So far", said Mr Benton, "we are ahead of target".

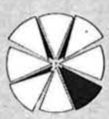
British Telecom Journal, Summer 1980

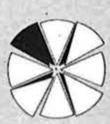


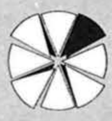
Eight point plan

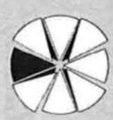

MODERNISATION: The first System X local exchange comes into service later this year. System X will play a major role in modernising the telephone network.


REPLACING EXTERNAL PLANT: Engineers trace a fault in an underground cable.


IMPROVING THE STANDARD TELEPHONE: The Ambassador – first of the new generation telephones.


IMPROVING THE PAYPHONE SERVICE: The blue payphone will spearhead the campaign to improve service at public call offices.


IMPROVING THE INTERNATIONAL SERVICE: International traffic is increasing by 20 per cent a year – helped by satellites like OTS2.


IMPROVING REACTIONS TO CUSTOMER COMPLAINTS: A customer makes a point to a clerical officer in a London telephone area sales office.


IMPROVING PURCHASING METHODS: The automated warehouse at Swindon speedily distributes stores and equipment purchased by British Telecom.


REMOVING THE CAUSES OF STAFF DISSENSION: Restructured grading should help unify staff.

The new identity

The British Telecom logotype and symbol has during the past few months become an increasingly familiar sight on vehicles, buildings, stationery and advertisements and it is hoped this new trading name will be used more and more both at home and overseas. The Business has, in fact, taken on a completely new identity aimed at reflecting the deep and profound changes facing it in the months to come.

But adoption of a new look is, of course, only the first step along the path which will lead to the ultimate separation of the Postal and Telecommunications Businesses. It is, however, a significant one and is being introduced over several years to tie in with normal replacement and refurbishing. In time 'Telecom' – a contraction of the word 'telecommunications' – should identify with British Telecommunications and all it stands for.

But how was the new identity developed? How was such an important change undertaken? And how is it being applied?

Four leading industrial graphic design groups were invited to submit proposals and eventually the work of Banks and Miles was chosen. This company already had a long association with the Post Office for it was they who conceived the double line lettering which became part of the Corporation's image in 1975. Banks and Miles's scheme was selected on the essential simplicity of its approach which meant that it could be applied very effectively and with economy by British Telecom. It also had a particular liveliness and originality about it which was perhaps lacking from some ideas submitted by the other three graphic designers.

With an organisation as big and widespread as British Telecom, the scheme will obviously be phased in gradually, although already, almost all the country's 61 telephone areas have at least one new-look vehicle in service. By the end of the year, a further 8,000 new vehicles, the normal annual replacement quota, will carry the new livery. In addition, existing vehicles will be treated as they become due for routine overhaul and repainting.

The new logo, or symbol, will soon be appearing on directories, dialling code booklets, telephone bills, headed

Five modules comprising the new identity have been submitted by the Post Office for registration as trade marks. These are:

The symbol

The dot-dash symbol

British TELECOM

The 'British Telecom' logo followed by the dot-dash symbol

British Telecom

The symbol followed by the words 'British Telecom' in plain type

British TELECOM

The word 'British' in plain type followed by 'Telecom' in stylised type without the dot-dash symbol

The new logo and symbol should be described as Post Office trade marks or should be used with an associated small 'TM' sign. As the symbols have yet to be registered, however, they cannot be described as registered trade marks, identified by the initials 'RTM'. And the words 'British Telecom' when written or printed in an ordinary typeface, should not be acknowledged as a trade mark.

notepaper and other stationery used throughout the business. It will also be seen on jointer's tents, safety helmets, equipment and lapel badges. And an early change affects one of the world's best known landmarks – the Post Office Tower becoming the London Telecom Tower.

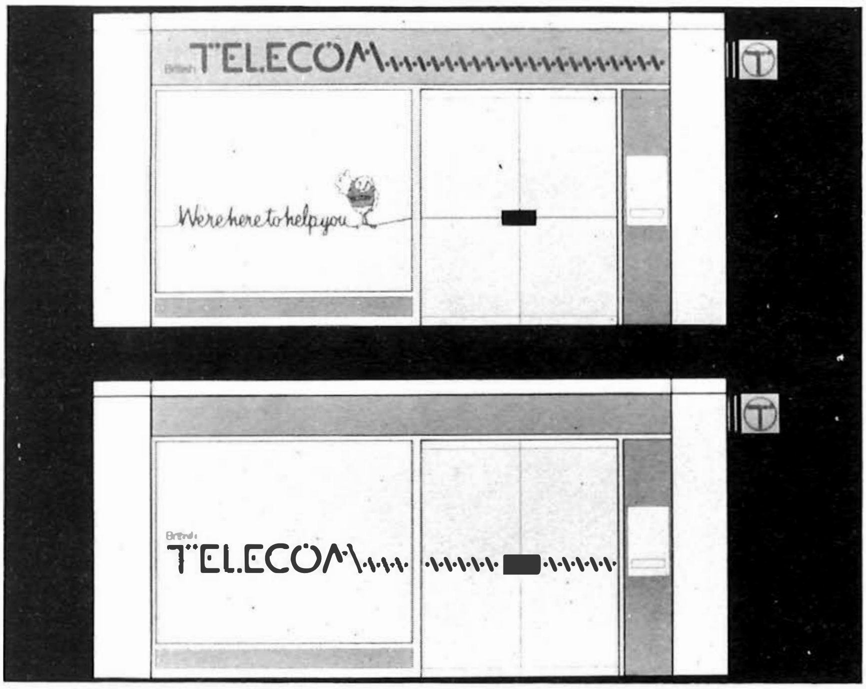
To achieve the corporate identity, Banks and Miles considered a number of criteria. They began with their definition of a corporate identity – a concept aimed at giving all those in an organisation a common banner under which to work, and to enable all its activities and property to be identified by employees and customers alike.

A vital aim was to ensure that while

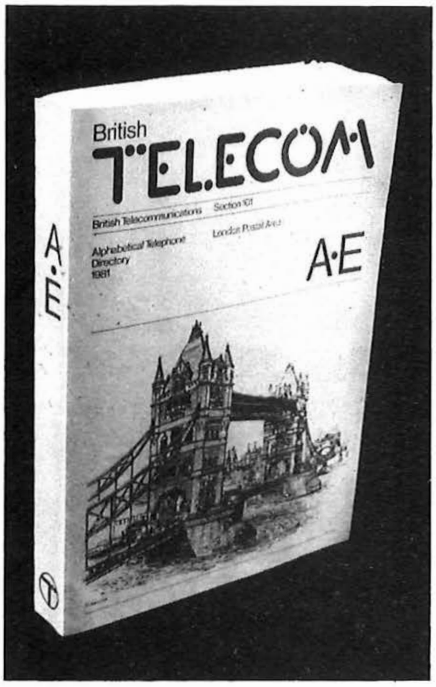
British Telecom Managing Director Peter Benton explains the reasons for the new identity at the press conference.

Technician Jacqueline Hache – a one-person installer based in Aberdeen – demonstrates the look for the engineer of the eighties.

An example of the new-look letterheadings.



Design for British Telecom shop frontage.



The new-look telephone directory.

the new name must clearly be seen to break with the Post Office, at the same time the public would want assurance that the new organisation was sufficiently linked with the past to retain the traditions and the experience of the existing business.

Thus the colour yellow was retained to maintain this continuity and also because it had become so well established, it would have been expensive to change. The second colour, blue, was chosen mainly because it complements yellow and stands out clearly on a light background.

But does the new look mean a change in the colour of the familiar public call offices from red to yellow and blue? With a new range of telephone boxes currently under development which are to be more flexible in application than those currently in use it looks as if changes are on their way. British Telecom will in future be far more responsive to public opinion on colour than in the past, and so the new range may become available in a limited number of colours. And although yellow and blue are the new house colours, it does not mean that they will be used on every occasion. Where they are not suitable, another colour may be chosen.

It will, of course, take many years for the new identity to become totally absorbed into every facet of British Telecom life. Items such as manhole covers have a long life, and will not be replaced until necessary. But by the end of next year, it will be something of a rarity to see the name Post Office Telecommunications.

The change has already begun. But it is only the start of a penetration into every part of the Telecom business, becoming as familiar in time as the old GPO. It is intended the new look will become a symbol of excellence, and will represent good service and value for money.

As Managing Director Peter Benton said when introducing the new look at a press conference, it was British Telecom's intention to provide one of the finest telecommunications systems in the world. The new identity represented this change in attitude.

British Telecom Journal, Summer 1980

The National Westminster Bank building which dominates the City skyline.

City Area's tall order

D Davison

The brand new headquarters of the National Westminster Bank is Britain's tallest office block dominating the City skyline and – like the Post Office Tower – provides an unmistakeable landmark. It has also been the subject of a 10-year project involving staff from London Telecommunications Region's City Area who have been charged with equipping the 46-storey building with a modern and sophisticated telecommunications system.

Above: Technical officer Ted Walton checks a call through the exchange in the basement of the Nat West building.

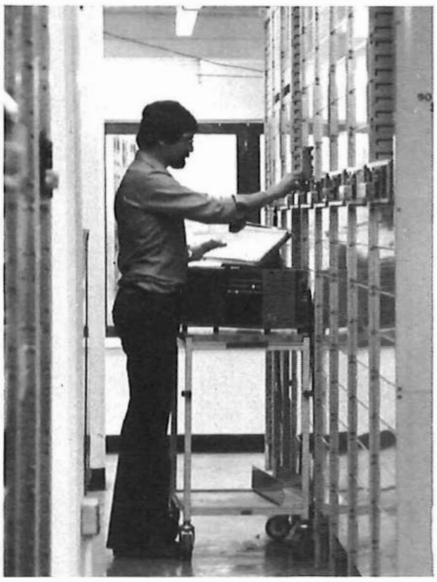
When the National Westminster Bank first approached City Area in 1970 one of the main tasks was to forecast the amount of traffic that the new system was to carry. Traffic records were taken on 10 of the Bank's existing installations and from them the forecast was derived. More discussions followed later and these determined the further requirements.

Once the specification had been decided the contract was awarded to Thorn Ericsson for the provision of an AKD 793 crossbar system. This has 500 exchange lines and a 3,300 extension multiple. To cope with the high calling levels required, it is equipped to provide a maximum of 2,950 extensions as well as providing service to the tower. It also serves a number of local NatWest buildings by external extensions.

There are 23 operating positions and facilities incorporated include push-button dialling, direct dialling in (DDI), automatic call back, external abbreviated dialling, traffic measuring equipment, selective answering and group banking on certain extensions.

Before the project, City Area staff had had little practical experience of the equipment involved and to overcome this, a special course was arranged at the Engineering Training School, at Stone, Staffs, using an AKD 791 for the purpose.

Below: Dave Dix, a technical officer, tests exchange line access in the Nat West building.



Installation of the system by the contractors began in May 1977 and it was completed 16 months later and handed over to City Area engineers for acceptance and testing. The PABX was designed to carry an overall calling rate per extension of 0.199. It was finally accepted for service in May last year and then subjected to busy hour traffic simulation tests conducted by City Area's Traffic Division.

The test involved passing 43,320 calls of all types through the system and of these 98.75 per cent were successful at the first attempt. After further testing and clearance of identified faults the PABX was accepted for connection to the telecommunications network.

Some 2,500 bank staff are now being transferred to the tower and to make sure that telephone number changes did not cause confusion, the bank and City Area devised an ingenious two-part plan which called for the provision of 200, 500 and 800 pair local cables.

In the first stage, staff from four locations served by external extensions from the Bank's Northumberland Alley AKD 793 moved to the tower but continued to be served by external extensions, retaining their existing numbers. At the tower, their telephones were tied to their new internal extension numbers which remained until change-over earlier this year.

In stage two, all remaining staff due to be served from the tower were provided with external extensions tied to their existing numbers. The new extension numbers remained wedged out until change-over day. On change-over day staff already in the tower became normal internal extension users, while staff housed elsewhere became external extension users served by the tower PABX. They retained their new numbers as they progressively moved to the tower and became internal extension users.

The AKD 793 is housed in the basement of the tower and an interesting feature of the equipment room are the 10 false windows with various views photographed from the top giving panoramic views of London. This is both a novel and attractive way of compensating for the absence of natural light.

Taken as a whole the project with its fast reliable service, gives a good indication of the systems that City Area, and no doubt many others, will be providing in the future.

Mr D. Davison is City Area public relations officer in London Telecommunications Region.

British Telecom Journal, Summer 1980

Intelsat's global challenge

Created 16 years ago in Washington DC when 11 countries signed agreements to establish a global commercial satellite system, Intelsat, the International Telecommunications Satellite Organisation, has grown to the extent that it now provides high quality telecommunications services for 143 countries and territories. British Telecom is the second largest shareholder. Here Mr W G Geddes, Intelsat's director of operations and formerly head of international satellite communication division in the Post Office's External Telecommunications Executive, looks at prospects for the next 10 years.

INTELSAT VI

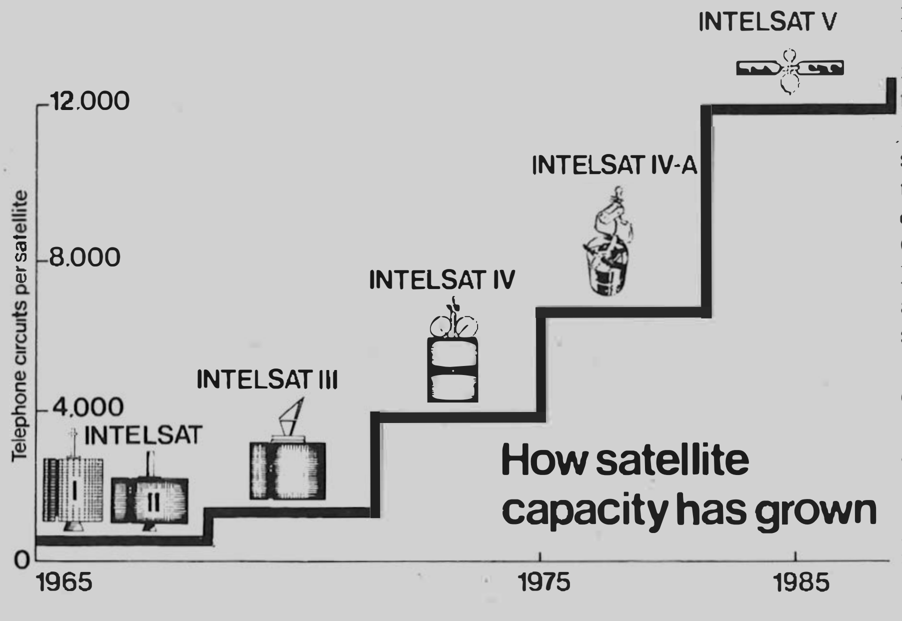
Few would question Intelsat's record of success in exploiting satellite communications and in meeting and overcoming the many challenges in establishing a global system. In the 15 years since Intelsat began commercial operations, the number of satellite circuits carrying international traffic has increased from 75 to more than 17,000 and at the same time the charge per circuit has been steadily reduced so that it is now only one-sixth of what it was in 1965.

Also, television transmissions which, in the early days, were confined to special occasions are now routinely handled at a rate of more than 1,000 a month and provide high quality reception world-wide at about half the original charge. In addition, the system provides domestic services for 15 countries. Growth has, therefore, been remarkable and a network of about 300 antennae located in all regions of the world carry the various services.

Although its achievements in meeting past challenges have been outstanding, indications are that even greater challenges lie ahead if Intelsat is to continue to cope successfully with the ever-increasing demand for the services it provides.

So far, Intelsat has relied on two main approaches to satisfy demand for in-orbit capacity for international services. These have been to increase the capacity of individual satellites and, when demand in a particular region out-stripped capacity, to introduce multiple satellites.

Individual satellite capacity has been increased by exploiting advanced technology and by using more powerful rockets to launch the resulting bigger and better satellites. In the 10 years between 1965 and 1975 four generations of satellites were developed and placed in orbit. In parallel, two-satellite operation was introduced in the Atlantic ocean region in 1972 followed by three-satellite operation in 1978.



The increased capacity of succeeding generations of satellites was enough to meet the needs of the Indian and Pacific Ocean regions with a single satellite but two-satellite operation is being introduced in the Indian Ocean region this year leaving the Pacific as the only region whose requirements can be met with a single satellite.

To meet the needs of the 1980s, Intelsat decided, in 1976, to develop a fifth generation of satellites (Intelsat V) employing new techniques including dual polarisation which enables two different sets of signals to be transmitted simultaneously on the same frequency. This, together with the introduction of 11/14 GHz frequency bands to supplement the 4/6 GHz bands, would result in the Intelsat V satellites having a capacity almost twice that of the Intelsat IV-A satellites currently in use.

Although constrained to the launch capability of the Atlas Centaur and Ariane launch vehicles, Intelsat V has also been designed to be launched by the Space Transportation System (STS), the so-called Shuttle, with the prospect of later models of the Intelsat V being able to take advantage of the much greater launch capability of the space Shuttle.

The early plans for Intelsat V, although soundly based when developed, have been overtaken by escalating demand with the result that although the first Intelsat V has yet to be launched, forecasts indicate saturation of the Atlantic and Indian ocean region primary Intelsat V satellites by the middle of the present decade. Moreover, the delays that have been experienced in the Shuttle programme put in doubt the possibility of being able to utilise its ability to launch larger satellites at an early enough date to meet the full requirements of Intelsat.

Intelsat was thus faced with the problem of the Intelsat Vs becoming saturated well before the end of their seven-year design life. To remedy this situation, a new approach was decided, involving the introduction of a more efficient digital modulation technique, obtained by the provision of new equipment at the earth stations. This would substantially increase the traffic-carrying capacity of the satellites.

The digital modulation technique chosen was time division multiple access (TDMA) which, together with digital speech interpolation (DSI) can provide about a threefold increase in the traffic-carrying capacity of an 80 MHz transponder in an Intelsat V satellite compared with the traffic that could be carried by frequency modulation/frequency division multiplex.

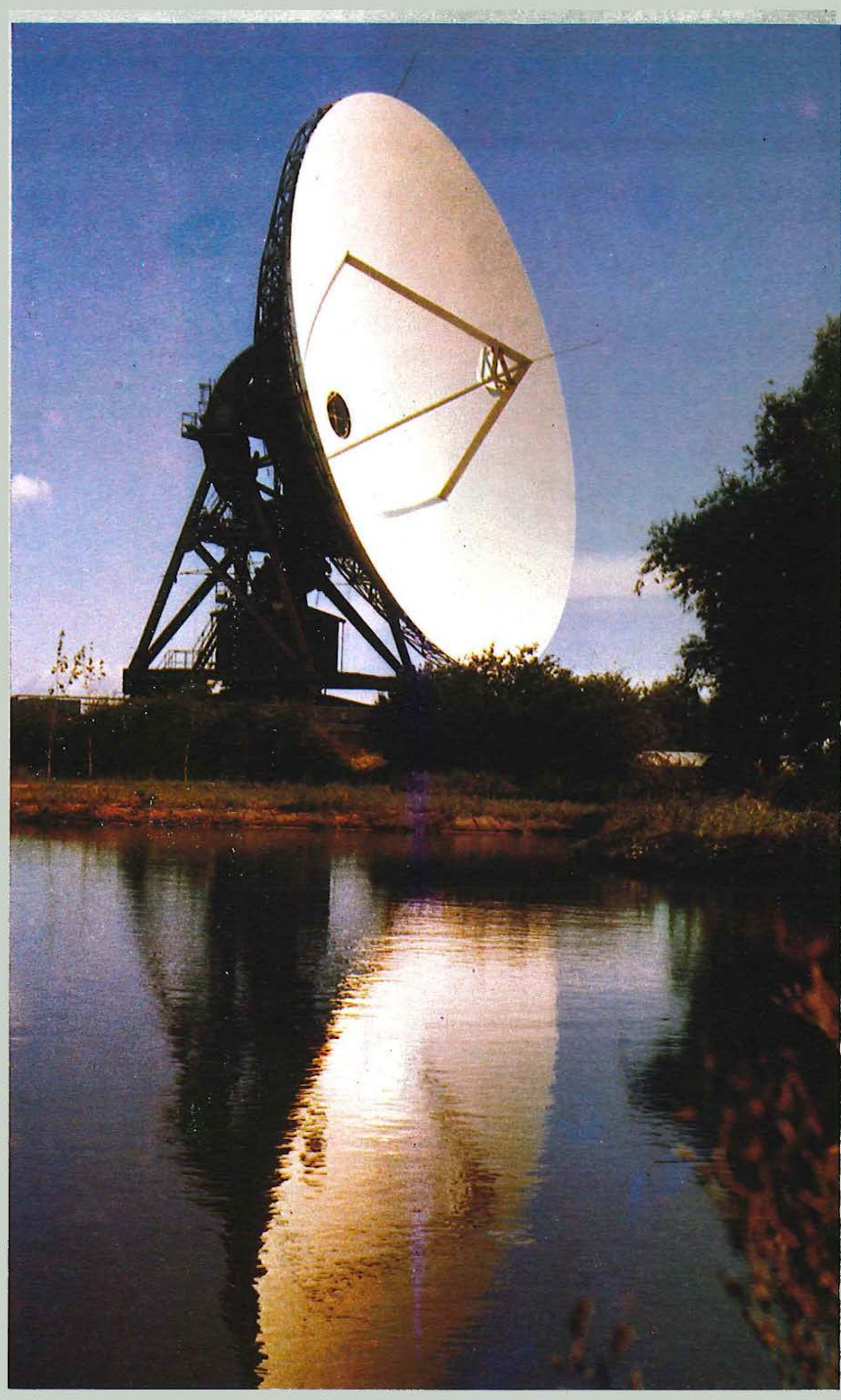
Digital modulation techniques are not new to Intelsat, which began experimenting with them in the late 1960s and they have been used since 1974 in the SPADE system which provides circuits between countries on a demand assigned basis. Field trials of a prototype TDMA/DSI system took place in 1977 and plans have been developed for the introduction of TDMA/DSI in the Atlantic ocean region in 1983 and in the Indian ocean region a year later.

It is generally accepted that digital transmission techniques will provide the backbone of future communications systems and it would seem that Intelsat's timing is about right. Nevertheless, to change from a predominantly analogue to a predominantly digital system in a time scale that is largely dictated by system as opposed to individual requirements, will pose as great a challenge as Intelsat has ever had to face.

In the past, growth problems have been solved by adding in-orbit satellite capacity, the cost of which is borne by member countries in accordance with their investment quotas. These are based on each country's use of the system and currently range from 22.5 per cent to 0.05 per cent. Thus, for the smaller users with low investment shares, the cost of putting another satellite in orbit does not present a significant financial burden.

The successful implementation of TDMA/DSI will, however, involve substantial expenditure on earth station equipment and although initially only the larger users will be required to provide the new equipment, eventually some of the smaller users will also have to face up to what for them will be a major capital outlay. On the other hand, all members of Intelsat will benefit in due course since TDMA/DSI will make possible major savings in satellite costs and there will be a corresponding reduction in the capital contributions that they will make to Intelsat.

The process of implementing TDMA/DSI will be spread over a number of years and much will



Aerials at British Telecom's earth stations at Goonhilly, Cornwall and Madley, Herefordshire carry signals to and from satellites over both Atlantic and Indian Oceans. Our picture shows the Madley 1 aerial with its 32-metre diameter dish.

The Intelsat V spacecraft – minus solar panels – undergoes antenna pattern measurements. Due for launch within the next six months, the satellite has a capacity of about 12,000 circuits and two television channels.

depend on how well the system progresses in the early stages, and on the determination of the bigger users to make sure it gets off to a good start. The challenge is there, and it will be interesting to see how well the major users rise to the occasion. As the second biggest user in the Atlantic ocean region and the biggest user in the Indian ocean region, British Telecom will have a key role in giving a lead to ensure the timely implementation of the system.

Although TDMA/DSI will result in more efficient use of satellite capacity it will not, by itself, solve Intelsat's problem of keeping pace with demand for international services. To this end plans have been developed for the introduction of the next generation of satellites – Intelsat VI. These are being designed to incorporate even more advanced techniques – including satellite-switched TDMA – which will enable satellite capacity to be further increased. When introduced into service in the second half of the 1980s, these should provide for international service requirements into the 1990s.

As well as the challenge posed by increased demand for international services, Intelsat is also faced with increased demand for domestic services. Intelsat's first domestic service customer was Algeria which began operation in 1975. Since then, domestic systems for a further 14 countries have been established using Intelsat satellites. Five more countries are in the process of constructing domestic systems and a further 12 are in various stages of preparation.

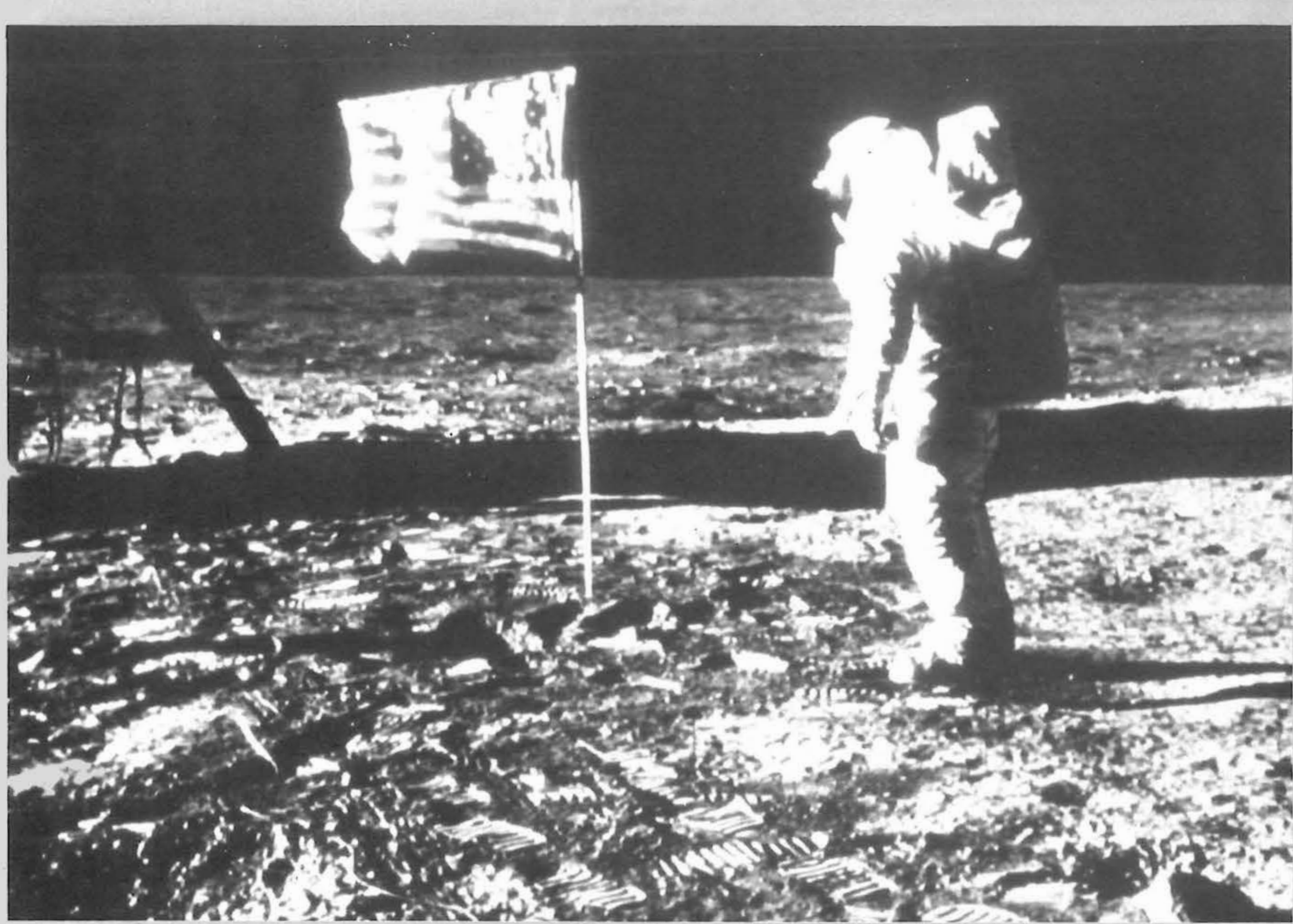
So far, domestic services have been provided by Intelsat mainly on spare capacity, utilising the in-orbit spare satellites provided in each region to take over in case of failure of one of the operational satellites, or on older type satellites which have been retired from international service. Charges for these domestic services have been at a lower rate than for international services and the services have been provided on a pre-emptible basis and subject to interruption should the satellites carrying the domestic services be required for international services. But, no country's domestic service has yet been pre-empted.

As demand for such services grows however, and as the older type predecessor satellites reach the end of their useful lives, the risk of pre-emption becomes greater. By the end of 1982 the only satellites capable of providing domestic services will be the in-orbit spares and, for example, in the Atlantic ocean region, the in-orbit spare could be carrying domestic services for 15 countries. Failure of an Atlantic operational satellite – and there are three of them – would mean utilising the in-orbit spare to restore the international services in which case the domestic services of all those countries provided on the in-orbit spare would be pre-empted.

This is a situation which Intelsat would find difficult to tolerate and for which a solution has to be found. With few exceptions, Intelsat is well placed to provide for most countries requiring domestic satellite service and indeed, in the majority of cases, leasing satellite capacity from Intelsat is the only viable way by which developing countries can satisfy their domestic telecommunications requirements. To meet these requirements will need the provision of satellite capacity for domestic services which is not subject to pre-emption, either by means of dedicated domestic satellites or in some other way at a price which the countries concerned can reasonably be expected to afford.

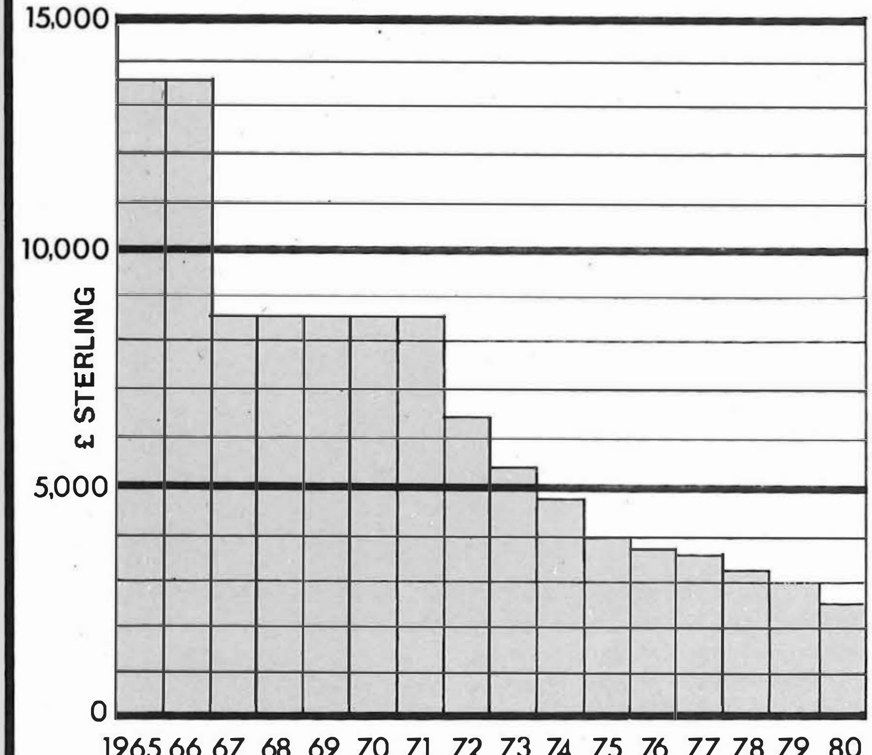
Yet a third challenge facing Intelsat is the provision of maritime services. With its established network and the ability to equip its satellites with maritime packages, Intelsat is clearly well placed to provide the space segment for maritime services. This has been recognised by the board of governors of Intelsat which has approved the installation of maritime packages on the last four of the eight Intelsat V satellites on order. It has also been recognised by the Council of Inmarsat which has invited Intelsat to bid for the provision of space segment capacity for maritime services.

It is in fact, a new experience for Intelsat to find itself in the position of a bidder, in competition with others, for the provision of satellite services. To succeed in the competition to provide



The historic moment when man first set foot on the moon was relayed live via satellite to a television audience of 500 million people throughout the world in July 1969.

How the annual cost of using a one-way circuit has fallen



at least part of the initial space segment required by Inmarsat is Intelsat's first objective: what may be even more far reaching is the part that Intelsat may be asked to play in future in providing for Inmarsat's later needs.

As the new decade begins, Intelsat can look back with a sense of achievement at having successfully overcome the challenges of the past 15 years. What is certain is that the challenges of the future will probably be far greater than those of the past. Identifiable areas which will call for special efforts are the international, domestic and maritime services and, with the rate of progress over the last several years, it appears more than likely that demands for new services will emerge which are not even definable today.

The success of Intelsat will depend on its ability to meet these challenges and this will require a combination of technical judgement, sound planning, co-operation and timely decisions. Given its record of success in the past, there is every reason to be confident of Intelsat's success in future.

British Telecom Journal, Summer 1980

An optical fibre cable on the Walsall-Brownhills route is coated with lubricant to enable it to glide easily into the duct.

Optical fibres-work begins

The foundations of British Telecom's new optical fibre network which, by 1982 will be the biggest in the world, have now been laid.

For the past few months, engineers throughout the country have been installing nearly 450 kilometres of the special cable which houses the hair-thin strands of purest glass capable of carrying thousands of telephone calls simultaneously on beams of laser light.

In all, there will be 15 routes in England, Scotland and Wales with lengths varying from four kilometres (Vauxhall to London) to 75 kilometres (London to Reading). The network will progressively come into service from September.

The new network is the first step in a major drive by British Telecom to speed the adoption of optical fibre communications in Britain. The technique is expected to make a significant contribution to the efficiency of the nation's telecommunications system by the mid-1980s.

One of the greatest benefits of optical fibre communication is expected to be the significant cost reductions it will offer in sending phone calls, television pictures and computer data. It needs less amplifying equipment to boost telephone calls over long distances, and this can lead to considerable savings. A further advantage is the size of optical fibre cable compared with conventional telephone cables having copper or aluminium conductors.

A pair of fibres can carry up to 2,000 calls, and potentially many more. The cables used in the new network will contain eight fibres, and therefore be able to carry up to some 8,000 calls – but their overall diameter is only some 10 millimetres (less than ½ in). By comparison, the most commonly-used inter-city coaxial phone cable – which carries broadly the same number of calls – is about 35 millimetres (1½ in) in diameter.

Because optical fibre cables are so small, more of them can be installed in British Telecom's vast network of underground ducts. And their size and flexibility make them much easier to handle than the stiff and cumbersome telephone cables.

The new systems will transmit information using the internationally agreed standards of 8 Mbit/s, 34 Mbit/s and 140 Mbit/s, with respective capacities of 120, 480 and 1,920 bothway telephone channels. All these systems will form part of the growing digital transmission network being set up in Britain as the essential forerunner to the introduction of digital electronic exchange systems.

The 140 Mbit/s systems will be used in the trunk network. They require dependent regenerators located at intervals of about eight kilometres compared with the two kilometre spacing of repeaters used in 12 MHz analogue coaxial cable systems. They use lasers as the light sources and the transmission equipment also includes a system for feeding power to the regenerators along the route. The 34 Mbit/s systems will have many of the features of the 140 Mbit/s systems and are being designed to be specially suited to the needs of export markets.

Of the 24 8 Mbit/s systems being ordered, two are for one route on the trunk network (Oxford-Banbury), while the rest are for nine routes in the junction network, interconnecting local exchanges. Junction routes are relatively short, and usually in urban areas. Some routes will not need regenerators, but when regenerators are required, they can usually be housed in British Telecom buildings rather than in underground manholes. Regenerator spacings may be up to 12 kilometres.

The fibres used in the cables will be mainly of the graded index type. Low-loss fibre – less than 4 db/km at the operating wavelength, which lies in the range of 820 to 900 nanometres – will be used for the long-haul systems, to exploit the economic advantage obtained. Transmitting devices are lasers – on the higher bit-rate systems – or light-emitting diodes, while the optical receivers are generally avalanche photodiodes.

British Telecom Journal, Summer 1980

The first 15 optical fibre routes

Route	Length km	Rate Mbit/s	Number of systems
Colchester-Basildon	61	140	2
Basildon-London	47	140	2
London-Reading	75	140	2
Reading-Guildford	53	34	2
Reading-Oxford	48	34	2
Oxford-Banbury	39	8	2
Croydon-Vauxhall	16	8	2
Vauxhall-London	4	8	2
Arrington-Cambridge	17	8	2
Brownhills-Walsall	9	8	2
Aberyswyth-Ponterwyd	19	8	2
Tywyn-Corris	23	8	2
Corris-Dolgellau	16	8	4
Corris-Machynlleth	9	8	4
Aberdeen-Kingswells	12	8	2

This, the second article in our series on foreign administrations, looks at the domestic scene in Japan for which Nippon Telegraph and Telephone Corporation is the operating authority.

A yen for success

In 1948 there were four times as many telephones in Britain as there were in Japan. By 1963 the two systems were about equal in size. But now, with more than 50 million telephones, Japan has double the number of the UK. And with telephone penetration about the same as that of the UK, there is still plenty of scope for further growth.

Japan's phenomenal growth in telecommunications – it has the second largest system in the world – matches its post-war industrial growth. This is all the more remarkable when seen in the light of two greater disasters – the 1923 earthquake which destroyed nearly two thirds of Tokyo's telephones and the second World War in which over half the country's telephone lines were destroyed leaving about half a million by 1945.

Japan's telecommunications recovery began in 1952 with the formation of the Nippon Telegraph and Telephone Corporation (NTT). Although the Ministry of Posts and Telecommunications controls the finances and basic tariffs, NTT was given relative freedom to administer inland telecommunications. And while another organisation – Kokusai Denshin Denwa Co Ltd – is responsible for the international side, NTT is similar to the proposed structure of British Telecom in that it is a public Corporation separated from Posts and operating at three main levels.

At the top there is Head Office, roughly equivalent to THQ; at the second level there are 11 Telecommunications Bureaux corresponding to UK Regions, while under these are 70 field administrative Units, a little larger than UK Telephone Areas but operating twice as many telephones.

NTT policy, executed in a series of five-year plans since 1952, has been two-pronged and consistent. The first aim was to provide service without delay. By 1977, applications were being dealt with immediately, in contrast to the situation in 1970, when there were more than three million applicants on the waiting list. The second aim, nationwide dialling, was achieved last year.

Up to half of NTT's cumulative capital has been financed by NTT Bonds, which every new customer must buy for between £40 and £300 depending on the local exchange size and type of service. Even though Bonds can be resold at once, a new customer must initially find up to £500 to obtain service; this figure includes a connection charge of about £150, the cost of Bonds and a monthly rental graded according to exchange size. The customer may then enjoy call charges which compare favourably with those in Britain.

Local calls are timed and cost 10 yen for three minutes about 2p. Trunk call charges compare well up to about 100 km but beyond that they become more expensive than in the UK. And calls over 240 km cost as much as UK calls to Europe. Japan's call tariffs however, have remained unchanged since early 1977 when monthly telephone rentals were doubled and call charges were increased by about half.

NTT is now turning attention to its residental customers who form nearly two thirds of the total compared with about 80 per cent in the UK. By current British Telecom standards, NTT attachment policy is liberal in that it insists only on providing the main telephone. This has allowed fast growth and boosted telephone use. The so-called 'home telephone' system with up to four extensions on one exchange line, often used by small businesses as well as in homes and shops, is claimed to have increased calling rates and the 'extension telephone system', which has up to three extensions, there are more than five million such installations.

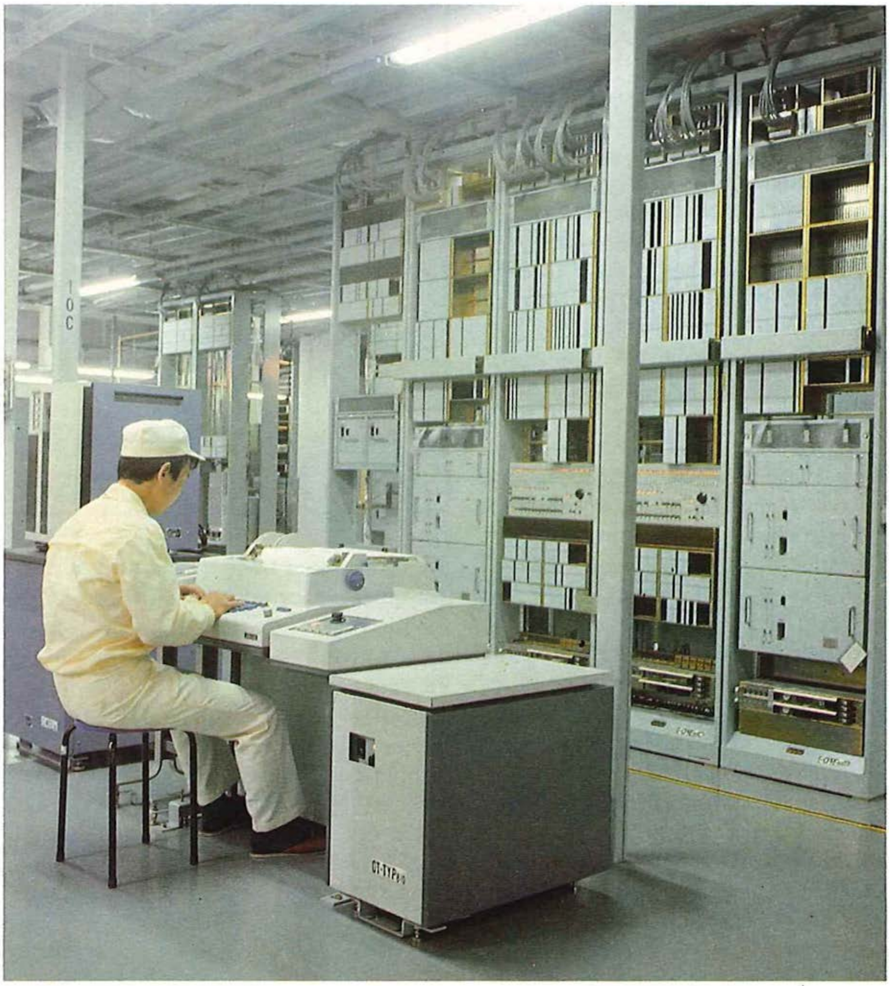
Cordless telephones were first introduced publicly earlier this year.

The 'push-phone', or 'key-phone' is also very popular with nearly $2\frac{1}{2}$ million in use, half of which are used at home. Customers with these telephones have an abbreviated dialling facility where up to 20 numbers can be registered on a magnetic drum so that, as with callmakers, only two digits need be sent. Both key-phone and rotary dial phones on modern exchanges may have a call waiting facility known as 'catchphone' where waiting calls can be accepted without losing the first call. Some 200,000 customers use this facility which costs about £6 a year. And for about £11 a year, users may have a telephone message advisory service which gives up to 10 standard messages; this service competes with privately supplied answering machines.

But the supply of many attachments and facilities is not enough in itself to ensure call revenue when the system contains a high proportion of home phones. The customer must be assured of a sound basic service. NTT achieves more than a 70 per cent successful call rate, compared with about 64 per cent in the UK. The Japanese customer, however, contributes notably to the success rate by his availability at the end of the phone. But perhaps the most outstanding feature of telephone service in Japan is its reliability. Now running at the rate of about one fault per customer every 14 years, it is believed to be the best in the world.

Explanations are not hard to find. For a start, telephone sets are very reliable and exchange equipment is more modern than in Britain where 80 per cent of exchange equipment is still of the Strowger electro-mechanical type. In Japan there is about the same proportion of crossbar equipment – all installed since 1955. Electronic switching systems are extensively used and by 1983, step-by-step trunk switching will no longer be in use. And digital switching systems are being planned for introduction in the near future.

The external fault rate is also very low, allegedly because of the wide use of plastic-coated cable. NTT's maintenance philosophy probably also contributes to its high service reliability. Using a system of controlled corrective maintenance, NTT sets control values for service and plant performance in every operating unit monitors achievements constantly to see they are not exceeded.



Japan has an extensive programme for introducing electronic switching. This is the D-10 electronic switching system.

Three of the half million desk-top red coinbox phones in use throughout Japan. These are situated in a Tokyo telephone centre.

Exchanges are also very clean and air-conditioning is provided for the most modern equipment. As is customary when visiting a shrine or temple in Japan, indoor shoes must be worn as well as a white nylon coat to enter a telephone exchange.

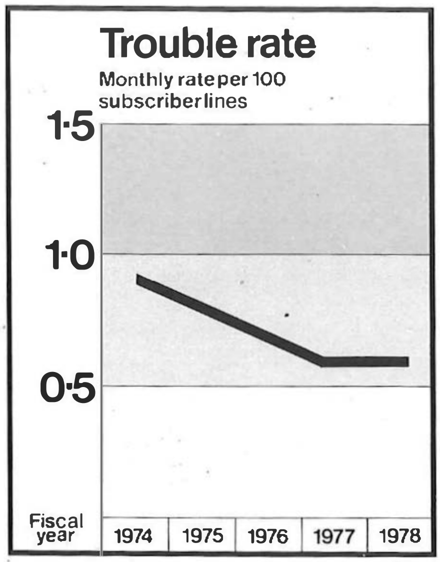
With Japan in the typhoon belt and having to contend with frequent earthquakes of varying intensity, elaborate precautions, such as special forms of cable joint sheath closure, are taken to minimise damage. Such a network is bound to perform well under normal conditions.

In common with other major world administrations, NTT is now keenly aware that it is entering the era of the 'information society'. With one-way information flows via media such as newspapers and television virtually saturated, two-way communication continues to expand, but both the traditional alternatives to the telephone – telegraph and telex – have passed their peak in Japan. Telegram traffic has been declining for some years although use of the greetings telegram representing nearly three-quarters of the total, has been maintained. Telex customers peaked at 75,000 terminals in 1976 but the number has now dropped to 67,000. The problems of communicating the written word in a language with several thousand characters are better solved by facsimile than telex. NTT is competing openly with the private sector in marketing facsimile machines associated with the telephone for use on the public network. A recent introduction, Facsimile-20, can transmit A4-size documents in two or three minutes and tariff approval has been sought for Facsimile-10, a new device which can transmit the same quantity of information in just 50 seconds. Already, more than 10,000 terminals have been connected to the facsimile service.

If facsimile has succeeded telex, then data transmission may be said to have succeeded telegraphs. On-line information processing services offered by NTT are of two types. First, a public data communications service with a general purposes facility is offered on a time-sharing basis. Not only does it provide scientific and engineering calculations, the service can also control sales and inventories. Secondly, there are specific customised services for public utilities such as a motor vehicle registration system, emergency medical information, environment pollution and so on. In 1971, NTT gave way to pressure from potential users who wanted its data communications monopoly to be relaxed so that the public network could be used by private computer operators. This led to a dramatic increase in both dedicated and dial-up circuits and now more than 100,000 terminals are in use.

Cultural attitudes may play a significant part in the Japanese enthusiasm for telecommunications. More group orientated than Westerners, the Japanese are probably a more homogeneous nation than any other.

And it is the telephone which has eased the strain of rapid industrialisation and increased mobility on family and community life. The Japanese are not merely content to use the telephone between their homes and offices – they have extended the network to mobile points. Years ago, NTT introduced a telephone service on the Shinkansen 'Bullet' train. Now they have opened a national automobile radiotelephone service. With more than 30 million cars and trucks in Japan, the forecast of a million customers may not be optimistic.



While many in Britain seek refuge from the telephone, the Japanese will cheerfully allow themselves to be called while on the golf course or even on holiday. Radiopaging is marketed by NTT as 'Pocket Bell', and its success is such that Japan has the largest number of radiopagers in the world – about three quarters of a million.

Radiopaging is likely to be stimulated by the availability of public telephones, and Japan, with seven per 1000 of the population, is believed to have the largest number per capita in the world. They come in bright red, blue and yellow and are among the first things to strike the visitor. About half-a-million are robust red desk-top telephones usually put out at the front of shops in the day time. Many others are to be seen in departmental stores. In every case, they are provided under an agency contract between NTT and the site owner – thus solving the problem of securing sites.

Unlike red telephones, the blue and yellow ones are available 24 hours a day and are housed in glass-sided cabinets or protected with transparent covers. Blue coin boxes accept only 10 yen coins and are only available for local calls, while the yellow will accept both 10 yen and 100 yen coins (say 2p and 20p) and can be used for all calls. NTT has increased the number of public telephones by about 80,000 in the past two years – more than the total number in Britain.

There are almost as many pink renters coinboxes as there are red, blue and yellow public boxes. As they are usually installed in shops and cafes to serve both their own and customers' needs it may be inferred that there are nearly $1\frac{1}{2}$ million telephones publicly available in Japan during the day.

NTT impresses upon its 330,000 staff, the idea of 'spirit of service'. Staff are encouraged to serve society and the country as a whole and this leads to a high degree of diligence and loyalty. Throughout Japan there is a strong tradition of life-long employment with the same company or corporation.

There is little or no conflict between management and workers. Union activity may be fierce in the spring wage bargaining period but it does not cause any long-term bitterness and has become a sort of ritual. Half yearly bonuses form a substantial part of an employee's income. The working year is long on hours and short on leave, particularly in the case of senior managers who may give up part of their leave in the interests of the job. Health and welfare are not neglected by NTT who provide 13 hospitals and more than 100 medical clinics and dispensaries. Retirement is at 55.

Japan's communications technology is already knocking at the doors of its greatest rival – the USA. The great strides it has already made, and no doubt will continue to make, spring from the loyalty and dedication of its staff on the one hand and the paternalism of the employer on the other.

In the next issue of British Telecom Journal, the authors will take a look at telecommunications in West Germany.

The authors – **Mr O. P. Sellars, Mr J. J. E. Swaffield, Mr J. F. L. Stubbs** and **Mr S. Lunt** – are all members of the international comparisons group in the Service and Performance Department at THQ.
They acknowledge the help given by **Mr H. Ito**, London senior representative of the Nippon Telephone and Telegraph Corporation, in the preparation of this article.

British Telecom Journal, Summer 1980

Better joints for local lines

In an effort to improve the overall reliability of local underground plant and give better customer service, British Telecom has been developing new methods for closing joints in the local cable network.

D Ansell

To seal a cable joint, technical officer Trevor Boyce sets a pneumatic gun in position on an electrically-heated mould to inject polyethylene round the cable end. After injection, the mould is water cooled and a joint may be pressure-tested immediately.

Many faults in the local cable network occur at jointing points and a significant number of these are due to a failure of the joint closure which allows water to enter the joint causing low insulation. This gives rise to noisy lines, overhearing between circuits and often results in disconnection faults from corrosion of the conductors in the local cable.

Although the network consists mainly of polyethylene-sheathed cables, which withstand the general environmental conditions of underground plant, there is a basic difficulty in providing satisfactory and lasting seals at cable joints. This is due to the complexity of the network and the varieties of obsolete cable and jointing practices still existing in the system.

Basically, the network is divided into main cables and distribution cables. Main cables are the large air-spaced types of up to 4800 pairs which radiate from the exchange to aboveground jointing structures such as cabinets and pillars. These serve as flexibility and connection points to the distribution cables. The cables are air pressurised and monitored by pressure alarm circuits which give warning of a cable sheath or joint closure failure and also provide a degree of security against water ingress while the fault is located and cleared.

Methods of jointing on existing plant are lead plumbing if lead cables only are involved or epoxy resin putty (EP), plumbed joints where polyethylene or a mixture of lead and polyethylene cables are present. For several reasons the EP closure method has proved unsatisfactory for maintaining an adequate pressurisation standard and two new practices – injection welded joints and another EP repair method – have been developed and satisfactorily undergone trials. Both apply equally to the trunk and junction cable network.

Injection welding uses a heat fusion process to weld the cable sheath and joint sleeve together. It can be used on any polyethylene sheathed cable containing an aluminium water barrier and by using a special tape it can also be adapted to lead cables if required.

The technique involves placing a steel-lined polyethylene sleeve over the joint which is held in position with split heat-resistant discs fitted between the sleeve ends and cables entering the joint. An electrically-heated mould is fitted around the sleeve and cables, and molten polyethylene is injected into the mould from an electrically-heated pneumatically-controlled gun.

Technical officer Fred Honour tapes over the mild steel tubular mesh on a one-to-one cable before application of the shrinkdown sleeve.

After injection, the mould is cooled by pumping water through passages provided in the mould body. The heating and cooling cycles are controlled semi-automatically from a master unit thus making the fusion process less operator dependent. A joint may be pressure tested immediately it is completed to prove that a sound closure has been made. This equipment is now being issued to telephone areas for new cable provisioning work and for replacing those existing EP joints which have caused problems.

Most faults at EP joints are pressure leaks which do not affect customer service but since it is a difficult and extensive operation to remake the closure and restore pressure standards, a relatively easy and effective maintenance repair method using split heat shrinkdown sleeving has been devised for these situations. Shrinkdown sleeving is made from a flame-retardant polyolefin material which is expanded during manufacture to a predetermined size according to the shrinkdown ratio required. The inside of the sleeving is coated with a hot melt adhesive. When heat is applied, the adhesive melts and the sleeving attempts to revert to its original size, thus forming a tight adhesive-filled compression bond.

For single or multi-entry cable joints accommodated in surface joint boxes the cables are built up to the diameter of the joint sleeve by casting a resin block on to the cable adjacent to the faulty plumb and completely enclosing them. A suitable size of split heat shrinkdown repair sleeve, cut to length so that it overlaps on to the joint sleeve and extends the full length of the resin block, is wrapped around the repair area and the split secured together with a flexible metal rail. Heat is applied from a propane torch and by working outwards from the centre of the repair sleeve in a circular motion, the sleeve shrinks down fully on to the resin block and joint sleeve.

In manholes a repair to a single entry cable joint is made by building up the cable with layers of self-amalgamating tape so that the change of plumb to cable sheath diameter is made more gradual. A length of heat-shrinkable sleeve is used to seal the joint sleeve to cable sheath as already described. Whereas an EP joint closure cannot be pressure tested until 24 hours has elapsed, this repair can be tested after a period of cooling no less than 45 minutes.

Distribution cables, normally two to 100-pair size, distribute the main cable pairs to customers' premises. Some 90 per cent of the network is polyethylene sheathed, a large amount of this being directly buried and jointed. Since it was introduced in the 1950s, various types of polyethylene cable have been used, including air spaced (unfilled), water blocked (containing blocks of compound at discrete intervals in the cable) and the present type which is fully filled with a petroleum jelly compound.

Similarly, many types of joint closures have been used ranging from expanding plugs, tee couplings, the all-tape joint, through to the present methods of taped sleeve and collar joints, Sleeves 31A and above-ground jointing posts. It is not surprising, therefore, that most service affecting faults occur in this section of the network and many of them can be attributed to joint failures. To combat the problems, three heat shrinkdown sleeve techniques have been developed and evaluated for national introduction. In each case the main jointing components will be supplied in the form of kits.

The first method, principally designed for new cable work, is basically for in-line jointing situations where more than one cable enters either end of the joint. It makes use of a preformed collar with three outlet ports which are made of heat shrinkdown material to cover 20 pair to 100 pair cables. It is intended that one of the outlets should be left spare for maintenance purposes.

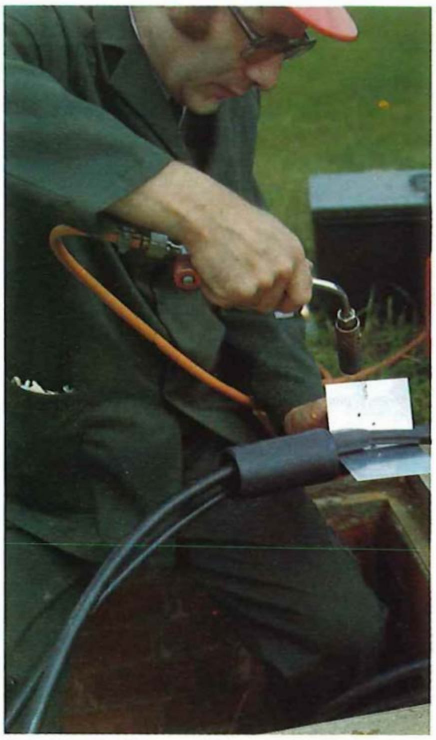
For jointing, two collars, two pieces of tubular shrinkdown sleeving and a polyethylene jointing sleeve, are fitted over the cables, as required. The collars are placed at predetermined positions either side of the joint and the outlets used are shrunk on to the cable sheaths prior to jointing the conductors. A special tool protects any spare outlet from the applied heat. After jointing, the polyethylene sleeve is slid into position on the collars and the collar-to-sleeve closures completed with the shrinkdown sleeving.

The second closure method is suitable for one-to-one type cable joints on new work or maintenance applications. The jointing kits will be provided in three sizes to cover the full range of two to 100-pair cables, each kit containing a heat shrink tubular sleeve, a mild steel tubular mesh, and polyethylene coated aluminium foil. The tubular mesh and shrinkdown sleeve are fitted over the cable to one side of the joint.

The aluminium foil is cut to size and wrapped around the jointed conductors and secured to the cable butts with tape. The mesh is moved over the joint and secured at one end to the cable sheath. It is then smoothed down and fully overtaped and secured to the opposite cable sheath. Finally the shrinkdown sleeve is applied over the joint with equal overlaps at each end and shrunkdown over the full length of the joint.

The third and final closure method comprises a split heat-shrinkdown sleeve containing a spur outlet port opposite the split. It is intended primarily for maintenance purposes to replace existing faulty frontage tee joints which are small taped polyethylene T-shaped split sleeve closures previously used for connecting the customer's two pair lead-in cables to the frontage cable. The spur cable is fed through the outlet port and jointed to the appropriate pairs in the frontage cable. Three layers of polyethylene-coated aluminium tape are applied over the cable core to serve as a heat shield. The sleeve is fitted over the joint, the split secured by a flexible metal rail and the complete sleeve shrunk onto the cables.

Other developments under study include heat shrinkdown sleeve and collar joints for pressurised main cables, and split sleeve versions for multi-entry distribution cable joints which will be more readily adapted to maintenance conditions. When the new practices are used in conjunction with existing accepted Sleeve 31A and jointing post techniques, they will be of considerable assistance in providing a more reliable and secure cable network.



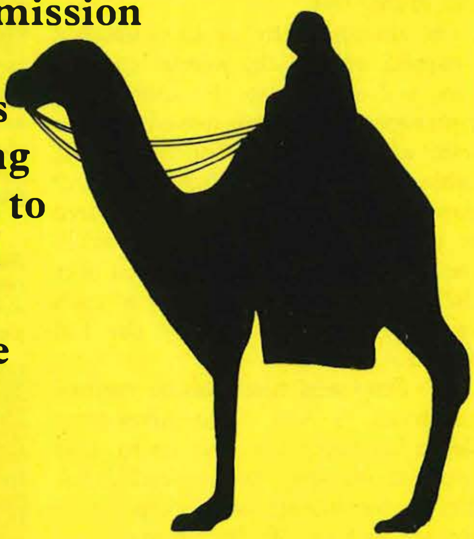
Above: Technician Dave Radford uses a specially designed tool to protect spare outlet ports as he applies heat to fix a multi-entry shrinkdown collar on to a cable.

Below: Dave Cooke, a technician, pours resin into a mould before applying the shrinkdown sleeve between the joint sleeve and the block.

Mr D. Ansell is an executive engineer in the Network Executive's Junction and Operational Planning Division where he is responsible for local line maintenance.

Training for the desert

Development of Telconsult, British Telecom's consultancy service to overseas administrations, has been a major growth area of the Business in recent years. One of the biggest contracts has been to plan, specify and construct an extensive new transmission network in Libya, and this article looks at the special training programme devised to prepare the selected technicians for the overhead open-wire construction work.



DA Phillips

Trainees use a 'wacker drill' to prepare a hole for an explosive charge. After the explosion the hole will be big enough for a pole to be erected.

It was over two years ago when the first approach was made to Telecommunications Personnel Department to provide training for staff going to work in Libya.

The initial request to train 16 men in open-wire construction techniques and 12 men in pole erection methods seemed within the normal compass of Regional Engineering Training Centre (RETC) training courses, even if the scale of the complete project was rather daunting, with a total of 1875 kilometres of open wire route requiring the erection of 27,740 poles. Many thousands of associated spindles, insulators, brackets, not to mention 85,000 felt washers were also needed.

Gradually, however, the picture began to change. The proposed 150 lb cadmium copper open wire became 150 lb hard drawn copper and eventually 200 lb hard drawn copper – a rare commodity these days. Could the pole erection teams be taught manual and pole erection techniques as well as be instructed in the use of explosives for excavating pole holes? Some of the wiring team would need instruction in special jointing techniques while storemen ought to know how to handle explosives.

Supervising officers, of course, would need to know about everything. And to keep everyone on their toes, a 'passing out' exercise consisting of the erection against the clock of two kilometres of properly regulated route with simulated road and power crossings was requested.

It soon became clear that although the necessary training expertise could be assembled by drawing upon staff from several RETCs, none of the RETCs had sufficient ground area to allow the erection of two kilometres of overhead route. An alternative training site, therefore, had to be found. Following a suggestion from the project controller and after various letters, visits and telephone calls, permission was obtained to make use of the Home Office Fire Service Technical College at Moreton-in-Marsh, Gloucestershire for the main training exercise, with access to a local quarry as a suitable site to practice hole blasting.

The Fire Service Technical College (FSTC) is based on a Second World War airfield which incidentally was the original inspiration for the famous BBC programme *Much Binding in the*

Marsh with Kenneth Horne and Richard Murdoch. It is a purpose-built establishment constructed to a high standard and offers training and residential accommodation for 470 trainee fire officers supported by comprehensive sports and recreational facilities. British Telecom was given permission to erect an overhead route around part of the old perimeter track and also given access to an area of semi-waste ground for practices.

Within a couple of months, the general programme had taken shape but a great deal of detailed planning still remained. It was important to assemble the training team selected from three RETCs not only to meet one another but also to discuss and agree the course timetable. This item alone required two full-day meetings. There were also considerable quantities of unusual engineering stores to be obtained at very short notice and at least three pole erection units had to be 'borrowed' together with a four-ton vehicle, a one-ton vehicle and two personnel carriers. Considerable administrative arrangements had to be agreed with the FSTC staff, and last but not least, each student had to be individually advised of the course dates and arrangements.

The task of interviewing the many applicants for the various posts was a long one and it was not until just over a week before the starting date that the list of students was available. Eventually students began converging on Moreton-in-Marsh from as far afield as Bournemouth and Blackburn, Newcastle and Nottingham, and Southampton and Stranraer. At the course assembly, everyone met each other for the first time and was given an outline of what was expected during the two-week course. The students were left in no doubt that it would not be a rest cure!

After welcoming the British Telecom staff and giving them a guided tour of the FSTC, the local liaison officer invited full use to be made of the excellent sports facilities and hoped there might be a team formed to challenge the Service at squash, volley ball, cricket or any other games. Later the British Telecom course director explained the plan for the course, as well as dealing with the inevitable personal queries. Training began in earnest with the unloading of 34 sticky telephone poles, and from that moment every minute was fully utilised in preparing the students for their special duties in Libya.

It was soon apparent from the general willingness and competence of the students that the selection panel had made sound choices. Although 28 trainees on such a course was rather more than ideal they were divided into teams and the timetable was so arranged that while one party was away at the local quarry blasting holes, another was learning a new method of jointing 200 lb hard drawn copper. Careful manipulation by the training staff ensured that every man had adequate opportunity to practice the skills in which he was already experienced, as well as learning new techniques needed to enable him to carry out his duties in Libya.

After eight days of this concentrated activity, the success of the exercise could be judged from the impressive overhead route that had sprung up around the perimeter track. All the poles were vertical, dead in line, wires regulated with geometric precision, special transposition spindles correctly installed and the simulated road and power crossings duly constructed. It really seemed rather a shame that the whole thing had to be dismantled, packed up and taken away. The final activity was an organised 'scavenger hunt' to check that all pole holes had been filled in, turf replaced, no litter left behind and to ensure that the FSTC grounds were as neat and tidy as they were before the course started.

Before the final dispersal, the usual open forum was held when the students were invited to give their views on the course. There appeared to be general satisfaction all round whether the training had been of a refresher nature or something quite new. When the forum was widened, however, questions about 'what happens in Libya?' came thick and fast and Network Executive staff present were able to allay any fears.

Many people both within and outside British Telecom contributed to the success of the venture, but undoubtedly the lion's share of the credit must go to the training team which comprised engineering instructors from Muirhouse, Shirley and Bletchley Park RETCs, ably led by Alistair Kennedy, a lecturer from Muirhouse.

Mr D. A. Phillips is a head of group responsible for training staff from other administrations and is currently based in British Telecom's Vocational Training Division.

British Telecom Journal, Summer 1980

Above: A trainee at Moreton-in-Marsh begins tensioning the 200 pound copper wire used along the test route.

Below: Before any training could get underway 34 telephone poles were delivered to the site for use during the course.

Measuring up for quality

Three years ago, the first measurement and analysis centre (MAC) – computerised equipment for measuring the quality of telephone service and operating as a centralised maintenance aid – was delivered to Guildford Telephone Area. Similar equipment is now being introduced nationwide to benefit all customers.

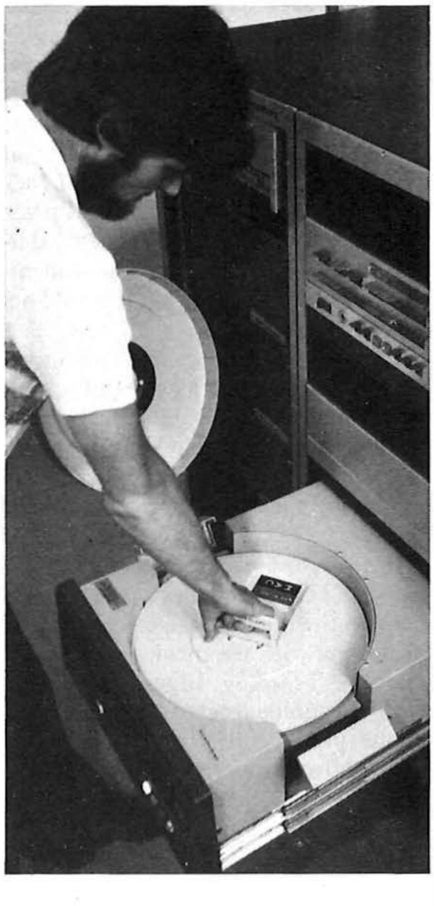
R Clarke

Author Nobby Clarke, assistant executive engineer in charge of the Aldershot MAC centre answers a question about a card on MAC access equipment, the interface between the computer and the equipment under test.

Within 24 hours of its delivery at Aldershot telephone exchange, the first MAC processor was making test calls using prototype exchange access equipment at six Guildford Area exchanges. Three years later, its full potential is still being realised.

MACs are designed to monitor exchange performance and to identify equipment faults as they occur (see *Telecommunications Journal*, Winter

Technical officer Ted Dowson carries out the regular morning exchange of magnetic tape which holds the MAC sequence programs. The changeover is a security measure.



1976/77). At Aldershot, hundreds of individual faults have been found with the aid of MAC analysis sequences, most of them common problems such as broken selector wipers, disconnected cords, electrical high-resistance solder connections and dirty or out-of-adjustment contacts.

But not all the faults have been easy to find. There was, for instance, the case of the TXE2 electronic exchange which was giving customers a high percentage of no dial tone. Extensive investigations revealed two causes – a low output from the associated amplifiers and a permanent wiring reversal into a register.

There was also the rural non-director exchange which had a similar problem. A thorough search revealed that the ringing machine was wrongly connected internally so that it produced pulses all with the same polarity.

But perhaps the strangest case of all was that of the new crossbar exchange which had been connected to MAC before it was brought into service. It promptly failed every metering check. The clerk of works at the exchange found that every ratchet relay had 36 teeth instead of 33. In finding this fault at such an early stage, the contractor was able to effect repairs before the exchange entered service – thus saving British Telecom a great deal of money.

For four weeks after MAC's introduction, THQ carried out tests on both software and hardware. In July 1977, the first of the regular measurement months were started using two sequences on five exchanges. Coded MSS1 and MSS4 – MSS standing for measurement series sequences – the tests looked at 'own exchange' and originating STD traffic. First exchanges to receive attention were a small electronic exchange (TXE2), a crossbar exchange (TXK), two small Strowgers, one trunk portion of a GSC and a large Strowger GSC.

Soon afterwards the prototype exchange access equipment was replaced with a production unit. By now, more exchanges were being connected, although industrial action halted further developments until September 1978. By this time, all the exchange access units had been installed.

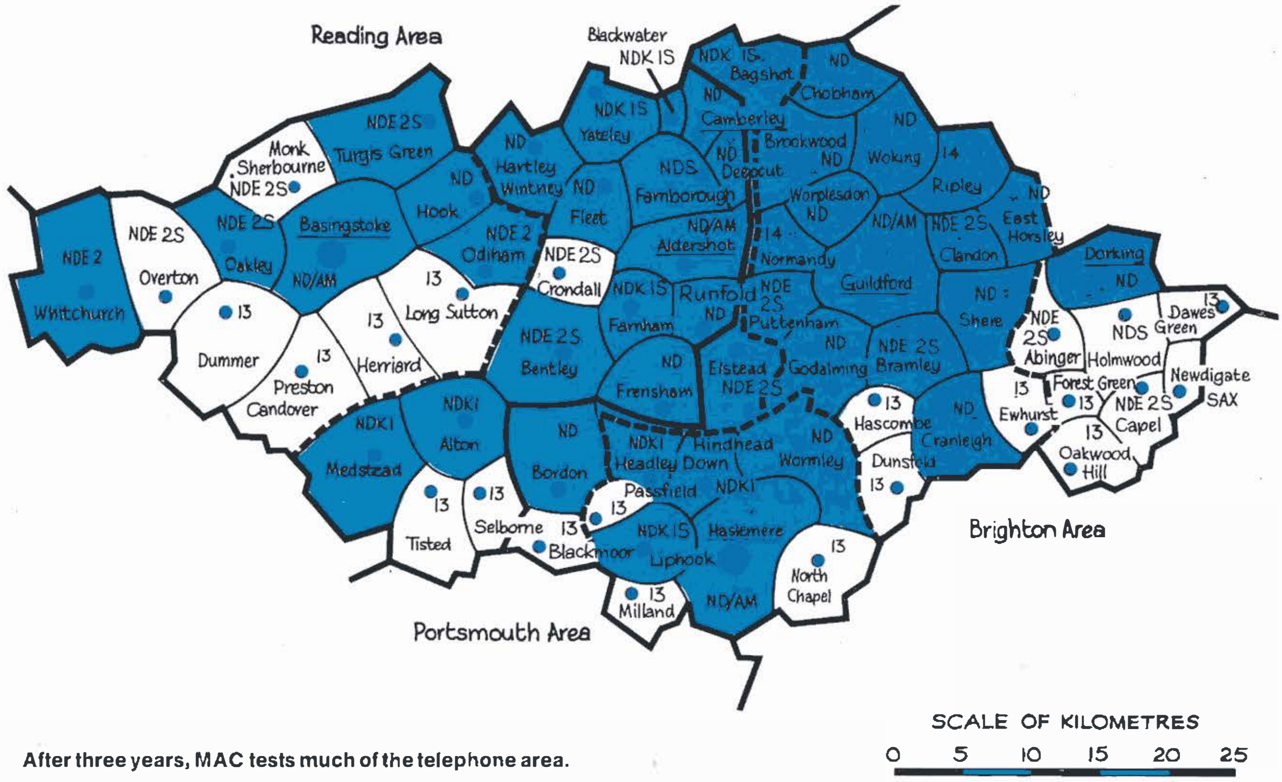
To ensure its smooth introduction, just two test sequences – MSS1 and MSS4 – were adopted. Where a group switching centre (GSC) was connected, a sequence for international calls – MSS6 – was started as soon as the service was made available. When all exchanges in the telephone area had the 'own exchange' sequence running, and had achieved a plant defect failure rate of three per cent or less, a new sequence – for STD terminating traffic – was introduced for the GSCs.

At the same time, another measurement series sequence – MSS2 – was introduced to access local exchanges. A frustration here was finding suitable test numbers at exchanges available at the local charge rate. Probably the most difficult sequence to introduce however, was MSS3 – used for overall STD testing – mainly because of test numbers being unavailable.

Staff at measurement and analysis centres need a broad knowledge of all the locally-used switching systems to ensure that they appreciate how MAC can be used to test specific parts of an exchange or the network. A thorough understanding of transmission theory and practice is also needed, as MAC tests some five per cent of calls for transmission, and at the heart of the system is the processor – its maintenance requiring a knowledge extending from basic Strowger to computers.

But what of the equipment's own ▶

Extent of MAC penetration since its introduction in Guildford Telephone Area



After three years, MAC tests much of the telephone area.

performance? Since being installed, the processor has given more than 22,000 hours service – with just four failures, and more than 1,800,000 calls have passed through the 12 special interfaces (sender/receivers).

As far as MAC software is concerned, the main problem has been the time delay between identifying an error and taking corrective action. The most interesting – and most difficult – to prove was on coin-box timing. The original timings were so tight that the exchange equipment under test – known as coin and fee check – approved by standard test equipment, failed when tested by MAC.

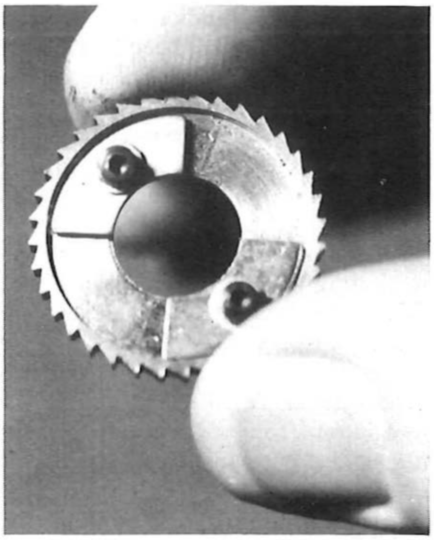
Probably the most useful facility has been the ability to use an analysis series sequence – known as ASS2 – for special measurements and call holding. Capable of working 24 hours a day, completely unattended, this facility is particularly useful for testing common equipment during very low traffic periods. But maintenance staff are not the only ones to reap the benefits of MAC. An example is staff on trunking and grading duties who use figures showing the extent of engaged plant to check traffic records.

The proof of the system however, is in its results, and the figures below show the percentages of plant defects when the system was first introduced and, on the right, after one year of operation. Further improvements are expected as MAC-based management strategy takes effect.

	Year 0 (%)	Year 1 (%)
MSS1 (own exchange test sequence)	1·6	1·0
MSS2 (local dialling area test sequence)	2·7	2·1
MSS3 (overall STD test sequence)	6·4	4·8

Inevitably the Aldershot MAC has attracted many visitors from THQ, South East Telecommunications Region and even engineers from overseas. Local exchange maintenance engineers have from the start been invited to visit the centre and talk with its staff about its purpose and its complex capabilities.

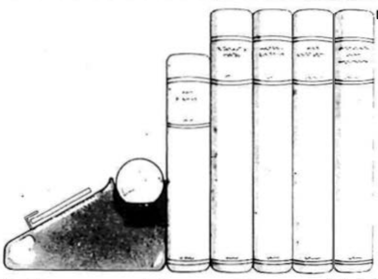
Enthusiasm for MAC continues to grow and after three years of experience the system at Aldershot is still gaining momentum. New ways are still being found of using MAC to help maintenance staff give customers an even better quality of service.



This 36-tooth ratchet is similar to those found by MAC at a new crossbar exchange in the Guildford Area during a metering check. Crossbar exchange ratchet relays should in fact have 33 teeth.

Mr R. Clarke is an assistant executive engineer in Guildford Telephone Area and has been in charge of the MAC centre since its introduction three years ago.

British Telecom Journal, Summer 1980



Bookshelf

The telecommunications function in the British Post Office; a case study of bureaucratic adaptation

by Douglas Pitt. Saxon House, 1980. £9.50.

It is not often that a book is published on the organisation of the Post Office and Mr Pitt's book, coming on the heels of Michael Corby's *The Postal Business* last year, reflects growing interest.

Mr Pitt has written an administrative history that is timely now that the split of the Businesses, a new generation of telecommunications equipment, and changes to the monopoly are at least on the horizon. His central theme is to trace how the Post Office has adapted to its environment, and the perspective he adopts is that of "contingency theory" – the idea that "technology and environment provide constraints within which organisations function".

Mr Pitt identifies several periods in the growth of the organisation. The first is the conservatism of the early 1900s before nationalisation of private companies in 1912, during which "day-to-day disagreements drove out planning". The second period, the 1920s, was marked by growth of Liberal criticism that the Post Office could not be run simply as a Government department, since that type of organisation was not necessarily appropriate.

Only in the third period, in 1932, after great outside pressure, did the Bridgeman Committee ask whether any changes in Post Office organisation would be in the public interest.

The fourth period, in the 1940s and 1950s was quiet in terms of organisational reform. But in the early 1960s, which marked the opening of the present period, the prospect of growing automation led to a revived interest in having an appropriate organisational structure. Once more a critique of the Post Office's bureaucratic structure arose, leading to the calling in of a firm of management consultants in 1965 and expressed in the recommendations of a little Neddy committee on the abandonment of a rigid bureaucratic structure in favour of a functional organisation.

These pressures led the Select Committee on Nationalised Industries in 1966 to approve the establishment of a public corporation by the 1969 Post Office Act, on the argument that traditional Civil Service patterns of organisation were unsuited to the biggest service industry in the country.

Mr Pitt deals only in passing with the Carter recommendations, and there are some limitations in any book that has to rely heavily on library research. It is, however, a useful guide to the history and growth of British telecommunications, especially for those of us who have not lived through or taken part in the historical changes that he describes.

J A Hudson

British Telecom Journal, Summer 1980

Dr Flowers' bouquet

The man who invented Britain's first electronic computer and saw it used during the last war to crack the enemy's secret codes has become the first holder of British Telecom's Martlesham Medal. He is 74-year-old Dr Tommy Flowers who began working for the Post Office in 1926 and whose pioneering work has made him the acknowledged father of electronic switching.

The Martlesham Medal is to be awarded annually by British Telecom to staff past or present, for outstanding achievements in telecommunications, and many eminent scientists, engineers, academics and leading figures from the electronics industry gathered at the Savoy Hotel in London to see Dr Flowers receive his award.

In presenting the award, Post Office Chairman Sir William Barlow said that Dr Flowers was a worthy and distinguished recipient. The Post Office, industry and the country owed much to his skill and vision. The new Martlesham Medal will, in the future, help to recognise other men and women who have contributed to the success of British Telecom.

It is only now being realised the extent to which the Post Office pioneered the development of computers in the UK as part of the massive wartime effort to break enemy codes. And as national security veils lift, the importance of Dr Flowers' work becomes better appreciated.

An executive engineer in the Switching Division of the Research Department, Tommy Flowers was called to the Government's codebreaking headquarters at Bletchley Park, Buckinghamshire, in 1942, and asked to help crack the Nazi five-unit code, known as Enigma.

By the end of 1943, Dr Flowers and his team had designed and produced 'Colossus'. Stretching across seven equipment racks and containing 2,400 valves, Colossus was the first electronic, program-controlled digital computer. The first machine was moved to Bletchley Park from Dollis Hill in January 1944, and by the following month, was ready for service. So successful was Colossus that Dr Flowers and his team were asked to build additional models, and within six months, the fourth had been delivered.

When the war was over, Dr Flowers returned to Post Office research work at Dollis Hill, developing voice-frequency signalling and electronic register-translator techniques which paved the way for trunk telephone automation and subscriber trunk dialling.

Dr Flowers' achievements are all the more remarkable in view of the fact that the transistor had not been invented, and that he had to work with thermionic valves, cold cathode tubes, germanium rectifiers and mercury delay line stores, all highly-advanced technologies for the period. There is, in fact, a link between Dr Flowers early creative work and today's System X exchanges and the coming all-purpose digital telecommunications network on which plans for the 1980s and beyond so depend.

Dr Flowers, whose work has already been recognised by the award of an honorary doctorate of science at Newcastle University, is the first of a long list of distinguished recipients of the Martlesham Award. Whatever the distinction of those who follow, none is likely to have deserved the award more than Tommy Flowers.

British Telecom Journal, Summer 1980

Dr Flowers, the first recipient of the Martlesham Medal, with valves of the type used in his computer invention and a modern microprocessor which can do the work of 25,000 such valves.

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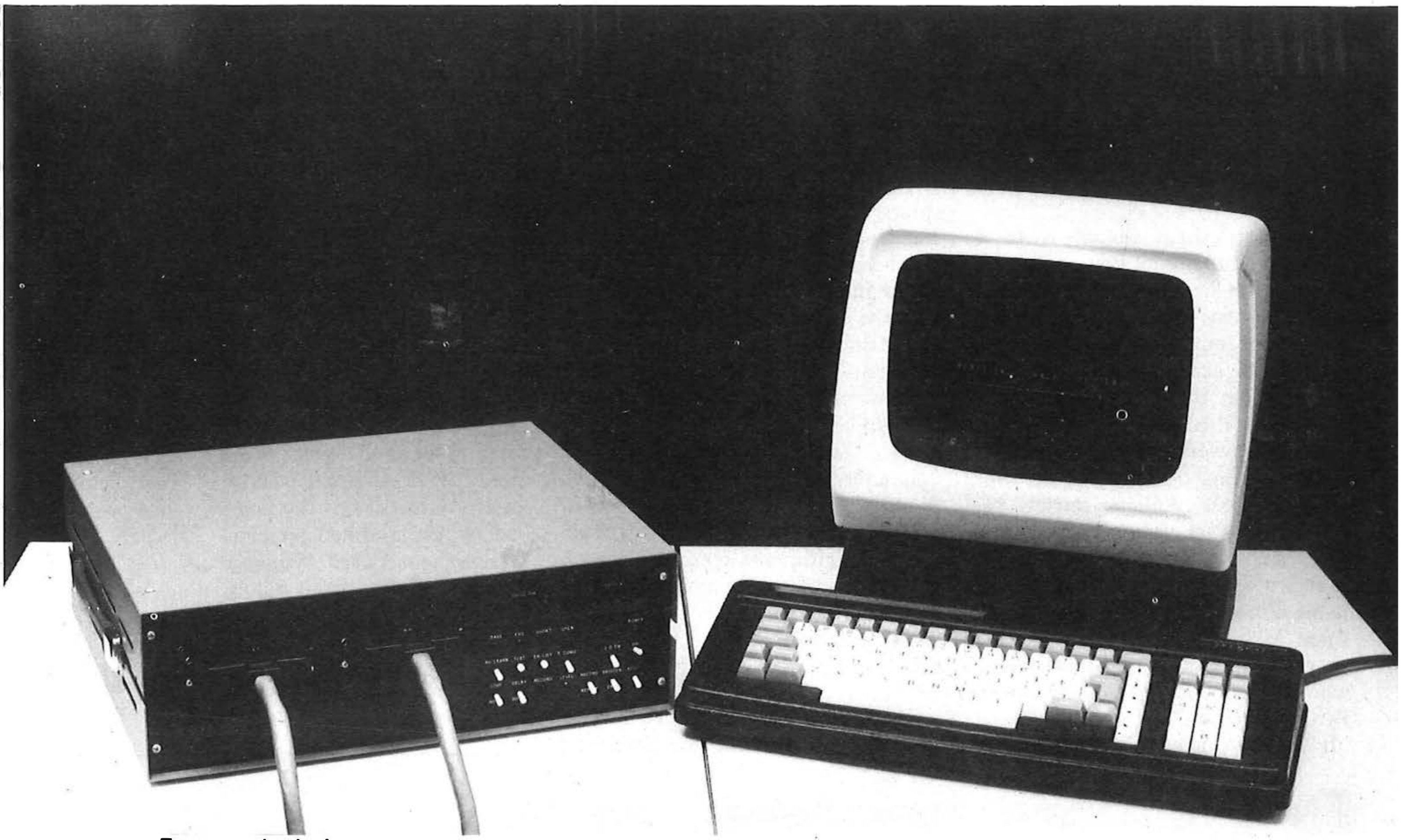

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The customer's view

Exchanges and computer centres throughout the country threw open their doors for two weeks in July in a bid to show customers just what is being done to improve telecommunication services.

Typical of many scenes during Telecom Fortnight, these west London customers take a look at some directory enquiry positions.

'Telecom Fortnight' helped to reinforce British Telecom's recent announcement of an eight-point plan – see page 8 in this issue – which promises improvements and expansion in many areas of telecommunications, an annual investment programme of £1,500 million each year for the next ten years, better value for money and better customer services.

Many exchanges were opened by local dignitaries, and during the two weeks of 'Telecom Fortnight', thousands of visitors were given the opportunity to see equipment floors, switchrooms and many other vital operational areas. In a series of leaflets for visitors, British Telecom explained its plans for the future. A pledge in one of these, given by Managing Director Peter Benton states:

"We are attacking our problems at the roots; we intend to improve service permanently, and we will not be content until Britain has the finest telecommunications service in the world. Much has already been achieved. We are working systematically and with great determination to improve the quality and range of our services fast. There are still deficiencies unresolved, but we have the will and the ability to overcome them".

During the two weeks, customers were also told that:

- Over £70 million is being spent by British Telecom on research and development – with much of it being directed to the digital future.
- More than 20,000 million telephone calls are made every year from more than 26 million telephones throughout the country.
- In the last 12 months, British Telecom has installed two million phones and has led the world in international direct dialling, bringing 420 million telephones in 100 countries within reach of 96 per cent of British Telecom's 17 million customers.
- The standard telephone is to be improved by introducing new components such as electronic microphones with built-in amplifiers. This £50 million programme will, over the next four years, reduce the number of faults reported by customers.
- By 1985, all 77,000 public kiosk coinboxes will have been replaced with the new electronic Blue Payphone.

One of the specially-produced leaflets explained how calls are metered and charged – and how telephone bills are prepared. With over 65 million bills produced every year, the reader is given an insight into the complexities of account preparation.

Computer centres in Cardiff, Derby Leeds and Portsmouth joined the hundreds of exchanges in opening their doors to the public. Each provides computer services for British Telecom and all are heavily committed to the production of telephone bills, payslips for staff and information for telephone directory entries. Derby is also helping in the development of System X, making its three ICL 2960 computers available to software engineers from GEC, Plessey and STC – British Telecom's industrial partners. Cardiff computer centre also looks after the financial accounting for the UK's international telegram service, while Leeds has a system called Number Information Service which provides information for alphabetical and yellow page directories as well as the special records used by directory enquiry operators.

Informing the customer – some of the material available.

MISCELLANY

Major new cable

British Telecom is to invest more than £5 million as its share of an international project to improve international telephone links to West Africa and South America.

The scheme involves an undersea cable to be called Atlantis planned to be in service by mid-1982. It will connect three continents: Europe (from Portugal), West Africa (from Senegal) and South America (from Brazil) and the £103 million project will increase capacity for calls and cut waiting.

The southern link from Senegal to Brazil has a length of 1,850 nautical miles on a 14 MHz cable with a capacity of 1,380 circuits and the northern link from Portugal to Senegal is 1,580 nautical miles long using an S25 cable with a capacity of 2,580 circuits.

This is the first time a cable has linked three continents and the 10 countries involved are Argentina, Brazil, the Federal Republic of Germany, France, Italy, Ivory Coast, Portugal, Senegal, Switzerland and the United Kingdom.

Calling all ships

Global radio cover, which will enable ships anywhere in the world to contact the mainland, becomes possible through a new arrangement made by British Telecom with the Japanese telephone authority.

The arrangement expands the Marisat system which provides communications with ships through satellites. It means that telephone and telex users in the UK will now be able to reach ships in the Indian Ocean via a Japanese satellite earth station southwest of Hiroshima.

Marisat satellites already provide links with vessels in the Atlantic and Pacific but the new arrangement completes global coverage via satellite with ships around the world.

Contacting ships by satellite is faster and more reliable than using radiotelephone. Calls are free from the fading and distortion which can affect other forms of long range maritime communication.

Price rises sought

A rise in British Telecom prices is being sought from 1 November as a result of the rate of inflation, recent pay settlements and the Government's requirement that public sector borrowing should be limited to figures set last year. This has restricted the amount of capital which British Telecom may borrow to finance the improvement and expansion of the services it provides.

The price proposals include an increase in the telephone call unit fee with reduced time in the inland cheap rate period and rental increases to £16.75 per quarter for a business line and £12 per quarter for a residential line. The maximum connection charge for new lines is to be £75 for business and £65 for residential.

Announcing the proposals, British Telecom Managing Director Peter Benton emphasised that the modernisation and expansion programme of £1500 million in 1980/81 had been formally approved by Government last December.

System X at Rio

System X has made its first appearance south of the equator this year at a major international exhibition in Brazil. A working system took pride of place at Intelcom 80 in Rio de Janeiro early this summer.

The UK's pavilion was a government backed venture in which British Telecom and BTS – British Telecommunications Systems Ltd. – joined with 10 other electronics firms in a major bid to secure more export business for Britain in Latin America.

Chips in Britain

Some of the world's most advanced silicon microchip technology is to be made in Britain and supplied to British Telecom and industry design teams under two agreements reached in London with the Canadian based Mitel Corporation.

Under an agreement with British Telecom a pilot plant using this semiconductor technology – known as ISO-CMOS – will be set up at British Telecom's Research Centre at Martlesham where a new microchip production unit was recently opened by Mr John Alvey, British Telecom's Senior Director for Technology.

This unit will enable British Telecom to acquire expertise in ISO-CMOS technology which can be passed on to British Industry. It will make prototype ISO-CMOS integrated circuits and, under the agreement, the Research Centre will collaborate with Mitel in development of the technology which has considerable potential for further evolution.

AHOY! IT'S BUZBY

First there was the Buzby train, then the Buzby balloon and now the Buzby Barge has taken to the water to help float the British Telecom message along the South Coast.

Launched by South Eastern Region, the barge – almost unchanged since she was built in 1891 – carried an exhibition of all the latest Telecom equipment from Portsmouth round to the Medway.

Invited businessmen and members of the public were able to try out the equipment at all 10 ports of call and the unusual surroundings added much interest.

The display, with Buzby at the masthead, was built by a special team of Portsmouth telephone engineers. Our picture shows the barge at Portsmouth with local general manager Basil Williams and sales clerical officers Jackie Johnson and Justeen White.

Largest private network

A new telecommunications network believed to be the largest private network in Europe has been inaugurated by Grand Metropolitan Chairman, Maxwell Joseph. Also at the ceremony was Dr Alex Reid, Director of Business Systems, British Telecom who spoke of the co-operation between British Telecom and Grand Metropolitan staff in building the network.

Century for IDD

Brunei, a sultanate on the northern coast of Borneo has become the 100th country to which telephone users in Britain can dial direct. The addition of Brunei to the International Direct Dialling (IDD) network is a landmark in British Telecom's programme to establish direct dialling links with countries round the world.

Martlesham open week

About 20 exhibits covering British Telecom's main areas of research and development will be on show during open week, September 22–27 at the Martlesham Research Centre.

The exhibits will also illustrate British Telecom's major involvement in the larger national effort aimed at ensuring a first class telecommunications system for the UK and providing a range of products which British industry can sell abroad.

New chairman of British Telecom is to be Mr George Jefferson, a British Aerospace board member and chairman and chief executive of its dynamics group.

An honours engineering graduate, Mr Jefferson (59) becomes a deputy chairman of the Post Office on 1 September. Pending the formal separation of posts and telecommunications, Mr Jefferson's appointment is as Chairman Designate of British Telecommunications. Mr Jefferson has directorships of overseas companies associated with British Aerospace, is a National Enterprise Board member and is also on the National Defence Industries Council. He is also a member of council of the Society of British Aerospace Companies.

The holder of a Fellowship of Engineering, Mr Jefferson is also a Fellow of the City and Guilds Institution, the Royal Aeronautical Society, the British Institute of Management and the Royal Society of Arts. He is a member of the Institution of Mechanical Engineers.

Prestel's export success

Austria has become the fifth country to buy the technology of British Telecom's Prestel system, the world's first public viewdata service. This latest export success was sealed when contracts were signed in Edinburgh.

The contract with Austria is for the sale of the programs, or instructions which control the operation of the computer on which the wide range of information is stored.

Certain uncertainty

The increasingly complex problems facing telecommunications planners was the subject of a talk given by Mr John Harper, Deputy Managing Director (Operations), British Telecom, at Fontainebleau in June.

Entitled "Certain uncertainty", Mr Harper's theme traced the background to planning in British Telecom with references to the one year, five year and 10 year planning documents. He stressed the importance of securing the right sort of inputs but emphasised that at no time should sight be lost of the outputs – the results as far as customers were concerned.

Mr Harper also pointed out the difficulties of coping with the new, unprecedented demands for telecommunications services on a network parts of which were literally wearing out.

Then there was the technology which was presenting an explosion of possibilities and it was the lot of the planner to choose from among them. Very important too was the element of competition now being introduced and how best to deal with it.

Finally, Mr Harper underlined the need for ordered plans which took account of uncertainty and all its implications. It had to be assumed that forecasts would be wrong and that there was sufficient flexibility to enable adjustments to be made quickly.

New gold standard

By halving the thickness of gold plating on electronic equipment contacts, British Telecom expects to save about £2 million a year once its new gold standard is implemented.

Gold plating has been used by British Telecom since the early 1960s to ensure reliable electrical connection for push-in printed circuit boards (PCBs). The gold is applied to the contact pads which run down the back edge of the board to make electrical connections with other equipment when the board is pushed home into its socket.

The cuts in the use of gold – to be introduced on boards ordered after 1 October – follow four years of exhaustive tests which showed conclusively that as a result of improvements in plating quality, the thinner film would still be able to protect the underlying metal surface from corrosion.

Contract

Marconi Communication Systems Ltd – £5 million worth of pulse code modulation equipment. The order is the largest ever placed for this equipment by British Telecom and means that nearly 4,000 systems have been ordered from Marconi since British Telecom began large scale installation of digital systems as part of the drive towards the provision of a fully integrated digital network in the UK.

Channel Islands link

Contracts have been signed for a new £8 million submarine cable which will double the number of telephone links to the Channel Islands.

Using the latest technology, the new system will also give improved security to cross-channel communications. The cost will be shared between British Telecom and the Telecommunications Boards of Jersey and Guernsey. There are three existing cables between Britain and the Channel Islands with total capacity of nearly 2,000 circuits.

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The Editorial Board will be glad to consider articles of general interest in the telecommunications field from all sources. No guarantee of publication can be given. The ideal length of such articles is between 1,000 and 1,500 words. The views of contributors are not necessarily those of the Board.

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23 Howland St., London W1P 6HQ.
Telephone: 01-631 2192 (editorial) 2193 (sales).

Publication:
The Journal is published in February, May, August and November.

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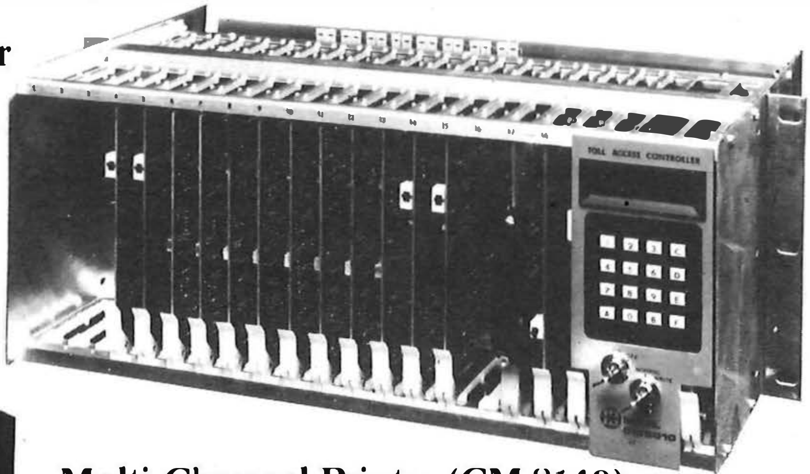

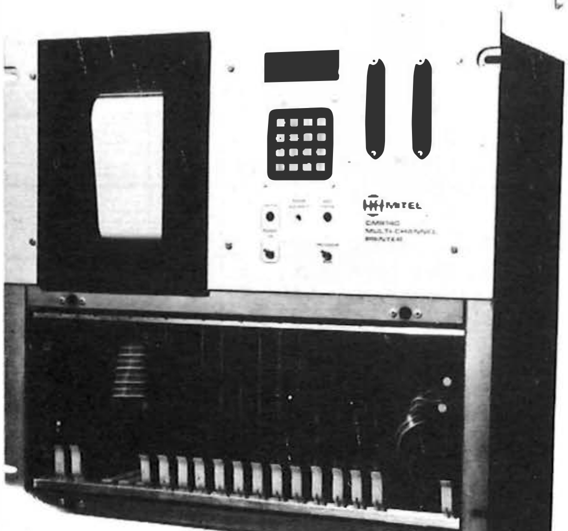

Multi-Channel Printer (CM 8140) *left*

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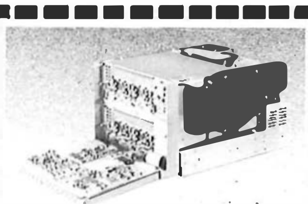

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